Adventures in Environmental Design. Memoir of Jon Charles Coe

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CHAPTER ONE - INTRODUCTION

This is a story about innovative service to people, places, and nature through physical, intellectual and emotional journeys, with lessons learned along the way. As an environmental designer and landscape architect, I strive to create connections and possibilities, insights, and empowerment, in small ways creating a better future for my clients and myself. This story is directed toward those also aspiring to create a better future by design, students or career changers in formal design professions or independent searchers, and those seeking such services.

> *"Standard approaches are not working. All professions are specializing and losing touch with reality. Become a generalist, think holistically, invent a new approach. Don't ask for permission, just do it."*[1] Grant R. Jones

Why is innovation important? Stasis brings rigidity. Static professional fields and cultures tend toward regulated conformity, meaningless novelty, and obsolescence. Our rapidly changing technologies, societies and climate bring peril and opportunity, especially to underserved people, places and nature threatened by over-consumption, unsustainable development, mass migration and resulting conflict. Insightful, resilient pioneers emerge during times of challenge and change and, if guided by ethics, ecology and respect, can empower beneficiaries, while earning personal satisfaction.

As a student of landscape architecture in the 1960's, I witnessed my profession emerging beyond park and estate garden design revolutionized by Fredric Law Olmsted during a time of great change and chance a century earlier. Exploiting opportunities in emerging fields, landscape architects revolutionized remote sensing, ecologically based regional and watershed planning and wildlife corridors, visual resource management, and wellness gardens, as a few examples. When I began studies in zoo design soon after, the field was controlled by popular zoo personalities directing non-specialist architects and engineers. Zoos were judged on collection size rather than animal wellbeing. Today, thanks to the efforts of myself and my colleagues described in Chapter Seven, this design field is largely led by landscape architects and joint landscape and architectural practices, with wildlife research and zoo biology advisors, at least in North America. Today, animal well-being has become the dominant concern in the best zoos globally.

Results are more important than credentials in changing fields. My entry into publishing in scientific journals without any scientific background was possible because the field of zoo biology was new and expanding. Innovations I helped to develop in housing for elderly, disabled and poor economic migrants in Canada, Brazil, and subsistence

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[1] Jones, Grant R. VOICES of the EARTH, Talking with Rivers, Mountains and Animals. Listening to Trees and Each Other. An Autobiographical Narrative with Stories, Poems and Drawings. Design Primer from an American Landscape Architect. Page 261. In press.

2. Ibid

farmers in Afghan mountain villages, were made possible by working in under-regulated fields. If, like me, you are drawn to global transformative innovation, read on.

Looking back over a long active career, I can see several useful patterns. For one, I have always wanted to be different. Many understandably seek safety and comfort in professional and social communities by fitting in. My urge, perhaps originating in family history as edge people, was to rebel against conformity in thought and fashion and especially to avoid being forced into standard norms. I resisted being boxed in by limiting descriptions, restrictions, predictions and expectations. From this evolved my guiding admonition: *"Build bridges and not boxes!"*

Bridges are portals to other worlds and views, dangers and delights. Lately I have expanded this bridge building metaphor to think of bridges as means to "connect the dots" and discover unique insights. They are pathways to collaborative opportunities and hybrid ideas between and among siloed tribes and cultures. They are passages and journeys. Travel, especially international travel, can be seen as both a bridge to and passage between and among different geographies, landscapes, languages, cultures. One meets amazing individuals and landscapes. When seen from below, bridges form portals for boats, trains, roads and thoughts, perhaps a means to escape polarized choices by opening an unseen third journey.



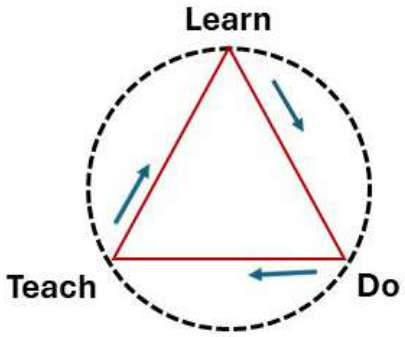
During one of my visits to China I had a chop (a carved stamp used as a signature) made from my name. The artist listened to my name, "Coe Jon," surname first in the Asian manner, and translated the sounds as he heard them to "Ko Qian En." These words, he said, were like the Mandarin words for "bridge" and "portal." Perhaps one way my story can be told is as a series of journeys over many bridges and through many portals and passages, exploring the science and art of environmental design. Perhaps this tale will encourage others to bridge barriers, find fruitful passages and improve the future.

Another characteristic I have found in myself is a level of perfectionism, resulting in the self-admonition: *"Exceed expectations!"* When I exceed my own expected resources in energy, time, knowledge or skill, perhaps working all night in the "zone" or the "flow", I will likely exceed the client's expectations as well. This results in personal satisfaction, no matter what the final project outcome. Several of the project experiences I will describe exemplify this and if you find this characteristic congenial, read on.

Empathy, an emotional sensation, is an important motivator and focuser, helping one to see and connect. It leads to a fourth personal characteristic I learned from my father, the outward manifestation of empathy, which is respect. Respect for beauty, utility and resilience. Respect for authentic, knowledgeable, and wise people, for their intellectual and emotional depth, whatever their station. Respect for plants, animals, geology, geography, climate and their networked interactions we call nature. Respect for ancient cultures and climate-grounded vernaculars supported by useful innovation. Respect for the numinous and transcendent and respect for fragility. Good ideas and inspiration are

often found in unexpected places, when we listen and see. Later I will relate examples of unassuming yet extraordinary people and places. May such a path interest you? Read on.

On a practice level my professional mission evolved to become *"collaboration in the design of sustainable and delightful habitats for people, plants, and animals."* Learning landscape architecture and environmental planning, both at university and in early practice, was basecamp for skills development and vision enlargement. There I learned from inspiring specialists in art, design, illustration, communication, horticulture, soils, entomology, site engineering, architecture, ecology, geography, and psychology to name interrelated fields. I also challenged elitist demagogy. On my outward passage I became both specialist and generalist. Work ranged from detailed writing and illustration for zoological and botanical garden interpretative signs to innovating animal and botanical habitats and management systems, to planning communities and city, regional and national parks. My fascination with vernacular and ecological diversity resulted in journeys of discovery and service in forty-five countries, with active projects in fifteen on six continents, and residence in five nations. Experiences gained through this diversity of subjects and places strengthened my ability to recognize patterns of convergence and symbiosis; to envision and form bridges to opportunities hidden to others, to innovate.



In about 2016, I was collaborating with long-time friend and then client Mr. Andrew Scanlon, then head of the United Nations Environment Programme in Afghanistan. Andrew is a deep thinker, interested in the ethos and philosophy of work and service from an ecological perspective. One observation we developed was the idea of life as a virtuous cycle of **learning**, **doing**, **teaching and repeat.** I diagrammed this as an equilateral triangle within a circle with the learning-doing-teaching represented by the points of the triangle and the repeating of these stages, the cycles through the three stages, represented by the circle. But since these cycles occur through the fourth dimension of time, a spiral would be a better representation, although more difficult to diagram. This is still a great oversimplification. **Learning**, reading a book, going to a lecture or into the field or traveling to unfamiliar places are also forms of doing. **Doing** is a form of learning framed by the saying "learn by doing." **Teachers** are continuously learning how and what to teach. So, at one scale learning-doing-teaching can blend simultaneously. On an intermediate scale, a design or planning project involves **learning** about the project site, its opportunities and constraints, the client's and other stakeholders' needs, ambitions, and resources and about the philosophies, arts, and technologies available to advance the clients' vision and satisfaction. **Doing** is represented by the undertaking of the design, construction, and commissioning processes. **Teaching** can be represented by reporting and publishing findings and lessons learned.

This memoir follows this general formula although each life stage also contains this cycle. For example, as a student I was keen to both learn and help other students learn. While the chronology of events and experiences described is important in describing a life's work, it is secondary to the context, subject areas and values of the events described. Organizing my tale by subject areas allows readers the choice of following the tale as presented or selectively engaging in subjects of greatest value or interest to them.

- **Chapter two - Foundations and Formative Years**, recalls early life-shaping experiences.
- **Chapter Three - Learning from and with people** describes my university student experiences and later, my experiences as a professor and faculty member.
- **Chapter Four - Learning from the land**, chronicles international travel, both for research and for pleasure, which greatly informed my work.
- **Chapter Five – Designing for people,** is about national and international work where both landscape and culture are essential features.
- **Chapter Six – Designing for the land,** chronicles international work planning and protecting natural areas including national parks.
- **Chapter Seven – Designing with People, Plants and Animals,** recalls experiences designing zoos and botanical gardens in seven countries.
- **Chapter Eight – Planning and design with land, people and culture** includes some previous themes, but focuses on the profound influence of unique landscapes, cultures and colleagues.
- **Chapter Nine Learning with Family and Colleagues** includes homelife adventures with frequent moving and resettlement in four countries and the colleagues, challenges and delights of life in professional design offices and on the road.
- **Chapter Ten - Lessons Learned**, shares what I've come to find important and rewarding.
- **Appendices** include a listing of publications, lectures, honors and awards and a chronological outline of subjects.

My body of work includes well over one hundred-sixty planning and design projects completed for nearly one hundred different clients and traveling in forty-five countries on six continents. I have selected those that in my opinion are most innovative, interesting, informative, and rewarding. If friends and colleagues do not find projects they had a hand in, I apologize. I also describe selected travel experiences and adventures, included because of the inter-applicability of travel (learning) and practice (doing and teaching).

Now, in my fourth year, I still study, observe, learn and do, providing pro bono services to worthy undertakings. My emphasis now is teaching through writing, lecturing and

informal mentoring – sharing ideas, insights and experiences. Developing this book is an extension of this work.

Who will read this narration? My work is best known in the specialized field of zoo design. I have collaborated on award-winning zoo projects and frequently receive queries from students seeking entry into this specialized field. I am also contacted by journalists seeking a deeper understanding of events and trends in zoo practice. I have a smaller academic following from my publications on zoo design, animal welfare theory and practice. I have done much broader work, if less well known, as this journal describes. My journey began with the profession of landscape architecture. Other careers may better suit readers, proceeding where passion, need and opportunity lead. Perhaps a global audience of generalist environmental architects, landscape architects, engineers, and planners, as well as those teaching and seeking such services will find value here.

CHAPTER TWO - FOUNDATIONS & FORMATIVE YEARS.

Introduction. Each of our journeys began with our unique genetic and cultural inheritance shaped and founded by early years of learning from family, friends, educators and environments. Recalling my early experiences reveals likely connection to later pathways taken and avoided.

Who are the Coes? I have always thought of our mob as “edge people”, avoiding the mainstream in everything, always on the move, active and creative. None of my ancestors, going back generations, worked for government (except during wartime and in the US Peace Corps) or large corporations. My paternal ancestors were not stay-at-homes, migrating across the USA in three generations.



Figure 1. Left: my father, Francis M. Coe, in his native habitat, an orchard, about 1984, age 83 years. Right: I am chatting with one of my king parrot neighbors and walking the dogs at the same age.

My father, **Francis Morse Coe** (1901-1986) was born in Bakersfield CA. His father, Edwin Morse Coe, born in Riverside Iowa, moved with his family to California where he married my grandmother, Julia Potts, who had traveled to southern Californian from Texas by horse and carriage. Edwin moved the family to the Isle of Pines, on the southern side of Cuba. Julia Potts Coe returned with her children to California. Edwin Morse Coe went on to marry again twice, siring a total of fourteen children and dying at age 96 in Miami Florida in 1962.

My mother, Edith Martin Coe (1896-1975), born in Fairmont NB, came from a traditional family. She once described her father, Melville E. Martin as ‘a short bald man’ and a community leader. Edith was a public health nurse with the University of Nebraska, teaching home hygiene to farm wives. They met while my father was studying for his master’s degree in horticulture. This was not a good match. Edith sought a conservative, predictable family life as the wife of a respected university professor. Francis lived an unsettled life, moved from place to place like his mother, with what I call the Coe restlessness. Edith sought seclusion. Francis was the life of the party, enjoying singing and dancing. Edith was self-conscious and camera shy, so sadly I have no photos of her. She never learned to drive and thus was isolated at home. Politically

conservative, Edith never forgave Francis for voting for President Franklin Roosevelt and the New Deal during the great depression. We were fortunate children to have both parents, born in 1896 and 1901, with university education. We took our studies seriously and learned to love learning for its own sake. Both parents were deeply religious, gentle, loving, and respectful to others. I am sure I inherited or learned my deep respect and intuitive empathy from my father. He treated everyone respectfully, whether a simple immigrant gardener or the university president. His empathy gave the appearance of a softhearted do-gooder, as likely to give food to the poor as to provide it for the family table. Dad taught more by example than precept and never missed an opportunity to teach me plant Latin names and their uses. He also taught me mistakes to avoid by experiencing his own failings. Living in poverty early in his life gave him a false sense of economy. He believed cheaper food prices were always better, even when the nutritional value was lower. He would bring home a package of chicken backs that were on sale, even though there was little meat on them. Or he would come from the store with a lug box of grapes on sale because they had fallen off the stems and would spoil before we could consume them. Dad was always late. As a result, I am paranoid about being punctual and I arrive at appointments or airports far earlier than needed. These are small matters compared to the life lessons of doing hard work as its own reward, doing good work whether noticed or not and having the courage to explore novel landscapes, cultures and concepts.

I am one of six children. My siblings were David Martin Coe (1927-2007), Emily Ann Diggles (1928-2022), Phillip Hargrave Coe (1928-2003), Paul Francis Coe (1932-2013), and fraternal twin James Robert Coe (1941-2024). We all lived restless, creative edge lives, moving often. Of the six of us, three had long-term marriages, three were or are artistic, four could be considered religious searchers, and four were avid gardeners.

My early story.

Born in mountain foothills in 1941. My fraternal twin brother James Robert Coe and I were born at the base of the Wasatch Mountains in Logan Utah, USA where Jim and I lived our first four years. I have always had a fondness for foothills and mountain landscapes, and I live in a beautiful foothill landscape today. Father taught in the Horticulture Department at Utah State University, and later I also became a horticulturalist and university professor.

Our siblings were more than nine years older than Jim and me, and my mother was forty-five years old when we were born. We were her second family. My earliest memories are of our shaggy sheep dog “Snubs” and picking strawberries with the family on a brisk morning from one of the University’s agricultural test fields. University faculty families prospered during the Great Depression and World War Two, being able to feed themselves from test fields and research livestock. Our hands were working in productive soil from an early age, something I find sustaining to this day.

Southern California 1946. At the end of World War II, my father took a leave of absence from Utah State University to teach at the Berlitz University in France. This program provided vocational education to American soldiers serving in Europe. Francis drove the family from Logan Utah to San Bernardino Southern California in a model A Ford (or other incredibly old car) on mountain roads to leave the family with his mother Julia Potts Coe. My grandmother, 'Ma Jewel" as she was called, loved playing her large piano and singing.

Berlin Germany 1946-1949. After a year, the Berlitz teaching program closed, and Francis transferred to a program in Berlin. In December 1946 my mother, sister Emily and brothers Philip, Paul, James, and I travelled to Berlin Germany. We crossed the US for several days by train. We then took a harrowing fourteen day crossing of the stormy North Atlantic on the USS General Patch, an old, repurposed hospital ship. Jim and I travelled in a boy's ward sleeping in three-level bunk beds with many other boys. I only recall the excitement of adventure despite being a six-year-old sleeping away from my family for the first time and being surrounded by strangers. Our ward was on the main deck. One night a powerful North Atlantic storm blew the cabin door open, and a wave crashed through our ward, washing all the suitcases stowed under the bunks around the room as the ship tilted and swayed widely. Fortunately, I was on a top bunk.

We arrived in Bremerhaven. Taking a train through the Russian Sector of Cold War occupied Germany with windows blacked out, we finally arrived in Berlin, joining our father just before Christmas. We lived in a stately home confiscated by the US Army from its Nazi owner, the local mayor, Herr Trokstorff, on stylish Vogelgesangstraße (Birds Song Street) in the suburb of Zehlendorf West. I had never seen such a large house nor such luxurious carved wood panelling, mantles and stair rails, and large oil paintings. The city was in ruins from firebombing. Streets were halfway blocked by fallen bricks being collected into piles by women bundled against the cold, surrounded by multistorey charred building walls. We soon moved to a more modest home near our English-speaking school for dependents of American service personnel. My sister Emily, then a young adult, returned to the US. My older brothers entered high school. Jim and I entered first grade. During summers, our older brothers took us on adventures boating on Wannsee Lake and exploring burned-out bunkers in Grunewald Forest. We even visited what remained of the famous Berlin Zoo, watching a zookeeper feeding a valuable loaf of bread to a hungry hippo, my first zoo experience. During this time, my father Francis was providing vocational horticultural and basic literacy training for American servicemen stationed in Berlin, helping them prepare for careers after leaving the army.

We stayed in Berlin as a family during the **Berlin Airlift,** 24 June 1948 –12 May 1949. All the city's western sector needs, from coal to food, were transported by air by the US military. We went to Tempelhof Airport to watch the DC3s come in like an aerial conveyor belt, landing directly behind speeding yellow jeeps with large "Follow Me" signs leading to off-loading ramps. Power outages were random and frequent. These

were extremely difficult times for Berlin people, but in our safe, warm, and comfortable home we entertained ourselves in the dark by placing a flashlight behind our fish tank and watching the large projected images of fish moving on the opposite wall.

As a youngster I picked up German language more easily than adults and became my mother's translator. While my skill in German has long vanished, I was able to understand some spoken German during a visit sixty years later. I believe this early encounter with a different language later predisposed me to pick up Spanish and Portuguese more easily as an adult.

My mother met the wife of General Lucius D. Clay. He was post-World War II Military Governor of Germany who organized the Berlin airlift and had his headquarters there. At his wife's invitation Jim and I, dressed in Halloween costumes, went trick-or-treating with mother past the US Army MP gate guards to receive treats from General Clay and his wife at their official residence.

Near the end of our third year with winter approaching my older brother drove us through Checkpoint Charley into the Russian Zone of East Berlin. This was long before the Berlin Wall was built and the border was more relaxed, but it was a daring adventure. We returned with warm new camel hair coats at an exceptionally low price.

Return to USA 1949-1952. In 1949 my mother, brothers and I returned to the US. This return crossing of the Atlantic took only ten days in a more comfortable ship on smoother seas. I was bunked with my brothers Jim, Paul, and Phil. After a two-week quarantine at Ft. Hamilton in New York City, we flew across the US to return to Southern California. This was my first flight; It took three stops as jet airliners had not yet been introduced. Old propeller powered airlines flew at lower, more turbulent altitudes. My brother Jim and I were air sick for the entire time. We eventually settled in rural Newhall, north of Los Angeles on the edge of the Mojave Desert. Francis continued living in Germany, working in the export-import business to make ends meet. These were trying times for our family, as the monthly support checks from Francis became decreasingly frequent. Mother had to apply to charity for support. Brothers Phillip, joined the Army and Paul joined the Navy during the Korean War, sending their paychecks home to support us. Elder brother David moved in with us for a while, adding his oil field worker income. I remember my mother occasionally went without her meal to ensure Jim and I had enough to eat. Once we had potatoes, cooked in a variety of ways, but little else, for four days until father's check arrived.

As an active nine-to-eleven-year-old, life in the desert provided abundant opportunities for outdoor exploration and adventure, often barefoot and wearing nothing but shorts. Summer days often reach 44-50C (114-120 F). Summer mornings I walked bare footed to the local library, lying on the cool linoleum floor in the stacks looking at black and white photos from around the world in National Geographic magazines. I wonder if this was the start of my worldwide travel later in life. At one pm the local swimming pool opened, and I would play and swim there until it closed at 5pm and the day began to

cool. We slept under the stars all summer long, learning the constellations and celebrating meteor displays.

I also became a Boy Scout camping overnight in the desert, digging a deep hole in the sand of a dry streambed which would be half-filled with ground water in the morning. I earned a merit badge by tracking a bobcat up the dry wash for a half mile.

“Imagination is the gift of dyslexia” (Orlando Bloom). While I thrived in nature. I struggled in school. Being raised in a well-educated family with older siblings, I had an advanced vocabulary, understanding of geography, and artistic learnings, but could not spell and was late in learning to read. I dreaded the humiliation of spelling bees! I could later attest to never passing a spelling or math test through high school and community college. While dyslexia was discovered in 1877, it was unknown in any schools I attended during the 1950’s.

During this Newhall period without my father’s presence, my oldest brother David was an important influence, teaching me to use power tools for woodworking, building and flying model airplanes and kites. I recall, at the age of ten years, working all night building a model airplane, looking up in surprise to see the dawn outside. I discovered ‘being in the zone’ or ‘the flow.’ Time became meaningless. David also introduced Jim and me to science fiction. This stimulated my interest in both reading and future thinking.

Dad returns and high school days 1952-1959. When Francis re-joined the family in 1952, Dad, Edith, Jim, and I moved to a trailer park for a year in the eastern suburbs of Los Angeles near the college town of Claremont, with its top-level school system. Here I began seventh grade and soon found I was failing in three subjects. I was bounced between college preparatory classes and remedial classes. My apparent intelligence and vocabulary did not fit classes for slow learners, but my failures in spelling and arithmetic disqualified me from regular classes. I did not fit their prescribed educational boxes. Perhaps this experience set me on a path of non-traditional learning and professional work.

We then purchased a house across the San Bernardino County line in the town of Montclair, and I transferred to Vina Danks Junior High School in the city of Onterio. The contrast to Claremont High School could not have been greater. Here there were youth gangs and insubordinate students who dominated some teachers. In response school discipline was strict. Racist faculty and our school bus driver assumed I was Jewish (although I was not) and singled me out for harsh treatment. In a shop class I received the teacher’s permission to grind down a steel file to make a hunting knife blade. Soon other students were also making knives and throwing them into walls.

Our home was in a rapidly growing “Chicano” (Mexican American) neighborhood. I fit in well enough with my Spanish speaking school mates, treating everyone respectfully and forming friendships with some, but fights between White and Chicano students were a frequent occurrence at school.

In 1955, after one year, Jim and I were able to transfer to the new Upland High School, with new facilities and more motivated faculty. While occasional student fights remained, I became involved in seasonal school athletic programs, especially American football. Teams included both groups, creating personal bonds. I took two years of Latin with a focus on grammar and barely passed. I followed this with two years of Spanish, with a focus on verbal communication. I thrived. Spelling in Spanish is very regular and speaking fluency, within a Spanish speaking student community, was both fun and practical. I did well in geometry, which is visual, but poorly in algebra because I frequently transposed numbers in calculations. I understood the principles but got the wrong answers. Our annual academic achievement tests showed typical dyslexic scores, excellent in subjects like geography and civics and poor in math and spelling. During my four years of high school only one teacher asked me why my scores varied so widely. Dyslexic minds were unknown and thus unsupported. Dyslexic strengths and perfectionism with engineering drawing and art laid foundations for major skills later. I also enjoyed a variety of shop classes in wood and sheet metal working in which I excelled. I was a visual and tactile learner, although these educational classifications were not yet used.

While in junior and senior high school, I helped my father doing commercial garden maintenance and fruit tree pruning on weekends and holidays. For one summer I worked for the Ralph W. Smith Company in Azusa, a large landscape architecture and garden construction firm. My job was weeding and watering their large private nursery and occasionally helping on their construction crew. This experience set me on a career path in the then little-known profession of landscape architecture.

A highlight of this period was a camping visit to Yosemite National Park. The Sierra Navada mountains are granite country, most visibly expressed in Yosemite and to this day I feel an affinity to granite country, whether in Rio de Janeiro, Hong Kong, Serengeti or here in Australia.

A depressing memory of this period was witnessing the endless orange groves surrounding us gradually dying when irrigation was cut off, and the land eventually converted to housing tracts. Snow-covered Mt Baldy became hidden by smog so thick children were kept indoors during school recess. As I write about this today, the population of Southern California has tripled since my high school days.

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CHAPTER THREE – LEARNING WITH & FROM PEOPLE

Introduction. While I struggled through grades 3-12, not fitting into the neat boxes in the standardized school system, the farther I advanced in higher education the more freedom I found or took for creativity and originality.

College of San Mateo 1959-1961. In 1958 my father was hired to teach a new division of courses in vocational horticulture at the College of San Mateo, a two-year community college in the San Francisco Bay area. So, after graduating from high school in Southern California, my brother Jim, and I immediately drove north to join him and enrolled in the College of San Mateo day program. There were two campuses in those days, an old two-story masonry building where dad's evening classes were held and a WWII grouping of temporary barracks on Coyote Point, a picturesque eucalyptus covered peninsula in San Franscisco Bay where Jim and I majored in art. Jim was interested in fine art photography and I took courses in drawing, color theory and graphic design since there was no architecture program offered. I also attended my father's evening classes in vocational horticulture three nights each week, making a very heavy workload. I repeated beginning algebra twice more and finally passed even though my test scores were poor. By then I could have taught the course. Three of my most helpful academic classes were in public speaking, architectural drafting, and English literature, where our extraordinary instructor, Ms. Wirth, guided my growing ability in written expression.

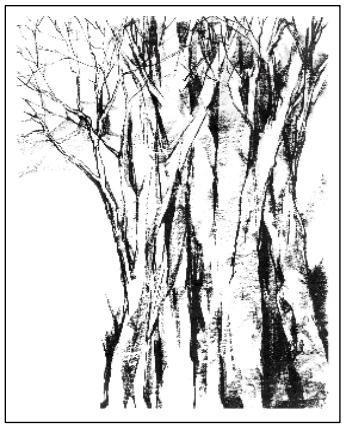
In those days California community colleges were free and living at home also saved on costs. For one summer I collaborated with my father designing and building residential gardens and garden maintenance work. I temporarily took over a gardening route to the healthy suburb of Atherton in the apricot growing south of the San Francisco Peninsula. Today, this is the Silicon Valley computer hub. Durning the second summer I worked for my older brother Phil in his carpentry shop and business in Venice Beach in Southern California and attended the UCLA summer program to complete advanced algebra. This was a turning point. Our young instructor was much more interested in our understanding of algebraic principles than getting all the correct numerical answers, foreseeing the time when handheld calculators would do the actual computations.

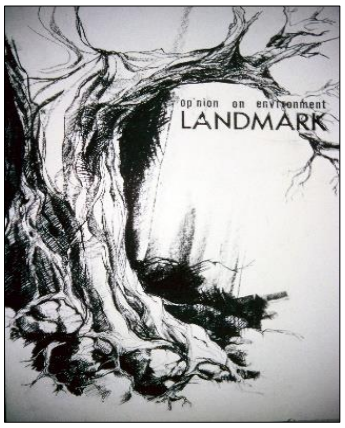
University of California Berkeley 1961-1964. The next step in pursuing my interest in landscape architecture was enrolling in the University of California across San Francisco Bay in Berkeley. In those days California residents had free tuition to one of the world's great universities. Upon beginning classes, I thought I would have a career in professional garden design or designing houses and gardens together. I soon discovered landscape architecture (henceforth LA) including regional and environmental planning, environmental impact analysis, site planning for new towns and residential areas, design of gardens, schools and parks, zoos, and botanical gardens and, yes, zoos.

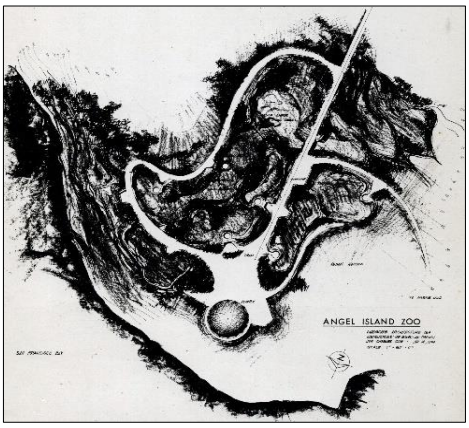
My two years of community college study counted as one year of university level study, so I had three years of study to earn a Bachelor of Landscape Architecture degree. In addition to studios in landscape architectural history, design, site planning. construction, and plant materials, I took two studios in architectural design, required courses in botany and economics and elective courses in soil science and entomology. I also audited courses in geography, etching and attended open university lectures.

For the first time in my schooling creativity and wholistic, thinking was more rewarded than getting the “right answer.” I now realize how fortunate we were to be encouraged to think for ourselves rather than simply copying acknowledged “masters”. Even today this is rare in design schools. Our LA studios were in the basements of old Agriculture and Giannini Halls, before the present Environmental Design Building was built. Our windows looked out to the ground level. This humble, soil-level perspective provided a logical foundation for our future nature-based and service-oriented profession.

I was fortunate to benefit from thoughtful and innovative faculty, guest lecturers, and studio master’s from the “California School” of design including Robert Royston, Garret Eckbo, R. Burtin Litton and Lawrence Halprin. My second required architecture design studio was with noted West Coast architect Donlyn Lyndon, designer of award-winning Sea Ranch. I designed a passively heated and cooled office building (fifty years before this became common). My building model had working vents to smoke test the model building’s ventilation by blowing smoke through it. He liked my work and told me, “Coe, you’re pretty good. You could be an architect.” I thanked him and replied my future would be in landscape architecture. Neither of us foresee a time when I would bridge both professions, and several more.







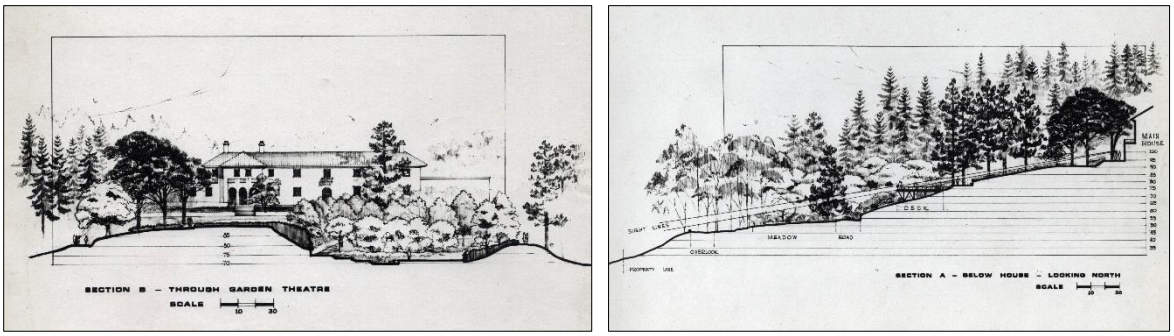


Figure 2. Drawings from student days at UC Berkeley. Upper left: trees using conte crayons. Upper centre: tree drawing used as the cover of a student publication edited by my future wife Susan Webster. Upper right: my first zoo design project as a student, envisioning a domed aviary, native animal habitats on hillsides and an observatory at the summit of Angel Island in San Francisco Bay. Bottom images: two illustrations I drew for Landscape Architecture Professor Geraldine Knight Scott showing her plans for the university owned Blake Estate.

My background in art, illustration, garden design, horticulture and construction gave me a head start on most entering students, so I helped them as much as possible. We arranged to keep our design studio open all night and many of us worked together helping each other as we would later in a professional office. Working all night was common before deadlines. During my final year I worked seventy-two hours without sleep, completing four separate final projects. I came to realize that not only was I again 'in the zone,' but I was also a perfectionist and would work as long as possible to help others while advancing my design and communication ideas.

My only regret from this period was commuting to the university from my parents' house in Colma, south of San Francisco, through the city and across the Bay Bridge an hour and a half each way in heavy traffic for my first two years. I did this to save money, but I could easily have fallen asleep at the wheel and caused a terrible car crash. This time could have been used for studies or sleep. During my final two years I rented a dormer room near the university and saved money by washing pots and pans at a fraternity house in exchange for evening meals. Once I was so sleep deprived, I fell asleep while washing pots and awoke with my face in the soapy dishwater.

During the summer, after my third year of study I got my first job in a professional office, working as a drafter for the San Francisco landscape architecture firm of Osmundson & Staley for a pay of $2.00 per hour.

The highlight of my senior year was meeting Susan Webster (now Susan Coe). Susan was one year after me in the landscape architecture program. We first dated on Halloween in 1963 and have been together for over sixty years.

UC Berkeley was a centre for political radicalism, and the free speech sit-in demonstrations of the mid-1960s surrounded us. But while an observer, my focus was on my studies, being grateful for the opportunities I had rather than pushing for even more freedom. My brother Jim studied fine art photography at the San Francisco Art

institute, including a course under landscape photography icon Ansel Adams. The Height-Ashbury Hippy music and lifestyle scene was nearby, and Jim became the sound technician for the Jefferson Airplane rock band and toured the US and Europe with them.

Vietnam War beckons. I received my Bachelor of Landscape Architecture Degree with Honors and the American Society of Landscape Architects Student Honor Award in June 1964. I applied to the Harvard Graduate School of Design to continue my studies and was accepted for Advanced Entry. This honor meant I could complete the Master of Landscape Architecture degree in one and a half years rather than the normal two-year program. I would attend beginning in February 1965. This was both an opportunity and a problem. My draft board in conservative Southern California wanted to draft me into the Vietnam War and I had passed one military physical examination. If I remained a full-time student, I would continue to be granted a student deferment, meaning I would be inducted after completing my education. However, beginning at Harvard in February meant I would miss the autumn semester and thus I was no longer a full-time student. I went to work in San Francisco for the LA office of Tito Patri, a remarkable designer and employer who gave me considerable design opportunity in our two-person office. I also continued to see Susan in Berkeley. After three months I received the official notice I dreaded, orders to appear in Southern California for my pre-induction physical examination, the first step in being ordered to report for military duty. This was early in the war and years before the student anti-war movement took place across the USA. I was against serving because I had dedicated my career to helping people and the environment. I remembered the ruins of Berlin and its devastated people and refused to support a war destroying people, their livelihoods, and environments. Taking advice from anti-war activists, I waited until just before the scheduled examination and sent a registered letter to my draft board requesting my physical examination be transferred to the Oakland area where I then lived. This rescheduling gained me two months. During the autumn of 1964 I received the date for the preinduction examination in Oakland and again requested a revised examination location in Boston, where I would then be living. In January 1965 I enrolled in the Harvard Graduate School of Design in Cambridge, Massachusetts. Within a week I received an official letter informing me I was immediately to report for induction in the US Army. I sat looking at this notice in shock before I realized there was a second page informing me my military induction was temporarily delayed and assigning me a continuing education deferment.



Figure 3.1966 Master of Landscape Architecture graduating class. Grant Jones, who I would later work for, is shown on the upper left and I am in the second-row centre, the only student with a beard. We had only one woman in our class. Today most graduates are women.

Harvard Graduate School of Design 1965-1966. The best thing about my Harvard education was the quality of my classmates, both as designers and colleagues. The worst aspect of the design program was its Euro-biased, modernist, master-disciple philosophy. Variant, “west coast hippy” opinions were unwelcome. The masters knew what was best for the world and if we emulated them, we would become masters and tell the world what to do. It was also clear that architects were the masters and landscape architects were of little importance, a sentiment supported by our studios being in the basement of old Robinson Hall. This strident modernism was antithetical to my beliefs then and now. I revered the beauty and sustainability of vernacular architecture and landscapes, and believed architecture should respond to landscape and climate and not vice versa.

I quietly revolted, developing the strategy that I would meet every studio master’s project requirement fully, no matter how arbitrary, but in ways that turned their philosophy on its head. For example, one studio project called for students to design a central plaza for the University of Colorado campus. This was a flat area surrounded by important buildings and student destinations. The design style of the day was to create a large kidney shaped raised and planted mound, diverting pedestrians from their otherwise straight paths to their destinations to ornament and break up the otherwise boring space. Students from California like me were not permitted to use curved lines in our designs. This arbitrary requirement was based upon the assumption by East Coast faculty that curved designs originating in California were all we knew. How ironic, when the kidney shaped raised planter faculty had used was copied a California style a decade earlier, and irritating because fellow students from other states had no restrictions placed on them for design cliches popular in their home regions.

My design solution was expressed in two ways. Seen from above, I recorded the most direct pedestrian pathways (desire lines) between all doorways around the plaza and suggested planting in the areas between, as if pedestrians were walking along pathways through a forest. No curves were apparent, satisfying faulty requirements. However, when seen as a cross section, I sloped the planted areas between pathways, so the entire plaza seemed to undulate with subtly three-dimensional curves.

This contrarian strategy required more creativity than simply complying with their philosophy. I learned far more as a result.

The Harvard Graduate School of Design (HGSD) program was excellent in large scale subjects like regional and environmental planning. Professions like forestry, hydrology, ecology, cultural history, and settlement patterns informed landscape scale planning. These subjects and more were integrated by landscape architects, who had professional understanding of each field, into long-term sustainable development plans. Here multidisciplinary team collaboration and communication skills replaced the patriarchal design master's direction. We were inspired by a visiting environmental planner Phill Lewis, a landscape architect who promoted the "environmental corridor" concept and contributed to the origins of geographic information systems (GIS) technology with his concept of using transparent overlays of mapped natural and cultural resources for environmental planning.

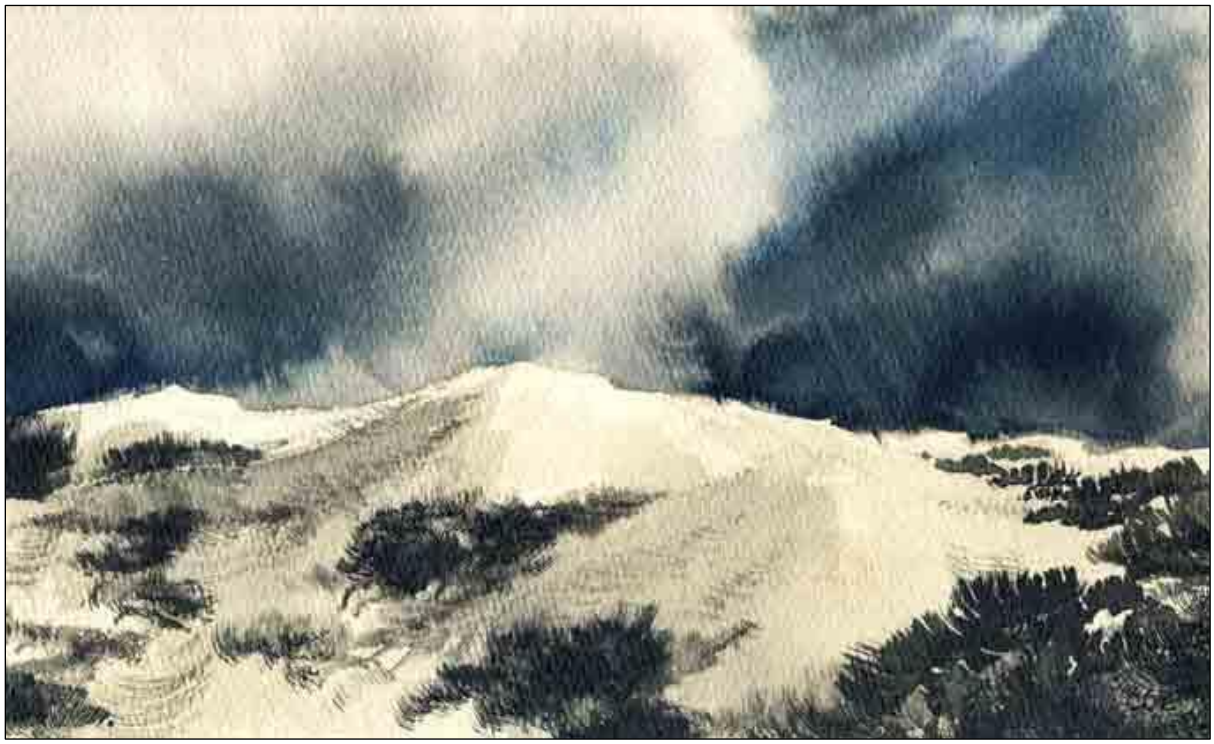


Figure 4. My 1965 watercolor of coastal dunes on Cape Cod.

One faculty member, Mr. Peter Hornby, took an early interest in me and invited me on an introductory winter drive up the New England coast. I had the opportunity for summer employment in a large prestigious Boston architectural office but on Peter's advice chose to work for the landscape architectural office of Carol R. Johnson. In the future Carol's office will become a leading, multi-award-winning firm, but that summer there were only the two of us. As with my work for Tito Patri the summer before in San Franscisco, I learned from Carol about the business side of the work. And I witnessed first-hand how poorly female professionals were treated, especially by male engineers in city departments. Her perseverance was and remains inspirational and I am gratified by her later success.

By the summer of 1965 Susan had graduated from UC Berkeley and joined me in Cambridge, Massachusetts, having arranged employment with the old Olmsted Associates office. Her income helped support us both while I was a student. During weekends we explored New England, hiking, camping, and canoeing in landscapes vastly different from those of Southern California where we grew up.

Harvard University is known for the quality of guest speakers, and two were especially important to my future work. The first was a Brazilian architect who demonstrated how much better adapted their old colonial buildings were to their tropical climate and culture than the celebrated modernist International Style buildings of Brasilia. These could not be repaired locally and forced residents into elite utopian rather than culturally appropriate social groupings. His views strongly supported my vernacular design philosophy. The second speaker of note to me was a young American landscape architect named Mr. Joe Volpe who had graduated before me and had worked briefly in Brazil. Listening to him planted a seed in my thoughts that someday I could visit and work in Brazil as well.

My studies at the HGSD culminated in a master's thesis, a semester long independent study. Given my wide-ranging interests, I was unsure what subject to select. I found my answer while attending an informal drawing class at the old Franklin Park Zoo in Boston. I heard a great commotion coming from the old elephant house. Upon entering, I saw three chained elephants fighting, the chains prevented them from hurting each other physically, but their emotional distress, bellowing, screaming, and the resulting smells were appalling. The keeper was leaning helplessly against the wall. I asked, "Why are they fighting?" He answered, "Because they're chained". "Why are they chained?" "Because they fight" he answered. I resolved to use my thesis to find answers for preventing this needless abuse and chaos.



Figure 5. My 1965 photo shows two of the three chained and fighting elephants at the old Franklin Park Zoo.

Even though I had another semester before beginning my thesis, I immediately began to study wild animal behaviour to improve zoos. My early work included learning about the ancient history and evolution of zoos and the writings of pioneers in wildlife behaviour including Konrad Lorenz, Nikolaas Tinbergen, Frank Fraser Darling, Desmond Morris, George Schaller, and the founder of zoo biology Heini Hediger. Jane Goodall, Dian Fossey, and Birutė Galdikas begun their studies of wild great apes in 1960, but their work was not yet published. Before the beginning of my final term, I suggested my thesis subject to my faculty advisor. He responded with two discouraging facts: 1) no one could make a living designing zoos (in those days); 2)

no one on the HGSD faculty could advise me on this obscure subject. After initial discouragement, I realized the obvious: Harvard University has resources beyond those offered by Design School faculty. I recalled from my recent readings the names Washburn and DeVore, who had studied baboons in East Africa. Professor Irven DeVore, a founder in the field of evolutionary anthropology, was a member of the Harvard faculty. I knocked on Professor DeVore's office door, introduced my area of interest and he generously became my advisor. He not only provided reading lists to familiarize me with terms and practices of behavioral psychology but also attended my thesis presentation and spoke well of it while my design faculty advisor had fallen asleep. My thesis, titled "Artificial Habitats for Captive Animals", described and graphically presented a comprehensive range of animal behavioral strategies supported by expert quotes and citations. I recommend that zoos be organized around naturalistic representations of bio-climatic zones or biomes, following the systems developed by Heinrich Walter. My paper was research dense, seventy-page outline for a full book never published. Instead, I submitted it in outline rather than narrative form. This exhausting work has been entombed in my files ever since Harvard returned it to me, but the information learned, and strategies gained have lasted a lifetime. My work was appreciated by the Harvard GSD with the award of the Weideman Traveling Fellowship. I was able to delay this travel with my wife Susan until after our US Peace Corp Volunteer service described in Chapter Eight.

Move to Philly - 1983. Seventeen years after graduating with my master's degree I again found myself at an Ivy League university, but this time as an Assistant Professor of Landscape architecture. In about 1979 Professor Ian McHarg, then Chairman of the Department of Landscape Architecture, Graduate School of Fine Arts at the University of Pennsylvania, began offering me a teaching position in his department. At this time, I was enjoying working with Jones & Jones in Seattle (see Chapters Seven and Nine). I was now a junior partner, and not keen on leaving our Bainbridge Island lifestyle. As Westerners, we were not keen to relocate to the US east coast. However, I eventually became interested in university teaching and Ian McHarg was internationally respected in the field of ecologically based regional planning from the sales of his book Design with Nature. As an environmental planner, he wanted me to bring this ecological emphasis to teaching at the project design level. As a historical footnote, my Harvard classmate and later employer Grant Jones presented is thesis on ecologically and culturally based regional planning in June 1066, predating Ian's publication. Ian attended, which stimulated him to hastily publish Design with Nature before others like Grant or Phil Lewis beat him to it.

Ian tried to recruit me annually and by 1983 I decided to accept this full-time university teaching position. Jones & Jones were moving away from the zoo work, and managing partner Ilze Jones, once instructed me sternly when returning from project travel, "Don't bring back any more Midwest Zoo work!" While I enjoyed city park and national park design, the zoo field was in much greater need of improvement. Still, I didn't want to break ties with Jones & Jones, who had become a second family. So, when I left Seattle

for Philadelphia it was on a medium-term basis. I agreed to teach for only four years, and I returned to work with J&J during the following summer.

University of Pennsylvania Design Studios. In negotiating my position, I stipulated my intention of teaching for only four years and not seeking tenure for a permanent position. This facilitated my hiring since the university had a limited number of tenured openings. I enjoyed teaching at the master's level. Students were more mature and many had professional tools to develop and express their ideas well. My main responsibility was as a "studio master" for four upper-level design studios per year. This involved finding and arranging a willing client and suitable site, developing the student program (schedule, interim and final products, reference books, field trips, guest speakers and such) as well as spending two afternoons each week with the students in addition to trips. Every studio I managed was completely original. As an example, in my first semester I managed a joint studio with the architecture department in the dilapidated Civil War Era industrial and worker housing area of North Philadelphia, in this case in the Puerto Rican Barrio. Recalling my Peace Corps favela experience I met with Puerto Rican community leaders, most of whom were women, who had developed community gardens on vacant lots. The people I met in North Philadelphia grew up in small farm communities in their homeland. They knew how to grow food and use informal community gardening meetings to quietly manage their barrio. As in my earlier Brazilian university teaching experience (Chapter 8), my upper-class students were afraid to enter the barrio. I assured them that we would be guests of respected community leaders. I don't think my use of Mexican and Brazilian-accented Spanish was very understandable to Puerto Ricans but hoped they appreciated my efforts to communicate in Spanish. The architecture students developed community housing concepts while the LA students designed community gardens, learning from our Latina clients. When the studio ended I invited community leaders we collaborated with to our Ivy League campus to observe and comment on the students' final presentations. Afterwards we shared a meal of Puerto Rican empanadas I had picked up in the Barrio that morning.

This design studio demonstrated my respectful approach, so different from the imperialist master-designer philosophy I had encountered among some faculty at Harvard: 1) Respect, listen to and learn from your clients and their communities. 2) Design to meet their needs (and not just yours). 3) Design local user-friendly systems and features they identified, can afford to build, and maintain. 4) Try to communicate in ways the clients understand. 5) Build bridges, in this case between the Barrio and the university.

The following year we ran a similar studio with the North Philly African American community with good results. In both cases I'm sure the students learned more from the communities than the communities learned from the students. Other design studio subjects I developed included designing a learning garden for the University Museum, with its worldclass collection of Mezo-American knowledge and antiquities, and projects

at the Fairchild Botanic Garden. In addition to teaching design studios, I attended Fine Arts faculty meetings and sat in during presentations given by students in other departments. After sharing my opinion of the shallowness of the architecture studio led by popular “post-modern” architect Robert Venturi, a leader of what I consider a frivolous style-of-the-day, I was not invited back to their department.

The Pros and Cons of Teaching. I mentioned earlier that I had never worked for a large corporation. The University of Pennsylvania is a large educational corporation, but our Fine Arts Department seemed more like a small company with the corporate advantages of excellent employment benefits such as medical and dental care and retirement investment programs which I had never previously had access to. For the first time in my career, I was able to accrue savings.

What didn’t I like about teaching at Penn? Ian McHarg was an international celebrity and charismatic spokesman for environmental planning. He was not a good administrator, and funds were limited. The result was he saved operating costs by only having adjunct lecturers, which is professionals working in private offices and only coming in for their studios and visiting lecturers. The problem with this was that, as the only full-time professional staff, I had duties such as arranging chairs and studio spaces, setting up and taking down student exhibits, designing and posting posters, counseling students and arranging local guest speakers. A related problem was that Ian used the same adjunct and visiting lectures and studio masters year after year and most simply repeated previous lectures and projects with no additional preparation. Students were putting forth their best efforts; several adjunct faculty members were not.

Despite these shortcuts, university tuition continued to rise. Professor McHarg talked students into taking out long-term loans far beyond their future earning power to repay. This high-cost situation had several outcomes. 1) Most students were foreign nationals from wealthy families or with support from their governments. This cultural diversity was wonderful for both American and foreign students. I certainly enjoyed working with many wonderful international students. 2) Unfortunately, many students who could afford the high tuition were admitted without the required undergraduate academic prerequisites. These were required to have had some training in design, graphic communication, and other skills taught in American undergraduate programs, but many did not. In addition to my regular teaching load, I was required to teach remedial drawing classes, which I enjoyed, but received no additional pay. Students could have taken such training at local vocational schools for far less cost to themselves.

My major grievance was that at the beginning of each term studio masters, including noted visiting landscape architects such as eminent British garden designer Sir Peter Shephard, presented their studio subjects and the students selected their favorite studios. If too few students signed up for my proposed studio it was canceled, and my preparations wasted. Proposed field trips and guest speakers were cancelled. By then I had a reputation among advanced students as being demanding, while the guest speakers were known to be easy-going. Some visiting international professors were the

best choice for some students. The result is that for much of my time I became a support figure for the student's selected studio master. This was easy, but it hardly used me to my potential. As a significant example, and the reason I decided to resign, occurred after I met with a group of severely disabled students learning computer coding in a special off-campus facility. Some had such limited mobility they could only be moved about on a wheeled gurney, yet all were keen students. I asked the small group if any were willing and able to join my students in doing a disability access study on the University of Pennsylvania campus. Four agreed. I then organized a design studio offering this unique collaborative study opportunity. I knew that many people feel uncomfortable around strangers with disabilities or other unfamiliar characteristics. From my own experience I also knew this discomfort disappears with familiarity, once you get to know people as people rather than as anomalies. Further, I realized that upcoming legislation, the Americans with Disabilities Act (ADA) of 1990, would require landscape architects to be knowledgeable in this subject. Also, I long supported the concept of Universal Design, inclusive design that work for everyone. Comfortable ramps providing access for people in wheelchairs are also convenient for people pushing baby strollers, for example. At the beginning of the semester, I introduced this design studio option to the Penn students. Sadly, only one signed up. As a result, I had to cancel the studio and go back to the disabled students and their instructors and regretfully tell them my Penn students did not want to collaborate with them. This should have been a required design studio for all landscape and architecture students.

Puerto Rico Field trips. I resigned from my full-time position as Assistant Professor after my agreed four years of full-time teaching but remained available as an adjunct lecturer. I agreed to lead two summer Tropical Ecology Field Programs to Puerto Rico. I traveled with a tropical ecologist and soils expert who conveniently also organized everything, so I only needed to deal with the design studios. The first thing I learned is that my Mexican-Portuguese accented Spanish was not understood in Puerto Rican any more than it had been in the Puerto Rican Barrio in Philadelphia. However, I was able to translate Puerto Rican Spanish for my students.

The first year, January 1988, we designed a beachfront park on the eastern end of the island below El Yonque Peak and National Park. During the second Puerto Rican field studio the following year we drove to the semi-arid southwestern coast west of Ponce. Here the students developed the master plan for Guanica Nature Park. This is where the endangered estivating toad Sapo Concho lives in limestone crevices and breeds in seasonal puddles in their car park. There is also a relic grove of ancient *lignum vitae* (*Guaiacum sanctum*) trees growing slowly on limestone bedrock. *lignum vitae* is one of the hardest of all wood species and highly valuable. In addition to developing a park master plan with the Park Ranger, the students also wrote and illustrated a booklet of rare plants and animals found there. Both the master development plan and guidebook were published and used by the park.

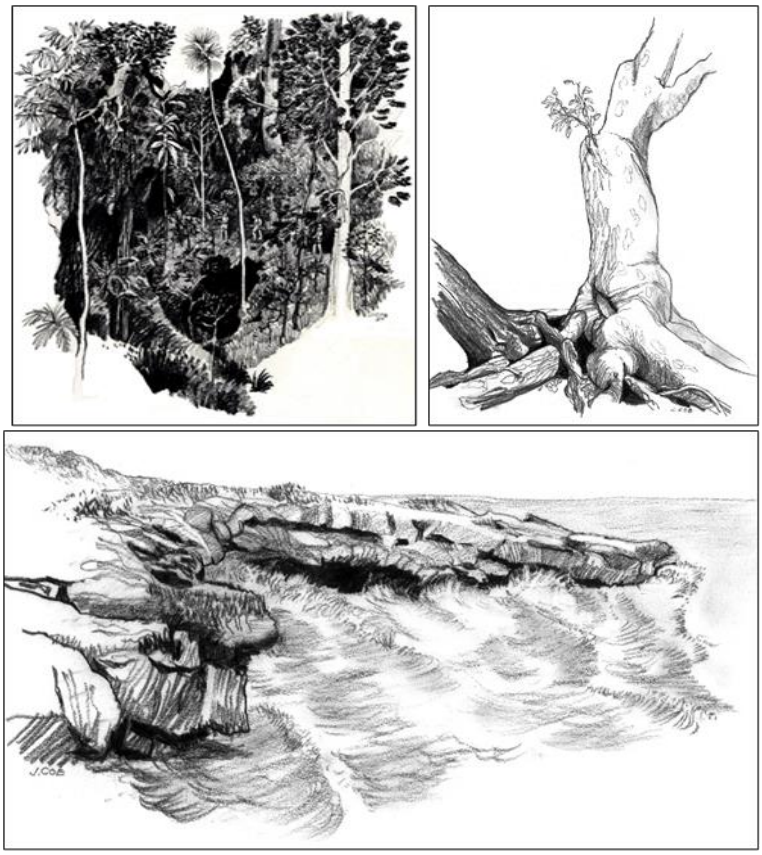


Figure 6. Upper left: imaginary karst rainforest landscape I sketched on the flight home from Puerto Rico. Upper right: Lignum vitae tree in Guanica Nature Park. Below: limestone shoreline in southwestern Puerto Rico.

I was later invited to lead our landscape architecture students on a third summer tour, this time with eminent American evolutionary ecologist Professor Daniel H. Janzen to the Guanacaste dry forest research site in Costa Rica. Sadly, the trip was cancelled for lack of sufficient students. I had never visited Costa Rica, and this would have been a lifetime experience and chance to spend time with one of the heroes of modern ecological research.

Conducting weekend Charettes. Later, during the 1990's while working with my Philadelphia design firm CLRdesign, I greatly enjoyed visiting university departments of landscape architecture and conducting weekend charettes, and design sketch problems. Zoo design studios are popular with students, although few go on to work on a zoo design project. My purpose was to use this subject to encourage students to pay deeper attention to the needs of humans during their future professional work. My experience was that when people design for other people, they often make assumptions about the wants and needs of future users work based upon their own untested opinions or popular stereotypes. However, when designing for zoo animals, they realize that studying the natural habitats and behaviors of the species they design for is important.

I introduced the studio to the students on a Friday afternoon. They were provided with a list of popular animal species resident in several biomes. For example, the African tropical forest would contain gorillas, mandrils, elephants, and leopards. The African savanna would include lions, giraffe, rhinoceroses, and gazelle. A coral reef could be home to clown fish, moray eels, reef sharks and coral animals. Each student picked a species. I then introduced the project goal with the instruction: “Design yourself a garden of paradise of you are a lion, elephant or clown fish.” I defined a paradise garden as the natural habitat in which their chosen species evolved over millions of years. Students had the afternoon and evening to do research in the university library (this was before the internet, Professor Google and Wikipedia were available). Friday night and Saturday morning each student prepared a quick sketch of their animal’s paradise based upon their research, which they presented to the group. Saturday afternoon students formed into teams based on shared biomes. Their task now was to design as a team the shared paradise where each of the species could share. And a further point, they had to add an additional species, occasional human tourists. To communicate their design each team would build a table-sized model on brown craft paper using modelling clay and anything suggestive of their landscape they could find on campus. These were intended to be temporary models displayed and photographed the next day and then discarded. Teams began Saturday afternoon and presented their models to university faculty Monday morning.

I conducted these workshops at five American universities. The most imaginative teams were from the University of Virginia. Students dressed in appropriate costumes, with the African savanna team dressing in safari gear. The Africa rainforest team ranged through their building borrowing all the indoor tropical plants they could find to surround themselves and hide behind during their presentation. The leopard dressed in black and draped herself over a small table to make her presentation.. The coral reef team used common candy types like jellybeans to simulate colorful corals. As a summary, I admonished the students that they must use the same openminded research and creative fun when designing “paradise” projects for human users as they had for designing gardens for exotic wildlife.

CHAPTER FOUR - LEARNING FROM THE LAND

Introduction. This section is about physical journeys and learning experiences informing both my work and evolving philosophy. While vernacular cultures met along the way enriched my experiences, this chapter is about the lands they shaped and that shaped them. Some stories relate to travel for its own sake, and some describe journeys sponsored by zoos or botanical gardens for the purpose of producing better animal and plant habitats and more accurate, inspiring, and informative visitor displays. The map below summarizes my travel locations. While this map may be referred to for project sites covered in other chapters, the stories to follow occurred outside of North America.



Figure 7. Upper: map of my global work and travel. Brown squares show where I have lived, green circles where I have done projects, and blue circles show places I have visited. Lower. map of Susan and my

travels in South America. Yellow solid lines indicate land travel; yellow dashed lines air travel and light orange lines show Peace Corps Volunteer travel in the interior of Bahia (Chapter Five).

South American Tour (1968)

After graduation from Harvard, my wife Susan and I joined the US Peace Corps Volunteer service in Brazil as a peaceful and positive alternative to military service in Vietnam (see Chapter Eight). As we completed our two years as Peace Corps Volunteers in Bahia, Brazil, Susan planed our further South America travels using the book “South America on $5 a day.” We had Peace Corps funds for our flights home and USD$2000.00 each as our readjustment allowances. In addition, we had my Jakob Weidemann Traveling Fellowship for Young Artists from Harvard. This could provide about seven months of frugal travel. We wanted to visit national parks and wild areas, along with prehistoric and historic sites and minimize time in large cities, which would save money. By visiting Peace Corps offices in each area we could find low-cost accommodations, sometimes listed as “suitable for Peace Corps”, the lowest rank given in back-packer travel guides of the time.

Amazon uncertainty. This was well before the days of internet connectivity. Mail was slow and uncertain and long-distance phone service unreliable. Travel and hotel reservation were made in person upon arrival. Uncertainty was normal. We had hoped to take passage on a freighter up the Amazon River from Belém to Iquitos in Peru, but when we flew to Belém we found the ship’s schedule had changed. After touring the city and the excellent Goeldi Natural History Museum we flew on to Manaus in the centre of the Amazonian rainforest. After a one-day look around, we boarded a flight to Bogotá Columbia. Our plane circled over the “joining of the waters”, where the black Rio Negro joined the muddy Solimões River to form the Amazon River. But rather than providing a tourist view, the pilot was dumping our fuel. We soon returned to Manaus. We were told to return to the airport the next day, and this occurred each day for five days, so we could not book river cruises or get out of the city. Finally, we made the flight to Bogotá.

Columbia. Bogotá is high elevation (2,600m, 8500’), temperate, and somewhat European. We enjoyed American style coffee, fried eggs, toast, and jam for breakfast on cool mornings for the first time in years. Colombia had the reputation as a country of thieves, but for tourists the threat was from pickpockets (we were prepared and survived a purse slashing) or even armed robbery, but that would be conducted politely. Personal danger was rare, unlike today’s drug cartel killings and kidnappings, which have decreased in the last few years.

Fresh from Brazil, I gave a lecture at the local university architecture department using my best high school (Mexican dialect) Spanish language skills. When I later ask if I had been understood, the faculty told me they had understood my Portuguese perfectly! Later traveling from country to country in Spanish speaking regions, every time we crossed a boarder, the new Spanish dialect seemed difficult. I was able to adapt as we traveled but a month later, crossing another border, the next dialect was difficult. The

difference in pronunciation between the Columbian Spanish dialect (the easiest for me) and the Argentine dialect was huge to my ear.

We made a short trip to Panama City, Panama to buy duty-free camera gear and flew back to historic Cartagena on the Caribbean, traveled by train along the coast to Barranquilla and another train south up the rich agricultural Magdalena River Valley to Honda in a steep mountain valley. The last three hours I made standing up because a mix-up caused us to disembark, then reenter the same train with seats fully occupied. After an overnight and brief tour of Honda, we continued our travel back to Bogotá.

Next, we hired a taxi (driver recommended by the local Peace Corps office) to drive us to the historic village of Villa de Leyva. The following morning, we awoke to the sound of gunshots outside our window and a cowboy shouting with a Texas accent! An American film company was shooting a western movie, and the actors were practicing nearby. The driver was a good guide and purchased food and other items for us at local prices. We took another side trip to Manizales to see its traditional bamboo architecture but were disappointed to find the bamboo structures and woven matting walls were covered with plaster and paint.

Heading south from Bogotá we traveled by bus or “collectivo,” a private taxi for as many passengers as can be fit in and shared the cost, unless they were the driver’s friends or relatives. Drivers drove like maniacs on steep twisting mountain roads; very unsettling. We drove though Cali and on to Popayán, where we visited a lovely native market, then crossed into Ecuador at Ipiales. We were traveling by local bus and were the only foreigners abroad, we sat near the back so we could not witness reckless driving. As our bus approached the border station some of the Indian passengers, mostly young men, came back and handed me their cartons of cigarettes with a grateful smile and returned to their seats. My lap was soon filled with cigarette packages as the border guards inspected the bus, glanced at us, and left. After crossing the border, the Indians gratefully reclaimed their duty-free cigarettes.

Ecuador. We continued south by bus on the Pan American Highway. After a long drive through moist mountain landscapes, we descended unexpected into the arid Chota River valley and stopped at an African village. We were surrounded by a village of round mud buildings with thatch roofs. Our guidebook explained escaped African slaves sheltered in this inhospitable landscape and built villages as they had in their homeland, and these persist to this day. Food was provided at these stops by local women and boys selling edibles up through bus windows. ‘Safe’ food for tourists included anything you could peel, and shelled or boiled items such as hardboiled eggs, boiled potatoes, oranges, and bananas. For water we carried our own canteens which we filled every night, adding an iodine tablet. The water tasted terrible but was safe in the morning. After a while we no longer noticed the iodine taste.

It was a long ride to Otavalo, where we enjoyed a wonderful fair specializing in cloths of amazing colors. “Unbreakable” locally made cloth products made excellent souvenirs for

backpackers, especially items we could wear. From Otavalo we continued to Quito, Ecuador's capital, high in the Andean foothills at an altitude of 2,850m (9,350'). After touring the vast central square, visiting the bank and resting, we continued south to the port city of Guayaquil. We planned to visit the Galapagos Islands, but in the days before mass tourism access was by booking on a monthly freighter or going by air, also on a monthly schedule midway between freighter voyages. The next ship would not depart for two weeks. If we took it and stayed on the islands for two weeks, we did not know how to get between islands, and we would use up three weeks of our travel time. We did not see anything fun to do around Guayaquil for fourteen days, so we decided to travel onward.

Chile. We flew over Peru (we would visit there later) and northern Chile's vast Atacama Desert to Santiago, the capital. Located in a valley between the cost range and towering snow-capped Andes, Santiago reminded me of the Los Angeles area, although far less developed. At least it was in 1968. The two cities are at about the same latitude with similar climates. Santiago also suffers from devastating earthquakes. I felt at home.

Our first side trip was on one of the world's steepest highways to the crest of the Andes to Portillo 2,880 m (9,450 ft) above sea level. Near the summit we had clear views of Cerro Aconcagua 6,960.8 m (22,837 ft) the highest mountain in the Americas. In Portillo there was one hotel and a border crossing into Argentina. After a long winding decent we reached the beautiful town of Mendonza. The climate was dryer, but the terraced landscape was dissected by clear streams and poplar-lined irrigation channels with frequent orchards. I was immediately reminded of my birthplace, Logan Utah. Today Mendoza is the capital of Argentina's wine country. This is not surprising since after WWII Germans, Austrians and Italians immigrated to Argentina with their wine culture. During our return to Santiago, we enjoyed a more modern coach compared to the ancient busses in Ecuador but were frustrated by not being able to stop for photographs.

From Santiago we took a pleasant (but delayed by a workers' strike) train ride down the fertile central valley to Temuco. Spanish invaders, conquering local Indian nations, were stopped at Temuco by the Araucani Indians. As a result, the local First People have considerable autonomy, a case parallel to the dynamic political balance achieved by the undefeated Māori in New Zealand. We purchased an example of Temuco weaving which we still display in our home.

Lake District. We continued south through the beautiful Chilean Lake District surrounding Puerto Montt in Chile and linking to San Carlos de Bariloche and Parque Nacional Nahuel Huapi in Argentina. At 45 degrees south, like the north latitude of Portland Oregon, the landscape more resembles that of Seattle, with beautiful rivers, lakes, and sounds; then and now a tourist heaven. This is the austral temperate forest zone represented by both evergreen (northernly) and deciduous (southernly) "southern beech", *Nothofagus*. Many similar species are found in Chile, Argentina, Tasmania and

Victoria in Australia, New Zealand, New Guinea, and New Caledonia, remnants of a time these areas were joined in the ancient super-continent of Pangea

Sea & archipelago voyage. We wanted to book passage on a freighter through the Chilean archipelago south all the way to Punta Arenas, but booking had to be made in person on the first day of 1969. We had two days to fill, and took a local ferry to Chloé Island, just south of Puerto Montt. Castro was a quiet rural town with a corrugated iron church. We never suspected that four years later we would purchase property on smaller Bainbridge Island taking the ferries across to Seattle in a similar climate and landscape.

We returned to Puerto Montt, got up early and waited in front of the freighter office at 6 am to be first in line to book passage when they opened at 8am. Luckily a passenger with advanced booking had cancelled and we secured the only cabin available. This freighter only had two “first-class” passenger cabins; very basic. The other cabin was occupied by a priest visiting fishing villages along the way. “Second-class” male and female wards were shared by up to seven, and “third-class” allowed passengers to sleep in the cargo hold on sacks of potatoes. This was used by Indian sheep shearers and other migrant laborers going south. A Peace Corps couple from Lima, Peru booked accommodation in the wards. We met them at breakfast the first morning after their sleepless nights in cabins filled with smokers. We took pity on them, and they slept in sleeping bags and pads on our floor for the remainder of the trip.

The ship passed smoothly through narrow fjords with snow covered ridges lost in the constant low overcast created by moist sea air passing over the permanent ice fields. We had entered the coastal temperate rainforest. Although the vegetation was different the landscape resembled the SE Alaskan archipelago we would visit decades later. After days in protected waters, we were required to turn west into the roaring 40’s of the open Pacific, passing around the Peninsula de Paytao. I prepared myself by skipping dinner and going out on the heaving deck at first light while everyone stayed in bed seasick. The leaden waves towered above us in perpetual gale. Cold salt spray stung my cheeks while albatross skimmed their long-pointed wingtips through whitecaps. I realized appalling weather for me was a lovely day for the albatross, which perhaps would find a calm sunny day appalling. I eventually retreated into the ships swaying mess for breakfast, joining the captain and priest. No other passengers came.

The next day or so we docked in a small fishing village where the priest disembarked. Native fishermen, perhaps the last of the Indigenous Fuegians, arrived in rowboats to sell fresh oysters and smoked clams. They were dressed in warm wool sweaters and trousers, but barefoot in the cold water collecting in the bottom of their boats. The sun came out for the first time as we ate oysters fresh from the sea and drank excellent Chilean wine on the ship’s stern. The water was so clear we could see the oyster shells we threw back shining all the way to the harbor bottom. This is one of the strongest memories of this entire voyage.



Figure 8. Photos of local indigenous people who sold us excellent fresh oysters and smoked clams.

After another day or two's voyages we entered the Straights of Magellan steering east. To starboard was Tierra del Fuego. Soon the landscape became dramatically dryer and more open and the sun came out as we passed into the Andean rain shadow. Turning north we arrived at the small city of Punta Aranas, the most southerly city in the world at a latitude of 53° S. The town of Ushuaia, capital of Teirra del Fuego, is even further south. In Punta Arenas we tried to book passage in a boat across the Strait to Teirra del Fuego, but storm forecast prevented the crossing.

We shared a taxi north to Puerto Natales with an Israeli couple. The town is nearly surrounded by fjords and bays. As we walked along the shore admiring distant black necked swans a car pulled up ahead of us and fired pistol shots out the car window at the distant birds. He missed and we understood why the swans were far from shore.



Figure 9. Torres del Paine is one of the most majestic national parks I have ever visited. The persistent, cold, roaring-forties winds and bright atmosphere contribute to the memorable experience.

Torres del Paine. The next day we hired a driver to take us north to Torres del Paine National Park. It is among the most dramatically beautiful landscapes in the world. We were driven up a dirt track and dropped at a small shed, our accommodation without furniture or heat. It was already half-filled with supplies for a Japanese mountaineering group already challenging their skill against the mountain towers. We hiked around

open country, seeing distant guanacos and condors, enjoying fresh calafate berries (*Berberis microphylla*) and leaning into fierce chilling winds. We recently purchased local heavy wool sweaters. These were almost sufficient, but burs caught in the hand-spun wool were uncomfortable. Walking back from the turquoise lakes bordering the magnificent two-toned peaks, we were overtaken by rain from a nearly cloudless sky, blown horizontally by the driving wind. Chilling wind and clear light are memorable qualities of roaring 40's landscapes. Today there is a highway through the national park with at least a dozen hotels.

Argentina. It was now January 15, 1969. Returning to Puerto Natales, Chile, we took a local bus east across the border to the coal mining town of El Turbio, Argentina. We were the only foreigners on the bus filled with local miners going to work. After a while, a bottle of local homemade distilled spirits passed around. Not wanting to be unfriendly, I also took a sip. The bus unloaded us at the coal mine and no farther. We entered the coal company bar and arranged overnight accommodation. Asking the bartender how we could get to Rio Gallegos, about 300km further east, he suggested there may be someone staying at the mine heading that way. After dinner we were introduced to two traveling sales representatives leaving early the next morning who invited us to travel with them in their spacious pickup trucks. The following day we crossed austral prairies dotted with pothole lakes with abundant waterfowl. Midway we stopped and our hosts invited us to lunch. One of them hung a half a butchered lamb on a steel spit over a fire and went off to fish. Later we enjoyed an authentic Argentine bar-b-que. By the day's end we reached Rio Gallegos on the south Atlantic coast. That night I became extremely sick. The alcohol I drank on the mimer's bus was not enough to kill an intestinal bug I picked up then which made me unpleasantly sick for two days. I don't have pleasant memories of Rio Gallegos.

While there is much worth seeing along the southern Argentine coast, our main interest was visiting the Argentine Andean national parks. Decades earlier President Juan Perón had decreed a great highway be built along the east slopes of the Andes. This road was never built, but not wanting to disappoint the president, it was shown on maps. In 1968 the only way to reach the Patagonian mountain national parks was by sig-sagging between coast and mountains. Buses alternated with Argentine Airforce DC-3s between major destinations. We used both. Bus rides were long and basic, but we could see the passing country. DC-3 flights were shorter, but turbulence and indifferent or nonexistent cabin service left a poor memory of the flights.

Perito Moreno Glacier. From coastal Rio Gallegos we traveled northwest to El Calafate on Lago Argentina and the entry to Los Glaciares National Park. The glaciers originate in the vast Andean icefields between here and the Chilean archipelago through which we had sailed. We passed along Lago Argentina's north shore to a smaller lake with a low water line, reaching a point where the Perito Moreno Glacier emptied into a small lake. A dam of glacial ice, Brazo Rico, blocked the connection to the larger drier lake below. About every five years the smaller lake, fills with ice bergs and melt water from

the glacier, rises to a level overtopping the glacial dam, quickly cutting through the ice and emptying Brazo Rico into the lower lake and on to Lago Argentina. We camped on a forested slope overlooking the 30m (100') high glacier as icebergs calved and crashed into the lake with echoing thunder.

From Lago Argentina we again crossed the country west to east to the coastal town of Comodoro Rivadavia. The next day we crossed again east to west to reach the coal mining town of Esquel in the Andean foothills still further north.

Esquel and Los Alerces National Park. We arrived in the Welsh town of Esquel. Welsh people first came to Patagonia in 1865, migrating to protect their native language and culture threatened by the English in their native Wales. While on a bus ride in the area I met a Welsh scholar from the UK there to document this preserved dialect, now extinct in Wales. He told me remote farmers he visited spoke archaic Welch and the local native Indian language but had not bothered to learn Spanish, the Argentine national language. They preserved their ancient world and still worked the local coal mines.

We were now in the region of more popular and developed national parks. There were more tourists and comfortable coaches to travel on. It was easy to reach Los Alerces National Park, but we wanted to visit the ancient alerces trees. Remnant groves were well into the park interior. Alerce ("larch" in Spanish) is *Fitzroya cupressoides*, an ancient form of cypress. Fossilized examples have been found in New Zealand, home to many ancient Gondwanaland tree species. *Fitzroya* may have been one of the oldest and largest trees in the world. Ancient specimens have grown to more than 70m (230'), 5m (16') in trunk diameter. One magnificent tree was estimated to be 3622 years old, older than the most ancient redwood in California. A less common, but beautiful small tree found here is the Chilean myrtle, (*Luma apiculata*), said in our guidebook to be the inspiration for the trees in Disney's early movie Bambi.

Our coach carried us through light-leaved forests of southern beech, (*Nothofagus*), another Gondwanaland relic, to Lago Futalaufquen. There we boarded a boat traveling the length of this glacial lake and up a fast-flowing river to small Lago Verde where passengers stayed at a local resort. We took a second coach for a short ride to Lago Menéndez, another long boat ride to our destination, the alerces grove now called Alerzal Milenario (Millennium Larch Grove). This grove was small and surrounded by southern beech, blocking full views of the magnificent *Fitzroya*, making it impossible to appreciate or photograph their full size. These were tightly pyramidal, branching to the ground with dense foliage, reminding me strongly of mid-aged Sierra redwood (*Sequoiadendron*). Years later I read that the tallest and oldest Fitzroyas (not this grove) had been cut down by illegal loggers.

Near the end of January 1969, after our return boat ride, we camped for four days beside the broad, fast river near Lago Verde. I remember this as the most relaxing and beautiful camp I have ever enjoyed. I am not an angler, but before leaving Esquel I purchased fishing line and hook, but not a fishing rod or reel. Walking beside the rapid

river the large horse flies were annoying. If they are annoying me they may be tempting the trout in the river. I swatted one, put it on my hook, threw it where the current would sweep it over deep river depressions. I did this four times and retrieved three pan-sized, pink-fleshed rainbow trout for breakfast.

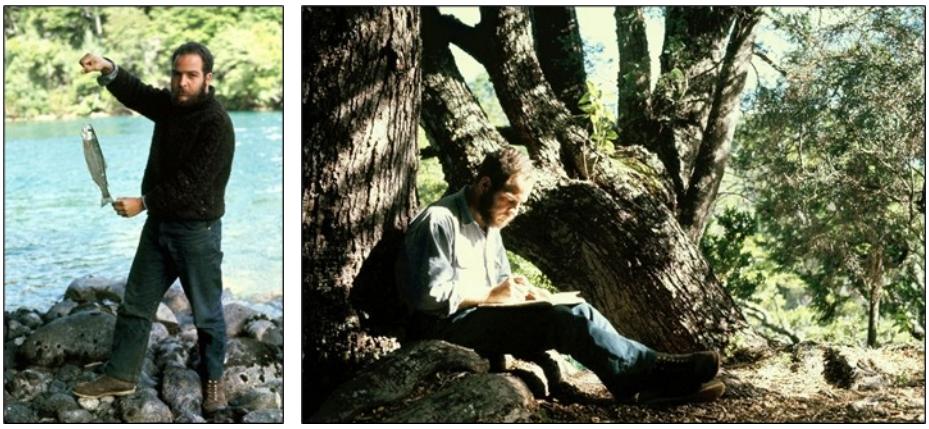


Figure 10. Left: one of three rainbow trout caught in four casts of my handline. Right: catching up on my travel journal.

Parque Nacional Nahuel Huap, Argentine Lake District. We returned to Esquel and continued north in a comfortable tourist coach to San Carlos de Bariloche, capital of the Argentine Lake district with developed tourist loops connecting back to Puerto Mott, where we began our Patagonian adventure. This is an exceptionally beautiful area, but even then seemed overcrowded with tourists after our experiences in the Patagonian far south.



Figure 11. Notable Chilian and Argentine Lake District vegetation. Left: Chilean myrtle (*Luma apiculata*), centre: southern beech, (*Nothofagus*), right: monkey puzzle tree (*Araucaria araucana*).

San Martin de los Andes. Traveling north, we reached San Martin de los Andes February first. We had come to see the “monkey puzzle tree” (*Araucaria*) groves native to this drier zone in the southern temperate forest. This is another ancient genus, once browsed by dinosaurs and widely distributed including nearby Chile, and southern Brazil but also in Australia, Norfolk Island, New Caledonia, and New Guinea. It has soft pine-

like wood I used to build our furniture when we lived in Bahia. The largest *Araucaria* trees we saw were on a hillside grove. They were about five hundred years old. The name relates to the Araucanian Indians we visited in Temuco in southern Chile.

From San Martin we again crossed into Chile to Lago Pirehucio in the Chilean Lake District, then traveled north through Lanco and Temuco, returning south to Puerto Mott and completing our memorable circuit of Patagonia. What a beautiful area of the world! We then headed east again, crossing into Argentina.

Buenos Aries. We traveled on good highways on a comfortable coach to the capitol city of Buenos Aries, a trip of about 18 hours. By now we needed cash withdrawal, clean clothing, a more varied diet, and rest. We were kindly hosted by two American women living in BA we had met on our travels. They graciously showed us around the city. One memory emerges these many years later, a visit to an outdoor performance in Spanish of Shakespeare's "Midsummer Night's Dream". It was performed in a famous local Amphitheatre built in a gap between buildings in a rundown but artistic district. I really enjoyed this mix of big city art and culture after our months of primitive travel. BA, as it is known, was expensive compared to our remote travels, but this Argentine urbanity was a welcome break, and we stayed for six days. We had completed our first five months of travel.

Uruguay. Traveling north again by buss we stayed the night in Posadas, Uruguay. I stopped to buy a fine suede sports jacket at a low price, a beautiful garment which turned out to be slightly too small for comfort later.

Iguazú Falls. These magnificent cascades are located at the boarder of Argentina, Paraguay, and Brazil and comprise the largest waterfall system in the world. There were few safety precautions during the time of our visit. We could walk to the very brink of thundering falls and cross rushing tributaries meters from the drop on narrow slabs without handrails. We had now reached the tropics and butterfly flocks were remarkable.

Return to Brazil. We traveled on to the southern Brazilian city of Curitiba. I was now speaking Portuguese once more and a cab driver commented he understood my Spanish perfectly. To this day I speak a mixture of Spanish and Portuguese languages. I can cast the accent one way or another, but verb forms and vocabulary come out mixed. We then took a bus to Rio de Janeiro Spending five days visiting friends, shipping souvenirs home, and recovering. The next day we took the long and familiar overnight bus back to Salvador Bahia, completing our South American travel loop. We stayed four days arranging our eventual flight home and tourist visas for ongoing travel. From Salvador we took the bus to the modern city of Belo Horizonte and on to the historic colonial town of Ouro Preto, which we had visited briefly during our Peace Corps in-country training over two years before. This Sixteenth Century hill town was still a wonder, but also a major tourist hub. We traveled on to the town of Diamontina, which was wonderful, but not over-visited. Both towns are noted for the unique sculpture

of Aleijadinho (Antônio Francisco Lisboa c.1738 –1814) who continued to create masterful religious sculptures with his chisel strapped to his hand after leprosy had damaged it, or so his legend is repeated. We also visited the historic town of Congonhas, where his remarkable work is also found. Aleijadinho cleverly placed his life-sized statues of biblical prophets at turning points on the Baroque stairs the church. As one moved past them climbing the stairs, your motion seemed to animate the statues as if it were they that were moving relative to each other. This is one of the most memorable sculptural experiences I have witnessed. On 23 March we traveled by bus back to Rio de Janeiro for two days before flying to São Paulo and on to Cochabamba, Bolivia.

Bolivia. Cochabamba, at 2,570 m elevation (8,432') was a small city set in the forested foothills of the vast Amazon basin in eastern Bolivia. We then took a long, slow, ascending bus ride up to the Sucre, the colonial Bolivian capitol (2800m, 9000'). During our touring of Ecuador and on Bolivian and Peruvian altiplano we traveled on peasant buses, old even then. Modern readers would not recognize these small, cramped vehicles. There were no built-in toilets. Every few hours the driver would pull over on some remote mountain road. Women would gather near the front left bus bumper to pee while men used the right rear bumper. Men and women took their living livestock to market on these buses. Goats would be bound and carried on the bus roof. Live chickens and guinea pigs were carried by women inside the bus. With our backpack between our legs and other passengers' baggage stacked around us, hours would pass before we could see our own feet again. Once I found an escaped guinea pig scurrying under the seats between my feet, soon followed by a little girl, also scurrying back under the seats in scrambling pursuit.

In Sucre, I remember having breakfast in the colonial era market. At this altitude mornings were cold, but we warmed ourselves drinking what we called "hot purple." This was a satisfying warm drink of spiced liquid purple corn starch. We knew it was safe to drink because it had been boiling and it was very filling, along with a local pastry. The next day we took an ancient bus mounted on narrow cage railway tracks to the traditional Palm Sunday market in the remote village of Trabucu. We accompanied a Peace Corps Volunteer we had met who spoke the Quechua language. Listening to the Quechua conversations around us among the colorfully dressed locals, he could hear that we were the subjects of most in-transit conversations. We were the only foreigners at this colorful market and purchased small local crafts as souvenirs. Afterwards, easily fatigued by the high altitude, we rested by a small fountain in a local park. Susan was always careful with her purse but for some reason left it on the bench when we departed. We had gotten about 50m when we heard a local Quechua Indian fellow running after us yelling: 'Senora! Senora, su bolsa, su bolsa!' 'Lady! Lady, your purse, your purse!' and returned it to Susan, refusing any reward. He was simply showing his hospitality to guests in his village.

On 2 April we took a local bus from Sucre even higher to the old silver mining town of Potosi. At over 4000m (13,500') It is one of the highest towns in the world, and the highest elevation we experienced. We stayed overnight and took the early morning bus to La Paz.

La Paz, the modern Bolivian capitol has an altitude of 3600m (13,250') yet is in a round valley surrounded by an even higher plateau. We visited for four days. We met a Peace Corps doctor in La Pas who has a runner and ran from the valley floor to the ridge three hundred meters higher every morning. Seems humanly impossible. By traveling by road up from the amazon foothills over five days our bodies were adapting to this high elevation far better than if we had simply flown to La Paz by airline.

La Paz is a wonder of historic architecture, but was, at the time, politically insecure. The President of the Republic was driving through the city and his security guards insured that every window, including our hotel window, was closed before he passed. We stayed, as usual, in a cheap hotel without hot water, but 'suitable for Peace Corps' (and recommended by the local PC office). We were told that at the time only one hotel in the entire country, then called Hotel Grande in La Paz, offered hot showers. We couldn't afford to stay there but recklessly splurged and had breakfast there with fresh strawberries and cream.

We traveled on to Lake Titicaca, at 3812m (12,500') the highest large lake in the world. It is surrounded by high dry grasslands of the altiplano, far above timberline. We visited the floating reed villages of the Aymara people. The Aymara are thought to be the precursor of the Inca culture of Peru but retreated to their floating reed islands as a defense from later Inca attackers we were told. The Aymara language is distinct from the Inca and modern Peruvian native Quechua language. We also visited the 'Gateway of the Sun" a Tiahuanacan historic artifact near Lake Titicaca. This culture is thought to have been about 1800 years old.

Peru. We crossed into Peru along the shoreline of Lake Titicaca on 8 April. The next day we took an overnight train trip to Arequipa on the western slope of the Andes overlooking the distant Peruvian coastal desert blending farther south into the Atacama. Returning the next day we saw vast dry open country, remarkable in its simple grandeur. We continued by local bus through Puno to the Inca capital of Cusco (3400m, 11,150' altitude). Most tourists to Cusco find the altitude difficult but having acclimatized, we did fine. Inca stone architecture is made with perfectly fitted mortarless joints, sometimes with extremely large boulders at their astounding 15th Century fortification at Saqsaywaman, or with intricate polygons such as the 13-sided stone fitted into a foundation wall in Cusco we visited. Supremely skilled stone worker teams were having fun and showing off. In traditional Inca architecture, the heavy interlocking stone walls were topped with lightweight timber and reed thatch roofs. This was perfectly designed to survive frequent earthquakes. When shocked the stones could rub against each other, sliding back in place when the quake subsided. Later Spanish built large churches and civic building using European ridged mortar joints above pre-existing Inca

stone foundations. During subsequent earthquakes Spanish architecture crumbled. Inca foundation walls remained. Flexibility and resilience outlasts strength and rigidity.



Figure 12. Machu Picchu is the most dramatic ruin I have ever visited. Left: the 'Hitching post of the sun" formation remains after Inca stone cutters removed all the surrounding granite leaving a flat floor. Their sun was spiritually attached to the very foundations of their world. Centre: Huayna Picchu is the peak rising at the lower end of the settlement. It is a challenge to climb the steep narrow steps handing over the Urubamba River gorge far below. Right: well-earned view of Machu Picchu from Huayna Picchu.

On15 April we took the local train to the fabled ruins at Machu Picchu. This was the slow train with countless switchbacks downhill. The elevation of Machu Picchu is about 1000m (3300') lower than Cusco in the vast upper Amazonian watershed. We took this train because it was less expensive and arrived earlier than the more comfortable tourist train. We left the train at the station on the Rio Pacaymayo and decided to save further cash by walking up to the ruins rather than paying for the van…what a mistake! The driveway up to the ruins was steep and long with countless switchbacks. Burdened with our packs, we arrived breathless. Susan had booked lodging for us at the single hotel in those days. This was expensive by our standards: USD $60 in 1969. We stayed two nights. The tourists arrived at 10am and departed at 4pm, giving us glorious sunrises, mornings, late afternoons, and sunsets to explore the empty ruins by ourselves. The Inca architecture of Machu Picchu represented my ideal of perfectly blending site and structure. The granite mountain merges with granite architecture. The stonework and water systems are both enduringly functionally and astonishingly beautifully. 15th Century builders cut steps into the massive granite and then built additional granite steps to continue the stairway. They leveled the top of the highest granite nob, leaving a 2m high pylon, called the "hitching post of the sun" emerging from the original rock (Figure 12). The overall organization of buildings, water channels, and terraces is balanced along the narrow defensible ridge high above the river canyon. In this region of rapid geologic uplift resulting in steep slopes and frequent earthquakes, enduring landscapes, much less architecture are rare. Yet Machu Picchu remains faultless due to its resilient design and superb construction. This was one of the most memorable visits of the entire trip.

Lima. We flew from Cusco to Lima and stayed with the couple who had shared our small cabin on the voyage south through the Chilean archipelago. We stayed eight

days, but I do not recall much of that period other than being exhausted tourists. We didn't care to see another museum or ruin. We missed out on much Lima had to offer, but enjoyed catching up on contemporary culture, including the music of a new English group called the Beatles.

Return to the USA. On 27 April 1969 we flew from Lima to Mexico City and on to San Diego, USA, where Susan's family lived. We were in South America for about 30 months and travelled through nine countries. One of our goals was to travel for USD$5.00 a day, including land travel but not counting airline travel. Susan's meticulous travel and fiscal management made this possible. We traveled by horseback (to see one ruin), taxi, bus (ancient and modern), train (ancient and modern) and air (DC-3 and 707), riverboat and cargo freighter, mostly living from our backpacks.

Africa

First African Safari -1982. Mr. Hank Klien, then Education Director at Woodland Park Zoo and his wife were leading a safari to Tanzania open to zoo society members. Did I want to come? Of course, I did! At the time I was working with Jones & Jones in Seattle Washington specializing in zoo design work. J&J agreed to split safari cost in exchange for the photos and notes I took. They even provided the film. During a ten-hour stopover in London, and my first visit there, I took the tube downtown and navigated to find a unique bookstore where the Collins Guides including "A Field Guide to the Birds of East Africa" by J.G. Williams were sold. At the time these were the best wildlife fields guides for Africa, India and Southeast Asia.

After two sleepless overnight flights we arrived in Arusha, in the Tanzanian highlands, on 5 February 1982. We had been warned to beware of illegal money changers at airports and only to use banks and international agents like American Express. When we asked the airport customs official where we could change money, he happily did it for us at a fair rate. So much for following the rules. We visited Arusha National Park, Lake Natron (flamingos), Karien Gorge (vultures, then Maasai village), Soit Ayai kopje, Nduto Lake (vast herds of wildebeest, zebra, antelope, cheetah hunt), Ngorongoro Crater (lions around camp, bull elephants), Gibbs Farm on the crater rim (Swiss family, great coffee), Lake Manyara (abundant hippos). This was a wonderful but trying trip. Sengo Safaris, our host, had excellent African staff, but poor equipment. We had two or three flat tyres each day. One vehicle would only start if pushed, even when lions were nearby. The frequent stops gave me the opportunity to do many journal sketches and compose many sketch poems.

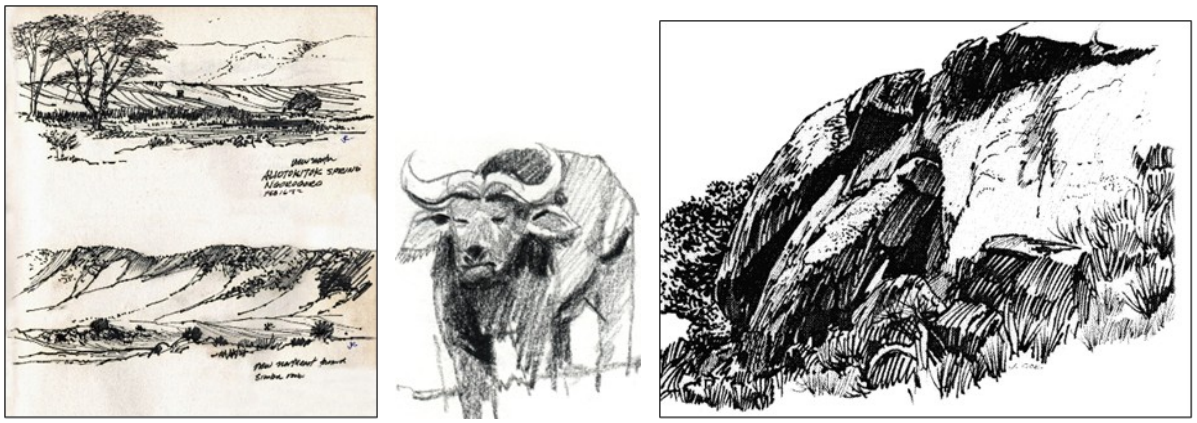


Figure 13. Left: my sketches near camp in Ngorongoro Crater. Centre: bull buffalo. Right: kopje at Soit Ayai.

A highlight of the trip was the wonderful friends I met. Several of us have stayed in contact, and recently six of us had a 42nd -year virtual reunion and group reminiscence. We recalled camping on the floor of the Ngorongoro Crater (no longer allowed), the wild buffalo snorting and farting outside our tents at night and the two male lions waiting at the campground gateway where several of the group had just done an early morning run.

Toronto Zoo & Safari -1990. My firm at the time, CLRdesign in Philadelphia, entered a competition to design an African Savanna exhibit for Toronto Zoo. We were selected for the work and requested to lead the Zoo's team on a safari to experience the real thing. Several staff members were bird lovers, so I selected East African Ornithological Safari's Inc. Mr. Steve Turner, the founder's son, with dual citizenship in Kenya and UK, agreed to lead the safari himself. His knowledge of the areas we visited, local geology, cultures, wildlife and especially birds was outstanding. The Toronto Zoo team was led by Dr. William Rapley, Head of Live Collections and later Zoo Director and included Tobi Styles, John Carnio, Vern Brinsmead, Paul Harpley, and Duncan Bourne. From 11 – 25 June we visited Tsavo East and West, Amboseli, Samburu and Massai Mara National Parks in Kenya, East Africa.



Figure 14. A Maasai Moran (warrior) and two Masai women supplement their incomes posing for tourists during my visit to Kenya with the Toronto Zoo team.

I found time to keep up my journal, sketches, and poetry and had a wonderfully informative experience myself. Here are a few examples.

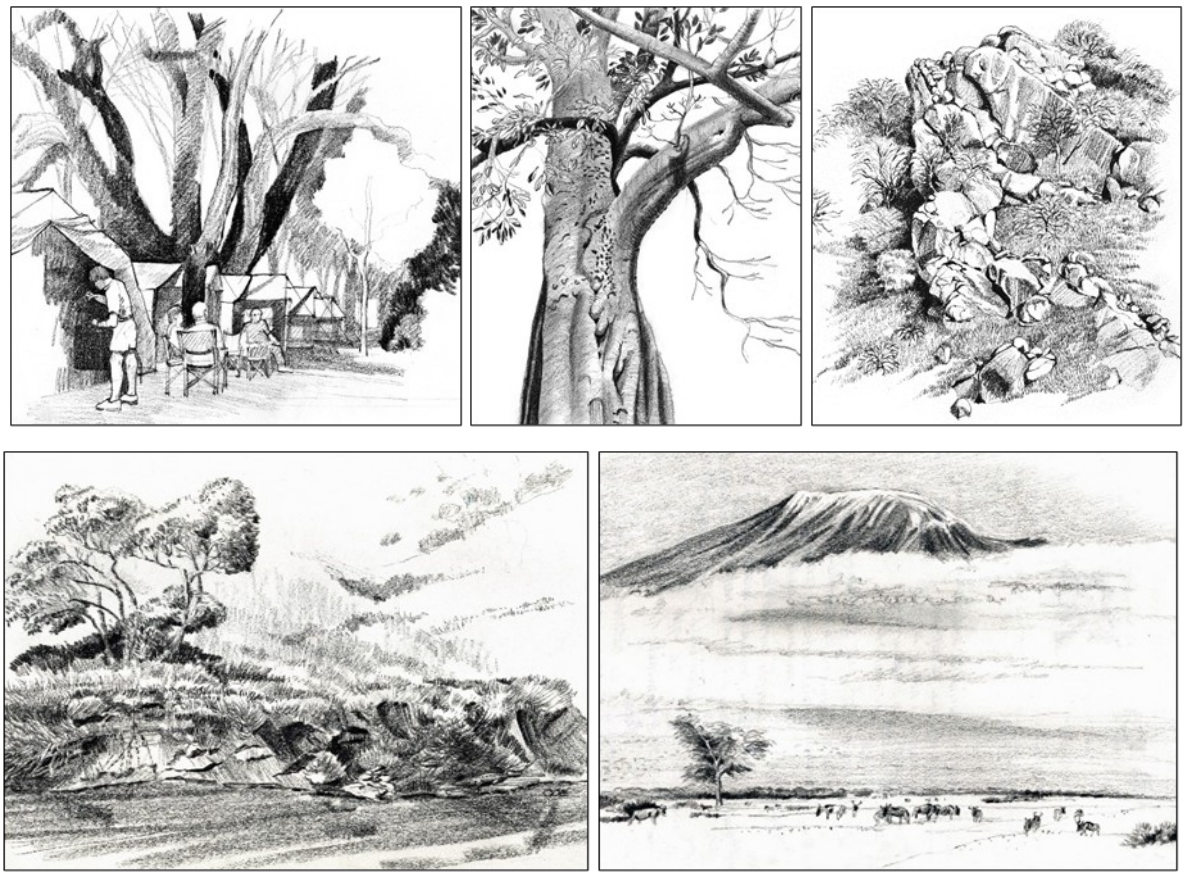


Figure 15. Sketches from the Toronto Zoo 1990 Kenya Safari I led. Top left: private camp under spreading acacia in Samburu. Duncan Bourne is shown in the foreground, and Bill Rapley is seated and facing me. Middle: baobab tree. Right: rocky ridge in Samburu National Park. Lower left: Mara River, right: Mt. Kilimanjaro from Amboseli National Park.

Ghana Kakum National Park – Master Plan sponsored American Society of Landscape Architects - 1994. The ASLA collaborated with Conservation International (CI) on a pro bono initiative to prepare a master plan for Kakum National Park in Ghana, West Africa. I was invited to join a group headed by Mr. Chuck Hutcheson of CI, which included Johnpaul Jones, my old colleague from Jones & Jones and a fine architect of Native American decent, Mr. Walter Hood, an African American landscape architect, artist and social activist, Mr. George Patton, a landscape architect and just retired head of the American National Park Service, and Ms. Susan Everett representing the ASLA.

We arrived in the capital, Accra, and the following day enjoyed the two-hour drive west to the town of Cape Coast, passing through beach communities with colorful and imaginative stores, business, and church signs. Cape Coast is a fishing town reminding me, almost transporting me, back to our Peace Corps Volunteer days living in Bahia,

Brazil (Chapter 8). Fante, the local dialect, sounded much like the African accent given to the Portuguese language in the Bahian markets where we shopped. Indeed, some of the African slaves transported to Brazil, and especially to the Caribbean, where imprisoned in Cape Castle, the Portuguese fort built here in 1482. We respectfully toured the fort, now an important historic site. We ducked under the low “Door of No Return” from which shackled slaves departed the prison and entered the slave ships. This was a somber and unforgettable experience.

Our work began with an inspirational presentation by Mr. Kwesi Agbey, Ghanan Director of Tourism. Cultural and eco-tourism have become important elements in the government’s strategic plans for the region. His talk was followed by a broad and deep introduction to local culture and demography by Dr. Henry Wellington, a German trained Ghanan architect and planner. We were also introduced to Ms. Emma Tacke the lead project architect. She had worked for a large firm in England, but her skills were not recognized so she returned to Ghana. Emma was one of several female professionals we had the pleasure to work with, and I was delighted to see the support given to their professional advancement by the senior Ghanian officials we met.

One highlight of the project was our formal introduction to the local Paramount Chief. He had deeded 55 ha (136 acres) of village land to the national park. This had been an oil palm plantation which became uncompetitive with vast new plantations in Southeast Asia and had been cleared. The plan was to locate park support facilities such as parking, admissions, and services on this disturbed site so that no damaging construction would be required inside the forest park itself. This donated village area would then be reforested. We entered the village residence of the Paramount Chief, a substantial white tropical colonial building with a large forecourt surrounded with folding chairs. Strict protocol instructions included forming a reception line moving in a counterclockwise direction. In this manner, when meeting the Chief and shaking hands, our right hand with palm open would be in his full view. This was a sign of security and respect. When we took our seats around his courtyard, we were to sit upright with both feet firmly on the floor. Slouching or leg crossing were considered rude and disrespectful. The Paramount Chief gave us a rather long and formal speech in the Fante language. His words were translated for us by a young female park ranger. This is noteworthy because in West African culture the ‘Chief’s Voice’ (translator) is a highly respected position. This is another example of leaders supporting opportunities for female staff in a traditionally male-dominated culture.

The Chief then leaned back comfortably himself and greeted us heartily in perfect American English. He told us the formal speech was a diplomatic necessity to his community. He graduated from West Chester College, not far from my office in Pennsylvania. Refreshments were then passed and we had a pleasant informal discussion about his project.

Kakum is the first national park (375 sq km or 145 square miles) created by local initiative rather than the national government in Ghana. Endangered species include

forest elephants, yellow-backed duiker, bongo antelopes Diana and other monkeys, 266 species of birds including African grey parrots and hornbills. During our long rainforest reconnaissance walks we surprised a forest elephant, who burst trumpeting onto our trail as our guides fled. Fortunately for us, the elephant also turned and fled in the opposite direction. Later we were shown a forest elephant nocturnal wallow where we suggested construction of an overnight treehouse platform. Someone, perhaps Conservation International, had suggested installation of an elevated canopy walkway suspended between large existing trees. These are attached to the trees in such a way as to cause no lasting injury to these forest giants. At that time, I believe one such construction existed in rainforests in Australia and one in South America. Our task was to determine the best location. After our reconnaissance hikes we located two gradual hills with a steep-sided valley between them the elevated walkway could span. Hikers could climb gradual forest trails to the height of the Canopy Walkway, suspended 30 meters (100') above the valley. When later constructed, it spanned 350m (1,150 feet) supported by seven great trees.



Figure 16. My 1994 sketch of the proposed tree-to-tree canopy walkway and Dennis Paulson's photo from the finished feature thirty years later.

I ran our workshops as we developed plans for the arrival area, visitor and support facilities and produced six colorful architectural illustrations, all approved by our clients. After returning home, I drafted our formal design report, which was combined with a park management report by Conservation International.

After leaving the Cape Coast tropics, the return flight to Newark Airport landed in a blizzard. The airport was closed. My flight to Philadelphia was cancelled. I was able to take a bus (the only passenger) to Newark train station and a late train to Trenton. A taxi drove me home to Newtown, Bucks County Pennsylvania through falling snow. My willing taxi driver was from the Caribbean and had never driven in snow, much less a blizzard, before. His old car slipped and slid but we had the roads to ourselves and arrived home safely. I urged him to stay the night with us rather than risking the return drive, but he only laughed and roared off into the white night.

Travels with Terry – 1986. I will discuss our design work with Dr Terry Maple for Zoo Atlanta in Chapter 7, but first I'll describe some of the research travels Terry arranged to support our design and marketing of their new exhibits. Terry was a Master of Marketing, an alpha male, self-described 'silverback' as we say, utterly convincing with his combination of confidence and intelligence. He convinced Mr. Bert Rudman, a producer for Atlanta area Channel WSB TV to film a "documentary" titled In Brightest Africa (title stolen from Carl Akeley's book) and other research trips to inspire the zoo's new exhibits. Surprisingly, Ford Motor Company was marketing their Taurus family car line in Atlanta and picked Zoo Atlanta, popular with young families, to support their corporate marketing budget. Thus, the resulting exhibit gorilla exhibit complex was named the Ford African Rainforest. Terry convinced his Ford Motor Company sponsor to underwrite the trip to study gorillas in Africa. I wrote "documentary" in quotes because the actual plans had already been prepared before these trips occurred. The "special" aired just before the new exhibits opened.



Figure 17. Left: with Kathy Day and Molly Bloomsmith visiting mountain gorillas in Rwanda. Right: photo with Terry Maple and Kathy Day in the Democratic Republic of Congo.

Interview with Mountain Gorillas. I missed out on the first trip on which zoo staff, joined by a popular WSB TV presenter Ms. Virginia Gunn visited Costa Rica. The second trip, and my first with Terry, was to East and Central Africa beginning 3 March 1986. Zoo staff included Director Terry Maple, Bird Curator John Fowler, who had previously worked under Dr. Dian Fosse saving the mountain gorillas before her 1985 murder, Dr. Molly Bloomsmith, Vet. Dr. Ken Gould, gorilla expert from the Yerkes Regional Primate Research Center, which would be supplying most of the gorillas to Zoo Atlanta, and Ms. Kathy and Mr. Brad Day, daughter, and son of doner Ms. Deen Day Smith. WSB TV producer Bert Rudman and videographer David Lyman joined us as the video production team. Terry had led the Day family on a previous African Safari resulting in the seed funding for our Zoo Atlanta Master Plan which was instrumental in gaining support for Zoo Atlanta's rebirth.

Kenya. Travel began with a flight by the Belgian airline to Brussels, where we toured the historic city plaza and enjoyed wonderful local beer. That night we flew on to Nairobi, Kenya. We began with a safari and hot air balloon flight in the Massai Mara

National Reserve. One imagines these great balloons silently floating over the great herds. In fact, the sound is deafening every time the pilot must burn a jet of pressured propane to heat the air in the balloon. The herd below us fled and elephants stomped and snorted, shaking their great heads each time this happened. Later that day the balloon pilot and his wife were our guides for a safari drive and demonstrated a notable lack of knowledge or empathy for the wildlife we viewed. It was breeding season and male antelope were defending display areas from other males while attracting females. Our guide was about to drive the midst of this active group when I told him to stop and go far around them. His thoughtless interruption may have cause a dominant prime male antelope is once-in-a-lifetime opportunity to pass on his magnificent genes.

We spent a night at the ARC Lodge in the Aberdare hills. Like the more famous Treetops Lodge in the same area, the ARK is located near an active waterhole which is floodlit. Guests could sign up to be awakened when notable species like elephants or rhinoceros come to the waterhole. I was so enthralled by the wildlife dramas I observed that I didn't bother to go to bed at all that night. The principal characters were a mature hyena pair and their ambitions but unskilled young adult pup versus a bull buffalo and later tracking five baby warthog piglets. Happily, for me, but not for the hyenas, all the piglets somehow survived for another day.

Rwanda. The highlights of this safari were our experiences of two days exploring Volcanos National Park in Rwanda and meeting two troops of mountain gorillas. According to gorilla encounter rules, only six tourists were allowed in a group. Since there were seven in our group, I was excluded the first day and, with a knowledgeable, local guide, studied and photographed the botanical communities in the mountain gorilla habitat. This high elevation landscape, between 2500m (8000') and 3500m (11500'), featured bamboo at lower elevations, dense herbaceous thickets including Galium (bedstraw), Urtica (nettles), scattered groups of Hagenia and Hypericum and large leaved, spreading Vernonia trees. The giant Lobelia zone is a higher area we didn't reach. The wet herbaceous alpine/temperate landscape is completely different than the tropical forest of lowland gorillas such as we would provide for in our Zoo Atlanta exhibits, although we noted many plant species which grow in Atlanta's temperate climate.

The second day we hiked through the cultivated fields of pyrethrum daises, which are grown to produce organic insecticides. At the park boundary, our guide introduced us to the encounter rules: 1) never approach or touch any of the gorillas. If a youngster wants to climb on you avoid it if possible. 2) If a silverback charges you, drop to the ground in a ball and whimper as a sign of submission. 3) Head height is a sign of dominance. Always keep your head lower than the guide's head. The guide will always keep his head lower than the silverback's head. The silverback will then know the guide has his group under control. The slopes of Mt Karisimbi were steep, the air cool and humid. We passed up through the bamboo zone (cloud forest indicator) to the last place group thirteen had been seen and found them after only about 45 minutes. Some tourists

never found their group and Terry's group the day before had hiked for hours in their search. The gorillas were low on a hillside above us as we stood in a small valley. Curious about the silverback's sense of status, I backed up slowly increasing my distance from him even further. Soon I was slowly backing up an adjoining hillside. As my head came to the head level of the now distant and seemingly inattentive silverback, he lowered an eyebrow, signaling the guide, who immediately turned and, frowning, signaled me to get to lower ground. To this day I'm amazed at the finely tuned communications the guides and gorillas share. In my 1985 paper "Design and Perception, making the zoo experience real" I had admonished readers and zoo designers to always locate zoo visitors below zoo animals for the welfare of the animals and to teach respect to zoo visitors. Now I have proof of the importance of keeping zoo visitors' heads below animal heads, especially for great apes. Troop thirteen moved up the slope to a level shelf and lay down for a midday nap. We were observing from the steep slope just below when we heard a grumbling sound. A female gorilla wanted to join her family, and we were in her way. At our guide's orders, we dropped flat to the sloping ground and held very still. Soon the female gorilla moved up over us. I recall her dark furry foot placed carefully next to my face as I hugged the ground.

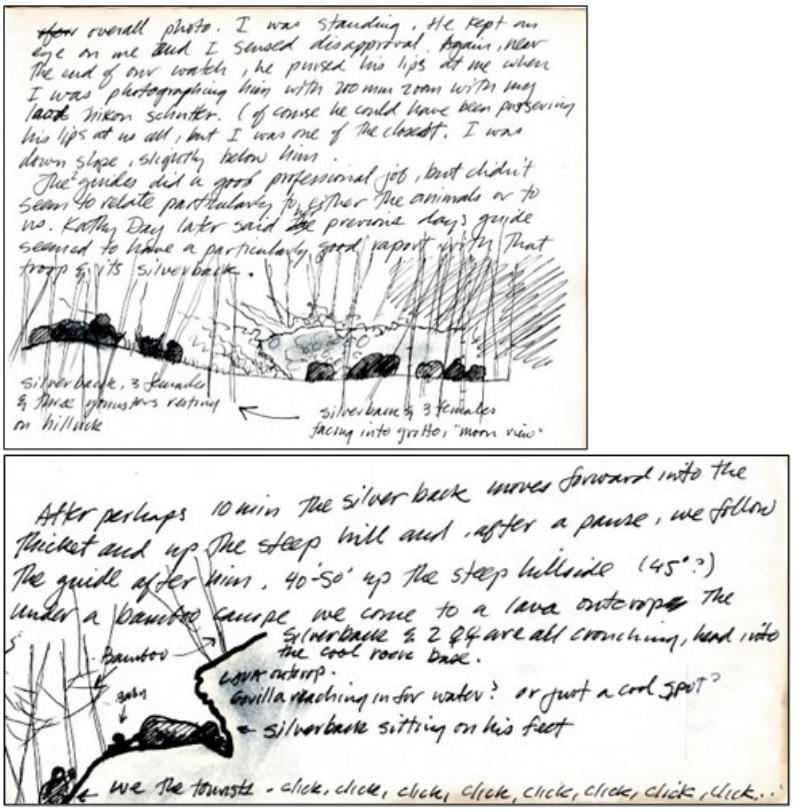


Figure 18. My 1986 field journal notes and sketches. Above: showing gorillas resting on turf under small trees, then going to an old lava outcrop with a small grotto from which cool air emerged. Below: the gorillas rest with their faces in the grotto's cool air as children put their heads into open refrigerators on hot days.

Democratic Republic of Congo (DRC). We left the hotel in Rwanda early to get to the border crossing into the Democratic Republic of Congo (DRC) at Goma. We found that, since it was Sunday morning, the customs officials were sleeping in. When we got to Goma airport our elderly DC3 flight was taking off from the terminal. Our taxi chased it to the end of the runway. There it slowed almost to a stop as we scrambled aboard, turning and accelerating before we could reach our seats. No one had taken our tickets. Welcome to 1986 DRC! The 40-minute flight took us south across beautiful Lake Kivu to Bukavu. Upon arrival at the Bukavu airport, all African passengers were directed one way, and we tourists were directed into a wooden shack where three Congolese boarder officials intimidated us for about 40 minutes, claiming we needed a special paper we had never seen, but we had to buy from them. If we refused, they would confiscate all our luggage and cameras. This was simple extortion costing each of us about USD$ 10 and could have been done in ten minutes, but they wanted us to understand who had the power, and it wasn't us.

We entered the decrepit Belgium colonial era town of Bukavu and drove straight to Kahuzi-Biega National Park to observe Eastern Lowland Gorillas, one of the four species of gorillas. Upon arrival we had to pay USD$ 100 each to take photos, even though our tour had been booked months earlier. We followed our guide, who gave us no directions or behavioural rules or instructions. We soon saw our first eastern lowland gorilla, a silverback sheltering under some low vines and branches. The guide approached the gorilla and provoked it by hacking away the vegetation around it with his machete, unimaginable poor manners in gorilla language. Finally, the silverback made a half-hearted charge at us. I tried to drop to the ground as we had been instructed in Rwanda, but a second guide held me up, scolding me for being afraid. "A man stands his ground!" This was gorilla management by human dominance, as taught by the Belgians who opened the park to tourists in 1969. This was so different from the respectful management of the mountain gorillas in Rwanda. A little later we observed a young male gorilla in a tree only using one arm. Close inspection showed his other arm caught tightly by detached snare wire. Even with Veterinarian Ken Gould, we were powerless to help and the guide and their helpers seemed unconcerned. Ken said the young gorilla may survive with only one arm or may die from infection. We saw enough and left the park.

That night we stayed in the old tourist hotel, with guestrooms upstairs, bar and brothel downstairs. In the evening, we visited a Belgian expat who had retired there. On his fireplace mantal was a shriveled gorilla hand as a souvenir. He brought out a cardboard box, revealing a blackened gorilla skull embedded with circular patterns of cowry shells, a native totem. I felt its malign power immediately and we urged him to put it away. The next day we returned to Bukavu airport, where Terry had arranged for a private Canadian pilot to return us to Goma. The pilot was late and we worried as several soldiers with beers and automatic rifles who had been watching us started our way. Just then our pilot arrived. We were all very glad to leave the backend of DRC and not keen to return.

Cameroon -1987. Terry Maple arranged with noted primatologist Dr. Stephen Gartlan, who was doing field studies in West Africa, to guide our Zoo Atlanta design team to visit and document natural habitats for the Cross River subspecies of western lowland gorillas, chimpanzees, and other primates at his research sites in Cameroon. Our team consisted of team leader General Curator Dietrich Schaaf, Ms. Trish Pfeffer, Dr. Gail Hern, a university researcher, and me. Cameroon was an uneasy country with suspicious military leadership. For example, tourists were not allowed to photograph public buildings, bridges or anything which could be construed as a military target. Steve had a special letter from the Governor allowing him to travel freely attached to our windscreen. This allowed us to travel through the frequent military checkpoints along our routes. We first traveled up the slopes of volcanic Mt. Cameroon (4,095 m., 13,435 feet) to the cloud forest level. The altitudinal zones allowed species to ascend or descend as world climates changed, making this mountain an important “refugia” for sustaining species in times of global climate change, as well as providing opportunities for speciation when species become separated. This topography helps to explain the diversity of primate species in the region. We next visited Korup National Park, where we joined a research group from the St. Louis Botanical Garden led by PhD. botanists Duncan & Jane Thomas and their two hardy young children. Mr. Fernando Ngomo (called “Fergie”), their native driver and cook, was a multilingual walking encyclopedia of local plants and animals. Stephan left us to attend to other responsibilities.

Wildlife in this lowland tropical rainforest were poorly protected. Gorillas had not been seen for several years. Once we heard chimpanzee alarm calls in the distance but never sighted any ourselves. I was able, with Fernando’s knowledgeable assistance, to sketch and photograph their favored food plants as well as the dominant characteristics of local forest trees, vines, understory, and groundcover species. I also wrote many sketch poems with these sketches, recording more of the spiritual and emotional qualities of our study environment.

During our hike from a plantation into our camp we negotiated a bridge made by a single log over the Ndian River, already occupied by marching army ants. We were instructed to run along the log bridge as quickly as possible and then hurry well off the path before stopping to remove the massively jawed guard ants attached to our skin or clothing.

It rained every afternoon in this rainforest. We spent a week in constantly wet clothes. During other times native bees enjoyed our perspiration. Several stings each day were the norm, even for Thomas’ young children, who cried only briefly before resuming forest play. Each day we started very early during the relatively cooler period and, following Fergie, hiked to different areas of habitat diversity. One day I stayed in camp to do more sketching while the team took an exceptionally long and difficult hike, where they were rewarded by observing wild mandrills.

Fergie, a hunter in his youth, could mimic the sounds of monkey-eating crowned eagles as we hid with him. These sounds attracted multispecies groups of primates in

“mobbing displays” intended to drive away predators. Thus, Fernando was able to record species and numbers for his ongoing population census of the park. Steve Gartlan and colleagues published this scientific census and sensibly included Fernando, who had little formal education, as a co-author.



Figure 19. Upper left: my jungle explorer outfit. Upper middle: standing on the high buttress roots of an ancient Zingana (Microberlinia brazzavillensis) tree. Upper right: our driver, cook, guide and local ecology expert Mr. Fernando Ngomo. Middle row: two of my botanical sketches from the field. Lower Left: photo I took of poacher’s snare in Cameroon. Right: simulated poacher’s snare in Gorillas of Cameroon exhibit at Zoo Atlanta made safe for use in a public place.

We said goodbye to our botanist colleagues, again joined by Steve Gartlan and moved southeast to Campo Reserve (now Campo Ma'an National Park). The park borders' large tropical hardwood lumber operations. Everywhere logging roads abut or enter the park. Poachers have wiped out wildlife populations for a distance of at least 10 kilometers from roads. We made several hikes through this impoverished zone, once with a local Chief. We saw several snares, including a snare with a dead water chevrotain, a tiny aquatic antelope. We saw blue duiker, black casque hornbill, tracks of sitatunga and forest buffalo. We also noted gorilla food plants such as Aframomum and saw banana trees broken down by gorillas or forest elephants. We heard three species of guenon monkey according to our guide. In our camp on dark nights we admired bioluminescent fungi, the soil around our camp glowing faintly. This is a very abbreviated account of our Cameroon research adventures. The many photos and sketches were very useful in selecting plants hardy in the Atlanta area which closely resemble those of the Cameroon tropical forest. Importantly, our zoo staff colleagues now had a personal understanding of what gorilla habitat is like. During our zoo design work, I found General Curator Schaaf rather conservative and not very supportive of untested animal management ideas. However, he was an excellent field leader. I'm also reminded of an important lesson taught by our driver, cook and guide, Mr. Fernando Ngomo. The lesson that genius is where you find it.

In Search of the Red Ape was the WSB TV special filmed during our tour of wild places in Indonesia beginning 20 April 1988. Our travelling team included Terry Maple, Terry's brother Max Maple as videographer, actress Ms. Stephanie Powers, her friend Mr. Michael Brockman, Bert Rudman WSB TV Producer, Dave Lyman, soundman, Dr. Ken Gould, of the Yerkes Regional Research Centre, Dr. Ellan Bradford from Zoo Atlanta, Indonesian landscape architect Arief Wiriadunata from our firm CLRR, and Mr. Les Gilbert, owner of the Australia based zoo and museum interpretive firm Magian. Les was recording wild soundscapes and making them available for our projects. Actor Stephanie Powers agreed to join us for no fee, provided she could personally tape a strong conservation message to the Indonesian President from our visit and she could bring her boyfriend. She has extensive conservation credentials, owns the vast Willian Holden Ranch near the Mt. Kenya Safari Club, and competes in annual polo competitions in Argentina, a very active retirement. Stephanie is second-generation Polish and speaks seven languages. She appeared in the long-running American TV series Hart to Hart, which was still running in Asia during our visit. Although she wore no make-up and kept her hair under an old bandana, people everywhere asked for her autographs, especially in airports. She was unfailing kind and generous, going out her way to put them at ease. She explained this was just part of show business, but her sincerity was genuine and admirable.

Terry had arranged first-class passage on Swiss Air, which we enjoyed in the first leg of the flight to Zurich. We passed a pleasant day at Zoo Zurich with then Director Christian Schmidt, a past student of Professor Heini Hediger. Our 25-hour transit via Bangkok and Singapore delivered us to Jakarta. Swiss Air's promise of first-class travel was no

longer honored. We visited the Jakarta Zoo, welcomed by then Director Linus. Terry especially enjoyed seeing their young orangutans traveling around the zoo in pony carts with bells ringing. I recall seeing the Sumatran rhino and later did a sketch-poem of it. We flew to the Sumatran city of Medan, visited an appalling crocodile farm, and then drove north around Lake Toba. The super-volcano eruption creating this lake occurred around 74,000 years ago was one of the great prehistoric geologic events. It changed the global climate and altered landscape and early human settlement pattern of a vast area. Near the lake we stopped to photograph a traditional Sumatran longhouse, an architectural form we later worked into Zoo Atlanta's orangutan exhibit. On this long drive Stephanie Powers entertained us by leading sing-alongs of Broadway hits from productions she had performed in.

Rafting on the Alas River. From Lake Toba we drove east through southern Aceh Province, to the Alas River. Stephanie berated soundman Lyman for giving candy to local children. "Don't you ever give local children something for nothing" she scolded. "Ask them to do something for you, then reward them," she admonished. As we were loading our four inflated rafts she assembled all our gear in a pile on the beach. Our gear was of great interest to the older children. Then she drew a line in the sand around our supplies. She turned to then and, with Arif our translator, told the, "Outside this circle we are all friends. Don't step inside this circle." Soon we began a three-day rafting experience through Gunung Leuser National Park. While there were a few brief white-water events, most of the river flow was gentle and quiet under towering emergent rainforest trees. Occasionally a large water monitor dropped from an overhanging limb into the river at our approach. We heard gibbons and looked fruitlessly for orangutans. Assured by our guide the river no longer contained crocodiles; we floated peacefully beside the inflated rafts in life jackets. We made camps on sand bars. On the second day we did some white-water swimming in our life jackets. At one point an illegal logging road reached the riverbank, and we observed cut logs prepared to be floated downstream in a national park.

On our final day the river widened and slowed, and we had miles to paddle with an approaching tropical thunderstorm to hasten us. Stephanie and I had the bow sides. Others on our raft were weakened by too much sun and too little drinking water (heat stress). She and I kept up a firm coordinated stroke for several hours, reaching our destination just before the storm.



Figure 20. Wild Sumatran orangutans I photographed at the Bohorok Centre, attracted by the food set out for the rescued orangutans.

Bohorok Orangutan Centre. Our next stop was the Bohorok Orangutan Centre at Bukit Lawang, Sumatra. The Director, Mr. Anton, had read Terry's text on orangutan zoo management and was very pleased to meet him. The streamside facilities area had been damaged by a recent flood, and crossing the stream in a tippy dugout canoe was exciting. In the forest young, orphaned orangutans were fed milk and bananas on high constructed platforms under the forest canopy. As they matured, they could return to the forest whenever they were able. One wild male orangutan was waiting for a chance to steal food. He was identifiable both by his size and because he hung over the platform to take food rather than climbing on to it.

Komodo Island. On May first, 1988, we drove back to Medan and flew to Bali via Jakarta. I had no idea that in eighteen years I would be planning major theme parks in Bali and Jakarta. The next day we left beautiful Bali in a small plane and island-hopped to Lompoc, and then to Sumbawa. We then took a worn-out bus to the Port of Sape', where we boarded the interisland ferry-freighter for the six-hour crossing to Komodo Island. We passed through many small volcanic islands, even sailing through now underwater calderas. Just after a blazing sunset we boarded a small boat to reach the Komodo Island dock and went to our nicely designed long-house accommodation raised on stilts above the ground. The next day I met Dr Dale Marcellini, a Reptile Curator I knew from the Smithsonian National Zoological Park. Dale was there to collect and transport Komodo dragon eggs back to the USA for the first time.



Figure 21. My quick sketch of one of the volcanic islands we sailed through. This is a remnant of the mostly submerged volcano's rim. Komodo Island would look much like this from the sea.

The Indonesian archipelago (17,000 to 18,000 islands) are often thought of as having wet tropical rainforest landscapes such as those on Java, Sumatra and Borneo. However, depending on their orientation to monsoon winds, some have both a wet and a dry side, Islands on the southeast zone are drier than those in the northwest. Komodo Island has an open savanna landscape of dried grass, scattered fan palms and broadleaved evergreen thickets following seasonal stream courses. Tame Timor deer and demanding crab-eating macaques live around the accommodations.

Once I made the mistake of venturing outside my room while eating an apple. A large male macaque with hair bristling, seeing the apple, charged me from 30m away. Not wanting to fight him for the apple, I threw it at him. He easily dodged and was satisfied, retiring eating my apple. One dark night I encountered an even darker form moving nearby. Thinking of hungry Komodo dragons, I backed away as a small Timor deer emerged from the shadows. Komodo dragons and wild water buffalo are common and potentially dangerous. These dragons, monitor lizards (*Varanus* species) can grow to 3m (10') in length and weigh 150 kilos (300lbs). As if this wasn't frightening enough, these also produce a slow acting venom. There was the story of a young Dutch tourist who decided to sleep on the beach rather than enduring the indoor nighttime heat. According to this story, all that was found in the morning was his pack, camera and sleeping bag. Perhaps he was an easy meal for a browsing Komondor monitor, or perhaps this was a fable contrived to control wayward tourists. We were not allowed to venture beyond the centre without a guide. The next day, one hour before sunrise, Les Gilbert and I left with our guide to record natural sounds. We followed a dry stream for a mile and Les started to record, but the guide made too much noise as he smoked and shuffled his feet. Les and I, in silent agreement, convinced the guide that he and I were to wait while Les moved just around the stream bend for a quieter stand. After about twenty minutes the guide realized Les was gone, shuck his head and we returned to the center. Les returned safely by himself two hours later.

The highlight of our visit was a staged Komodo Dragon encounter, which is no longer allowed. We walked a mile or so down the beach, followed by a guide leading a sacrificial goat. We then followed a dry stream bed inland past thickets of small trees casting deep shadows. White piles of calcium-rich monitor dung were scattered along our route. Then we noticed some of the dark shadows were 2.5- 3 m (8-10') long Komodo monitors, many drooling, waiting for their meal.



Figure 22. Left: my field sketch of the area where we witnessed the staged encounter with Komodo monitors. Right: One of the many large hungry Komodo Dragons who awaited us.

We reached a circle of closely spaced wooden stakes about 60cm (2') high forming a circle. We were told if we stayed inside this circle we would be safe. The goat was slaughtered and hung from a pole above a depression below our safe circle. Giant Komodo monitors climbed over each other to grab and hang from the goat carcass. We were told their pointed teeth were made for hanging on and not for cutting meat and bone. Several giant monitors hung and twisted until the carcass ripped apart and was swallowed in large segments. The guides used long forked sticks to push away any giant monitors that came too close to us. Terry Maple's younger brother Max, our videographer, lay on the ground to get a lizard-eye video and a big monitor immediately charged him. The guide with the forked pole rushed forward and pushed the monitor's massive head away inches in front of Max's camera. I learned that to a clever Komodo monitor upright people bring food and horizontal people are food!

Ujung Kulon National Park. From Jakarta we boarded the smaller of the two private motor yachts owned by Arif Wiriadunata's father-in-law, a member of Indonesia's ruling family, for an overnight voyage in the Sunda Strait to Ujung Kulon National Park on the far western end of Java Island. Arief had arranged for us to use the boat and crew, and we only paid for the fuel. The boat didn't have enough bunks for our entire group. I tried to sleep on the steel deck with life preservers for pillow and mattress. It was a long tropical night with warm bow spray keeping me damp.

Ujung Kulon is the last refuge of the Javan rhinos, the most threatened of the five rhino species. It was then estimated only around 60 individuals survived, so our chances of seeing any during our six-hour hike in the dense jungle were small. We saw many impressive species of fig trees, including towering banyans. We reached a small cove, swam among coral reef outcrops, and rested under coconut palms before returning. Early the next morning our yacht departed to arrive at Krakatoa volcano, whose explosive eruptions in 1883 devastated western Java, and cooled the entire earth. The vast caldera is now flooded with seawater, and we cruised near a fuming new cinder cone, Anak Krakatoa ("Son of Krakatoa") in its center.

Bogor Botanic Garden. After returning to Jakarta, I enjoyed a reunion dinner with Ben and Dani Ishaki, two of my University of Pennsylvania students who had graduated two years before. The next day they drove me up to the hill town of Bogor, a Dutch colonial settlement. Europeans went there to escape lowland tropical heat. Today, one of several Indonesian presidential palaces is located there. Bogor is home to the fine old Botanic Gardens with many mature tree specimens and a splendid avenue of giant fig trees. It was wonderful to have a long visit with Ben and Dani in such a beautiful setting. Eighteen years later I was to make many visits to this cloud forest area helping plan improvements to the Taman Safari Park near Bogar between 2006 and 2016. Our long return flight home was not the best. Terry Maple was a big man, and our promised first-class seats were not delivered. Terry had a seat and one-half and I had what was left from adjoining seats for a fifteen-hour flight from Jakarta to Zurich and the fifteen-hour flight to Atlanta. It could be said we were tired close friends.

Back to South America.

Ecuador - Rio Napo botanical research. The New York Botanical Gardens (NYBG) sponsored me to visit their tropical research station in Ecuador as a part of my research for designing new exhibits in the historic Enid Haupt Conservatory (See Chapter Seven). On 7 September 1993 I flew to Miami where I met NYBG Conservatory Curator Adam Lifton-Schwerner, Lead Horticulturalist Francisca Coelho and tropical botanist Bradley Bennett. We also visited the Fairchild Botanic Garden with their wonderful tropical palm collection. We were hosted by my old friend Director Bill Klien, who I had worked with on several projects when he was director at the Moris Arboretum in Philadelphia.

We flew on to Quito Ecuador, which I had last visited twenty-five years before while backpacking around South America with my wife Susan. The following day we began our long ride up into the alpine paramo, up and down a thousand switchbacks through cloud forest along the eastern front of the Andes. This is the zone of tree ferns and ericoides, pink-flowered heath-like plants with red growth tips. This is also the zone of earthquakes and landslips. Bently mentioned the life expectancy of any planted slope in this zone was about twenty years before it would be swept away. This favored fast-growing short-lived plant species such as purple-flowered Tibouchina, colorful orchids and bromeliads. The middle third of our descent was in deep, steep, canyons, often among smaller palm thickets including the palm species used to make “Panama hats.” Eventually we reached the shadows of the Amazon lowland rainforests along the rapid brown Rio Napo. Finally, we reached our destination, the Cabanas Alinahui - The Butterfly Lodge, in Tena Ecuador.

These comfortable facilities were operated by a German fellow and his Cuban wife. In the hotel registry I found notes left by Dr. Edward Ross, my entomology professor at UC Berkeley thirty years earlier. I was told he visited here often and so I left him a note. We explored this area for three days led by Bradly. I made sketches of the amazing variety of tree base forms. One research site was Jatum Sacha, a 950 ha (865 acres) eco-

tourist property. Bradley said eco-tourism was more financially sustainable than using the land for cattle, without the need for clearing.

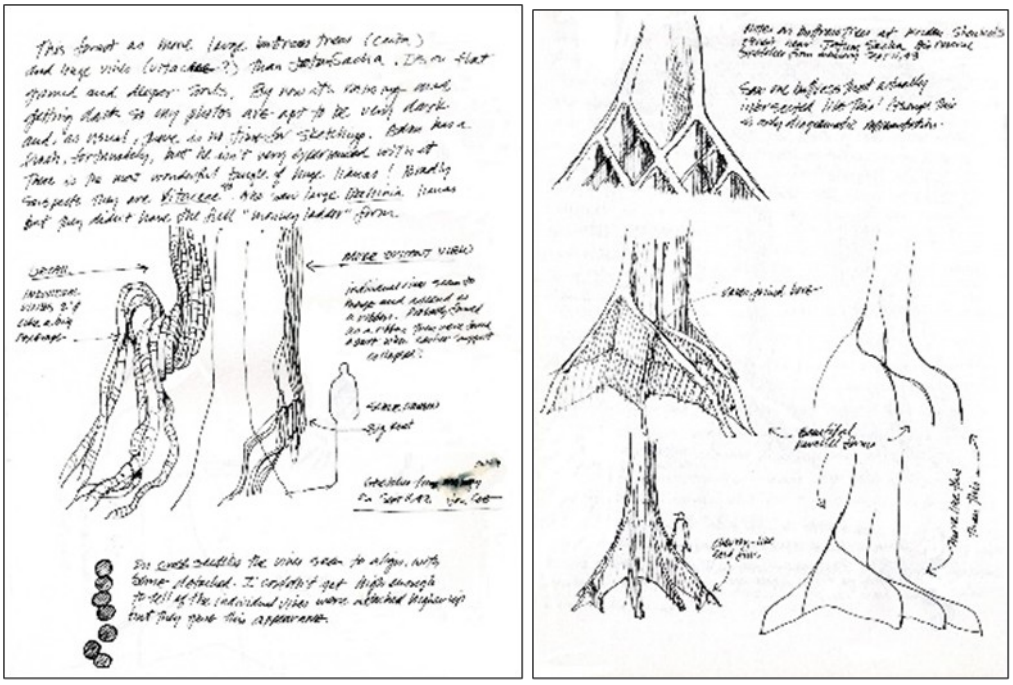


Figure 23: two pages from my journal of characteristics of vines and trees in the Amazonian rainforest in Ecuador.

Associação de Zoológicos e Aquários do Brasil Conference, Goiânia, state of Goiás -1993. Immediately after completing meetings for the Desert Park in central Australia, I flew from Alice Springs-Sydney-Los Angeles-Chicago-Philadelphia, a trip half-way around the globe with a travel time of 27 hours. After one night in my bed at home I then took the train to New York and flew São Paulo-Rio-Brasilia, travelling another 27 hours. Conference organizers were to pick me up for the two-hour drive on to Goiânia. No one met me. I didn't even know the exact location of the conference. After two hours of fruitless phone calls in half-remembered Portuguese, my cheerful escort appeared, and without explanation, we proceeded to the conference. There I met Dr. Devra Kleinman and Dr. Andy Baker, who were involved in reintroducing golden lion tamarins into Rio de Janeiro State, and with whom I would collaborate in the future. I gave my lecture in English with simultaneous translation into Portuguese, My Peace Corps Portugues communication skills returned sufficiently to chat informally with Brazilian conference delegates.

After the conference Sra. Susanna Sobral, our multi-lingual conference translator, kindly invited me to stay with her family in Brasilia for two days. We visited "Santuario", a monastery converted to a restaurant where we saw habituated wild maned wolves come up on their terrace for food, an amazing sight! She also showed me around Brasilia, the modernist national capital city. Seeing it in person confirmed my dislike for its cultural insensitivity. However, I enjoyed touring the Jardim Botanico, learning more

about the Brazilian biomes we had lived in and visited during our Peace Corps service and sketching some of the plants. A few examples are included below.



Figure 24. Three of my sketches from the Brazilian Botanic Garden in Brasilia.

Amazon River Cruise & Puerto Maldonado - 2001. When Susan and I had traveled around South America in1968, the freighter we planned to take up the Amazon River had a schedule change and we had to miss this experience. Thirty-three years later, we rescheduled our cruise, but this time with a more comfortable Abercrombie & Kent adventure tour on the MS Discovery. This ship was the first designed to carry up to 70 passengers around Antarctica, with a double hull for iceberg safety and bow thrusters for maneuverability. These features were perfect for Amazon River cruises during the Antarctic off-season. The program provided ten naturalist-lecturers in a wide range of ecological, botanical, and cultural subjects. We boarded in Manaus, Brazil and cruised 1,469 km, (about 920 miles) upriver to Iquitos, Peru, on the Solimões River (upper reach of the Amazon) with daily stops for river adventures in inflated Zodiac rafts.

In the distant past the Amazon River flowed west and reversed its course as the Andes Mountains arose. As a result, the river's 6,800 km (4,225 mile) long bed has very little slope. Seasonal rains flood vast areas creating unique flooded forests we were eager to experience.

Manaus is on the Rio Negro, the classic 'blackwater' river where we made an early stop for a swim. Here the river is 3.2km (2 miles) wide and up to 75m (250') deep. The water is clear and the colour of strong tea. When I dove down to a depth of 2-3m (7'-10') it was completely dark, as if I were swimming at midnight. Only my bubbles showed what direction was up. Blackwater is the result of tannin (humic acids and such) leached from leaves as water flowing through forest areas and is common in color, if not on scale to tropical forest streams I had seen in Africa. Igapó (blackwater flooded forest) surrounds the area with nutrient poor acidic sandy soils.

We then cruised into the famous "meeting of the waters" where the Rio Negro meets the "whitewater" (more the color of milk chocolate) of the Solimões River. We had only seen this vast river zone from the air in 1968. At this season the vast flooded forest region is

locally called “O Rio Mar”, “The River Sea”. At points the far riverbank is so distant it is nearly out of view. The várzea forest, inundated by whitewater, extended far beyond sight.

In reviewing my travel journal, I find mostly plant lists, botanical sketches and poems which flooded my consciousness with memories of our daily inflated Zodiac boat tours exploring the flooded forests, admiring the many birds, especially varieties of macaws flying to evening roosts in golden sunsets. Images from several encounters with white and pink Amazonian dolphins (Inia geoffrensis) emerge in memory. We visited flotations of giant waterlilies Victoria amazonica, over a meter across (please see sketch below). These are like giant solar cells, leaves collecting the tropical sun’s energy and thick underwater stems pumping air to roots submerged far below. We visited a village where houses and gardens floated on the rising and falling river tides. One evening touring along a flooded lane of towering tropical trees our boat passed a local Indian family paddling home in their dugout canoe as the sun was setting and flocks of macaws returned overhead to their night perches.

Puerto Maldonado (translated as “cursed port”) is in the Peruvian Amazon. We flew there from Iquitos via Lima and soon were on a smaller river in an open boat. Highlights include seeing giant river otters at a great distance and observing flocks of scarlet macaws landing and clewing on yellow clay cliffs at Tambopata. We were told the clay helps counter toxic chemicals in their food, allowing them to eat a wider variety of leaves and fruit.

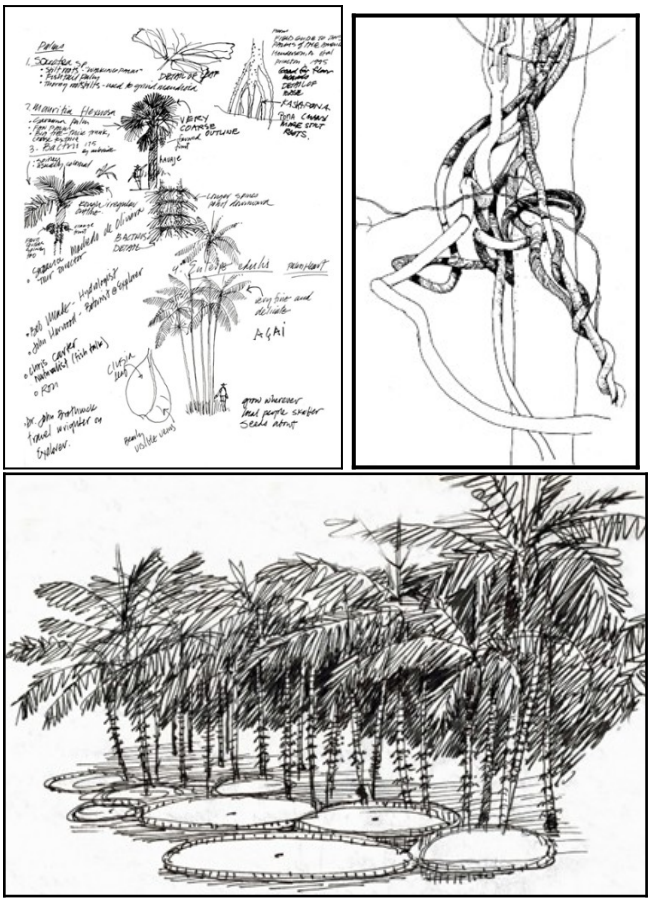


Figure 25: sketches from a page in my travel journal. Upper left: Studies of a variety of palms we visited. Upper right: Amazon liana study. Below: giant Victoria water lilies with Bactris palms in the Amazon flooded forest.

Cata Vina National Park, Baja - 2003. One highlight of my California Science Center (CSC) work (see Chapter Seven) was a field trip to Cata Vina National Park in Baja California, Mexico. CSC ecologist Chuck Kopczak led us, and we were joined by noted exhibit designer Jim Peterson and Julie Desmond from CSC. We drove about halfway down the narrow Baja peninsula to where the land becomes a coastal fog desert with extreme aridity but not extreme summer heat. Cata Vina is the only place where three of my favorite desert palms can be found together. The sturdy California fan palm Washingtonia filifera, is native to the deserts near Palm Springs California with a second population near Twenty-Nine Palms which may have been planted by ancient Native Peoples. These stately palms can be found as far south as Cata Vina. The tall slender Mexican Fan Palm Washingtonia robusta has been planted throughout Southern California and around the world but is native to Mexico only as far north as Cata Vina. The smaller blue-leaved Hesper palm Bramea armata also grows here and farther south. Another fascinating plant of this area is the Mexican frankincense tree Bursera fagaroides. It has swollen, flaking limbs, spiney stems and heavily aromatic leaves, like its biblical frankincense cousin the Boswellia tree found in North and West Africa,

Oman, Yemen, and India. Today we have a smaller Bursera growing in our Australian garden to remind me of the memorable visit.

Australia- Kimberly travel & sketches. I have traveled to many unique natural areas in Australia, often with Susan. 2016 we took a tour around the unique Kimberly region of northwestern Australia. Here are some of my photos and sketches.









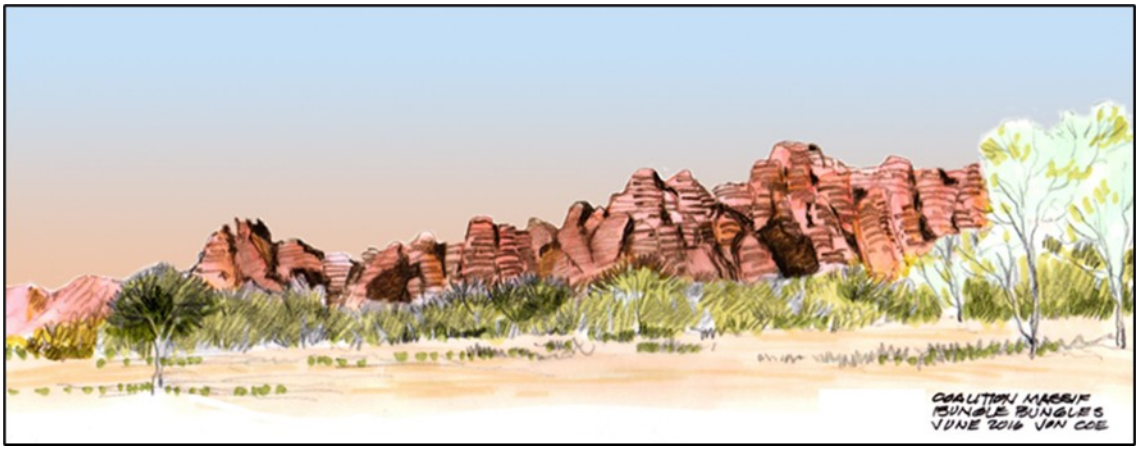




Figure 26: Upper left. helicopter view of the ancient, banded sandstone formations of the Bungle Bungles. Upper right: Mitchell Falls. Second row left: my sketches of Mitchell Falls. Third row: sunset over the Bungle Bungles. Fourth row: Wandjina art (Bradshaw style) dated between 26,500 and 20,000 years ago. By contrast, the famous cave paintings in Lascaux France date from 17,000 years ago and the oldest known animal paintings in caves are in Indonesia from about 61,000 years ago.

Travels in Northern Europe - 2017. My long-time friend Ms. Monika Filby, founder of the excellent ZooLex website and consulting firm, with whom I collaborated on the Frankfurt Zoo planning in 2009, helped organize the 2017 International Zoo Design Conference at Wroclaw, Poland with Zoo Director Radislaw Ratajszczak. I was invited to be a keynote speaker. I visited Monika and her husband Hans at their home in Vienna, then travelled by train across rural Czechia into Poland.

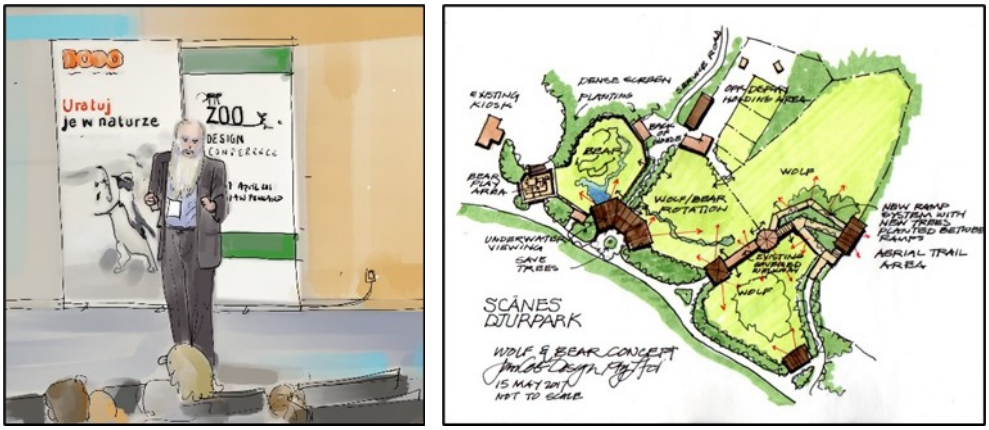


Figure 27. Left: sketch of me giving my lecture by German architectural historian Ms. Natascha Meuser. Right: sketch plan for wolf and brown bear facility renovations for Skånes Djurpark in Sweden. I don't believe these have yet been developed.

The conference was very successful, with two hundred-fifty attendees from thirty-nine countries. I met several European zoo designers such as Joke Klien and Erik van Vliet. I was surprised, in this growing age of mobile phones and selfies, how many attendees wanted their photo taken with me. Our post-conference tour visited Görlitz Zoo in eastern Germany where director Sven Hammer developed very clever opportunities for children and domestic animals.

After the conference Monika and I flew via Copenhagen to Finland and visited the Helsinki Zoo where Monika had done an excellent master plan. From Helsinki we took a large ferry south across an arm of the Baltic Sea to Tallin, Estonia. We spent two days consulting with Dr. Tiit Maran, a wildlife biologist who had just been appointed director of Tallan Zoo. We gave a planning talk to zoo staff and developed concepts for a new entry and improved hippo and otter exhibits. One evening Tiit showed us around the lovely walled Medieval city of Tallan, and the next day drove us to visit the stormy Baltic coast.

From Tallin we flew to back to Copenhagen and took a train across the Baltic to Swedish municipality of Höör where we were guests of Skånes Djurpark. This was the recent acquisition of owner Mr. Håkon Lund. Håkon, his assistant Ms. Therese Oddsen, and Chief Zoologist Anna Blinkowski hosted us. Located in Sweden, their main market area is nearby Copenhagen, especially for overnight guests. Their main attraction is the 20,000 sm (5 acre) “Shaun the Sheep” themed children’s fantasy farm area. However, this is a very large park featuring Nordic species such as bears, wolves, moose, red deer, otters, and smaller species. Håkon was keen to follow my concept of the “Unzoo”, in which animals live on very large enclosures and visitors are contained in vehicles, on boats, immersive trails, and in overnight accommodations. I developed sketches for naturalizing their eagle, wolf, and bear areas. As I said in my journal notes, “This zoo is a star for realistic possibilities and light years ahead in staff culture.”

We returned to Denmark and spent a day visiting Copenhagen Zoo. While large for a city zoo, it has added layer upon layer of exhibits and overlooks, resulting in human dominated and cluttered experience in my view. We spent several hours with Elephant Manager Claus Pederson touring their amazing facility. While relatively small by present standards, it is exemplary for a cool-climate zoo in enrichment features such as automatic elevated feeder systems and deep mulch bedding mounded up daily.

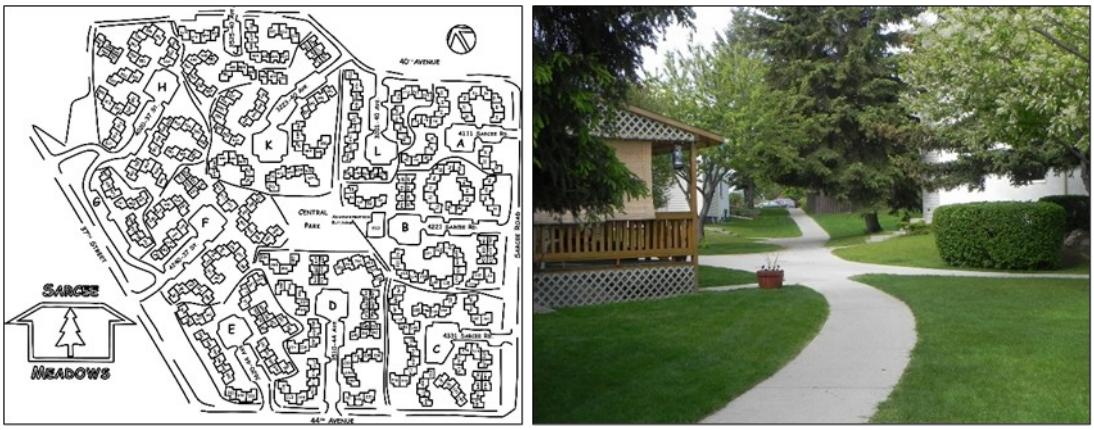
Returning the Vienna, Monika and Hans gave me an amazing tour of their glorious historic city. A memorable highlight was Schönbrunn Zoo established as a private menagerie by Empress Maria Theresa in 1752. Zoo staff have made clever improvements despite historic preservation constraints. This was the zoo where Monika worked as a ground’s keeper aspiring to be a designer before studying Landscape Architecture at the University of Georgia.

CHAPTER FIVE - DESIGNING FOR PEOPLE AND THE LAND

Introduction. This chapter describes design projects featuring environments focused on the needs of people. Landscape and nature were still very important, but these works required special attention and respect to human behaviour at various life conditions and stages.

In 1969, returning to the USA from our two-year US Peace Corps Volunteer service in tropical Brazil (see Chapter eight) the Vietnam War was still raging. Susan and I decided to join our UC Berkeley classmates Jim Talyor and Cameron Man in their new office Man Taylor Muret office Jim opened in the prairies of Calgary Alberta, Canada. Their home office was in Winnipeg, Manitoba. Susan and I both worked in the Calgary office of Man Taylor Muret (later known as Lombard North Planning), she for three years and I for four years, until 1973.

Low-income housing was needed in Calgary, which was a magnet for economic migrants from poorer areas of eastern Canada. We designed government supported low-income housing developments, usually fourplexes or short strings of attached townhouses. Most were designed by Architect Jack Long and Associates, with whom we developed an excellent relationship. Jack's firm designed easy-to-build and user-friendly residential units. We arranged them on the land, along with service roads, parking, play areas, plantings, and other landscape amenities. Susan developed excellent skills in this work. Her overall site design was outstanding, and her site engineering work remarkable. Shaping the land to establish individual building floor levels, and proper drainage, while minimizing construction cut and fill is difficult, especially on steep sites with high density housing. But Susan made it look effortless, often achieving a balance of cut and fill in the first try. One builder identified Susan to do all his work. Yet overall, her work was not as well appreciated as it deserved to be.



Figures 28. Overall Sarcee Meadows plan showing irregular strings of townhouses forming sub-community clusters and unique social spaces inspired by my experience living in a Brazilian favela. Note the abundant verdure as shown in the photo.

Sarcee Meadows Housing Cooperative Village was my favorite housing design project. Most high-density attached housing forms a monotonous grid, with each

residence much like its neighbors. Having recently returned from living in a free-form Brazilian favela and understanding the social interactions creating that form, and enhanced by it, I realized that busybodies want active locations, while others seek more privacy. Most people want choice and variety. The attached 360 housing units were designed so that they could be moved forward or back relative to their neighbors, allowing strings of units to form curved lines. Units could be near active intersections, others such as end units, had more privacy. Everyone had access to the central park area, mini-parks and play areas. An organic village was formed. Residents in a cooperative housing association own their homes, but can only sell to the coop. Thus, they cannot use increasing residential values as investments. The tradeoff is that housing remains very affordable. The program was originally intended to provide initial housing for economic migrants arriving in Calgary while they earned enough to buy a typical house in the suburbs. However, the first residents enjoyed living there and would not leave. A waiting list was maintained for six years and still no one left. When I visited over forty years later I was told very few residents had left and there were 2nd and 3rd generation families remaining in the village. They were building housing for the elderly so no one would need to leave the village when they aged. This may be my career's best work, integrating human psychological and social factors in site design. Had I showed such a plan to my international-style architectural modernist faculty at Harvard it would have been rejected, and it wouldn't win awards in local architectural competitions, but the residents for the last fifty years have shown it to be a winner.

Rundell Lodge. My favorite design project with Jack Long Architects was the Rundell Lodge elderly home. Jack reasoned that anyone growing old in Calgary had grown up in a small rural town. So, he toured local towns, photographing their architectural characteristics, low buildings with narrow eaves, white painted wooden siding and broad window and door frames. Jack was unsatisfied with his architectural staff's ability to envision an insightful floor plan and invited me to move over to his office and serve as chief design architect until completion of initial drawings. We wanted the building to look smaller than it was, with a friendly small-town feel. Our resulting design had three wings forming a partially enclosed atrium and a large lightwell but designed so that the size of the floor plan was not apparent from outside. Each wing became a 'neighborhood' and contained one community amenity welcoming residents in other neighborhood wings to visit. For example, one wing had the laundry, another a coffee bar and the third the hairdresser. Each of these social areas had a greenhouse roof on the south side. Visitors could relax in the sun indoors on bright cold winter days and enjoy living plants year around. The three neighborhoods were united in the community centre, a large lounge facing a great beehive shaped fireplace. On the opposite side of the fireplace were small hearths where friends or someone seeking privacy could enjoy the evening. Bedrooms in one wing surrounded the large lightwell in which the soil level was raised to window height, allowing residents to sit on the broad windowsill and grow plants. This project won the award for the best Provincial Elder's Home built that year. But when I visited in 2012 it had been demolished and replaced by a very ordinary apartment

building. This was my first experience designing themed architecture, something I would later enjoy doing in zoos and theme parks.



Figure 29. Rundell Lodge, my first architectural design project.

Red Deer Home for the Severely Disabled (now known as Michener Centre in Red Deer Alberta Canada). This was an important project during my stay in Calgary because it helped me focus on life experienced by people with severe physical and intellectual challenges and vulnerabilities. The director told us he believed environmental improvements could measurably improve a resident's wellbeing at least on stage. He described one resident, a grown woman in a permanent coma from birth, lacking both awareness and wakefulness. She could at least be wheeled out into a garden to bask in the sunlight on mild days. At the other end of the scale, residents able to leave the community could move to nearby halfway houses. Our project was to design a new recreation facility with an indoor swimming pool, gymnasium and exercise room. In cold countries like Canada, it is common to add such facilities onto existing buildings so users would not need to dress in warm clothing to venture outside. Having recently helped Jack Long design Rundell lodge to resemble a small-town building and realizing many Michener Centre residents were also from rural communities and if able may return to them. I realized that if residents were to advance in their coping capacities and build resilience and competence to increasingly take control of their lives they need to face and overcome sensible, achievable environmental challenges. Forty years later I formalized this concept for improving the choice, control and competence of zoo animals, later published in 2019 paper "Choice, Control and Computers. "The environmental expression of this idea at Michener Centre was to recommend the new recreation wing be located across a simulated small-town "Main Street" from the main building. I reasoned residents active enough to use such a building could go outdoors, cross a street (with almost no traffic) and enter a new building as safe preparation for possible advance to assisted living away from the Centre. Other special features I recommended were street props like traffic lights, crosswalk, bus stop, street trees and streetlights and park benches. Indoors I suggested large underwater viewing windows into the swimming pool for the snack room to help overcome fear of entering the water. We left Calgary before this project was designed in detail or built. I later learned my idea

of a separate building “across the street” had been realized, but the street was only a park walkway with no small-town pretenses. Michener Centre was closed in 2014 and residents dispersed to smaller and newer facilities. Looking back on lessons learned, Rundell Lodge and Michener Centre introduced me to empathy, respect, insights and knowledge needed to responsibly design inclusively for people of all types, ages and cultures and likewise of all species ages and conditions of animals in zoos and sanctuaries.

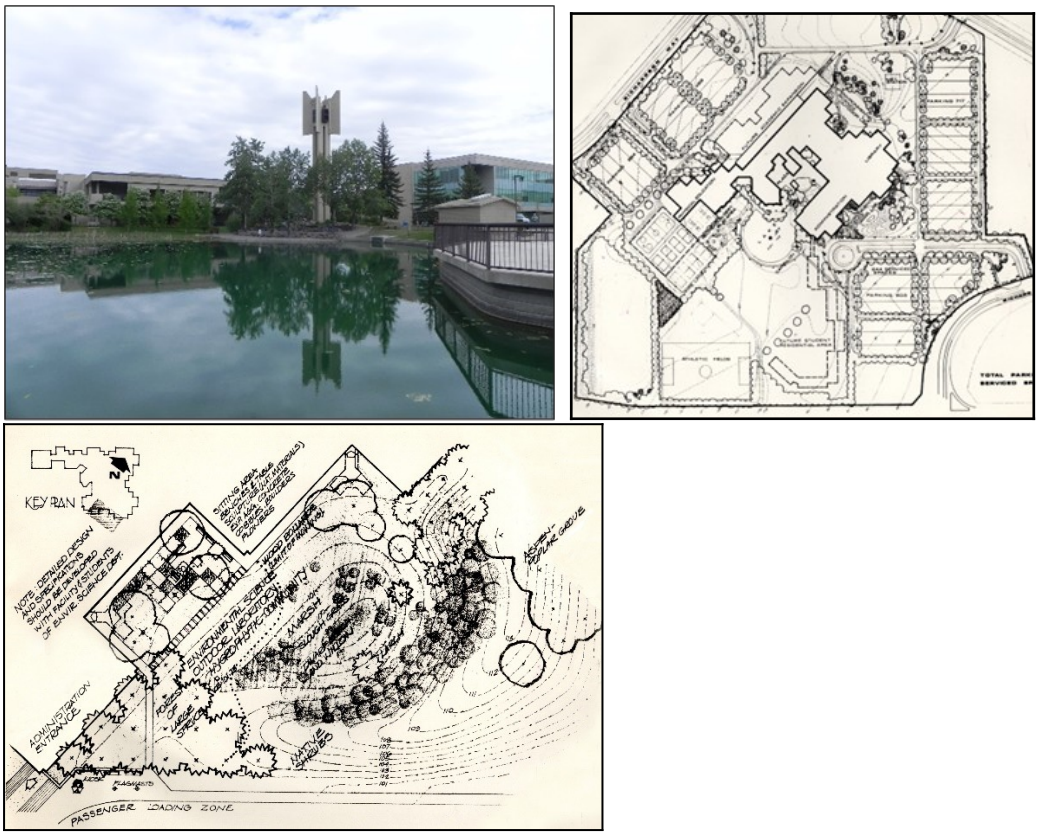


Figure 30. Upper left: view of circular lake I designed as a focal point for campus. Upper right: my overall campus plan. Lower: black spruce bog garden

Mt. Royal College. One major Calgary project was site planning for Mt Royal College. This work included locating the architects’ building on the site as well as parking areas, play fields and gardens. The architectural firm’s original plan had the building and parking areas aligned with the property lines. This gave little surrounding space for any plantings. My approach was to rotate the building 45 degrees, sheltering the building from parking with large planting areas. I also proposed establishing representative native ecosystems as gardens, an unheard-of idea in those days. These included 1) Prairie hillside (simulated stabilized dune formation) using remnant buffalo grass found onsite. 2) Poplar and white spruce woodland. 3) Black spruce bog built with faculty and students of their Environmental Sciences Department, transplanting appropriate species from the wild. When I visited the campus in 2012 the black spruce bog had been replaced with a newer building, but all other areas remained intact and well grown forty

years after planting. This is an early experience for me in ecosystem re-establishment. While planting native plant communities is justifiably popular today, I don't know of any other examples in North America over fifty years ago and certainly not in Canada.

Alberta Tar Sands Domed Town. In 1971 I was asked by creative architect and planner Mr. Arni Fullerton to collaborate in the design of a visionary domed town for one thousand residents to be established in northern Alberta as housing for workers and visitors associated with the proposed Tar Sands extraction program. At the time designing a domed town was an intellectually stimulating opportunity. Neither of us envisioned the environmental wasteland nor the carbon dioxide and other mass air pollution which has now resulted. Arni's plan was to develop ten communities in the area. Nine would be conventional stand-alone dwellings and a community center for more permanent residents. One community for both long-term residents and short-stay visitors would live under a great transparent dome. This vision was thirty years before the wonderful domed botanical habitats at the Eden Project in Cornwall, UK opened. I suggested an elliptical dome oriented on an east-west axis on a south facing slope to optimize solar penetration resulting from low winter sun angles. Greenhouses would be erected along the southern edge with growing fields below. Also, thirty years later, I later recreated this curving solar configuration for the Phipps Conservatory in Pittsburgh USA (please see Chapter 7).

The town would be configured on terraces, each house's roof being the front terrace for the house above. I called this the "Portofino model" imagining a Mediterranean climate alternative in Northern Alberta. All accommodations would receive direct winter sunlight as the sun's path arched parallel to the ellipse's curvature. The highest residences would be located above several levels of indoor parking, providing a layer of insulation from the cold northern exposure. The town government and evening entertainment precinct would be in the centre of the north side near the car park and isolated from residential terraces. The lower central area on the south side would have fields for sports and recreation overlooked by all residential units.

I invented a mythological storyline supporting this arrangement, as I have done on many projects. The northern cold was the common enemy, requiring the common response directed by local government and accessed by a single significant entry portal on the north. The southern side was lifegiving and friendly and thus had many gates leading through green houses as climate-controlled vestibules to seasonally productive community gardens and crop fields below. The east gate represented renewal, where excess heat from the tar recovery operation provided heat and energy for the domed town. The west gate represented remembrance, leading to the community cemetery. The hope was that warm rising indoor air would support the lightweight transparent film roof without the need for massive physical support structures. Perhaps several pylons would support the roof during the few times when the difference between indoor and outdoor temperature was insufficient to fully inflate the roof. Later Arni Fullerton consulted with German Architect Frey Otto, design master for tensile roof structures. I

wrote a short story of speculative fiction, a future history, describing a day-in-the-dome experienced by both visitors and residents including wild birds residing in this speculative environment. As far as I know, nothing came of this conceptual town planning project.

Garden of Awareness. This project, while built using landscape features, was primarily focused on design for people and their abilities and interests. The Blyth Park Garden of Awareness in Bothell, Washington, was the last city park project I developed while with the Jones & Jones firm in1982. We competed with another firm to design what was identified as a ‘garden for the blind’. Each team was assigned a blind advisor. The first thing our advisor told us was that “No self-respecting blind person would want to go to a ‘garden for the blind!’” They would want to go to the same parks as everyone else when it was planned to accommodate their needs. As a longtime advocate for “universal design”, I suggested we reframe the project as a “Garden of Awareness”, a sensory garden for everyone as an open area within the overall park.



Figure 31. Garden of Awareness concepts: Left, blindfolded orienteering, centre, scented herb contact, right, crawling on scented and textured groundcover.

We won the competition and both blind advisors joined our team as wonderful teachers and advocates. The garden was to be installed by a Boy Scout troop, so constructed features must be easy to build. Ideas I developed (illustrated above) included:

- An orienteering enclosure in which blindfolded visitors followed a sequence of sounds, touch/textures, and scents to reach their destination. A blind volunteer guide could be available to help them.
- Various scented and textured plantings to be explored by scent, touch, or sight.
- A crawling trail over scented and textured ground covers. Many other sensory explorations were developed as well, such as water activated gongs, wind activated chimes and plantings encouraging songbirds.

To communicate the arrangement of these ideas to our unsighted advisors and for the final group presentation, I presented a large master plan drawing which looked colorful but “normal” for visual people but was made of colored and textured cloth such as lace, corduroy, and velvet representing different functional zones. Small buttons located focal features so that visually impaired colleagues could also “read” this plan. This is an

example of using special communication methods to meet special communication needs. This project was built after I left the area, so I haven't seen it in use.

Battle Point Park, Bainbridge Island, Washington. In 1975 Jones & Jones were selected to master plan two parks on converted military sites on Bainbridge Island where we lived. I undertook the work with local architect John Rudolph. Park Director Larry Burris was energetic and supportive. The future Eagledale Park site was a small, 2.7 ha (6.7 acres), former Cold War anti-aircraft missile site. This plan was not built during my time there.

I remember Battle Point Park very well. It was a labor of love and took far more time than we were paid for. Again, this was a demonstration of using landscape to support the needs of people. This former naval radio station totaled 36.5 ha (90.3 acres) with a 250 meter (800') high steel radio tower and bombproof concrete transmitter building. The site was generally flat and open, and the project budget was far too small. To save money my plan was built in 1976 as a construction training exercise by the US Army 864th Fort Lewis Engineering Battalion who bivouacked on site. It was fitting that soldiers would work to convert a military site to peaceful purpose. Also importantly, they saved the park district an estimated $100,000 (2.5 times more than the original construction budget). The young soldiers were learning to use heavy equipment, but their experienced Sargent insisted on achieving good quality. This seasoned Sargent and his soldiers were wonderfully dedicated to creating a legacy park. The Sargent told me he was about to retire after 25 years of military service and wanted to build one worthwhile and enduring project before he finished his career. One young soldier building a pond worked all night operating a huge excavator, knowing this equipment had to be returned the following day and unwilling to leave the work unfinished. John Rudolph and I often arrived in the evenings with cases of beer to show our personal appreciation for these hard-working lads.

A major feature of construction was unifying stormwater drainage swales directing water to two ponds. This required combining flow from both the northeast and northwest corners of the site. Soon after construction there was a massive rainstorm. These combined flows backed up, flooding an adjacent blackberry farm owned by a Japanese American family. There were many in this area. I quickly visited his farm to assess the damage. To my relief, he laughed, telling me his plants had suffered in a recent drought and now had a been very well watered!

Today the park provides three high quality softball diamonds, two soccer pitches, basketball courts, two ponds, a perimeter running track and a large central open space, the Great Lawn, as well as Park District maintenance shop and offices. This is the only park with formal athletic facilities I've designed, and it is very well used. Forty years after Battle Point Park opened, I was contacted by Park District Senior Planner Perry Barrett. He was updating the master plan and had the curtesy to locate me here in Australia to ask my opinion on his plans, which I happily approved. It is nice to be remembered.



Figure 32. Battle Point Park views. Photos: Joke Klein.

Gene Coulon Beach Park, Renton, Washington. David Towne, previously Seattle Parks Director responsible not only for our work with Woodland Park Zoo, but also many innovative Seattle public facilities such as Gasworks Park and the Seattle Aquarium, eventually joined Jones & Jones for a while. During this time his long relationship with other area park departments enabled us to win the design contract for a major new park in Renton Washington, on the southeast shore of Lake Washington. This 23 ha (57 acres) surplus industrial pier site included 1.7km (5400 feet) of lake shoreline.

My plan provided a popular boat launching ramp and park center with a 285m (almost 1000‘) long walkway over the lake accessing two floating picnic barges. We also built several hills (covering toxic waste) with scenic overlooks. One I called Weather Top was inspired by the Lord of the Rings novel. It was crowned by a circle of very large boulders. I am especially proud of the 200m (650’) double row of Sierra Redwoods. I had them planted to give form to the central area. Now they are over 21m high (70’) high. Johnpaul Jones designed the wonderful pavilions. Becca Hanson, David Roberts, and others developed construction documents and provided construction supervision. I last visited it in 2008. It is a very popular park today.



Figure 33. Left photo shows the central area with the line of Sierra redwoods in the background. Both photos show Johnpaul Jones’ wonderful architectural skills.

Pro bono local community projects 2006-2019. I met Mr. Micheal de Oleveira, then Director of Healesville Sanctuary, during our visit in 1999. Soon after moving to Healesville, I contacted him again. He was now a nurseryman and horticulturalist, very involved in community improvements. I mentioned to Michael that I was willing to design local projects as pro bono community service. Here are three examples.

Healesville Labyrinth Park. Michael introduced me to the Eastern Mental Health Services group wishing to build a labyrinth in Healesville. I agreed to design it for them providing it became a labyrinth park and not just a single patterned pavement. My design respected the adjacent historic railway by featuring recycled railway rails, ties and hardware, and paint colors in construction. Since the central labyrinth is circular, I used it as something of a seasonal observatory. Timber railway tie gate posts marked the cardinal directions as well as the angles of sunset and sunrise during the vernal and autumnal equinoxes. The design was enlivened by wonderful ceramic tile illustrations by area artist Ms. Veronica Holland and artistically composed assemblies of tiles made by local children and families. Yarra Ranges Council supplied Aus$240,000 in funding and I supervised construction. The project opened in 2007.

At this time a local Aboriginal group was building a “Belonging Place” across the town in Queen’s Park. I suggested an annual “reconciliation walk” by adherents from both groups be organized to walk between these two spiritual centers with picnics following. Today, sixteen years later, Labyrinth Park has matured nicely and is well maintained by the Council, but little used by the public. However, the Friends of Healesville Labyrinth organize annual winter solstice celebrations in the Labyrinth, and the Reconciliation Walk still occurs between the Labyrinth and Belonging Place on the Vernal equinox.

ECOSS Environmental Park 2006-2014. Micheal de Oleveira also introduced me to a group starting an environmental park in an old 7.4 ha (18.3 acre) poultry operation now owned by Yarra Ranges Council in nearby Warburton Valley. I was joined in this volunteer advisory service by Mr. Keith Jesse, experienced in the design and operation of environmental centers, and Mr. Graeme George, permaculture, and local ecology guru. The goal was to build, operate and teach organic and restorative agricultural practices. I helped led workshops to formulate their vision, prepared their 2009 master plan and update it in 2022. I also designed their water harvesting dam (built in 2012) and developed many architectural plans for converting the two old chicken house steel structures for meetings and classrooms. These plans were followed in concept, but not in detail. Conservative engineers from the Shire Council didn’t agree with our reuse and recycle philosophy, which didn’t meet their one-size-fit-all standards. Nevertheless, ECOSS is still highly active and popular with the local green and arts community after eighteen years (see images below).

Healesville Hospital Wellness Garden - 2019. While visiting the local Healesville Hospital for medical tests I noticed an area outside their lounge and nurses’ station with wonderful mountain views. I suggested to Head Nurse Christine Wittkopp that they should build a wellness garden there and I volunteered to design it for them. Christine

became my principal collaborator and is an amazing community activator and fundraiser. Healesville Hospital is part of the Eastern Health network, and they became my very collaborative clients. Mr. Ivan Tarrant, their project manager, was experienced and effective. Michael de Oliveira, my friend, and colleague, helped to organize the planting donations. Programmed Property Services were collaborative and did excellent work installing the project.

Wellness gardens are designed to relieve stress for patients, their families and hospital staff. Losing agency, control of your actions, situations and even your prospects is stressful. You lose all agency during hospital visits. Hospital staff may have more control, but their work environment is extremely demanding at times. Research shows that contact with nature reduces stress, contact with family members reduces stress and the simple action of stepping outside, turning you back on the locus of stress and moving your body can be enriching, especially if interesting distractions are provided. The wellness garden provides a wide variety of situations, social places, private places, sun, shade and rain protection, tight secure introspective places, and spaces with prospects of distant mountains. The acoustic environment of wind blowing, water flowing or bubbling, birds singing, insects buzzing is important as is the olfactory setting with fragrant flowers and pungent-leaved herbs. Seasonally changing floral and leaf colors create enthusiastic and joyful areas and somber, restful areas. A special feature I added was a wide variety of potted herbs organized by the of the Mediterranean, East and Central Asian and Aboriginal cuisines. These herbs were grown and provided by permaculture specialist Mr. Graeme George. A wellness garden is a sensory garden.

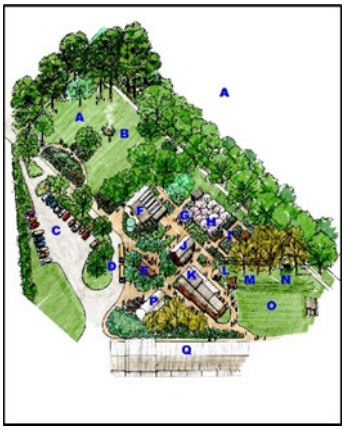
Art is also important. I arranged for a lovely, spirited, and dreamlike painting by Ms. Veronica Holland called ‘Garden Dreaming’ and an Aboriginal painting by Ms. Jo Voce, Eastern Health Aboriginal Hospital Liaison Officer and Wurundjeri Woman who also organized drawings by Wurundjeri children.

In keeping with my other community projects, the wellness garden was constructed from recycled materials such as bricks and timbers and all plants and planting were donated. Total construction cost was Aus$90,000. All this funding was donated, half from Eastern Health Foundation and half by local donors of funds, materials, and labor. The large rose arbor and many plantings were donated as memorials to diseased loved ones who had been cared for at this hospital. The garden is thriving today, lovingly cared for by a volunteer in memory of his wife. Hospital staff especially appreciate the garden during their breaks


Healesville Community Labyrinth
31 October 2007 Jon Coe and Rivendell


Heal our past
Build our future
11AM
Healing Walk at
H'ville Labyrinth
Railway Park, Healesville
FREE COMMUNITY DAY
Sunday 19th March
2017
ALL WELCOME
12 NOON
Welcome to Country
Free Bush Tucker BBQ
Brett Lee Concert at
Belonging Place
next to HICSA 1A Badger Creek Rd
CLOSE THE GAP




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Upper Yarra Community Environment Park
Our Vision is to create sustainable solutions for the Upper Yarra Region.
Our Program
Village Area Concept Plan

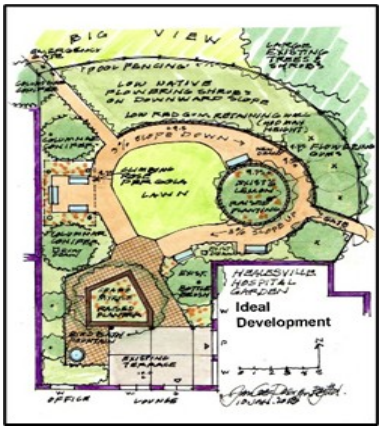

BIG VIEW
Ideal Development





Figure 34. Upper left: my sketch for the Healesville Labyrinth Garden. Upper right: announcement for the ongoing Reconciliation Walk between the European labyrinth and the Aboriginal Being Place I suggested in 2006. Second row: master plans I prepared for the ECOSS Environmental Centre. Third, fourth and fifth rows: Healesville Hospital. Third row: plan and perspective drawings. Fourth row: photo of completed garden and volunteers doing the planting with Michael de Oliviera (at garden cart). Fifth row: rose arbor and painting by Veronica Holland. Aboriginal artwork: small panels by children, a large panel and Aboriginal community contact by Jo Voce and platypus bench by Rob Bast.

CHAPTER SIX - DESIGNING FOR THE LAND

Introduction. I have worked in fifteen countries. This chapter describes work in four of these countries in which local people played important roles, but the land itself was the hero most in need of thoughtful and respectfully designed shaping and restoring.

Mackenzie River Highway Environmental Impact Study -1971. Working with Lombard North Planning, my most memorable experience in environmental impact evaluation was participating in the study of the proposed one-thousand-mile-long (1600km) highway along the Mackenzie River connecting Yellowknife, the capital of Canada's Northwest Territories on Great Slave Lake to Inuvik on the Arctic Ocean. We had two contracts. The first was to prepare an overview of the entire length of the proposed highway. The second was to study the upper third of the river corridor from Norman Wells past Fort Good Hope to Tuktoyaktuk on the Arctic Ocean. The mighty Mackenzie River is 6.5 km (4 miles) wide in places and becomes the only highway when it freezes during winter and trucks travel on deep ice. There is also limited barge traffic during summer. The river follows the eastern edge of the Mackenzie Mountains, the northern extension of the Rockies at 60-68 degrees north latitude. I was on the northeastern edge of the two great ranges extending south to Patagonia where we had traveled to 60 degrees south latitude in Patagonia.

Along the mighty Mackenzie the only widely separated settlements were associated with natural gas operations housing fly-in-fly-out technicians. The local population were Native Canadians living traditional subsistence livelihoods. These include the Shuta Got'ine, An Athapaskan-speaking group on the Mackenzie Mountain slopes and along the Mackenzie River in the areas of Good Hope, and Norman Wells. The Slavey, a main Dene sub-group, also live along the Mackenzie River. Interestingly, the Navaho people of the American Southwest are descendants of the Dene and refer to themselves by that name, which simply means "the people".

We surveyed this vast site by float planes, frequently landing on the river and staying in gas well camps. Float planes are noisy and cramped. Spiraling tightly while taking photos soon leads to motion sickness. Fortunately, the understanding bush pilot landed on the river occasionally, allowing my stomach to settle. The farther north we flew the more land turned to water with countless oval lakes formed over the permafrost (permanently frozen soi). A thick layer of moss and stunted black spruce insulates the soil, keeping it frozen during summer. Permafrost turns semi-liquid and very unstable when it melts, for example if this insulating organic cover is removed during highway construction. Engineers call areas of permafrost "ice rich soils." All road construction requires "ice-poor soil," the sand and gravel found in rivers and drumlin glacial formations. While these sources are commonly available they are also critical wildlife habitats. River gravel bars are critical resources for fish egg laying and gravel hillsides are critical habitats for bear and wolf denning. We were evaluating the possible biodiversity impacts of the road alignment suggested by the highway engineers. Suggested road alignment was directed from gravel source to gravel source to provide

needed ice-poor construction material. The engineers had aligned the future highway past what they thought to be a drumlin, an ice age gravel hill and excellent source of road gravel. Mr. Claude Muret, our aerial photo interpretation expert, identified this feature nots as a stable drumlin, but as an active “rock glacier.” This unstable hillside would constantly encroach on any highway cutting. The proposed alignment was then changed.

Completing our three days of float plane travel north, we landed in the hamlet of Tuktoyaktuk, an Inuvialuit word meaning "place resembling a caribou” and spent one night at the Mad Trapper Inn. Arriving late in the extended arctic summer daylight, I was able to enjoy seeing sunset over the arctic Ocean. Entering this cozy tavern, I was amazed to hear for the first time in high fidelity, Roberta Flack singing “Killing me softly with his song.” Hearing this hauntingly urban music in one of the most remote places in Noth America shocked me. The owner-bar tender, a young woman, told us she lived in Los Angeles, where she had access to the latest popular music, and worked up there for the summer season.

We were able to prove that this highway could not be built without serious environmental impact, and it has never been built, although there is now a road along the lower third of our route.

Moose Creek Dam Fairbanks, Alaska.



Figure 35. Photo of me posing beside super-sized plans for the vegetational renewal of Moose Creek Dam outside Fairbanks Alaska. We used big drawings for big projects in those days. Photo by Jones & Jones.

This was my first major work in ecological restoration or “rewilding” as it is sometimes referred to today. Working for Jones & Jones at the time, our client was the Alaska Office of the US Army Corps of Engineers. Mr. David Walters and I developed plans (report recommendations and landscape “soft engineering” drawings) for the revegetation of the 11km (7 mile) long Moose Creek earthen dam north of Fairbanks Alaska. The clients expected us to plant spruce trees to “beautify” their project. Instead, I converted the vast heavy-handed engineering design into ecologically based forms. The long, high dam structure and alignment couldn’t be changed and large areas of

northern riparian vegetation, mostly birch and willow, both up and downstream, had to be cleared. Tree roots were not allowed to penetrate the structural planted dam. In response, I showed filled areas added to side slopes where trees could be established. Straight engineered groundwater interception channels downstream from the dam were repatterned to resemble and function like local stream meanders. The corridor of clay channel lining placed by the engineers upstream from the dam to prevent water seeping under the dam would naturally be repopulated by native *phragmites* reeds. I also showed how acres of cleared forest debris, rather than being burned, could form river debris islands downstream, gradually to be converted to soil. These ecologically based strategies would allow natural boreal forest regeneration to take over the work of restoration. A single birch tree can distribute millions of seeds each year. Our strategies could save on substantial construction costs. These techniques were learned from my previous work in Northern Canada's Mackenzie River district and from ecological publications from the University of Alaska. Our plan was formally accepted, and I called the project a success until recent Google Earth photos showed me that our plan had been completely ignored.

Homer Hydroelectric Impact Study – 1982. The mountains of the Kenai Peninsula rises 305m (1000') above Kachemak Bay across from Homer Alaska. Lake water from this elevation could drop through underground tunnels to a proposed Swiss style (underground) hydroelectric plant at sea level. Nothing would be visible other than the overhead transmission lines leading away. I headed the Jones & Jones study to assess the environmental impact of this proposal. Dr. Dennis Paulson, our consulting ecologist, was unavailable so I contacted Dr. Steven Herrero, University of Calgary wildlife ecologist, to be our wildlife expert. Steven and I had collaborated on previous Canadian conservation efforts including our successful protests to prevent a high-rise sky resort from being built at Lake Louise in Banff National Park. Stephen had become a world expert in management of wild bears. Kodiak bears were common in this area as evidenced by many fresh footprints we found during our study. This was more of a camping holiday than ecological study. A float plane from Homer flew us to a high perched lake, where we camped, well supplied with fresh-caught local prawns. After a few days the float plane returned (with more fresh prawns) to take us to the far end of the same small lake, which was inaccessible by land. The following day the plane, with a canoe attached to one float, transported us down to Kachemak Bay to explore the nearby shore to assess the impact of the proposed powerlines. We wanted to keep the area entirely wild, but our study showed environmental impact could be manageable. Fortunately, from our perspective, this hydrological project was abandoned for financial reasons, and I am happy to see on Google Earth that the area remains undeveloped to this day. However, such an example of low impact sustainable energy supply may be superior to new energy alternatives for remote cities like Homer.

Jiuzhaigou National Park, China - 2007. After completing our work for the Giant Panda Center in Dongkoucao (please see Chapter 7), I was invited by Mr. Andrew Scanlon, project manager on the giant panda project, and Park Director Zhang Xiăopm

to contribute to planning Director Zhang's main interest, Jiuzhaigou National Park, also in Sichuan Province, This is one of China's most beautiful and popular national parks containing amazing azure lakes and travertine cascades surrounded by high mountain peaks. It is in a Tibetan ethnic region with wonderful cultural architecture. Visitors in their thousands arrived at the park entry complex. Most arrived in scheduled tour pusses with about forty passengers each and followed their banner waving guide to queue for the park buses taking them into the park itself. This vacation travel was very expensive by local standards and tours were tightly scheduled, with little free time. One result was that visitors rushed past the new interpretive center without entering. I was asked how to encourage more attendance in this exhibit and administrative building. I sketched a dramatic Tibetan style gateway in front of the otherwise unattractive entry which was well- built but had little effect. The existing large entry area was an anachronistic Western style park with rose bushes, trim boxwood hedges and potted annual flowers. Why not reestablish a beautiful native temperate forest landscape here for visitors to learn about the local ecology while enjoying natural shade in the long queue lines? Central Asian temperate forests are home to so many popular ornamental plant species, such as *Rhododendron, Camelia, Azalea, Buddleia*, and many species of cherry, birch and pine. Such a carefully curated forested area would be attractive, informative and provide the shade needed. It could also screen the long lines of visitors from each other. In a national park the spectacular landscape and relatively intact biodiversity should be the heroes. Or was this only my imported Western ideal? In speaking to a class of Chinese university students, I complained that most visitors were preoccupied in turning their back to the amazing natural views of waterfalls and azure lakes to take "selfies" with their phones. They missed examining the unique landscapes they came to see and experience. One student replied that this was the same in the USA. Sadly, he was correct.

Flying from the regional capital of Chengdu to Jiuzhaigou National Park required landing at Jiuhuang Airport on the Tibetan plateau with an elevation of 3,448 m (11,312 ft). Oxygen masks are provided to arriving passengers when needed. The drive down to the park entrance at elevation1,990 m (6,529 ft) takes about 1.5 hours by car. This is a beautiful drive with only one billboard posted along the way. I was invited to give a talk at a tourism conference hosted by the park as an "expert in national parks." During this presentation in front of a room filled with important Chinese officials, I recommended the highways leading to Jiuzhaigou National Park be officially designated as National Scenic Highways. I suggested the revenue gained for high quality tourism would be far greater than earned by billboards, which would not come to the government in any case. I was pleased to see nods of agreement in the front several rows occupied by the most important officials. I assume nothing came of this initiative but wonder at how close I may have come to having an important effect on Chinese national open space management policy.

Although I made four visits and produced many creative ideas, few were realized. The only recommendation followed was to close the well-used back gateway which

channeled visitors staying in the town past many staff areas. This was hardly a proper entry experience to a national park. While all my recommendations and supporting sketches were carefully reviewed by Park Director Zhang Xiăopm, this was the only recommendation implemented. I mention this work, and the takin wildlife study that follows, as examples of projects where the impact of the experience was largely to my benefit rather than to the park users. I enjoyed enormously these opportunities to study and experience the Central Asian temperate forest myself. Also, my introduction to Chinese Tibetans and their modern-day culture was notably rewarding.

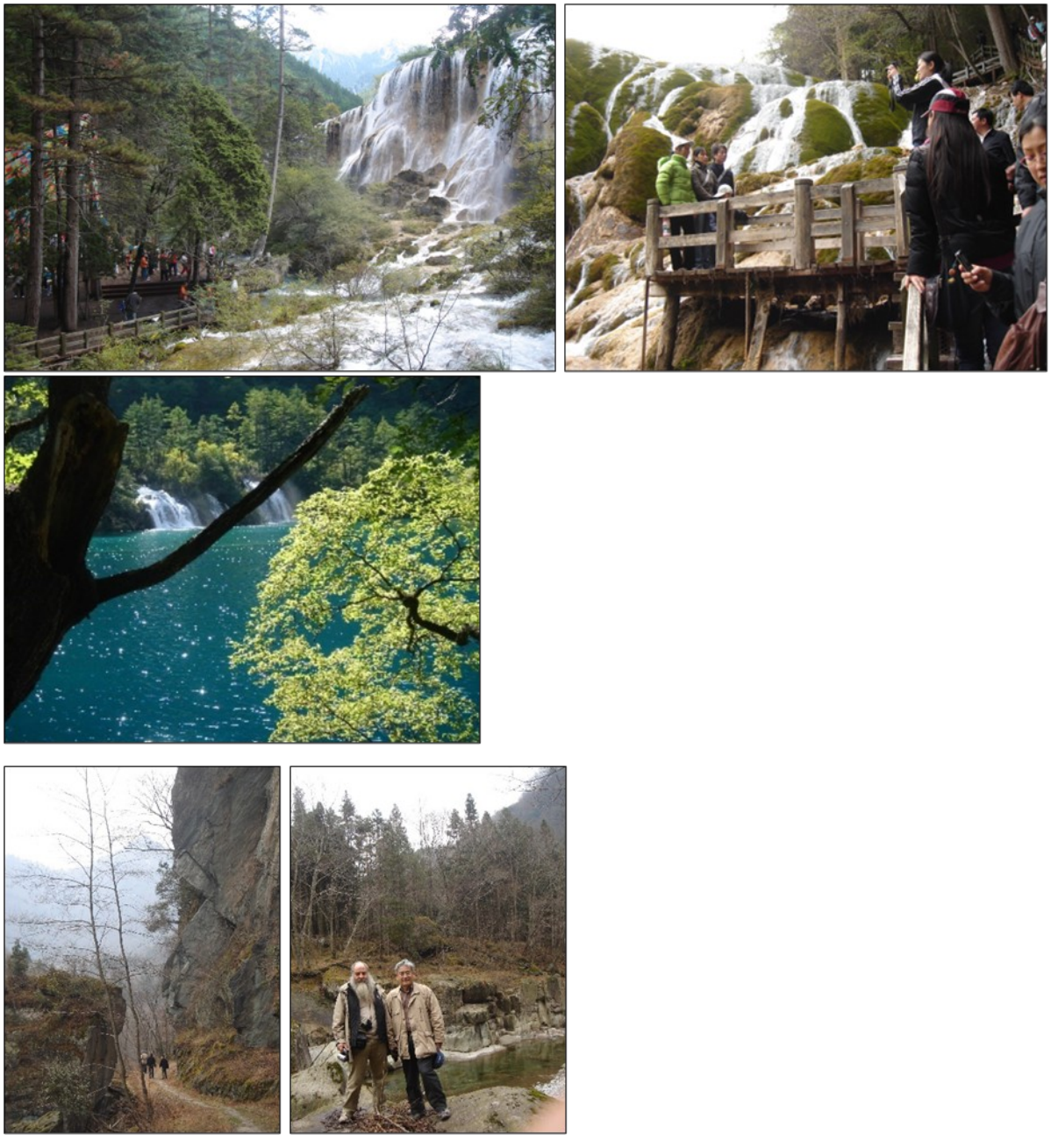


Figure 36. Top row: natural travertine dam and cascade, a rare geology I also later found in Afghanistan. Tourists queuing to have their photos taken in front of the scenic attraction rather than observing it

themselves. Centre: clear, azure travertine lakes surrounded by Asian temperate forest. Bottom row: Tangjiahe National Nature Reserve and early spring site photo with Mr. Keith H. J. Kuo, landscape architect from Taiwan.

Tangjiahe National Nature Reserve¸ China - 2008. I was invited, together with Mr. Keith H. J. Kuo, Architect, Landscape Architect and Planner with EDG International of Taiwan and previous head of Tiawan National Parks, to develop a master plan for Tangjiahe National Nature Reserve in the Min Mountains along the northern border of Sichuan, China. This was one of the last refuges of the Sichuan or golden takin. These are relic ice age beasts phylogenetically midway between North American mountain goats and arctic musk oxen. In summer takin disperse into surrounding mountain slopes. In winter they concentrate in large herds in the narrow 'Y' shaped valley. This winter refuge is essential to their survival. The Chinese government, keen to increase nature tourism to replace jobs lost to reduced logging, planned to convert this fragile valley into a tourist park. They insisted, despite our objections, that we locate the main park accommodation within the narrow valley rather than outside it.

Keith and I discovered through our own exploration that takins, like zebras in the Serengeti, take little note of people in vehicles, but immediately take fright from people on foot. We designed the tourist centre as a walled enclosure containing tourists, who were to be guided through the park in narrated tour buses. Takin were to be attracted to roadsides by the provision of browse forage plants grown and distributed by local farmers. This would be a highly managed facility, part free-range zoo and part nature park.

I completed our strategic plan report with Keith's review, and we both returned to present our plan to park authorities. We gave our presentation through translators. Then, after a long afternoon of speeches in Mandarin without translation, we were dismissed. Later Keith, who spoke Mandarin, told me our recommendations had been discarded. We were what Keith called "trophy experts", foreigners brought in for show and then ignored. There is hope for the takin. High tourist season is during summer when they are dispersed on the high slopes. While this outcome remains vexing, I did see and learn firsthand about these amazing beasts, the landscape supporting them and the misguided policies threatening them.

Band-e-Amir National Park Visitor Facilities Zone Physical Development Plan - 2011. On my first visit to Afghanistan with UNEP in 2009 (please see Chapter 8) I saw an unexpected familiar face in the hotel bar, Mr. David Lawson. David was the Northern Territories client when I worked on the Territory Wildlife Park planning in Darwin, Australia in 1998. He was now Head of Mission for the Wildlife Conservation Society (WCS), the international conservation arm of the Bronx Zoo. WCS had charge of development and management of Band-e Amir National Park, Afghanistan's first and only national park at the time. They were also doing endangered wildlife research in the high Wakhan Corridor in Northeast Afghanistan.

This 720 square kilometer National Park, established in 1987, features a high plains ecosystem at about 3000m (10,000ft) elevation. The focus of this semi-arid rolling landscape is a stunning system of six interconnected travertine lakes. These were formed when groundwater moves through calcium-rich soil creating super-saturated water, depositing travertine (hard limestone) when this water evaporates. These deposits build up over time creating natural dikes, some as high as ten meters (30ft) or more. These formations are rare. I had experienced another one when working with Andrew Scanlon at Jiuzhaigou National Park in Sichuan, China. Other examples are found in Türkiye, Croatia, and Iran. Yellowstone National Park's Mammoth Hot Springs is a fine example of these formations.

I first visited Band-e-Amir with Andrew Scanlon in 2009 and in 2011 was invited by WCS to design the park's visitor accommodation zone as part of the WCS Band-e Amir National Park Management Plan being developed by Canadian naturalist Dr. Chris Shank and published in 2016.Here is a quote from Chris in the introduction to this report.

"Band-e-Amir lakes, with their crystal-clear, azure water separated by travertine dams and surrounded by spectacular red cliffs, comprise one of the world's most uniquely beautiful natural landscapes."





Figure 37. Upper left: Band-e Kaybulant, the main tourist area. Upper right and middle row: lakes Band-e Myanaband and Band-e Zulfigar. Lower photos: two views of the massive travertine dike containing Band-e Kaybulant.







Figure 38. Upper row: spring flowering plants of these arid grasslands. Left to right: fox tail lily (*Eremurus* sp.), ground orchid, miniature aeroid, like a tiny skunk cabbage, with small matchbox to show scale, primrose (*Primula* sp.), cherry-like low shrub (*Prunus* sp.). Wild crocuses are also found here. Centre left: Dr. Habiba Sarabi, Honorable Governor of Bamiyan Provence giving a speech at the park. I briefly worked with her designing a new central park for the new government center in Bamiyan town. Center right: A broad coalition of national armed forces were guarding Afghanistan against the Taliban in those days. Band-e Amir National Park was guarded by a small force of Malaysians, who also provided a medical team to improve local community health. This soldier asked to have his photo taken with me. Lower: a large Afghan family sharing a meal next to construction equipment before proper accommodations were provided. Su7sh unregulated use destroyed local vegetation.

During this month-long mission I stayed with David Lawson in the WCS guest house when in Kabul and shared a small village house in Band-e Amir with Mr. David Bradford, a congenial and lanky South African who headed the WCS field team training park rangers and interacting with the leaders of the several local villages.

A national park (IUCN Category 2) is not considered a wilderness and is managed to provide for human visitation and its supporting infrastructure if these developments do not interfere with the park's conservation values. However, local villages are not encouraged. Most private property has been removed from national parks in the USA. Band-e Amir had long been a popular tourist attraction not only for its unique beauty but also its purported healing waters. There was a tradition that women unable to bare children or with related problems could be healed by complete immersion in this water in front of the old shrine. Afghans, being desert people, rarely know how to swim. Unfortunately, this sometimes resulted in women having a rope tied around their waste before being bodily thrown into the fridged water. I was told one woman nearly drown because her wet clothing became tangled with unwater travertine outcrops. She was revived by the Malaysian military nurses assigned to the local villages.

Local villagers traditionally arranged their shabby bazaar (shops and food outlets), essential income generators, next to the lake front area most accessible to tourists. Unregulated camping and parking have destroyed the local vegetation. This was offensive to Western aesthetics and conservation values. The WCS management plan required these shops to be relocated some three-hundred meters away from the lake shore in an inconspicuous valley where they would not detract from the stunning natural

landscape. This location was not clearly visible to arriving tourists. This narrow valley was also prone to flash flooding. Naturally, local merchants resented this interruption in their traditional ways and incomes. Nevertheless, the bazaar was moved to the indicated location, and an initial toilet block had been installed before I arrived. WCS staff fenced off much of the popular lakefront area and successfully restored native plantings. Working with the WCS team, my job was to design culturally appropriate and profitable visitor accommodations concepts which did not compromise the ageless beauty of this fragile landscape.

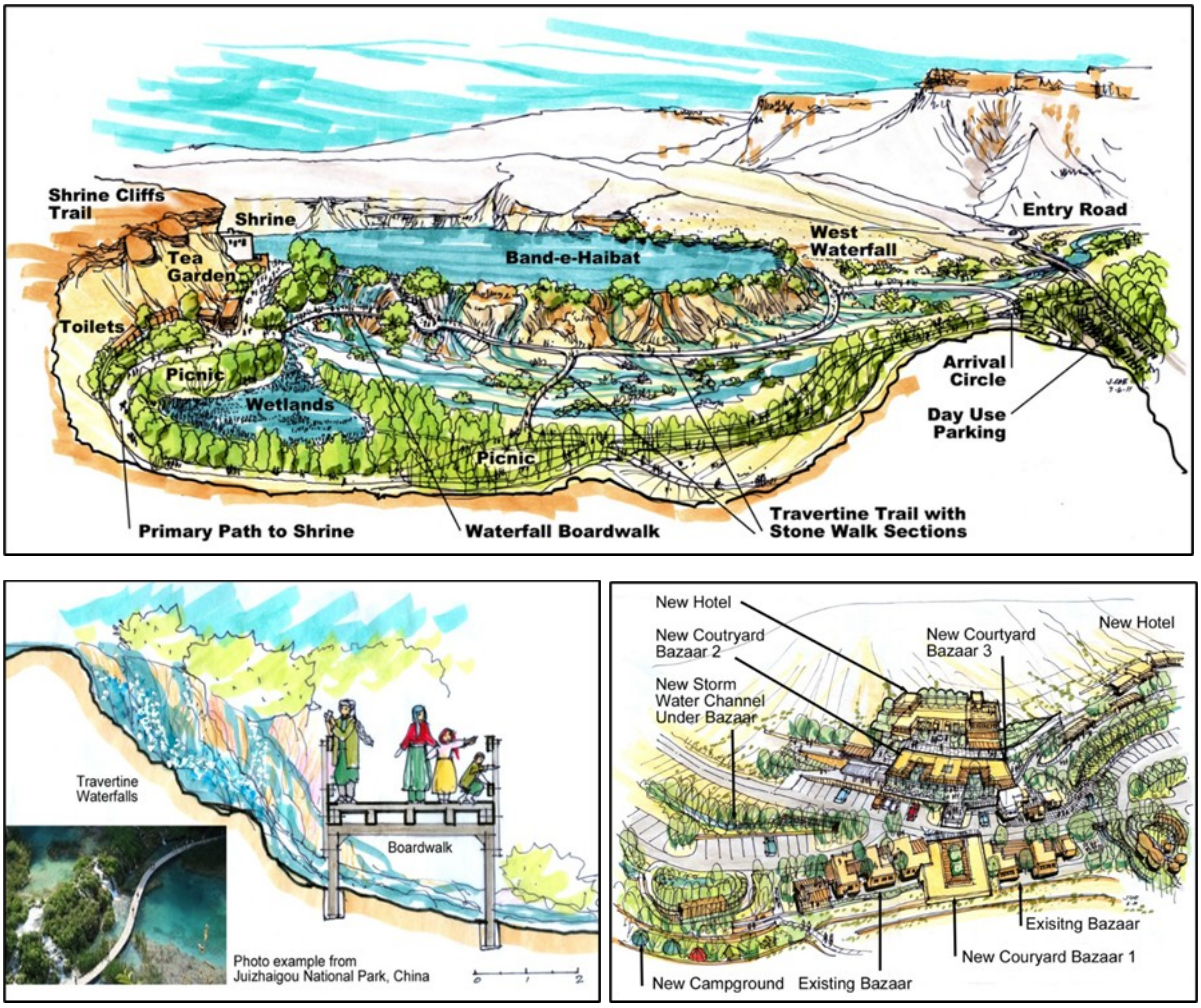


Figure 39. These are a few of my drawings illustrating our development concepts. Upper drawing: this panoramic view shows the previously cluttered commercial area restored to a natural travertine wetland traversed by a boardwalk system detailed in the lower left image. Lower right: my concept for a dense bazaar with guest accommodation and parking. Other plans included a family camping area with privacy screen walls and innovative toilet and shower facilities.

My plans were accepted, and some initial work accomplished. Wondering what the situation is like after Taliban take over, I checked updated Google Earth images. The new bazaar I helped to plan was partly developed, but without WCS or government control the makeshift bazaar has also returned to its original position. Taliban no longer

permit women to enter national parks, claiming their place is in their homes. Low barriers created by WCS appear to protect the fragile replanted lakeside areas. Since those days I have stayed in touch with naturalist Chris Shank. I visited him at his home outside Calgary Alberta in 2012.

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CHAPTER SEVEN – LEARNING WITH PEOPLE, PLANTS & ANIMALS in Zoos, Aquariums and Sanctuaries

Introduction. In previous chapters natural landscapes including wildlife, or people themselves, were the heroes to be celebrated, protected, supported, or healed. My growing attraction to and empathy for novel people, places, plants and animals began to expand into the realm of unique animals and plants in human care, in zoos, wildlife sanctuaries and botanical gardens. This peaked briefly with my master's thesis "Artificial Habitats for Captive Animals", about zoo design based upon animal behaviour and global biomes described in Chapter Three. However, it would be seven event filled years before I had my first opportunity to design a zoo. These stories cover times I was employed by Jones & Jones, Architects and Landscape architects in Seatle Washington through my partnerships in Coe & Lee, CLRR and CLRdesign, all in Philadelphia and concludes with projects by Jon Coe Design ltd. in Australia.

Northwest Trek Wildlife Park -1974. Soon after joining Jones & Jones in Seattle we won our first zoo design contract for the planning and design of Northwest Trek Wildlife Park in the Mt. Ranier foothills in Eatonville Washington. This property owned by Dr. David and Ms. Connie Heller already had a private collection of native hoof stock including moose, wapiti (elk), mule deer, mountain goat and later acquired bighorn sheep. Concerned about the continuity of their beautify enterprise, the Hellers donated the land to the Tacoma Park Department which also owned Point Defiance Park Zoo and Aquarium and who became our client.

Grant Jones and I surveyed the 290 ha (720 acre) site of deep evergreen and alder forests, a swamp, marshes, hills, and grasslands, in his vintage Land Rover and on foot, noting where these wildlife species chose to live. We then designed visitor tram roads connecting these animal-favored locations in the most inconspicuous and least damaging way possible. We studied viewsheds and located roads so that visitors in one tram would not be distracted by seeing other trams in their views.



Figure 40. Free-ranging wapiti and lake seen from the tour coach in 2012.

I designed exhibits for smaller animals like beavers, otters, badgers, and wolverines modeled after the innovative naturalistic displays at the Arizona Sonora Desert Museum in Tucson, Arizona I had visited during this work. This innovative outdoor natural history museum was directed by Mr. Merv Larson, a talented designer and builder. In 1976 he left the museum to found the Larson Company the leading zoo design-build firm in the USA in the 1980 and 90's. This company now operates globally as Larson Themed Construction. My beginnings with Merv Larson didn't go well. I had made an appointment to meet him at the Arizona Sonora Desert Museum. I was then beginning my zoo design career and unknown to him. He was busy, kept me waiting, spoke briefly to me and handed me off to his then lieutenant, Mr. Rick Dyson. Rick was friendly, interested in my projects and shared his time and experience freely. During the time we planned Northwest Trek, Rick left the museum to found his own artificial rockwork (mock rock) firm he called Cemrock. We then hired Cemrock to build the small mammal exhibits for us, and later, the exhibits at Woodland Park Zoo and many of my later exhibits. This infuriated Merv Larson.

In hindsight modeling our small mammal exhibits after those at the Arizonia Sonora Desert Museum recognized their groundbreaking realism and beauty but was a mistake in terms of exhibit size. Our exhibits turned out to be far too small for such active animals, especially the mustelid family such as otters and wolverines. Much larger areas of natural forest were provided for wolves and bears.

I designed the entry roads and car parks and located many facilities directly in the forest using stakes and strings, rather than designing them on paper in the office. Surveyors then prepared construction drawings from my staked field layouts. I have used this technique many times on future projects. This was often cold field work in drizzling rain and 5C (41F) temperatures. I returned home at night several times to dry my wet field drawings on an ironing board only to find the rain had smeared my pen writing and washed away my pencil notes. The benefits of designing in the field were also memorable. Large Douglas fir trees cleared for road and parking areas were sold for lumber, offsetting much of the construction cost. Overall, Northwest Trek, which opened in 1975, remains one of the finest "safari parks" in the world almost five decades later.

Woodland Park Zoo. In 1974 a master plan for the renovation of Seattle's Woodland Park Zoo by Architect George Bartholick was opposed by citizens not wanting to lose half of Woodland Park to zoo expansion and for being financially unrealistic. Seattle City Council negated this plan, leaving zoo redevelopment funding of USD$4.5 million (a huge sum in those days) waiting for a new plan. Mr. David Hancocks, an English zoo architect consulting to Bartholick, was retained to pick a new design firm and fortunately we at Jones & Jones were awarded the new planning contract in 1975.

Our team was led by Grant Jones, landscape architect, architect, poet, and Harvard classmate, consulting ecologist Dr. Dennis Paulson and me. Supporting team members included architect Johnpaul Jones (no relation to Grant) and landscape architect John Swanson. David Hancocks was the City's project manager. David, Grant, Dennis, and I

were the principal authors of the resulting 1976 “Woodland Park Zoo Long-Range Plan.” This became a sold-out model for “landscape Immersion” zoo design and is widely considered a classic resource today.

With my zoo thesis background, and all the zoos I had visited, I assumed we would model improvements on the best existing zoos, and the best animal management practices of the day. However, David Hancocks’ firm admonition was “You won’t learn anything from zoos, look to nature as the model!” This suited our team wonderfully, both logically and emotionally. This was in fact the point of my thesis, to use global bioclimatic zoo organization and natural animal behaviour rather than modern zoos to drive our design ideas.

Using Grant’s site analysis overlay system, I spent countless hours studying the existing zoo site. I calculated tree shadow patterns using summer, spring/autumn and winter sun angles for our latitude using existing tree cover maps. This defined our site’s landscape infrastructure and microclimate. If we wanted to create a forest biome for gorillas, it would go in existing tall groves. Open plains exhibit for giraffes would go in existing open lawn areas. I assembled a large folio with dozens of hand drawn overlays. With these we collaborated on organizing the entire property into biomes, even selecting pedestrian circulation systems linking biomes into adjacencies as they are experienced when traveling internationally. For example, tropical deserts are adjacent to tropical grasslands, these connect to savannas or woodlands leading to tropical dry forests then to tropical rainforests along a rainfall gradient. So, we organized our zoo exhibits in a similar sequence, while also fitting them to site vegetation patterns. As Grant Jones liked to say, “We let the site tell us what it wanted to become.”

The most important of our teams’ inventions was what Grant named “landscape immersion”.

“I originally coined the words “landscape immersion” to describe the responsibility of the strategic design to give a wild home place for each animal to adapt to (not an exhibit or landscape painting to peer into from a sidewalk). I wanted to cultivate the responsibility of each visitor to enter the animal’s private domain as a respectful intruder carefully passing through the animal’s habitat in an intimate experience that might, if as a visitor you’re lucky enough, include the animal’s own decision to interact on its own terms with you, or being thus comfortable with you on its own terms to retire off view.” [1]

Not only were we copying nature with great realism rather than copying other zoos, but we also intended zoo visitors to walk through, be immersed in the animals’ accurately simulated natural habitat. Only then would they discover the animals (separated by invisible barriers). I overheard a visitors say, “What keeps the gorilla from walking up and tapping us on the shoulder?” The human physiological-behavioural basis for

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landscape immersion design is defined in my 1985 Paper *"Design and Perception, making the zoo experience real"*[2] This paper has passed thirty thousand "reads" on the "Research Gate" online research site. This approach has three main focuses:

- Animal welfare will be enhanced by recreating the habitat in which the animal evolved as closely and richly as possible. This includes both facility design and design of management procedures, such as allowing gorillas to climb trees and providing and changing naturalistic behavioural enrichment features of interest to individual species. I call this the 'biocentric' philosophy, that nature knows best, as compared to the modernist 'anthrocentric' philosophy that humans and their technologies know what is best for animals. However, we accepted the modernist approach in designing the animal's climate controlled off-display management facilities. The animals seemed to benefit from both approaches.
- Visitors' experiences will benefit from being "transported" from the modern zoo to another time and place, such as the African savanna or the gorilla rainforest. The cognitive mind knows you are visiting the zoo, but the emotional mind "feels like" you are in the rainforest with gorillas. Strong emotional experiences make strong memories and stimulate learning. These visitor experiences were choreographed like theatrical or dance performances by mapping sequential "scenarios" or "storylines" I wrote as if I were walking through the actual scene and describing what already existed. These scenarios documented the specific proposed location, geography, landform, exposed geology or soils, plants, site ecological evolution and the viewer's visual relationship to landscape and animal inhabitants. We wanted these simulations to be of such quality than an expert scientist, geologist, or botanist, experiencing the exhibit, would say, "Yes, that looks right." Sceptics may say, "Why bother. Ordinary visitors can't tell the difference." I would respond, "Why limit the exhibit's teaching potential to a low level? Why not further enlighten, whatever education level the visitor has?" Zoos should lead and not follow popular tastes and styles.
- Reciprocal benefits to both visitors and animals. In both my 1985 paper (footnote 12) and 1984 paper The Coe Jones Rules[3], I list the "rules" of what has come to be known as "immersion design." One example is that exhibits are designed with the animals positioned above viewers, so that visitors "look up to" (respect) and don't "look down on" (disrespect) the animals. Being above strange humans is likely to make animals less stressed and more in command. Looking up to the animals predisposes visitors to learn from the animals. Thus, both visitors and animal's benefit. Certainly, demonstrating respect for animals, plants, and all of nature is our primary design goal.
- Implied conservation. Mary Akeley, wife of the famous museum taxidermist Carl Akeley, wrote that animals cannot be fully understood when taken out of context. To understand the animal one must see it in its natural habitat. This was

[2] Coe, Jon C. (1985) Design and perception, making the zoo experience real. Zoo Biology vol.4, no. 2, pp197-208.
[3] https://joncoe.net/wp-content/uploads/2021/12/TheCoe-JonesRules-1984.pdf

> demonstrated in Akeley's amazing museum dioramas. We took this idea further, asserting that animals and natural habitat landscapes are inseparable. If we are to save gorillas from extinction, we must save their habitats from destruction. Thus, we hoped that showing gorillas in a realistic simulation of their natural habitats would embed the implied conservation connection in visitor's minds. Visitors would support habitat protection. Looking back today, I do not believe that an implied conservation message is sufficient to evoke positive conservation action by visitors. William Conway's wonderful Congo Exhibit at the Bronx Zoo takes the immersive implied conservation farther with active conservation donation stations and a modest conservation directed admission price.

In addition to using microclimates to organize exhibits and landscape immersion principles, David Hancocks also wanted the design to include a second major concept, "social biology" developed by E. O. Wilson. This meant that social species would always be exhibited in social groups, never alone.

We assembled our overall concept for Woodland Park Zoo into a preliminary report for City Council to assure their support before we went further in development of the master plan. To our astonishment, immediately after our presentation and before any discussion, the chairman called for a vote to approve the Woodland Park Zoo Master Plan! This early draft was approved as the full master plan to release the funds for zoo redevelopment! Rather than continuing the planning work we were instructed to begin design of the first phase projects, the new Gorilla Forest, and African Savanna, Monkey Island and Waterfowl Marsh exhibits. David Hancocks was appointed Zoo Director and the team's work continued. It was only after completing the exhibit designs that we published the 1976 Long Range Plan[4], which became the "how-to-journal" on naturalistic zoo planning and design. It sold out soon and was reprinted by the Seattle Parks Department. In 2004 while with CLRdesign, I was commissioned to write the updated "Woodland Park Zoo Long Range Physical Plan." This is the version available today.

How do I now see my role in the 1976 Long-Range Plan zoo design breakthrough? Grant Jones, as principal of J&J, rightfully is listed as lead author. David Hancocks and Dennis Paulson put us and kept us on the right paths. I take credit for human behavioural insights and did most of the writing, illustration, and exhibit design in the Long-Range Plan, and the actual exhibits which followed. J&J architect Johnpaul Jones led naturalistic design of architectural features. Landscape architects including John Swanson, Dave Walters, Kai Makami and Peter Harvard transformed my sketches into buildable construction documents, inventing new construction details to achieve these highly naturalistic forms. Artificial rockwork fabricators Rick Dyson of Cemrock working under Jolly Miller contributed to our joint success. The resulting work was highly collaborative. My work would never have been as insightful or innovative without these

[4] https://joncoe.net/wp-content/uploads/2022/04/Long-Range-Development-Guidelines-and-Exhibit-Scenarios-WPZ-1976.pdf

complimentary and interactive team members. For more details on this important period in zoo design history please see these books listed in the footnote below[5].

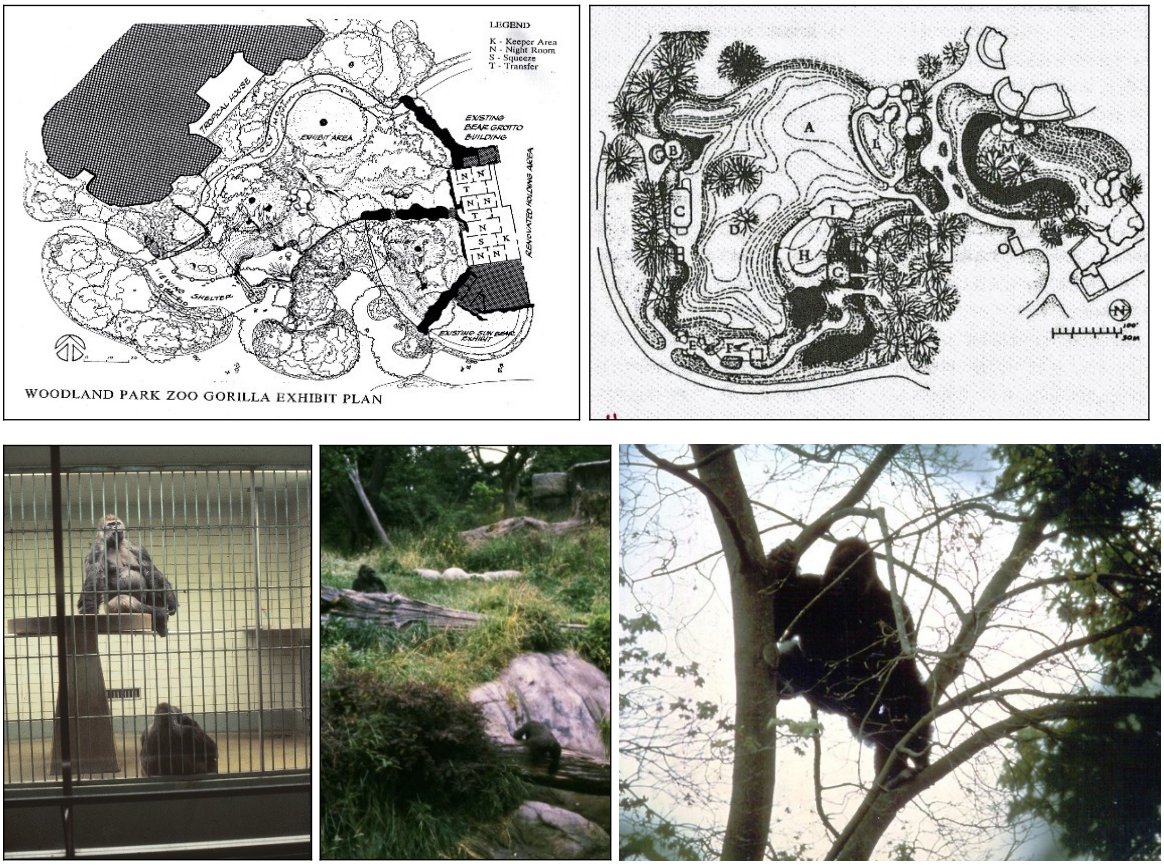


Figure 41. Upper row: drawings I made illustrating my design for the world's first immersion Gorilla and African Savanna exhibits. Note the visitor paths winding through the landscape rather than outside exhibits looking in. Lower images: two gorilla exhibits I photographed at different zoos in 1978 showing our remarkable revolution in gorilla facility design. Left: the old Cheyenne Mountain Zoo. Centre and right: our new exhibit at Woodland Park Zoo. Lower right: Kiki in his tree, where he would quietly watch the people around him and his family for hours. Photo: David Hancocks.

One of my memorable experiences was meeting with my hero the intrepid wildlife research scientist and fine writer Dr. George Schaller on the old Woodland Park Zoo site of the future gorilla exhibit. Director David Hancocks had been assured by "zoo experts" of the day that allowing zoo gorillas to climb trees was a ridiculous and dangerous notion. Tree limbs would break, and gorillas would be injured. Any counter argument that gorillas had evolved to be semi-arboreal was ignored. Dr. Schaller had studied wild mountain gorillas for a year and was the first to do so, spending hours perched on tree limbs himself. He didn't know zoos, but he certainly knew nature. I showed him the existing large maple trees we planned to provide the gorillas with access , mentioning the resistance the idea had received. Should we proceed with our

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plans? George Schaller looked at the trees, then looked at me, saying, ‘Someone has to do it.” You have to do it!’



Figure 42. Upper row: 1977 construction photos. Although our planning took careful account of existing trees, it was necessary to move many very large trees out of proposed biomes where they did not fit to other areas of the zoo where they would enhance future biome exhibit zones. All these trees survived transplanting and have become magnificent. Lower row. Left: landscape immersion’ means being within the themed landscape while seeing the animals in the same habitat separated by hidden barriers as shown here. Lower right photo taken by Brianne Hoppe in 2016 shows how zoo Horticulture Director Sue Maloney Nicol and her staff have maintained the dense habitat landscape for forty years, which our critics had said would be impossible.

Then Zoo Director David Hancocks asked me how long it would take for new plantings to become established before animals could be introduced into the new exhibits. I replied that a full growing season would be required. To our surprise, David delayed exhibit opening for a full year, a highly successful strategy no other zoo I know of has followed. During this plant growing period, I led groups of first grade school children through the areas the gorillas would later inhabit, seeing the world as the gorillas would later see it. I don’t know what other zoo visitors thought of seeing children in a gorilla exhibit.

After the exhibit was opened silverback gorilla Kiki spent hours most days high up in one maple where he had an excellent view of everyone approaching, including his

caregivers. He was never seen damaging the tree. Unfortunately, the tree died during the second year from root damage caused during construction.

Gorilla Kiki's day out.

During spring day in 1977 Zoo Director David Hancocks is in his zoo office when two zoo visitors come in excitedly exclaiming, "Your gorilla has escaped! He's out!" David replies calmly, "Oh no, the exhibit is designed to look that way, to look as if there are no barriers. As the two leave David hears them say, "Amazing just sitting next to the path like that." David sounds the alarm: "Code blue gorilla exhibit!" goes out to the walkie-talkies of all zoo staff. Their first task is to get all visitors safely indoors.

Kiki is sitting under a tall fatsia shrub near the Nocturnal House's service entry. He is trembling slightly, showing anxiety. Zoo Veterinarian Dr Jim Foster approaches calmly, with feigned casualness and encouraging words. He has known Kiki since the gorilla's infancy, but Kiki is an adult now with over 260 kilos (450 pounds) of gorilla strength. Potential danger is very real. Also, gorillas mostly associate veterinarians with uncomfortable experiences and rarely welcome their visits.

Jim calls quietly, "Come on Kiki, let's go." Kiki recognizes Jim and, becoming somewhat calmer, follows Jim back towards the exhibit, then hesitates. The bucket of bananas and sliced apples Jim ordered arrives and, with this incentive, Kiki again follows Jim. They reach the back of the Nocturnal House near the point where Kiki escaped, but the gorilla is still agitated and can bolt away. Calmly and slowly, Jim sits down next to Kiki and shares the fruit. They picnic under spreading magnolias just outside the escape-proof moat barrier. Sharing food has a calming effect on the gorilla, as it usually does with humans.

Jim then leads Kiki to the gorilla moat where an aluminum ladder has been placed across. Jim starts across the ladder, but Kiki won't follow. The ladder is too foreign to him. Then Jim rearranges the ladder so that it descends into the moat and climbs down, inviting Kiki to follow with the promise of more bananas. Kiki has not finished exploring and instead enters the hallway into the Nocturnal House service area. Keepers shut adjoining doors and Jim slips in behind Kiki. The gorilla randomly picks a door and turns the handle. It's locked. Kiki pulls harder, using his prodigious strength and the lock snaps open. Kiki walks into the service kitchen, where the food for the nocturnal animals is laid out in neatly spaced pans on the stainless-steel table. Kiki steps up onto the table and, stepping carefully among the dishes, samples the fare, picking out the papaya pieces and blueberries. He climbs down, quietly inspecting some small potoroos held in temporary cages nearby.

Jim has his tranquilizer gun ready but wants to dart the silverback when Kiki is distracted enough that he won't know where the dart comes from and can't associate the sting of the dart with him. Also, the tranquilizer takes several minutes to take effect, and it would be best to have Kiki in a confined area, so that he won't go too far before he is fully asleep. Kiki starts exploring a corridor towards the toilets. This might be the

chance. Jim tosses a banana ahead and, as Kiki turns to retrieve it, Jim fires his tranquilizer dart - a good shot. Kiki, surprised and recognizing the sting of the dart, turns and charges down the narrow hall at Jim, turns his 1.4m wide shoulders sideways, agilely slipping past Jim at full speed. In the kitchen he backs into a corner and succumbs to sleep. Kiki wakes up in his familiar bed the next day, no harm done.

The next day's Seattle Post-Intelligencer features a large cartoon showing Kiki being escorted around nearby Green Lake by two buxom blonds on roller skates, while Zookeepers with butterfly nets lurk behind bushes.

How did Kiki escape? Several small hawthorn trees, perhaps two meters high, had been planted in the exhibit before it opened. According to then director David Hancocks who inspected the scene after Kiki was returned, Kiki had planned his escape. He plucked one of these trees out of the ground roots and all and threw it into the back moat. Then he climbed down after it. The outer 3.65m (12') high wall was far higher than the small sapling tree, but Kiki had very long powerful arms. He only needed a step ladder to reach the wall top and lift himself out. Kiki then headed for the fatsia bush and settled down to watch the zoo visitors. After all, they had been watching him for years. As a post scrip, Jim Foster later became the field veterinarian at the Dian Fossey Karisoke Mountain Gorilla Research Center in Rwanda.

Did our Jones & Jones plus David Hancocks team invent landscape immersion design? We certainly named it and published the design process and rules for achieving it. In 1905 Carl Hagenbeck invented impressive "naturalistic" exhibits using "sightline design", but in most cases visitors were on the outside looking into the themed exhibit area and not immersed within them. Arizona Sonora Desert Museum Director Merv Larson was the first I knew to achieve landscape immersion a few years before us. He wisely borrowed and inserted surrounding Sonoran Desert landscape features and planting, making excellent use of distant "borrowed" desert landscapes. He never attempted to create exotic landscapes as we did, and kept his methods as commercial property, while we published our theories and techniques widely. Later his Larson Company zoo design/build firm created wonderful tropical simulations at the Bronx Zoo's Jungle World working with iconic Director Willian Conway and outstanding in-house designer John Gwynne at the Bronx Zoo. The skills of artificial tree fabricator Ms. Jonquil LeMaster are much in evidence. Still, John Gwynne didn't consider Jungle World immersive.

Director George Rabb at Brookfield Zoo envisioned highly realistic wilderness recreations for an early small but excellent indoor Predator Ecology exhibit that opened in 1979. Our Woodland Park Zoo work slightly proceeded this, but I think Dr. Rabbs vision there was original. Unfortunately, he lacked both the design theory and fabrication team to achieve this grand vision later with his vast Tropic World project.



Figure 43. Award winning J&J designed polar bear exhibit at Point Defiance Park Zoo and Aquarium. My small design contribution showed only the upper portion of the back moat barrier wall as exposed permafrost, giving the impression of a vast area for the bear. By today's standards the actual area of this exhibit is much too small for this species.

Point Defiance Park and Aquarium. After our success with Woodland Park Zoo and Northwest Trek, our J&J team prepared the master plan for the Pt. Defiance Park Zoo and Aquarium in Tacoma Washington. This was led by John Swanson with help from Johnpaul Jones and David Roberts. My input was limited, but it was I who suggested the viewing angles and barrier configuration which helped make their polar bear exhibit innovative and its landscape convincing. Working with ecologist Dennis Paulson we designed many small exhibits in the World of Adaptions using reptiles and insects to demonstrate ecological adaptations such as cryptic coloration. These exhibits were built by Mr. James Peterson, then a friend from Bainbridge Island who later designed exceptional displays at the famous Monterey Bay Aquarium and became a leading aquarium exhibit expert. Jim later formed the design firm Bios with John Nightengale, who earlier helped to design the Seattle Aquarium during the 1970s.

Living Desert State Park, Carlsbad New Mexico. During 1977 Johnpaul Jones and I were invited to redevelop their master plan and design new exhibits by New Mexico Parks Department Project Manager David Johnson. We loved this work because it allowed us, with David Johnson and ecologist Dennis Paulson as guides, to explore the Chihuahuan Desert ecosystem. During weekends, David toured us around the wonderful and historic town of Santa Fe and the ancient Anasazi villages of Aztec, Mesa Verde, and Chaco Canyon[6] in New Mexico and southern Colorado. David remains a distant friend to this day. Years later, Susan and I visited Chaco Canyon, Canyon de Chelly[7] and Acoma Pueblo, from which we still have a wonderful small ceramic pot. Later still, our daughter Alyssa attended the University of New Mexico majoring in archaeology. I retain great fondness for this region.

Pittsburgh Zoo. Working for Jones & Jones during 1979-81, we were hired by the Pittsburgh Parks Department to completely redesign the old Pittsburgh Zoo. We

[6] https://en.wikipedia.org/wiki/Chaco_Culture_National_Historical_Park
[7] https://www.nps.gov/cach/index.htm

coordinated with the city's project manager Todd Meyer and collaborated with Bill Swain and Bob Mullen and project manager Jim Pashek of GWSM Landscape Architects. This was a jolly group to work with. Bill Swain often invited us home for a family supper.

Zoo Director Howard Hays, in contrast, was a stern traditional director who didn't want us there. Perhaps he felt we threatened his knowledge and authority. He told me he had consulted with other zoos; he did not need us and could develop his own new exhibits if given the funding. During our first meeting Howard demonstrated his power by having Jones & Jones founding principal Grant Jones removed from the job. Grant was describing our overall master plan layout based upon bioclimatic zones. Howard didn't care about master planning and asked for specific animal exhibit details. Grant replied calmly he would come to that, but it was important to understand the big picture first. Howard then turned to City project manager Todd Meyer and said clearly, "I want this man off the team. He can leave now!"

Being a designer surrounded by others in this field led me to the false assumption that everyone else could also visualize abstract ideas and understand "big picture" concepts as we did. In Pittsburgh I learned that intelligent people often don't share this capacity. Howard Hayes could only visualize familiar details, but he could gradually arrive at the overall vision as the sum of the practical parts. Once I demonstrated I knew the details, such as what gauge of fence wire was needed to contain a tiger, he began to trust my ideas about organizing exhibits as geographic biomes rather than taxonomic groupings. Eventually we had a very good business relationship resulting in two highly successful stages of designs and constructions.

This was an important life lesson in patience and communication which taught me: 1) Respect people and their knowledge (or lack of it) and opinions even if you don't like them. 2) My job was to communicate my ideas in ways they could understand.

When I first toured the old Pittsburgh Zoo Main Building, opened in 1898, it was the worst animal welfare environment I had ever experienced. I walked past small, bared cages with desolate single animals whose mates had died. There were two of everything. Now there was one of some species. Some cells now were empty. A lone African elephant calf swayed endlessly with no herd contact and barely room to turn around. It had hurt its trunk by investigating a large fan set within its reach in a back corner and afterwards would only use the front half of the small space provided. During one visit I saw a dead manatee lying unattended on a zoo kitchen table awaiting necropsy. An overpowering smell of cleaning solutions and animal wastes permeated the dark oppressing structure, producing the indelible sensation that the old Main Building was filled with the ghosts of zoo animals passed, but not freed by death. I have never experienced this chilling premonition before or since. The hillslope site had been leveled for this long old building. Heartfelt demolition allowed to use this flat area to construction of the African Plains area for antelopes, zebras, elephants, and giraffes to the benefit of all.



Figure 44. National Geographic Magazine photographer Michael 'Nick" Nichols took these images of the elephant exhibit we designed on the site of the old Pittsburgh Zoo Main Building. Nick kindly gave me permission to use them. I wrote the concluding essay in his book: *Keepers of the Kingdom*, *the New American Zoo*[8]

Meeting Dr. Jane Goodall was a high point in my Pittsburgh Zoo experience. The first National Geographic TV specials on her work with African chimpanzees was produced by WQED-TV in Pittsburgh soon after she was introduced in National Geographic Magazine, so the producers decided to have her at the screening at Pittsburgh Zoo. She entered the presentation room after having been toured around the terrible old zoo by director Howard Hayes. She looked pale and ill from this experience as she took her seat in a folding chair next to mine. Early in the broadcast, at the scene where she is shown sitting on a hilltop, miscast as a ponytailed naive young woman, she turned and whispered in my ear, "It wasn't like that!" More about my work with Dr. Goodall is described later in this memoir.

Toledo Zoo. In 1981 I met Toledo Zoo Director Bill Dennler during a zoo conference and visited Toledo on the way home from one of the Pittsburgh Zoo meetings. Bill and his wife Jeannie were very hospitable. The zoo, while old, was lovely, including an aquarium, a natural history museum and an auditorium. However, fitting all these attractions on a small site resulted in limited space for the animals. Bill was as

[8] Nichols, Michael (1996) Keepers of the Kingdom, the New American Zoo. Thomasson-Grant-Lickle, NY.

welcoming to new ideas as the Pittsburgh Zoo director had initially been closed to them. Both directors, like most people, had difficulty visualizing intangible ideas. Having learned this lesson in Pittsburgh I devised a method to make my ideas more immediately clear. In the Jones & Jones office I designed a tracing table, a rectangular frame on wheels with a heavy plate glass top. It had an adjustable low shelf to hold a slide projector facing a 45-degree slanting mirror. The photo image was projected onto the underside of the tracing paper taped to the top glass surface. Thus, I could quickly trace projected images to show before and after animal exhibit perspectives…all long before the invention of Photoshop and iPad tablets. Using this technique, I produced a dozen or so sketches envisioning the zoo visitor experience moving through a proposed exhibit area. Decades later Bill reminded me of how helpful these sketches were to him.

Once I had developed the overall master plan, we faced the issue of phasing new projects around existing buildings. I printed the overall plans, both existing conditions and proposed changes, sized to fit into the top of a cardboard shoebox lid. Then I overlayed the two plans and cut out the new project areas on both, creating something like a double-layer picture puzzle. Bill could lift out one piece of the existing zoo and replace it with the proposed new area, instantly seeing how the zoo would look and operate at various stages of redevelopment. Today this would be shown using computer animation, but my trick worked very well in 1981.

An especially innovative exhibit J&J designed for Toledo Zoo was the world’s first Hippoquarium, with a massive filtration system designed by oceanarium filtration expert Mr. Nestor Ramos to remove the hippo’s frequent and considerable poo ejections. While I oversaw this work, architect Johnpaul Jones was the principal designer.



Figure 45. Upper left: my 2012 photo of the Toledo Zoo Big Cat House in the distance, converted to the zoo restaurant at my suggestion during my 1981 master plan. Upper right: my design sketch of the proposed white rhino exhibit and below is my photo of the completed exhibit.

During this general time, I gave a few talks at the University of Washington Landscape Architecture Department then headed by Professor Robert Buchanan. One of the students was Becca Hanson who later joined J&J with her later husband landscape architect, David Roberts. With the additional zoo work to be done, we also hired Charles Mayes and John Swanson' friend Mark Johnson, his then wife Ann Mullen, and several other talented young design professionals. I mention these people because I helped to train them in our zoo design skills, and they later became important designers in this field. Becca, David, and Charles helped to produce the construction drawings and field observation work for phase two of the Pittsburgh Zoo and Toledo Zoo exhibit construction. They also contributed to developing the plans and supervising construction of the Gene Coulon Beach Park mentioned earlier.

J&J partners Grant and Ilze Jones were no longer involved in my zoo projects in the eastern USA and fully trusted my team to properly represent the firm's interests. Suddenly I learned Becca Hanson, David Roberts, Charles Mayes, John Swanson, and several other J&J members had resigned to open their own competing firm, the Portico Group, and convinced our Toledo Zoo client to give them its next design contract. This was a serious blow to our trust in shared professional ethics. Nevertheless, we

continued with our trusting ethos and continued to win our share of new clients. Later Becca Hanson and David Roberts left Portico to open their own firm, Studio Hanson/Roberts. John Swanson opened his own single person firm. Charles Mayes stayed with Portico until his recent retirement. Mark Johnson, never part of the Portico firm, left J&J to open his highly successful firm Urban Initiatives in Colorado and is no longer engaged in zoo design. I've made it a lifelong practice to stay on good terms with everyone and remain friends with all these colleagues to this day.

Pardisan Park, Tehran Iran. Pardisan Park was a proposed public cultural attraction complex covering more than 270 ha (667 acres), in northwest Tehran, Iran. In about 1978 Ian McHarg, then Chairman of the Department of Landscape Architecture at the University of Pennsylvania and his design firm McHarg, Wallace, Roberts, and Todd were selected by Mohammad Reza Pahlavi, then Shah of Iran (the Shah's wife Empress Farah Pahlavi was more directly involved I was told) to design a vast new 'Pardisan' ('paradise' in Farsi). This would include an Iranian cultural centre, science and technology hall, planetarium, aquarium and zoo in the capitol, Tehran. After extensive research Ian's team developed a highly detailed ninety-four-page master plan published in 1975[9]. This plan described bioclimatic zones of Iran relating them to similar zones around the world and proposed recreating everything from tundra to tropical forest in the hot, arid climate zone of Tehran. Ian's plan was to literally transpose a rectangular map of the world, with Iran in the center, onto the sloping and deeply eroded ground. Vast mountains like the Zagros and Alborz Mountains of Iran and even the Alps, Himalayas, Andes, and Rockies would be represented by high concrete-covered earth formations dug up to excavation lakes representing the Caspian Sea and Persian Gulf. Only Ian had seen the actual site. This was an unpromising outwash plain descending from the Elburz Mountains, dissected by both deep and shallow erosion channels including an intermittent stream subject to flash flooding. Water would need to be supplied by deep wells with ground water levels declining. The plan was high on aspiration, zoogeography and bioclimatic theory without consideration for practical considerations such as how to build, plant and operate the grand vision. Ian's vision expressed in his team's exhaustive master plan was inoperable. He paid no attention to how the zoo would be designed in detail, how animals for this vast new zoo would be acquired or cared for or who would provide this essential care.

For detailed zoo design, Ian contacted the Jones & Jones team, including our excellent consulting ecologist Dennis Paulson and Woodland Park Zoo Director David Hancocks as advisers. Ian had not realized the cost of designing such an extensive project, and when he saw Grant Jones' fee proposal he realized he didn't have the funds for us to do the full design. Instead, Ian had J&J prepare the zoo concept plan and hired Mr. Gary Lee, a brilliant recent graduate of his university program, to do the detailed design and

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[9] PLAN FOR AN ENVIRONMENTAL PARK IN TEHRAN
For the Imperial Government of Iran, Department of Environment
The Mandala Collaborative/Wallace, McHarg, Roberts and Todd
1975

construction document preparation work which would normally require four to five experienced zoo designers. Dennis Paulson was funded and toured the diverse biomes and wildlife reserves.

I remember working on the project in Ian's Philadelphia office through the night with Gary Lee, while Grant Jones, David Hancocks, Ian McHarg and his chief assistant Narendra Juneja went out for a leisurely dinner. Ian and Narendra were heavy smokers. Gary and I were happy to work together after they left. This late-night work session is memorable because Gary and I got along so well we later formed a design firm together, Coe & Lee, later to become CLRdesign described in Chapter 9.

Ian liked to produce large drawings for large projects; what we called "bedsheet" graphics. Ian also liked to travel in style. On his final trip to Tehran to present his project to the Royal Family, he booked his flight on the supersonic Concorde airliner. When Ian checked in he was told this slender aircraft had no room for his large drawings. They had to be sent on a later flight. These critical drawings never arrived, and Ian had to present to the Shah and his wife without them. The Shah was deposed in 1979 and the ill-conceived project abandoned. Fortunately for us, architect, and landscape architect Gary Lee, originally from Medford Oregon, came to work for J&J. He will figure strongly in my story going forward.

Oregon Zoo and Beaver-Otter exhibit. We developed the master plan for the Oregon Zoo in Portland in about 1980 and then designed the first stage of their North Cascades zone, the Beaver-otter Exhibit. Gary Lee and I collaborated on the award winning, highly naturalistic aquatic exhibit with trout, waterfowl, beaver, and otter within a natural stream corridor. We worked together very well.

Coe & Lee. In 1984, soon after we settled into our home in Newtown PA to teach at the University of Pennsylvania (Chapter 3.), I was contacted by my old firm Jones & Jones in Seattle about a master planning project at Turtleback Zoo in New Jersey. J&J was not interested in the work but thought I might be. I contacted Gary H. Lee, who had recently left to open his own architectural office in Oregon. Gary agreed to fly out and collaborate on the Turtleback project. This was a small zoo with limited resources, and our plan was not especially noteworthy but for one thing. It led to our founding the firm Coe & Lee Associates in my Newtown homes' garage. Most of the following zoo projects I describe until 2004 were done in close collaboration with Gary.

Bronx Zoo -1984. The New York Zoological Society – Bronx Zoo under legendary director William Conway was and is one of the world's great zoos. Mr. John Gwynne, Director of their Exhibits and Graphics Depart (EGAD), a landscape architect and outstanding exhibit designer (and bird illustrator) and his team were fully occupied in the design and construction of their Jungle World facility. He asked me if we could assist them with other pressing exhibit design projects. Our first work was the redevelopment of the heritage domed "capitol" building at the head of Beaux Arts era Astor Court. Animals to be displayed included Asian elephants, tapirs, and Sumatran rhinoceroses.

Our first meeting included New York architects Goldstone & Hinz and General Curator James Doherty. Mr. Conway, a somewhat intimidating polymath asked, ‘Jon, you are most known for highly naturalistic exhibits. How will you deal with this symmetrical, axial setting?’

Assuming Mr. Conway, with his posh manner and English/American accent, would know art history, I recalled some of my own training in this area. I confirmed axial architectural symmetry became popular during the Italian Renaissance as early as the 14th Century, was celebrated in the Greek Revival Period in the mid-17th Century and re-envisioned at the beginning of the 20th Century as the Beau Arts style of Astor Court. However, during the mid-15th century painters Claude Lorrain, Nicolas Poussin and others created Arcadian pastoral landscapes with classical buildings seen from side angles as landscape features rather than architectural subjects. I suggested we could design the new exhibits with all views from side angles as Lorrain had done or bring visitors through dense vegetation obscuring the side of the formal main building and redirect their views outward, away from the building. I believe my display of erudition and practical approach was appreciated. I passed the test. We were hired. Here is another example of applying the appropriate method of communication to each client.



Figure 46. Views of the three exhibits I designed avoiding the architectural symmetry of Astor Court at the Bronx Zoo. The middle photo shows the central domed building more as an Arcadian relic than as the formal architectural terminus of the Beau Arts Astor court.

Bill Conway is also respected for founding the Wildlife Conservation Society, for whom I later did work planning Band-e Amir National Park facilities in Afghanistan. I was in occasional communication with Bill until his death at 91 in 2021. I’ve remained in infrequent contact with Jim Doherty, and he and his wife Elisie later visited us here in Australia. Sadly, Jim died in January 2024.

Dr. Terry Maple, beginnings of our Zoo Atlanta experience -1981. At the American Zoo & Aquarium Association (then AAZPA) National Convention held in Chicago in about 1981, I attended a lecture by noted animal behavioralist Dr. Terry Maple of Georga Tech University. I spoke to him afterwards and we spent the remainder of the afternoon in congenial professional conversation. One year later Terry invited me to give

a lecture to his university environmental psychology class. Later we spent an hour or so discussing how exhibits could be designed to feature and support the unique behavioural styles of three great ape species: chimpanzees, gorillas, and orangutans. While Terry left to deliver another lecture or other university business, I developed three sketches illustrating exhibit designs based upon these concepts[10]. Terry was so impressed he later included these sketches in several of his scientific papers and a joint publication[11]. Terry became founding editor of the Journal of Zoo Biology in 1982. With Terry's support as editor, I published my first peer-reviewed scientific paper "Design and Perception, making the zoo experience real" in 1985, in Zoo Biology[12]. Thirty-eight years later, this paper has gained over 11,000 "reads" and 164 citations on ResearchGate at the time I write this. Terry remained a much-appreciated friend and benefactor until his passing in 2023. His mentorship and life-long support has followed and benefited his outstanding students, now professional leaders, including Dr. Kristen Lukas, Dr. Tara Stoinski, Dr. Molly Bloomsmith, and Dr. Jackie Ogden, to only name a few I've worked with.



Figure 47. Left: staged photo of Zoo Atlanta Director Terry Maple in 1984 (photo: Zoo Atlanta). Right: Terry with me during his visit to Australia in 2019.

Zoo Atlanta design and reconstruction 1985-1990. In February 1984 *Parade Magazine*, a popular weekend newspaper supplement, listed the Atlanta Zoo as one of the ten worst zoos in the USA based upon ranking by the Humane Society of the United States. Proud Atlanta community leaders were shocked into action. In June Atlanta Mayor Andrew Young offered Dr. Terry Maple directorship. After hiring new staff in key departments, Terry, remembering our zoo exhibit design brainstorming based upon animal behaviour in 1982, hired CLRR (a later version of Coe & Lee), led by Gary Lee and myself, to develop the master plan for renamed Zoo Atlanta.

Importantly, the zoo now had both public funding and the right to self-management in what came to be called a public-private partnership. This was led by Mr. Robert Holder,

[10] For a variation of this account and the founding of Zoo Atlanta, including Gary Lee's and my roles, see: Maple, T. L. (2016) Professor in the Zoo. Designing the future for wildlife in human care p. 50 and elsewhere. Red Leaf Press.
[11] Coe, J., Maple, T. (1987) In search of Eden, a brief history of great ape exhibits. In AAZPA Annual Proceedings.
[12] Coe, J. C. (1985) Design and Perception, making the zoo experience real. Zoo Biology vol 2, no 4. Pp. 197-208.

who became first chairman of the reorganized zoo society. Seed money from the Cecil B. Day Family paid for our planning. Our master plan concept and graphics, supported by Terry's charisma and community leaders such a Robert Holder and Park Director Carolyn Boyd Hatcher, was soon accepted. We joined local architectural and engineering firms Turner Associates and Robert & Company designing early stages of development, including a new entry and, importantly, a new home for local celebrity silverback gorilla "Willie B." Captured as an infant in West Africa, 'Willie', named after legendary Atlanta Mayor William B. Hartsfield, had lived 27 years in a 6m x 12m (20' x 40') sterile, blue-tiled room, never being out of doors. Terry had negotiated with Yerkes Regional Primate Center Director Fred King to bring thirteen gorillas, three breeding groups, to Zoo Atlanta if our new facilities were the world's best. And Willie B would join them.

In 1986 Ford Motor Company saw the zoo as a magnet for the same young families they marketed their new Ford Taurus station wagon too. They donated $100,000 as development money, and far more funds later, from their Detroit marketing budget rather than from their much smaller philanthropic fund. Thus, the zoo's new gorilla complex was named the "Ford African Rainforest". Exhibits included "Gorillas of Cameroon", and "Monkeys of Makokou." Ford then asked us to build a larger scale model of the proposed Ford African Rainforest in a Plexiglas case. This was before our actual design was finalized, so an expression of our intent was visualized. This large model, built by staff members Nevin Lash and Larry Dame, made the rounds of Ford dealers in the Atlanta area, being displayed for about one month at each venue. I never heard if this helped sell Ford automobiles, but it must have helped sell the zoo's rebirth. Later Ford helped support our African research tour, provided travel bags, and even paid for us to attend the national premier of the film "Gorillas in the Mist" with Ms. Sigourney Weaver, in New York City. She later became a leading supporter of the Dian Fossey Gorilla Fund administered by Zoo Atlanta.

Rebuilding a major zoo requires much more than designing new facilities. Terry Maple recruited very able staff. While Terry himself was our major contact and the decision maker, I especially recall working with veterinarian Dr. Rita McManamon, General Curator Dietrich Schaaf, brilliant educator Jeff Swanagan, primatologist Dr. Molly Bloomsmith and zoo biologists Gail Bruner and Trish Pfeffer. We enjoyed their collaboration and support.

Gorillas of Cameroon. The concept Gary Lee and I developed was revolutionary, the world's first. Wild gorilla troops move or rotate between areas in their territories, accessing preferred food or other critical resources. The dominant troop gets first choice of its territory, other troops use adjacent territories, sometimes in sight of each other across ravines. Why should gorillas or other zoo species be limited to a single small area? Gary had coined the phrase "Activity-Based Design & Management"[13], based on

[13]Coe, Jon C., 2000. "Activity-Based Design and Management: New Opportunities for Apes and People" in The Apes: Challenges for the 21st Century, C. Sodaro, Ed.

the notion of using then new techniques of positive reinforcement training. I called this "animal rotation" and Gary referred to it as "flex exhibits".[14] Terry had hired California-based animal training team Active Environments, Mr. Tim Desmond, and Ms. Gail Laule, to help condition Willie B to tolerate the changes being planned for him. Using new reward-based techniques called "desensitization training" they gradually introduced Willie to novel objects in the familiar, non-threatening environment of his old room. Watching Tim and Gail work, I realized their training could be used to teach gorillas how to rotate through a variety of outdoor enclosures mimicking wild behaviour.



Figure 48. Upper left: gorilla troop rotation concept. Note "Research Camp" location. Upper right: view from the darkened, air-conditioned viewing pavilion across three gorilla enclosures with hidden barriers. Lower photos: the simulated Takamenda Research Camp showing tropical plantings and educators discussing gorilla biology on an elevated deck overlooking three gorilla display areas. There also was a large canvas tent, and later, life-sized sculptures of gorillas.

Above is a diagram of the gorilla habitat rotation concept I developed. The service building (gorilla night house) was a renovation and extension of the zoo's old feline house, entirely stripped and redeveloped. All the indoor gorilla dens connected to three outdoor exhibit areas and to one off-exhibit exercise yard. Our idea was that during the introduction period each troop would go to its accustomed outdoor exhibit area. The smaller central area would be for popular bachelor Willie B. Visitors viewing Willie B would be surrounded by gorillas on three sides. According to our plan, after the troops

[14] https://joncoe.net/wp-content/uploads/2021/10/ZooAnimalRotation1995.pdf

were each settled into their “home area”, each troop would gradually be introduced to adjoining yards until they were all comfortable using any of the display areas and rotating from one to another. They would be taking turns in each area, somewhat as they would do in the wild. Each gorilla troop would then have access to much more space and increased behavioural stimulation and opportunities.

Many zoo animal carers seek to keep animals in their care as stress-free as possible. Yet Professor Maple taught that lack of mild stress or achievable challenge resulted in boredom, apathy, and diminished welfare. I later called this deplorable state “welfare dependence,” in which zoo animals habituate to having everything done for them. I’ve more recently written about the need to provide zoo animals achievable challenges, novelty and complexity with concurrent agency and choice to develop physical, behavioural, and social competence to optimize their life experiences.[15] I predicted that allowing the gorilla troops to alternate among different areas would provide more opportunities for increased naturalistic behavioural opportunities and “ideal arousal”.

We designed the three display areas to be separated by hidden dry moat barriers. Each area had a high central point where silverbacks from different troops could display with species-typical short downhill rushes, or they could pass inconspicuously behind the hills to move into their areas. This was the behaviour the gorillas chose. The silverbacks took care that the females in their troop remained hidden from other silverbacks as they entered or left their areas. The gorilla exhibit areas were arrayed under large existing oak trees upslope from zoo visitors, encouraging visitors to “look up to the gorillas” and intending the gorillas to feel more comfortable by “having the high ground”.

I designed an air-conditioned viewing pavilion providing an extended view across three gorilla areas with hidden barriers (photo above). Guests on carpeted, terraced seating in a darkened, air-conditioned space savored this panoramic view, speaking in hushed tones while observing the gorillas. There were museum-style displays explaining gorilla habitat and behaviour. Barbara McGrath, our graphic and interpretive designer, and I planned a special infant and small children’s area in a far corner of this pavilion. Barbara designed carpet materials on floor and walls creating a soft rainforest corner occupied by a life-sized plush Coco gorilla doll. A low, child-height window extended to the floor, providing views out to the adjacent shady slope on which we placed a fallen log often occupied by a silverback gorilla. Silverbacks seemed to enjoy quietly observing human children as much as they enjoyed seeing him. Knowing male gorillas have been observed playfully interacting with young gorillas in their troop, we accommodated this expected silverback gorilla behaviour.

We also developed a themed outdoor viewing and interpretive area; a wooden platform called the Takamenda Research Camp (see photo above). In 1993, this area hosted a research tent, simulated gorilla nest, and other items to replicate a researcher scientist’s

[15] https://joncoe.net/wp-content/uploads/2021/12/EmbedEnrichmentDesigners2017Wroclaw.pdf
https://joncoe.net/wp-content/uploads/2021/10/Choice-Control-and-Computers-2020.pdf

home in the forest. A theatrical skit was written and performed by Zoo Atlanta staff, teaching the public how to observe gorillas using a timer and clipboard. Later bronze gorilla sculptures were placed there, so visitors could take photos and compare their size with that of a gorilla.

Converting an Atlanta oak tree shaded park landscape into a tropical jungle required special skills. When designing the very successful tropical-looking plantings for the Woodland Park Zoo gorilla exhibit I had developed a list of temperate plant species with tropical appearance. I had worked with their zoo horticulturalists Sue Nichol to develop their novel natural plant maintenance procedures. I had my Cameroon travel records and photos of western lowland gorilla habitat plants. However, Zoo Atlanta had no professional horticulturist to work with. I convinced Terry Maple not only to hire the best zoo horticulturalist he could find but also create the unheard-of zoo position of Curator of Horticulture. This was putting plantings and their care on the same level as zoo animals and educational programs. In 1987 Terry hired Mr. Don Jackson, previously with the Cincinnati Zoo, as Zoo Atlanta's first Curator of Horticulture. Don was a quick learner and good organizer, helping implement the massive plantings while making the remainder of the old zoo attractive.

A special task of mine was supervising the cutting, transportation, and placement of several large dead trees into the exhibits as gorilla climbing structures. I especially remember one very large, spreading elm which had to be removed to build the new zoo café. The contractor hired two of the largest mobile cranes available, huge machines, both to be cabled to this large tree. Crane operators looked to me to show where to make these connections so that the tree would remain in perfect balance when cut and lifted. Then, when the tree was attached and the two lifting cables tensioned, a worker with a long chainsaw approached the tree to saw through the base of the tree trunk. This was extremely hazardous. If not perfectly balanced, the massive trunk could swing and injure the worker. I circled the tree, again judging cable placement from all sides, took a deep breath, and signaled the cutting to begin. The trunk barely moved when cut through. It then rose upward in perfect balance! Both cranes moved in careful unison up to the building site and placed the tree in the prepared excavation while it was secured in place. In hindsight, I never should have taken on such liability, and the great tree only lasted a year or two until rot required Its removal. But I'm still proud of this perfect balancing act.

Building the Ford African Rainforest on this steep red clay slope was a challenge. Rain was the problem. Rain and the contractor's consistent failure to divert runoff away from the construction area. Muddy washouts occurred at least twice, flooding construction work with red mud, delaying work unnecessarily. Nevin Lash, CLRR's very able project manager delt with these and countless other challenges over five years of coordinating local architects, engineers, and builders. Remarkably, the plans we first established emerged into an award-winning reality with very few changes.

On the 13th of May 1988 Willie B, encouraged by his long-time friend and carer Charles Horton and trainer Tim Desmond (and a carefully placed trail of large strawberries), hesitantly let go of the doorway and stepped carefully down into his new habitat. This was his first touch of turf or leaf, his first sensation of sunshine in 27 years. What I recall most vividly was how Willie B changed, not in himself, but in our human eyes. Willie B, the sad and helpless victim, transformed into a majestic, confident silverback gorilla before our eyes. After standing up to touch living tree leaves he strode out into the centre of his area, turned sideways to us in a silverback side display position and proclaimed, in gorilla body language. 'I, Willie B gorilla, claim this land to be mine!' Then, as rain began to fall, Willie hurried back inside. There wasn't a dry eye among those of us blessed to be his witnesses.

After the opening we rewarded the remaining builders with a group photo of them in front of the completed Willie B area with Willie looking on, sending copies to each company.



Figure 49. Left: Willie B in his boring sterile home of 27 years. Photo: Terry Maple. Centre: Willie investigates a living tree moments after stepping outside for the first time in 27 years. Right photo: Willie in his dominant gorilla side display stance. Centre and right photos by Joe Sebo.

After the thirteen Yerkes' gorillas had also settled in, the Ford African Rainforest opened to the public in June 1988. Terry and I walked among visitors observing their responses to the new gorilla exhibits. I especially recall watching an attentive, middle aged African American man and his 12-year-old son approaching Willie B's habitat. I saw them again shortly after and heard the son tell the father: 'You know, dad, I think I like Willie B! Would the son have said this after seeing Willie in his old cage? I think not. Nine months later three baby gorillas were born among the Zoo Atlanta gorilla troops, proof of the "honeymoon effect" of changing environments, but also credit to the quality of facilities and care embodied in the new Zoo Atlanta. Bachelor Willie B not only successfully integrated with several females to form his own troop but sired three offspring. In February 2000 Willie B. died at 41 years old.. Ex-mayor Andrew Young led his memorial service, spontaneously attended by more than 7,000 people mid-week. This is reportedly more people than attended the memorial service for legendary Atlanta Mayor William B, Hartsfield. Willie's ashes are buried in a hidden location nearby. I feel

emotional just recalling this story and how our collaborations and Terry Maple's leadership contributed to the brief but spectacular regeneration of Willie B.

The gorilla rotation concept I devised was never used until one of Terry's star students Dr. Kristen Lukas[16] obtained permission to test it. She studied two troops in adjacent display areas, noting activity levels and other wellbeing indicators. She noted one female gorilla would step outside but never left the doorway area. Next Lukas gradually alternated (rotated) these troops into each other's enclosures so they now had periodic access to two different areas. This stage of the study noted substantial increase in exploitative and other positive troop activity and the timid female freely utilized entire areas of both displays when available to her. To conclude the study Lukas returned the troops to their original enclosures and their behaviour returned to old levels. The timid female again remained on the door sill. Thus, Lukas proved that our built-in rotation capability was indeed enriching. Nevertheless, over the years, the gorilla management team declined to use this behavioural enrichment opportunity we provided through flexible exhibit design. As Terry Maple explained about the revolutionary rotation feature: *"It was just too good too soon."*[17] Thirty-five years later I heard from present Zoo Atlanta Primate Curator Jodi Carrigan.

"Yes, we do rotate habitats regularly…we rotate different groups into different habitats that are acceptable for the groups. We are running 1 bachelor group, 1 geriatric group and 2 family groups at this time. 25 gorillas have been born at Zoo Atlanta."

Lessons learned include 1) provide a variety of enclosures to meet changing needs; 2) plan for eventually having elderly animals, 3) be patient when built-in opportunities are not immediately activated by animal care staff.

The Ford African Rainforest won the AAZPA Significant Exhibit Award in 1988. The Orangutans of Kitambe exhibit was designed and built at the same time as the gorilla facilities. The main feature was the 17m (55') high pine tree trunk we provided for the orangutans to climb for a great zoo-wide view. Soon after being introduced to the area, one young orangutan climbed and stood upright grasping the top of the pine log with his feet while reaching up with both arms into the sky, as if wanting even more height.

[16] Lukas, K.E., M.P. Hoff, and T.L. Maple. 2003. Gorilla behavior in response to systematic alternation between zoo enclosures. Applied Animal Behavior Science 81:367–386.
[17] T. M. Maple & B. M. Perdue (1913) Zoo Animal Welfare p. 147, Springer.



Figure 50. The Sumatran tiger exhibit and breeding facility was part of the Indonesian area exhibits with the Orangutans of Kitambe but opened a year later.

Masai Mara. The next stage included design and construction of the Masai Mara exhibit, which opened in 1989. This included African elephants, lions, ostriches, and hoofed animals such as antelopes, giraffes, and zebras. The black rhino exhibit was designed at this time but built the following year. My Serengeti and Masai Mara safari experiences in 1982 and 1986 heavily influenced my designs. We wanted to transport visitors emotionally to a different time and place, from Zoo Atlanta to Kenya, using a combination of landscape, graphic and theatrical devices I called “habitat theatre.”

Habitat Theatre. The experience started with a themed gateway like those we had seen in East African game park entries, including a signboard with park rules such as: ‘Wild animals are dangerous. Stay on the paths’, ‘Move quietly, Do not disturb the animals.’ ‘Take only photos, leave only footprints.’ My pathway layout, mimicking crisscrossing animal trails, was intended to disorient and confuse visitors. Suddenly, unexpected views of lions or zebras were revealed. Years later university researcher Dr. Jane Wineman reviewed the exhibit, criticizing the confusing and unclear layout as if it were a public park rather than an African savanna stage set.

I also invented a comic book hero, Game Warden Mr. Zuma. I sketched and wrote the dialogue for two comic book panels, one introducing Mr. Zuma and one illustrating his encounter with a poacher. Our art director Barbara McGrath located a fine professional comic book artist to illustrate the two panels, and they were mounted along the trail. I hoped we could design a weekly or monthly Mr. Zuma comic book series to include in the Zoo Atlanta member publication and to sell in their gift shop, but this didn’t occur.

I scripted the second Mr. Zuma cartoon panel to show Mr. Zuma arresting a rhino poacher. The poacher defended his actions, saying: “My father and grandfather brought food to the table and honor to the family, and now you arrest me for feeding my family!” Mr. Zuma replied: “In your grandfather’s time there were few people and many animals. Now there are many people and few animals. If we don’t protect the animals now, there will be no animals left for you the show to your own grandchildren!” My idea was that this encounter would be performed by costumed actors using the zoo exhibit as an

informal stage set. “Mr. Zuma” would then take the “Poacher” to the “Elder’s Tree Theater” we designed to hold a mock trial to be judged by the zoo audience. My intention was not to make poachers or other local citizens villains, but rather to demonstrate the real-life, complex issues of wildlife conservation.

In 1996 Zoo Atlanta hired Mr. Terry Richardson, a local educator, to play Mr. Zuma. In game warden costume, he greeted zoo visitors along the trails with *‘Jambo, habari?’* (Swahili for ‘Hello, how are you?’). He then encountered the poacher’s character and the public trial followed. The staged production lasted about 25 minutes with detailed script written by Gail Bruner and Adriana Warner from the zoo Education Department. Unfortunately, this program was discontinued after one summer because of lack of funding.



Figure 51. Zoo Atlanta Masai Mara exhibit area photos. Upper left: safari park themed entry way. Upper right: an example of ‘structural enrichment’, artificial lion rocks designed as passive solar furniture considering summer and winter sun angles to provide warm and cool areas for the lions in all seasons. Heating cables are also embedded in the concrete surface for cold weather comfort for the lions. This feature also provided panoramic views of lions and by lions. Lower left: Mr. Zuma actor Terry Richardson costumed as wildlife warden Mr. Zuma greeting children near the black rhino exhibit (photo Terry Maple). Lower right: Mr. Zuma comic strip I designed and wrote, wonderfully illustrated by a professional comic book artist hired by CLRR.

As initial designers we don’t have much control over eventual animal management and novel, changeable enrichment activities after exhibits open. But we are concerned with

what I've termed "built-in" or "structural" enrichment. These are permanent landscape features providing life-long benefits to animal residents and zoo visitors. The Masai Mara lion exhibit provides examples. As shown in the above photo, the artificial lion rocks were designed as passive solar furniture as well as needed lion look-out positions. Other hollow artificial rocks near a viewing window contained evaporative coolers to blow cool moist air down on lions and visitors alike during Atlanta's warm summers. I don't know if these are still in use.

Lessons learned at Zoo Atlanta. Firstly, it is a fortunate design group that can affiliate with a knowledgeable, risk-taking, determined, and charismatic zoo director like Dr. Terry Maple. Secondly, supported by Terry and the Ford Motor Company, our field research visits to Africa and Indonesia provided deep insights into both what was important and what was possible. Thirdly, senior level vision continuity is essential for long term success. At Woodland Park Zoo, the devotion to deep learning through intensive, immersive naturalism in exhibit design lasted for forty-seven years through four zoo directors. Zoo Atlanta's devotion to the highest quality of exhibitory began to ebb soon after Terry Maple moved on and funds for new exhibits became less available. However, their success in breeding great apes and other species continued. Lastly, Zoo Atlanta remains outstanding for its continuing emphasis on empirical research around zoo biology, which peaked during Dr. Maple's tenure. Reviewing the hundreds of academic papers published by zoo staff and university faculty using the zoo for research, I found thirty papers relating to or enabled by things our team had designed.

Many of the dates, names and figures given in this section were confirmed in Terry Maple's books describing this period[18].

New York Aquarium Sea Cliffs -1985. New York Zoological Society designer John Gwynne invited us to design the new Sea Cliffs exhibit at the New York Aquarium in collaboration with aquarium specialist designers Bios, a firm then composed of Mr. James Peterson and Dr. John Nightingale, old friends from Seattle ferry boat rides. New exhibits included habitats for sea otters, walruses, fur seals, and South African penguins.

[18] Terry L. Maple, Erica F. Archibald (1993) Zoo Man, inside the zoo revolution. Longstreet Press, Marietta, GA. Terry L. Maple (2016) Professor in the Zoo. Designing the future for Wildlife in Human Care. Red Leaf Press.



Figure 52. The New York Aquarium Sea Cliffs penguin exhibit designed with James Peterson and John Nightingale. The steep grass slopes were my special contribution, as well as the general layout. Photo by rockwork fabricator David Manwarren.

Innovations included a dump bucket wave machine for the penguin exhibit. I designed the shape of the penguin pool to concentrate the force of the wave into a spray near the visitor passage under the cliffs. I was keen to find a way to green the artificial cliff tops with living plants as occurs on natural sea cliffs. I developed a system of stacked soil bags made of long-lasting poly fabric above the artificial rockwork with lines of “leaky pipe” irrigation between bag layers. Then the stacked bags were beaten to form a generally even surface and then seeded with weeping lovegrass. This is an early experiment in my attempts to make permanent living or “green walls”. John Gwynne wisely insisted on building a small test installation to prove functionality. This was successful and final installation proceeded. Recently I heard from Mr. Rob Halpern, past NYZS horticulturalist, that the system later failed, likely because the irrigation system was not properly maintained. This is yet another example of a good idea, successfully tested, failing later because future operating staff were not properly informed of the original design’s intent.

Denver Zoo -1986. Gary and I received an invitation for legendary zoo director Mr. Clayton Freiheit of the Denver Zoo. Clayton was a crafty fellow and said he had been following our work for some time before approaching us to help develop their master plan. As his surname suggests, Clayton maintained the persona of a Prussian aristocrat or traditional German zoo director. He was a large fellow with many rings on his fingers (Gary would tease him with the phrase “You may kiss the ring.”) Clayton could be high handed and fear provoking with his staff but was a master of zoo board management. Gary, masterfully playing the court jester, developed a special relationship with Clayton and Denver Zoo gradually became more Gary’s clients than mine. Gary developed designs for the zoo entry, Predator Ridge (lion, hyena, and hunting dog rotation) and latest, Toyota Elephant Passage, a vast rotation exhibit for Asian elephants, rhinos and tapirs including an elephant overpass. Clayton exclusively called on CLRdesign for some 15 years of continuous redevelopment.



Figure 53. Left photo: gorilla and orangutan dayrooms were identical indoor exhibits for cool weather and 24/7 accommodations for the apes. Note high windows for basking in morning sun on winter days while viewing surrounding activities. Right photo: orangutan spending time in living poplar trees without destroying them.

Among our early projects I designed, the **Primate Panorama** project was especially innovative with several zoo firsts. This may have been the first “soft,” and voluminous indoor space in which great apes could stay day and night as social groups. The old Fisher Great Ape house at Lincoln Park Zoo was wonderfully spacious but had hard steel climbing and resting areas. Unfortunately, it was demolished to make space for their new facilities I will discuss later. Another innovation was an overhead mesh tunnel connecting smaller primates from the main building to their mesh aviary-like structure. This became a model for our later Tree-top Trail at Philadelphia Zoo.



Figure 54. ‘Sway Branches’, my invention to add motion to artificial climbing structures, was first used at the Denver Zoo in about 1987. Left: I hung upside down to test the strength of an artificial branch built by Rick Dyson of Cemrock. It had a steel core and epoxy bark. Middle: the same sway branch after installation being used by colobus monkeys. Sway branches of natural or artificial branches attached to a mast with a flexible or moveable joint are hung from a line. This allows them to be lowered for provisioning and raised into place at various heights. Moveable branches help arboreal animals improve their balance and agility. Right: we gave an African rural theme to this food and gift area in the Primate Panorama complex.

One evening I was walking through this area after hours. I saw a woman standing outside the service gate looking in. She was older, slender, dark skinned, and wearing traditional African prints. As I walked over I saw she was weeping. I asked If I could help her with anything. She said she had immigrated from Ethiopia and was feeling homesick. She had just seen the African themed building in the exhibit area pictured above and it looked just like the buildings in her native village! Recently I read a paper by a university academic declaring in essence that zoos featured themed mud and thatch huts as an unconscious celebration of colonial and present-day racism by featuring African buildings, and thus Africans themselves as backwards and primitive. She could not have been farther off the mark in assessing our design motives. Firstly, such exhibits are intended to emotionally transport zoo visitors to the biomes which both gorillas and people share, not to visit modern African capital cities. Secondly, rather than disrespecting the mud and thatch huts, I celebrated the simplicity, functionality, and beauty of these huts and the rich cultural and sustainably lives practiced by the people who build and live in them. We should learn from them. On later thatched structures we designed at Louisville Zoo we hired African Zulu thatchers to build these, providing both pride and incomes to these skilled workers. I doubt if the elderly Ethiopian woman I met at the Denver Zoo service gate would agree with the academic that we misrepresented Africans.

Oklahoma City Zoo 1991-1992. After our work with the Denver Zoo Primate Panorama project, Director Steve Wylie and Curator Jack Grisham invited us to develop a master plan for Oklahoma City Zoo. I previously met Director Lawrence Curtis at zoo conferences. Curtis was known as one of the great zoo “horse traders”, dominant directors in competition for the most spectacular rare species and for the size and diversity of their collections. Wylie and Grisham were an intermediate generation, developing larger populations and facilities for fewer species, resulting in improved animal welfare. As before, Gary Lee developed a great relationship with Director Steve Wylie while I related more with Curator Jack Grisham.

Their **Great Escape** project with gorillas, orangutans and chimpanzees was their first major project following completion of our master plan. The most innovative work was the design of the great ape complex.

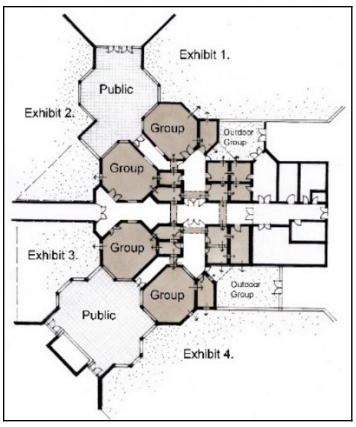




Figure 55. Left: The Great Escape Building Plan. Right: sway poles used at Melbourne Zoo orangutan exhibit in 2006. We invented these for Oklahoma City Zoo about 1991, now they are used worldwide. We tested commercial fiberglass pole vaulting poles, steel pipes and thick stemmed bamboo poles. We had especially good results with them later at Louisville Zoo. Sooner or later the orangutans bend or break them. Sadly, often they are not replaced.

The Great Escape building plan above shows the innovative and practical arrangement of large outdoor animal areas connecting to covered outdoor animal areas near and visible from indoor public galleries, viewing into enriched group rooms (much like the Denver Zoo day rooms shown previously), supported by a system of overhead raceways connecting individual temporary cells and off-display outdoor exercise or quarantine areas. This arrangement provides management flexibility. The sequential arrangement seems ideal for cold climate zoos.

About seven years after completion of the gorilla exhibit we received a call from Oklahoma City Zoo. They were being sued by a visitor for an injury sustained in a fall in a play area we had designed. Assuming this was a design flaw, the zoo was passing on the suit to our firm. After contacting our liability insurers, I researched our files, correspondence, and meeting minutes and then flew to Oklahoma City to learn more about the case. As was normal, we had several mid-sized dead oak trees mounted in the gorilla exhibits as climbing structures for the apes. Meeting notes implied my partner Gary had suggested setting one of the dead oak trees in a public overlook area for kids to climb on mimicking the gorillas, something called “parallel play”. The injured man claimed his son had climbed into the tree, was afraid to climb down and the father climbed into the tree to rescue him when a rotted branch broke causing him to fall and injure his back. He was suing for USD$75,000. Further research showed that 1) the limb was rotted. 2) The man had climbed higher than the boy to reach the limb which broke, and it appeared he could have reached the boy without climbing himself. 3) The man had a history of back problems and had scheduled an operation costing the same amount for which he was suing. This suit seemed suspicious. I further discovered the dead oak trees planted for the gorillas to climb had been found by animal care staff to be weakened by rot and were unsafe for the gorillas. The zoo had removed and replaced these gorilla trees. Why hadn’t the zoo replaced the tree in the public area? I contended our design was correct and the trees were sound at the end of our project guarantee period. The zoo was at fault for poor maintenance. When the case went to a local judge for consideration, the judge found that the plaintive knew it was just an old dead tree and should have exercised more caution. The case was dismissed. I am amazed how zoo clients whom we have gone so far to help, and are such good friends, then quickly abandon us when threatened by lawsuits. Similar expensive, undeserved and frivolous lawsuits were filed against our firm two other times by client zoo friends who were themselves responsible for visitor injuries. This is a major problem when working in the litigious American workplace.

National Zoological Park -1988. Most of my innovations described thus far have been intended to benefit both zoo visitors and zoo animals. The following is an example purely in the zoo educational area.

Ms. Judy Mitchell, Education Director of the US Smithsonian National Zoological Park, invited me to collaborate on her pet educational project, a new kid's learning center called **'Rabitat'**. Her twelve-year-old son made up this name from 'rabbit' and 'habitat'. Judy's vision was to take a simple idea about a common animal and "shrink the kids" to enter, the rabbit's world. We proposed to do this by using plants with giant leaves and setting up indoor and outdoor kid-sized mazes as illustrated below.

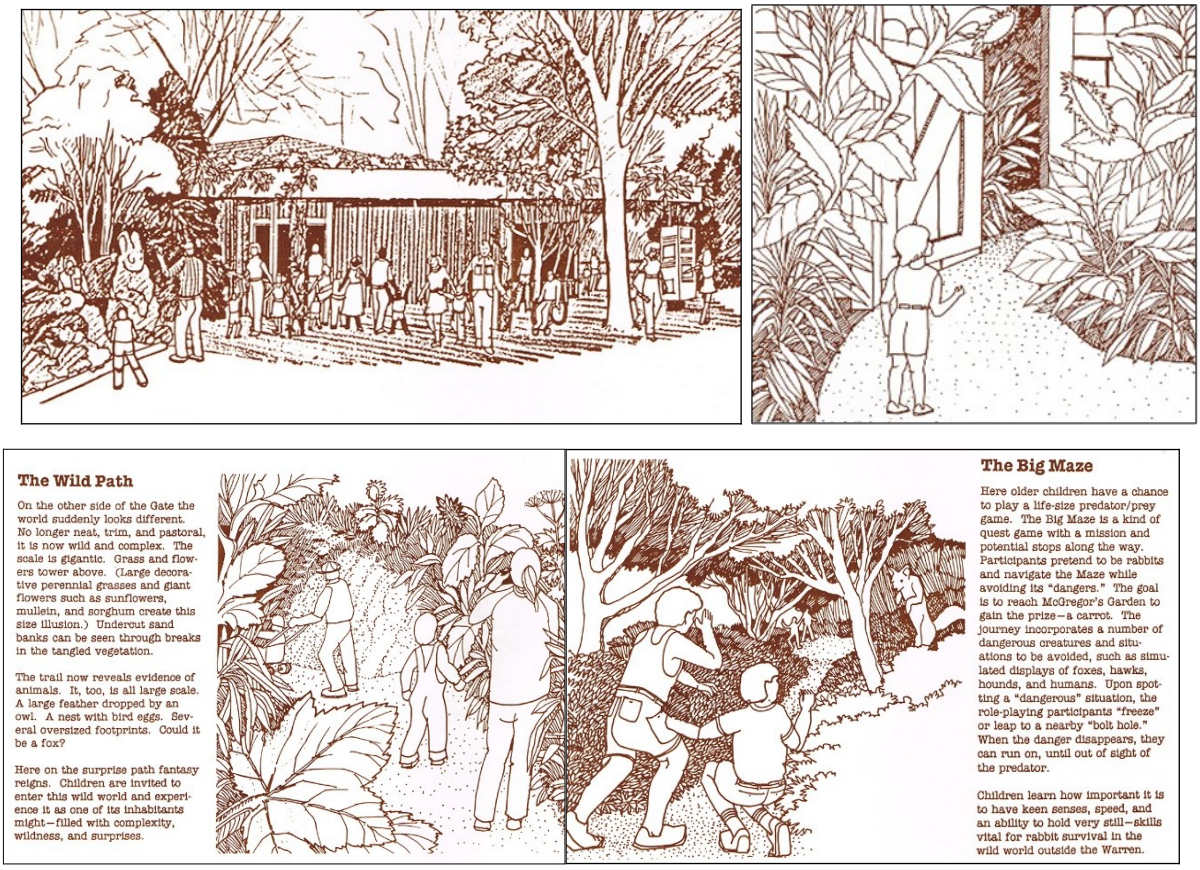


Figure 56. Here are four of my ten sketches from the Rabitat booklet.

Our problem was that director Dr. Michael Robinson had his full attention on building the highly naturalistic Amazonia project and Judy's project was never funded. At the time primatologist Dr. Ben Beck invited me to help him develop the concept for his new 'Think Tank' project. This would have been an amazing opportunity but working for the US National Zoo meant negotiating onerous federal government contracts designed for mega-contractors doing mega-projects. I sadly declined Ben's kind offer. Later Ben developed the world's first extensive overhead line (O-line) for orangutans. I regret that I missed this opportunity and congratulate Ben Beck on his inventiveness and willingness to take risks to advance animal welfare and visitor experience in zoos.

Brookfield Zoo 1988-1989. Dr. George Rabb, a leading zoo director who combined science and bold imagination, hired CLRR in 1988 to master plan their northwest zoo quadrant, an area featuring African hoof stock. George was mentor to his senior staff but sometimes fear inducing as well. Once again Gary Lee brought out George's lighter side by playing court jester, and George had a delightful light side.

It was mid-winter in Chicago, windy and very cold. We were being led through a distant area of the zoo where American bison were kept in a large snow-covered paddock. We needed to cross the paddock to inspect a major water pump location. As we went through the bison barn the staff member instructed us to pick up a rake, broom, shovel, or other tool to fend off the bison if they became too curious. I was last in line, and the only tool left was a rubber toilet plunger. I was also last in line as we made our way through the paddock with a line of Pleistocene bison closely following us, steam arising from their nostrils, as I defended our group with my toilet plunger.

The master plan led to a contract to design **Habitat Africa!**, the renovation of the old giraffe house to recreate the experience of exploring a granitic outcrop or "kopje" in East Africa, combining giraffes, hunting dogs (outdoors), klipspringer, pygmy mongoose, monitor lizards and a variety of birds (indoors).







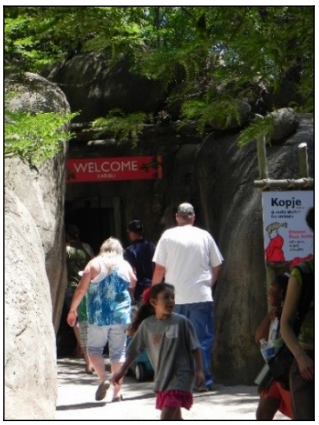




Figure 57. Upper photos: Brookfield Zoo “Habitat Africa!” outdoor and indoor giraffe display areas. The entire roof over the indoor area was one extensive skylight, providing natural appearing illumination. Middle photos: views of Habitat Africa! kopje entry showing over twenty years of plant maturity. Lower photos: left view from building into hunting dog exhibit. Right: indoor kope exhibit klipspringer enclosure. This project has matured marvelously over the years.

This design was developed using a large-scale model of the building, applying plasticine clay to shape the artificial boulder formations. We worked at night in an empty building on zoo grounds and George Rabb dropped by for informal and productive discussions. George picked up a handful of clay and began working with us once. Many zoo architects rely on specialist rockwork contractors to build scale models demonstrating and later fabricating their plans. But I always built models myself, often with other firm members, as a fundamental 3D design tool. Such large models also allowed clients to understand the designs in detail, when they were not trained to read architectural drawings. After the models were approved they became a legal part of the construction documents. Artificial rockwork contractors based their construction costs on the models rather than on architectural drawings and these models were kept on the construction site as references. Models usually did not survive this necessary but often rough handling. I now recall how Pittsburgh Zoo director Howard Hays taught me the obligation of presenting design ideas in the language clients can understand. Large scale models are just such a language.

Detroit Zoo 1988-1989. Director Steve Graham invited us to design a new chimpanzee facility based upon an earlier concept by Jones & Jones. We would collaborate with noted chimpanzee expert Dr. Franz de Waal. Franz had worked with and studied the groundbreaking chimp exhibit at the Bergers’ Zoo in Apenhuel, Netherlands, the most advanced chimpanzee facility at the time. Steve Graham wanted at least one 0.4 ha (one acre) outdoor area for the chimps and a sizeable indoor group area modeled after the Bergers’ Zoo’s facility to use during Detroit’s long cold winters. We designed the holding building with two indoor group areas and two outdoor yards, one large and one smaller, in case the chimp troop eventually split, as often happens with this species.




Figure 58. Detroit Zoo Chimpanzee exhibit two years after opening. The use of dead trees increases ape opportunities initially, but my experience is that zoos rarely replace them after they decay.

We debated using an expensive concrete dry moat like Zoo Atlanta, which would be safer, or a less expensive clay lined water moat, which would allow construction of the full-sized 4000sm yard Graham requested. Based upon Dr. de Waal's assurance that Berger's Zoo had used a water moat, we designed the exhibit with a water moat. Big mistake. Not long after opening a female chimpanzee, without coercion, tried to leap across the water moat and drowned. Forming new troops of chimps is dangerous. Competition for hierarchy can turn murderous if subordinate apes cannot escape their attackers. Later the first year a male chimp was attacked by the dominant male, had fingers bitten off and sustained other injuries. This ape and perhaps others should have been moved into the second area of enclosures, but Graham had imported gorillas and housed them there. Instead, Graham ordered the injured chimp to be promptly returned to his troop. Upon re-entering their yard, the injured male saw his persecutor, immediately fled to the perimeter water moat, leaped in, and drown. A heroic visitor, seeing the ape's distress, immediately waded into the moat and pulled the unconscious chimp onto the bank on the apes' side of the barrier, then quickly retreated before the other apes could respond. Were these tragedies a design failing or a management failing? Clearly they were both, but there were steps the inexperienced zoo staff should have taken during the animal introduction process to minimize risks. At zoo Atlanta and other ape exhibits, zoo staff placed electrified livestock fencing around the moats until the animals became accustomed to the area. This would have prevented the first drowning. Gorilla introductions by Zoo Atlanta staff were gradual and with great care to reduce aggression. Experienced great ape trainers were brought in to advise during this period. We were not involved in Detroit Zoo's introduction process, but the second drowning was the outcome of a rushed introduction process by the inexperienced director and animal managers. This is another example of the need for close coordination of design and management plans and systems.

Detroit zoo previously had chimps, but no one on their staff during the design and initiation of the chimp facility and management system had ever managed these apes. Primate care staff wanted a mechanical or hydraulic animal gate closing system that

could overpower any chimp trying to open or block the gate. We explained that the chimp had only to place a finger in the gate opening and staff could not close the gate no matter how powerful the mechanics provided. The apes needed to comply with staff requests through reward-based training and not physical force. In the design of the isolation pens and connecting animal gates Larry Dame of our team developed a clever counter-weighted safety locking system to prevent chimps from throwing open gates once they were closed. Staff approved prototypes we tested with them before installation. A few months later I received an emergency call from one of the chimp managers that a safety lock had failed and in securing the gate a staff person had her fingers bitten by a chimp. I hurried to Detroit and met with the staff manager at the gate that had failed. No chimps were present. While she watched I personally operated the gate one hundred times, counting off each time. The gate worked perfectly. Neither of us could explain why the gate or the operator had failed previously. We did not hear of any further problems with these gates.

Riverbanks Zoo 1989-1998. Director Satch Krantz invited me to come over to Riverbanks Zoo in Columbia, South Carolina while working with Zoo Atlanta. He was interested in ideas for a new white rhino exhibit area and a restaurant. These were built from the general sketches I provided during our meeting.

Aquarium/Reptile House. In 1990 we began to develop plans for a new Aquarium/Reptile House and invited aquarium design specialists Bios, James Peterson, and John Nightengale, who we collaborated with in the New York Aquarium Sea Cliffs project, to join us. I recall one evening when Satch, a natural worrier, sat impatiently watching us work on a large piece of brown craft paper, moving around paper blobs representing the approximate areas of the different exhibits he had requested, seeking the best arrangement from storytelling, visitor circulation and servicing standpoints. Satch had never seen designers' work. Collective logic, experience, and intuition were in free play. Finally, Satch ask: "Jon, are we getting anywhere?" I confidently replied: "Yes, Satch, we are nearly there," even though this was purely intuition. Five minutes later we had the jigsaw puzzle solved and presented it to an amazed and delighted zoo director. From this point on Satch had full confidence in our ideas and years later Satch reminded me of this experience.





Figure 59. Aquarium/Reptile House design came out wonderfully, being among the best small reptile displays and aquaria in the country.

During the construction of the coral reef tank the expensive new acrylic windows had been installed, waterproofing completed, and the big tank filled for testing. That evening during the weekend, while I was in Philadelphia, I received an urgent call from Satch. The back of the tank was leaking, and he could not reach anyone to solve this problem. I caught an early flight to South Carolina the next morning. Aquarium tank waterproof is not my specialty, but I could see small amounts of water beading along the back of the tank, leaking through small honeycomb voids in the concrete. There may have been a small leak around one of the windows as well. These problems were not urgent, but Satch, completely new to aquarium work, feared they might represent something serious. Technically, there was nothing I could do until the contractors returned to drain the tank and reapply the waterproofing, a common procedure. But Satch remained grateful that I was the one who dropped everything and responded immediately. Riverbanks Zoo attendance increased from six hundred thousand visitors to 1 million the year after the Aquarium/Reptile House opened.

Later Satch invited us back to design new Asian elephant and tapir displays. Riverbanks Zoo is on a riverbank, on high ground with adjacent lower, periodically flooded forest. I designed the elephant area next to this forest and proposed an additional elephant trail system through the forest which could be alternately used by tapirs. My notion was this would not be damaged by or interfered with occasional floods. Unfortunately, local river managers didn't agree. This may have been my first attempt to create long trails for elephants and other large species.

About this time Satch wanted to build a new botanical garden on the other side of the river, accessed by a new long pedestrian bridge. Years before I had recommended he hire a professional horticulturalist as horticulture Curator, as I had done at Zoo Atlanta. I no longer recall his name, but I collaborated with him on the general layout concepts for the public garden, but detail design was done by this Curator with good results.







Figure 60. Riverbanks Zoo gorilla, penguin, aviary, and elephant displays.

In 1998 Satch Krantz was organizing a development fund and invited us back to prepare a new master plan and design a new zoo entry, aviary, penguin exhibit, lemur island and gorilla display. This time Gary Lee oversaw the design work, though I helped develop initial design concepts. CLR designers Jon Stephensen and Greg Dykstra led the work as I recall. These are small, but beautiful and practical features and have proven extremely popular. Riverbanks Zoo has become one of the best mid-sized zoos in North America.

Nashville Zoo 1990-1991. I met Ms. Connie Cloak while attending a national zoo conference. Connie, an ex-zoo animal manager, led a small group attempting to establish a zoo in Nashville Tennessee. After the conference I flew with her to Nashville to learn more and visit possible future locations. At first we met a group with a zoo location, but the deed required only native animals be displayed, so Connie and her colleagues decided to proceed with plans for a larger zoo with a full range of species. After several false starts the ‘Zoo Boosters’ were allowed by the Tennessee State Parks Department to consider a large state-owned site next to a large reservoir being developed as a recreation precinct. The site had been suggested as the location of a shooting range in their master plan. I helped Connie and the Zoo Boosters by holding several community zoo master planning workshops. These were open to all, and proceedings were openly circulated in newsletters. Connie formally invited representatives from conservation groups such as the Sierra Club, Audubon Society and Tennessee Trails to participate in the workshops to ensure any objections could be delt with during planning. All these open workshops were attended by a representative from the Sierra Club and from Tennessee Trails. They sat in the back taking notes and declined to comment on or discuss the ideas being presented. Each meeting I invited them to participate, Each meeting they declined. Zoo Boosters visited all landowners bordering the proposed site, assuring them the zoo would not impact property values or cause nuisances, but would be good neighbors and an asset to the entire community. We submitted our master plan to the Tennessee State Parks Department with supporting community documents, along with a State recreation survey showing having

a zoo was the second highest state recreation desire, following only recreational driving in popular demand.

During this time the two conservation groups went to neighboring landowners, distorting what they had learned during our open workshops, and convincing them the zoo would become a smelly and dangerous neighbor, turning some of them against us. Anti-zoo newspaper articles began appearing. I spoke privately to the Tennessee Trails leader, who was more open to unofficial conversation. He told me that he liked our plan, but by publicly opposing it he had succeeded in increasing his organization's membership considerably. In speaking with a state park department official I was told they never expected the zoo boosters to prepare an entire master plan for their consideration. The implication was they were caught off balance. A simple letter of interest by the Zoo Boosters would have been easier to dismiss.

The Tennessee State Parks Department scheduled a public hearing to discuss our new zoo proposal. I flew to Nashville and, with Connie Cloak, was the second person to sign up as a speaker for the hearing. Advance applications were not allowed. Then we were told that only one speaker for the Zoo Boosters could speak for five minutes and that person must be a state resident. This barred me from being the principal speaker for our side. I would be allowed only three minutes like all other speakers. The hearing began with full press coverage. Connie gave our main presentation and I, having signed up early, expected to be called soon. After thirty minutes the press reporters left. After sixty minutes the convenor asked if anyone else wished to speak. I then spoke to an empty house. It was clear that my name on the speakers list had deliberately been bypassed until the hearing was over. The State denied our application and the Zoo booster organization dissipated permanently. This was very hard on Connie Cloak, though this conservationist ambush as completely beyond her control or mine. We were both under the outdated impression that national conservation organizations were still the 'good guys'. But ever since President Reagan's aggressive conservative Secretary of the Interior James Watt declared war on the conservationists, the warrior casts on both sides took control. Moderates, collaborators, and compromisers like me were obsolete. As a twenty-year Sierra Club member, I wrote my complaints to them. They did not answer, and I tore up my membership card and mailed it back. The other Nashville Zoo I mentioned earlier somehow changed their land donor's requirements and is now a successful mainstream zoo.

Los Angeles Zoo 1990-1998. Growing up in the Los Angeles area, I visited both the old zoo in Griffith Park and the new LA Zoo when it opened in November 1966. Ron Herman, a classmate of mine at UC Berkeley, had worked on the planning and thought highly of it. I did not. The architecture firm specialized in shopping malls and industrial projects and had simplified their zoo work by developing modular exhibits for great apes, big cats, hoofed animals, and aviaries. These were standardized footprints simply repeated all over the site in a modernist "one-size-fits-all" design system. The pathways were interlocking loops, causing visitors to constantly backtrack if they wanted to see

everything. Also, refreshment stands were placed at perimeters of walkway loops where visitation was low, rather than at key pathway intersections everyone would pass. There were many steep hills, difficult for pushing baby strollers or for the elderly or disabled, especially on hot Southern California summer days. Demographic surveys showed many of LA Zoo visitors were of Hispanic descent, arriving in large family groups. They would only walk as far as their elderly family members were comfortable going, not far on steep hills during summer heat.

Master Planning. In 1990 legendary Dr. Warren Thomas, Zoo Director from 1974 to 1991, invited us to update their original master plan. Colleagues Gary Lee and Nevin Lash also developed concepts for new animal health and education centers. Warren was one of the great 'horse traders' of the era, competing with other zoo directors for the rarest or most spectacular species for "his collection". His dealings with the Hunt Brothers, major zoo animal traders, were often rumored in zoo conference backroom gatherings I chanced to attend. Warran was a collector. One evening he invited us to his home for dinner, where he showed us his collection of medieval armor and rare chinaware. Warren treated us well and I enjoyed working with him. He was witty, creative, and combative, always in strife with the Greater Los Angeles Zoo Association (GLAZA), City of Los Angeles, the zoo worker's labor union or sometimes all of them together. He directed his curators, headed by very competent Mr. Michael Dee, and other staff, but rarely consulted with them. Warren's many battles finally got the best of him when the City government fired him. None of the work we began with Warren was ever realized.

Veterinarian Dr. Mark Goldstein, then Director of Franklin Park Zoo in Boston, was recruited to become LA Zoo Director in 1991 and requested us to revise the plan we developed with Warren. Mark was very personable and invited Gary and I to his home for dinner with his remarkable family on all our visits. I am still in occasional touch with him. Mark had a completely different personality and management style. He was welcoming, receptive, and collaborative with his staff. Warren had been self-assured and knew everything. Mark asked questions and invited information. Unfortunately, zoo staff had become combative under Warren, isolated into departmental fortresses, Some took Mark's openness as weakness. When we presented our overall plans to an open meeting of zoo-wide staff, I observed an atmosphere of hostility and resistance, without any particular focus on the plans we suggested. Neither of the two master plans Gary Lee and I developed received serious attention to my knowledge.

Tree of Life. One interesting outcome deserves mention. There is an important pathway intersection near the administration building, children's discovery area and a café forming a small triangular plaza. This was the first opportunity to create a landmark near the zoo entry. There were several medium sized Moreton Bay fig trees growing in the park. These grow into very large, impressive trees. I suggested that three be moved to the center of this area and pruned to make a single impressive living banyan. Life-sized animal sculptures in bronze or terracotta were to be mounted on sloping tree limbs. As

the tree grew it would begin enfolding these sculptures into its form. I called this the "Tree of Life." It was never built. At the 1994 American Zoo Association (AZA) conference in Toronto, I spent several hours over two days in my hotel room educating the Walt Disney Company's Head Imagineer Mr. Joe Rhode and his team in zoo design and landscape immersion theory. They had just begun planning the new Disney's Animal Kingdom (DAK) in Orlando Florida. I described my Los Angeles Zoo living "Tree of Life" concept to them in detail. DAK opened in April 1998 with a massive artificial "Tree of Life" with blended animal sculptures as its centerpiece. Joe Rhode and his team and consultants have done magnificent work designing Disney's Animal Kingdom.

In 1994 Dr. Mark Goldstein was replaced by new Director Manuel Mollinedo. Mark went on to take a senior position with the Humane Society. Manuel came from a parks and recreation background, I found him to be friendly in a professional sense, quietly guarded, and a strong leader. Manuel projected the image of the confident, unquestioned Spanish Don. Meetings were punctual and productive. There were occasional shared lunches, but no after-hour socializing. LA Zoo suffered from coyote predation, with poorly maintained fencing occasionally damaged by strong growing eucalyptus trees. During his first week Manuel ordered perimeter trees to have a serious haircut and fencing mended. This was not only sensible and overdue but also sent a clear sign to staff that Manuel expected prompt action. Director Manuel was a good fit for this difficult position.

Chimpanzees of the Mahale Mountains. The existing chimp exhibit was a donut-shaped concrete moat with a central concrete island on which a four-generation troop redirected their internal stress against the public, who reciprocated. This seemed a classic case of two territory defending species contesting their common frontier. An animal behavior researcher who had observed the troop for some time agreed with my observation.

Design for positive visitor-animal interaction. This sad situation led me to develop a new design theory I called **"Affiliative Design**[19]**."** We know that some environments, such as territorial boundaries, where "a line drawn in the sand" or resource poor environments can encourage agonistic behaviours while environments of abundance and shared benefits can encourage affiliative behaviours. Could we reduce aggressive behaviour between chimps and zoo visitors by designing areas of approximately equal amenity: sun, shade, topography, aspect, views, diversity, species-appropriate utility, on both side of the exhibit barriers? What if instead of an obvious boundary with crowds on both sides we devised a complex zig zag frontier suited to encounters of individuals or small groups rather than crowds of each species? Can we devise games people and chimps engage in, people enjoy, and chimps always win? These are examples of intentional affiliative design. I predicted these strategies would decrease or extinguish chimpanzee aggression towards humans. I also predicted this loss of the uniting

[19] Coe, J.C. (1999) Increasing affiliative behavior between zoo animals and zoo visitors. 1999 Annual Conference Convention Proceedings, American Zoo and Aquarium Association, Silver Spring, MD, pp. 216-220.

common enemy, human strangers, would result in aggression being redirected against status rivals within the troop. As a result, the troop would split requiring separate areas for each troop, as happened with the chimps at Detroit Zoo. These behavioural predictions came true soon after the exhibit opened.

Project staging. The new chimp exhibit was the area they were presently in plus an adjacent and equal area previously inhabited by baboons. Each had small underground night cells. Our job was to combine both areas, creating a unified area while the chimps remained in their present area during construction. We developed a three-stage strategy: 1) construction of a new and enlarged ape holding building next to the existing enclosures suitable for managing chimps 24/7. This building would have a penthouse enclosure in which zoo visitors could view the chimpanzees. 2) Move the chimp troop into the new facility, demolish much of the old facilities, but minimize cost by reusing much of the ugly existing concrete barrier walls. 3) Move the chimps into their new 883 sqm (9500 sf) outdoor display area.

Behavioral scientist Dr. Cathleen Cox recorded chimp behavior before construction and during each of these stages. Her report[20] concluded that chimp aggression directed toward the public ceased but intragroup aggression increased, just as I predicted. Unfortunately, this social struggle resulted in two chimp deaths before a new group hierarchy was established. Today these chimps are managed in two groups as we had prepared for.

The visitor's experience. We contrived a storyline that the shed structure we would build had been part of a tropical timber mill. When local timber had been exhausted, the mill was converted to an African chimpanzee sanctuary. Ms. Polly McKenna-Cress, our interpretive graphic specialist in this work, designed simple attractive panels setting out our concept. This ecological and cultural framing is important to me, a holdover from the Woodland Park Zoo Long-Range Plan scenarios. I doubt visitors ever understand this story or read about it in Polly's interpretive postings. Perhaps visitors to an opera or concert do not care about the libretto and come only to enjoy the experience. As designers we must aim high, satisfy ourselves as well as our audience and never "dumb-down" our performance or expectations.

Chimpanzee shower concept. We devised a game where people and chimps could choose to play and the apes would always win. During our work on the Detroit Zoo chimpanzee project Gary Lee and I were heading to Philadelphia airport for the flight to Detroit. We planned to discuss ideas for chimpanzee behavioral enrichment in Detroit but had not yet given the subject any thought. At Gary's suggestion we upgraded to first-class seats so we would have room to work together on the flight. We taped a large sheet of paper on the front bulkhead and began brainstorming. Soon many in the first-class section were joining in. I recalled a game chimpanzees and orangutans often play

[20] Cox, C.R., Wilcox, S.F. (1999) Effects of exhibit conditions on chimpanzee activities. American Journal of Primatology 49,1.

against their caregivers-spitting on them. The apes become masters at hiding water in their mouths and successfully luring humans into position with sweet expressions. What if we gave zoo chimpanzees access to a spray hose? Detroit Zoo staff were not interested in their apes being engaged in such undignified games.

A variation on the game, the ‘chimp shower’ idea occurred to me for the Los Angeles Zoo exhibit. We proposed a sign in the public area stating: “If you want the chimp to give you a shower, stand here.” The chimp then has the choice to climb up, pull a cord and activate a mist sprayer above the visitor. Primate staff objected. Perhaps, like Detroit Zoo staff, they also thought this behavior was too undignified and anthropomorphic. Or perhaps, recalling the visitor-chimpanzee aggression from the old exhibit, they feared the shower game public would encourage the public to misbehave. The chimp shower was installed by zoo volunteers, but staff had it removed after a few weeks, before independent testing could occur. However, the idea was later picked up and redeveloped for the orangutan exhibit at Toledo Zoo where it has proven very enjoyable for both orangutans and visitors. During my 2012 North American zoo tour described later, then Toledo Zoo director Dr. Anne Baker described a female orangutan tricking visitors.

“The female orangutan would place her darling infant next to the viewing glass to attract a group of adoring visitors ignoring the warning signs. When enough people had gathered, she activated the sprinkler on them!” Dr. Ann Baker.

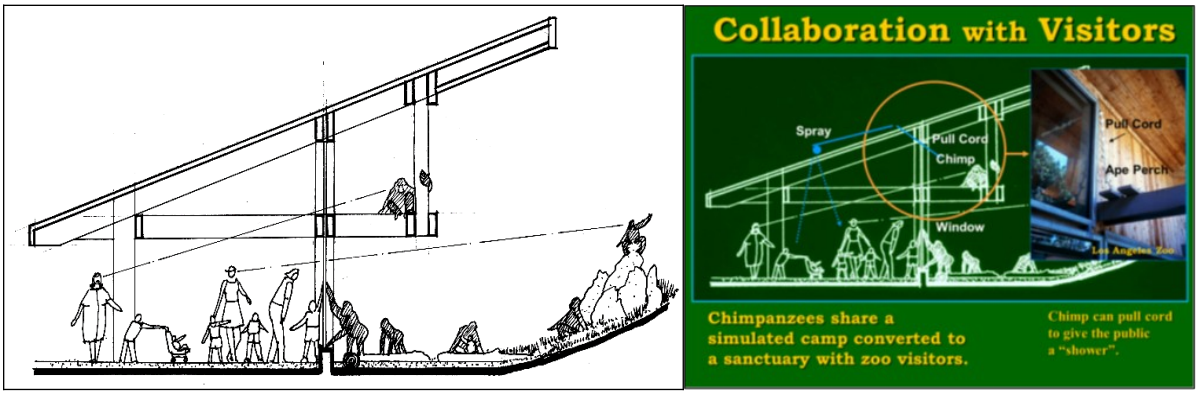


Figure 61. Left: themed as a converted tropical lumber yard shed, the shared shade roof and woodchip surfacing were intended to create a sense of equity to both visitors and chimps. However, the chimps could get above the humans. Right: chimpanzee shower concept. We devised a game where people and chimps could choose to play, and the apes would always win.

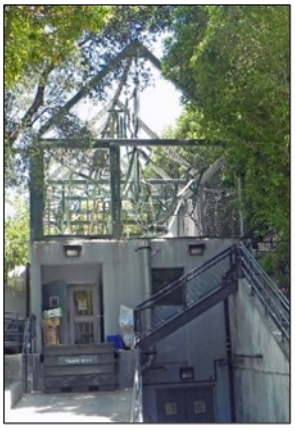
Features benefiting the chimpanzees. We designed the chimpanzee night house to be three levels high to accommodate the steep slope it was built against. Staff access was from ground level and midlevel. Indoor night rooms for the apes were on the midlevel with access to existing tunnels into their exhibit areas. A fine mesh-covered penthouse was built on the upper level (see photo below). This penthouse served two purposes, 1) allowing chimps to sleep under the stars when they wish and 2) the multi-male troop split into two groups, as I predicted. The penthouse is used by one group

while the other is in the main display area, another example of animal rotation or alternation.

“Howdy log” and “feeding log” enrichment features encourage positive chimp-visitor experiences. The “howdy log” was a large artificial hollow log made in two sections and mounted so that it seems to penetrate the exhibit window The window remains the barrier between children crawling into the log from the public side and a young chimpanzee entering from the other side. This was intended to encourage young humans and young chimps to entertain each other. I have seen children using it (see photo below), but no research has been done to evaluate the howdy logs effectiveness that I know of.

The feeding log was another artificial hollow log designed to allow chimps to forage for nuts inside the log using long sticks while visitors could watch closely through the open end that appeared to penetrate the glass. I demonstrated how to train the chimps to use this innovative feature to the caregivers. Unfortunately, this expensive feature was never used because the zookeepers union refused to allow its members to do enrichment work without extra pay, which zoo management refused to provide. About six years later I again demonstrated to new staff you to train the chimps to uses the feeder logs. To my knowledge these expensive and inventive enrichment features have never been used. However, during later back-of-house visits, zoo staff confirmed how much they liked the multilevel service building.

I positioned an elevated shady grotto under an overhanging cliff. A small waterfall provided with mist sprayers created a cool ‘throne area’. Here dominant chimps could rest on warm afternoons while overlooking their entire area as well as looking down on throngs of zoo visitors.



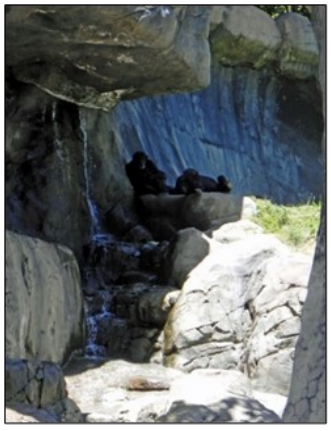




Figure 62. Los Angeles Zoo Chimpanzee Exhibit. Upper left: chimp penthouse above night holding building. Upper middle: “feeding log” integrated into the public viewing area. Upper right: overhanging cliff for shade and a small waterfall with a mist spray to create a cool chimpanzee ‘throne area’. Lower left: chimp using one of the artificial “feeder logs” inside the chimp area. Lower right: visitors looking into the chimpanzee’s world while both enjoy abundant summer shade.

“The chimps want to be able to climb, have a social group and plenty of things to occupy their time and their minds... They’ve got a state-of-the-world exhibit.” Dr. Jane Goodall, Renowned Primatologist describing this exhibit (as quoted in the LA Times).

In 1998 I was invited to be keynote speaker at the Jane Goodall Institute Chimpanzoo Conference[21] in Lost Angeles. During a tour of the LA Zoo chimp exhibit Dr. Jane and I had an opportunity to sit inside the elevated chimp rooftop penthouse. We sat quietly on log perches, under overhanging shade trees gazing around the zoo and up into the surrounding Griffith Park. We had used fine netting made of woven aircraft cable, nearly transparent, to enclose the space. This elevated position created a feeling of confident relaxation. Jane turned to me and said: “This doesn’t feel like a cage.” The chimps must have felt the same way.

On a later trip I followed a carer up the steps to the penthouse in which four chimps were relaxing. I, a stranger, stood one meter away from three chimps on the other side of the lightweight mesh barrier. One turned his head to look at me and turned back. Two others did not appear to wake up. In any typical zoo enclosure having a stranger in such proximity would cause an uproar among the apes. These experiences convinced me empathetic, informed design can indeed reverse a long history of aggression between chimps and humans, replacing agonistic chimp behaviours with indifference at least, even in challenging situations.

Orangutans of the Red Ape Rainforest. Our next LA Zoo project was a new orangutan exhibit. Gary Lee suggested the design of a donut-shaped cable mesh tent with viewing in the centre. Visitors would be surrounded by the orangutans above them, which could rotate around different sections of the loop. I suggested the entire area be enclosed with a dense hedge of towering timber bamboo. We installed heavy and

[21] https://joncoe.net/wp-content/uploads/2021/12/ChimpanzeeChoices1998.pdf

expensive sway branches which could be lowered for provisioning and then raised to changeable positions with small winches. When I visited 14 years later the carer responded she seldom used this feature because the winch wasn't conveniently reachable. Was this a case of poor design or low staff incentive? Given the staff-management problems I have observed over the years working with this organization I suspect the latter cause.



Figure 63. Orangutans in the round at Los Angeles Zoo. Left: public entry under the mesh torus. Centre: orangutan approaching gateway to the next section of the torus. Right: indoor night facilities with overhead raceways for transferring apes into different rooms; conventional but beautifully detailed. The wheel-operated manual gate control designed by our in-house genius Larry Dame and fabricated by A-thru-Z fabricators has become the international best product in my opinion. Left photo: CLRdesign.

Children's Zoo renewal. Under Director Manuel Mollinedo's direction I designed the redevelopment of the children's zoo area, especially the farm animal area. I ensured animals had "time-out" retreat areas, groups of animals were platooned so no one had to spend too much time being touched and garbed by zealous children. I also provided an organized waiting area for children and their families on crowded days. Rich new colors on the older buildings brightened the atmosphere.

Our final LA Zoo master plan. My major work with Manuel was yet another master plan, our third. We prepared a different master plan for each of the three directors we worked with at LA Zoo. I thought this one was both practical and far sighted. My plan for the new entry included a sweeping curved walkway accessible to all, a concept called "universal design". Senior staff felt it was not imaginative, not "Hollywood" enough. Soon after a San Francisco architecture firm designed a new billboard entry with a long steep stairway reminding me of Fascist Italian or German design. Grandiosity without sympathy for visitors with disabilities or elderly members or pushing children in prams. They were not welcome on the steep main path and had to take narrow inconvenient side routes. We provided the best ideas and best completed work to Los Angeles Zoo over a period of eight years, off and on, serving three directors. But in the end I never felt our work was appreciated the way it was by most of our clients.

Woodland Park Zoo Northern Trail 1990-1994**.** Northern Trail may be my favorite zoo design project because of the quality of design and implementation, the ways the

animals use it, how well it has matured and the support of co-workers on the zoo's team. I'm proud of other project successes under strong leaders. But the WPZ team at all levels fully understood and supported what I now call "deep landscape immersion." They enhanced our work with thoughtful management, allowing both landscapes and animal behaviours to mature gracefully. Our CLRdesign team of Gary Lee, Nevin Lash, Larry Dame, and I worked closely with the Woodland Park Zoo team headed by Director David Towne (David was Seattle Park Director during my earlier work with Jones & Jones and later joined the J&J staff when I designed Gene Coulon Park). Exhibits Coordinator John Bierlein was a past park naturalist, and lover of both wild nature and art. John was responsible for the whimsical art found around the zoo. Zoo Naturalist Gary Mozel previously worked as a naturalist in Alaska. Project Manager Jim Maxwell, together with John Bierlein, were keepers of the flame, insuring WPZ maintained its commitment to the highest quality of landscape immersion exhibits. Horticulturalist Sue Maloney Nicol worked with us during the first immersion exhibits and supported and managed our landscape-based exhibits for fourteen years before the beginning of this new work. Exhibits supervisor Larry Sammons, with John Bierlein, took wonderful photos of the completed work. Lead Keeper Gregg Thompson managed the mountain goats and had waited a decade and a half for his turn to design ideal facilities for his favored species. His knowledge of their unique behaviors resulted in innovations in the design of their transfer chutes and, with Gary Lee's personal design attention, their extraordinarily beautiful exhibit.



Figure 64. Mr. Kenny Twywana carved this wonderfully realistic artificial columnar basalt geology. Mr. Jolly Miller's company managed the outstanding rockwork construction. Photos: left John Bierlein, centre and right Woodland Park Zoo.

As determined in the 1976 Long-Range Plan, the project area was designated to recreate taiga (boreal forest), tundra and montane landscapes, simulating a visit to Alaska. Animals were to include white wolves, brown bears, wapiti (elk), river otters, mountain goats, fishers, snowy owls, and bald eagles. Recalling my experiences in the Canadian Northwest Territories, on the Kenai Peninsula, and Fairbanks Alaska, I suggested a storyline of ecogensis for the taiga exhibit. These northern landscapes, and resulting wildlife, are created by the interactions of **fire, frost, and flood.** Evergreen

forest, high and dense where soil drainage is good, stunted, and sparce where permafrost prevents drainage, is the most permanent of these landscape forms. **Frost**: over time the deep shade of large white spruce prevents soil warming during summer allowing permafrost to form and rise. Gradually deep sphagnum mosses form under the tall conifers, insulating the soil still further. Stunted black spruce muskeg becomes dominant. **Fires** consume trees and moss layers, exposing the soil. Permafrost recedes; seedlings renew the forest cycle. Openings are first colonized by birch, aspen, poplar, and willow. These later give way to pine and spruce. **Flooded** rivers change course, undercutting forests, creating gravel and sand bars. These bars are colonized by poplar and other deciduous trees, later replaced by conifers, again beginning the gradual forest transition. To express these events in the exhibit designs Gary and I created a fast-flowing stream crossing a gravel bar and flowing into a pool for the brown bears, suggesting flood renewing the landscape. The wolf area was in a birch grove with charred logs recalling the force of fire in shaping landscapes. Melting permafrost was simulated in the foreground of the snowy owl exhibit with water seeping out of deep bed of sphagnum moss.

Environmental enrichment[22], providing exhibit features encouraging natural animal activity and physical fitness, is an essential feature of good zoo design. A challenge is to provide enriching features which also support our ecological story. In the bear's pool I suggested placing a log floating in the pool while tethered to the bank with one end extending onto the land area. The bobbing motion attracted a swimming bear, who would wrestle with the log. This caused the elevated extension of the log to swing and sway, attracting the second bear to grab it. Soon the bears, one in the water and the other on land, would have a tug-of-war using the log. Zoo animals often get tired of such amusements, but the fact that zoo staff have replaced this log over decades of use testifies to the bear's continuing use of this natural enrichment feature. We also worked with zoo staff to design a computerized lazy-Susan device which randomly dropped food items into the water, including live trout hatchlings, for the bears to catch. While the public watches, the bears, heads underwater go fishing. Some trout survive to large size. These are examples of naturalistic enrichment for both zoo animals and zoo visitors.

This exhibit opened in 1994 after construction management by Gary Lee, Nevin Lash, and the zoo's team. Gary Mozel and Sue Nichol traveled to Alaska to purchase many of the plants and arrange shipments to Seattle. Sue and her horticulture team did all planting and maintenance themselves. I helped her with a few special details such as arranging and planting in special soil bags hanging down rock faces simulating an avalanche chute.

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[22] https://joncoe.net/zoo-theory/enrichment/
For more information please see: Bierlein, J. (1917) Woodland: The story of the animals and people of Woodland Park Zoo. p. 136. www.histotylink.org

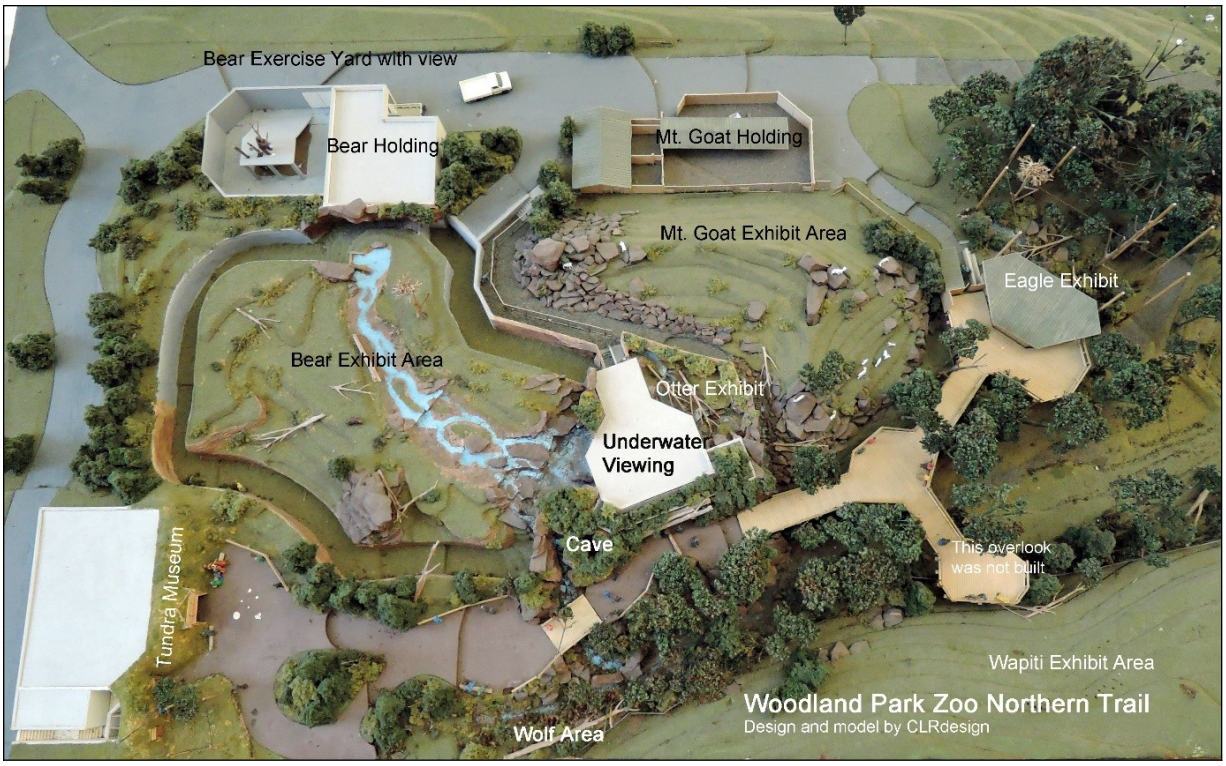




Figure 65. Above: This accurate model of the central area of the Northern Trail exhibit complex by CLRdesign demonstrates the use of hidden dry moats. These allow panoramic multi-species vistas illustrated in photo below by L. Sammons. The brown bear explores the foreground stream. Mountain goats occupy the high ground beyond. Borrowed landscape forms the backdrop, including trees outside the zoo property.



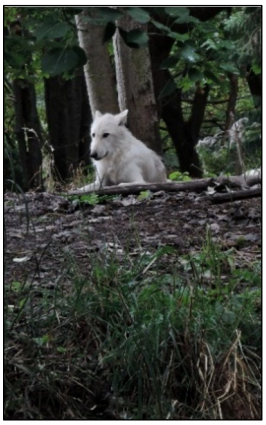
















Figure 66. Upper row: visitors enter the Northern Trail through transplanted Alaskan coastal forest, then see wolves with elk (wapiti) beyond. Second row: first major bear overlook and path to bear cave with the entry to Tundra Center in background. Third row: Bear Cave and view of bear from cave (Photo: S. Chin) and bears finding food in meltwater stream (Photo: L. Sammons). Bottom row: view from within the Taiga Center pavilion looking into bear habitat and bear in pool interacting with visitors. Botton left note floating enrichment log mentioned earlier. Last image of bear interacting with visitors which I often observed. Photo: Woodland Park Zoo.



Figure 67. John Bierlein arranged for local First Nations sculpture Tony Angel to create these sculptures of raven “Spirit Guides” and wolf puppies across from the wolf exhibit. I collaborated with Tony in developing this storyline and locating these sculptures.

Woodland Park Zoo hosted the 1995 annual conference of the Association of Zoos and Aquariums (AZA). As conference goers experienced the recently opened Northern Trail exhibit I happened to be standing behind legendary Bronx Zoo Director William Conway. I had worked with him and his exhibits team fourteen years before and they now were Woodland Park Zoo’s main competition for the most exhibit awards. I was delighted when I overheard Bill Conway say to his colleague “This exhibit is so good it’s scary!”. That week Northern Trail was AZA’s Exhibit Achievement Award winner.

I last visited the Northern Trail exhibit in 2018, twenty-four years after opening. It had been well cared for and the entire wooden elevated deck section had been replaced. Plantings had matured as the above photos demonstrate. To this day it is considered one of the finest zoo exhibits ever built. In 2023 the present Director changed the name

to the ‘Living Northwest Trail’ and changed the theme area from southwestern Alaska to northwestern Washington State, which fits the now mature landscape well. He has renovated the indoor Tundra Center (covered over the amazing tundra diorama painting) to a display of endangered local pond turtles the zoo is helping to conserve. He has also stated that the original bioclimatic zone zoo organization will no longer be followed as new exhibits are developed.

Adventures with Dr. Goodall: From LEMSIP to Chimp Haven. In about 1991 I received a phone call from Dr. Jane Goodall, the eminent primatologist, asking if I would help her with an undertaking. Perhaps she remembered me from our brief meeting at the Pittsburgh Zoo during the first showing of her National Geographic film, or perhaps someone had recommended me from my previous design work with great apes. Jane told me about LEMSIP (Laboratory for Experimental Medicine and Surgery in Primates) a chimpanzee breeding and biomedical research facility near the Hudson River in Tuxedo NY. At the time they had some 200 chimpanzees, ‘lab chimps’ and 200 smaller primates kept and managed in inhumane conditions. Early in 1990, the US Department of Agriculture had charged LIMSEP with 378 violations of the Animal Welfare Act. Jane told me she had offered Director Dr. Jan Moor-Jankowski to design and help fund a major chimp enrichment and exercise area. Jane asked me to design such a facility and assured me that if Dr. Moor-Jankowski refused, she and her colleagues would see that LEMSIP was closed. I drove to LEMSIP and met Vet. Dr. James Mahoney, Jane’s ally, and a strong animal welfare advocate. He showed me around and shared horrific examples of routine and casual animal cruelty. All chimps were kept in 1.5m x 1.5m x 1.5m (5’ cubed) cages, infant chimps were taken from their mothers and hand raised and of course chimps were inoculated with the many infectious diseases being researched. I then met briefly with Dr. Moor-Jankowski and explained my mission. After returning to our Philadelphia Office, I developed plans for a two-level outdoor steel mesh enclosure to be attached to one end or the lab building and filled with climbing and other behavioural enrichment furnishings and features. I sent a draft set of these plans with an explanatory narrative to Dr. Moor-Jankowski for this review but received no response. I sent a reminder and still received no response, so I contacted Dr. Goodall with this unfortunate negative result. LEMSIP agreed to close in 1995, causing a rush to rehouse around four hundred lab primates before it shut down in 1997. In 1998 Jane Goodall was featured in a National Geographic documentary ‘Chimp Rescue’ featuring James Mahoney's efforts to relocate approximately one hundred primates to humane sanctuaries. The remaining primates went to other government funded research labs.

Dr. Goodall sent me a thank-you postcard I still have. I first met Jane Goodall at Pittsburgh Zoo in 1979, as I described in that earlier section. In 1994, After helping design the Los Angeles Zoo chimp exhibit and being keynote speaker at her Chimpanzoo conference, I joined her party during four of her lectures in the Los Angeles area (she sent me a thank you postcard then also) and was a speaker with her at the SAGA primate conference in Japan in 2004. I also enjoyed a brief chat with her during

her visit to Melbourne Zoo in 2008. I always found Dr. Goodall to be friendly, approachable, and confident. I've seen her speak with austere Japanese business leaders with the same informal tone, and the same effectiveness she would uses talking with a passionate young zoology student. Jane once told me she met so many people on her travels yet had a terrible memory for faces. I was thus doubly pleased that she remembered me. Perhaps my long white beard was easier to recall than my face. Dr. Goodall is certainly one of my and the world's heroes.

In about 1995 I attended a conference intended to decide on future privately managed humane housing for government owned lab chimps. This was a groundbreaking coalition of animal welfare advocates both within and against the lab animal industry convened by the National Institutes of Health, the US government funding agency. It was pointed out during this meeting that maintaining chimps in labs was very expensive and that, when it was discovered that chimps were not biologically suited to testing drugs against AIDS, there was now a major surplus of lab chimps no longer needed for research. If private sanctuaries could be built for these apes, the government would help fund construction and operation and still save money. During this conference and subsequently a decision was reached to proceed with the private sanctuary movement with the requirement that once chimps were relocated no further breeding or invasive research would be allowed. The lab chimp generation would gradually age and go extinct. The CHIMP Act (Chimpanzee Health Improvement Maintenance Protection Act) was passed in 2000. The Federal Sanctuary System was born.

In 1995 I wrote *Giving Laboratory Animals Choices* published in Lab Animal Magazine. That year I was invited to help develop a master plan for Chimp Haven, to provide humane housing for lab chimps on an area of the Eddie D. Jones Nature Park in Keithville, LA. I visited their site with them and recommended an 81 ha (200-ac) parcel of mostly pine forest with the possibility to create several dammed water features and a wide perimeter buffer zone around it. There was a low security prison nearby and I harbored the dream these prisoners could grow crops to feed the chimps and, with proper training, could even work as caregivers at the sanctuary. I doubt this ever happened. I worked with co-directors Ms. Linda Koebner, who had helped rescue some of the LIMSEP chimps, relocating them to Florida's Lion Country Safari, and Dr. Linda Brent, a primate management expert[23]. Their goal was that with nurturing care and environment each chimp could advance to self-selected limits of personal development and welfare. This was exactly the goal driving the design of the Red Dear Home in Alberta for severely disabled people I had helped to plan back in 1973. For example, some lab chimps had been so mentally damaged they were afraid to leave their small cages. The door would be left open into a larger enclosure if they chose to leave their refuge. When possible, individuals would be paired with compatible partners and larger compatible groups would be formed with access to very large natural forest areas.

[23] I wrote a chapter on chimp facility design with her in her 2001 book *The Care and Management of Captive Chimpanzees* published by the American Society of Primatologists,

Flexible and efficient facility design was essential to minimize labor costs. In sanctuaries there are far more animals for each caregiver to support than in Zoos.

At this point my colleague Nevin Lash took over for the design stage and the result is a major success with the first chimps arriving in 2005 and there are now 300 chimpanzees living in Chimp Haven. I visited the facility in 2004 during construction and remain a donor.

Lincoln Park Zoo 1991-1993. Then Director Kevin Bell invited our CLRR firm to develop an area master plan followed by design of a major new facility, the 3000 sqm (32,000 sf) Regenstein Small Mammal-Reptile House[24]. Gary Lee and I developed a very innovative and I believe successful design process. The Zoo provided us with a dedicated work and meeting room. Before each meeting we covered the walls with very large and colorful drawings and models displaying our latest progress. We found these ‘bedsheet’ sized drawings more ‘client-friendly’ and more easily understood than smaller black and white prints usually used by architects. We filled large tablets with workshop notes and pinned these up as well. Everything was left on the walls when we departed and remained on display for casual staff visits before our next design meeting. When we returned the process was repeated, with newer drawings covering older ones. Nothing was lost. This process increased understanding and confidence, and thus support, among zoo staff.

The Regenstein Small Mammal-Reptile House displays small mammals, reptiles, amphibians, invertebrates, and birds. The first half of the visitor experience is organized in traditional museum fashion with viewers in a darkened gallery looking into living dioramas organized from very simple (What is a reptile?) to dramatic views of large snakes in simulated habitats. The organized visitor circulation follows the educational pathway, but experienced or impatient visitors can easily proceed to favorite exhibits. This free-flowing design is effective on high visitation days when typical museum galleries become congested. The second experience builds upon the basics demonstrated in the first gallery by immersing visitors in a tropical habitat within a large conservatory shared by many reptiles, mammals, birds, and plants. Long-time friend and colleague Mr. Ray Mendez of Work-As-Play built and provided animals for displays of naked mole rats and leaf-cutter ants. The third major element not seen by visitors is a large 400sm (4,300 sf) animal management and breeding facility.

[24] https://clrdesign.com/project/lincoln-park-zoo-regenstein-small-mammal-reptile-house/



Figure 68. Upper left: this building designed by CLRR architect Peter Alusitz makes a handsome contribution to the Lincoln Park Zoo campus. Upper centre. the education stations designed by Barbara McGraw roll out to enclose educators in front of iconic super-sized bat-eared foxes and geckos (not shown). Upper right: the gallery displays present animals in their scientific, taxonomic context, rather like a living science book. Curved acrylic windows supporting the free-flowing visitor circulation path. Lower left: the second visitor experience is in a tropical conservatory displaying animals in their ecological context, with free-flying birds and immersive exhibits of reptiles and small mammals within their heavily vegetated habitats. Lower right: the third project element was a large off-display and highly functional animal management centre especially suited to breeding small endangered species.

Traditional curators expected all their cherished collections to be on public display. A study done by Reptile Curator Dr. Dale Marcellini at the Smithsonian National Zoo found that no matter how many species were displayed, visitors only paid attention to about 25 species. Marcellini suggested it is more economical and effective to breed less popular endangered species in flexible off-exhibit areas. Thus, we planned for only twenty-two species to be displayed in the main hall with another 12 species in the naturalistic conservatory setting. Nineteen years later I visited the project (see photos above from 2012) and spoke to management staff who confirmed the entire facility was very successful, including the large off-exhibit animal conservation and breeding area.

Regenstein Small Mammal-Reptile House is our best architectural product, both inside and outside. Peter Alusitz our lead architect from the New York CLRR office managed

by then partner Geoffry Roesch, designed the building's facades to wonderfully harmonize with the traditional Lincoln Park architecture.

New York Botanical Garden Enid Haupt Conservatory 1993. The New York CLRR office headed by Goeff Roesch was awarded the work of redesigning exhibits in all eleven glass houses of the historic Enid Haupt Conservatory. The design work began as the conservatory was emptied of most of its plants and reglazed. The future locations of all plants were up to our planning. The old plantings had been arranged traditionally by taxonomic type by specialist collectors. For example, the giant domed Palm House displayed ferns and palms. Director Gregory Long envisioned bioclimatic organization based upon their wonderful research and collections of South American species, plus changing ornamental displays. I suggested keeping the palms and giant ferns under the palm house dome as an astonishing entry experience, followed by lowland rainforest, cloud forest and desert, with connecting glass houses featuring aquatics, vines and changing exhibits. Gregory Long left it to me to convince the traditional fern Curator who objected to these changes. "This is my collection", he stated "which I built over my career." To my encouragement that ferns distributed among all the bioclimates showed their diversity he responded, "My collection will be lost." He resigned later that week. Traditional curators in zoos, aquariums, botanic gardens, and museums were collectors and often thought of the collections they managed as personal, or at least professional property. It takes a strong leader like Gregory Long to unite them under an institution-wide vision.

Gregory Long organized two international research trips, one to visit and learn from the best conservatories in Europe and one for me to visit NYBG research sites in Ecuador.

On the first trip I joined Gregory, along with Geoffery Roesch and his wife Marcia, to visit Kew Garden, especially the new Prince of Wales Conservatory. We found the low roof created a sense of confinement and the plantings, while attractive and collected from around the world, had 'no science' in their organization. We next visited the Royal Botanic Garden Edinburgh. Their grand old tropical conservatory was arranged scientifically at the time with little attention to creating an aesthetic visitor experience. It seemed haphazard, accretional and clearly human dominated. As we left I asked Gregory "Why must collections be either scientific or ornamental? Why can't we have both? And why must even large conservatories appear so human-dominated? Why can't visitors take a beautiful walk through the wild in a large conservatory?"

In addition to visiting gardens, I also spent an afternoon exploring Edinburgh Castle and the historic road leading up to it. We next visited the grand Palmengarten Frankfurt and again found a beautiful but human-dominated environment with no sense of wildness. On the flight home I was seated next to Gregory and developed sketches and notes illustrating and confirming our findings.

Returning from Europe, I realized I had just visited four continents, North American, South America, Europe, and Australia, in fifteen days. A few days later I again flew to Australia for the Alice Springs Desert Park work.







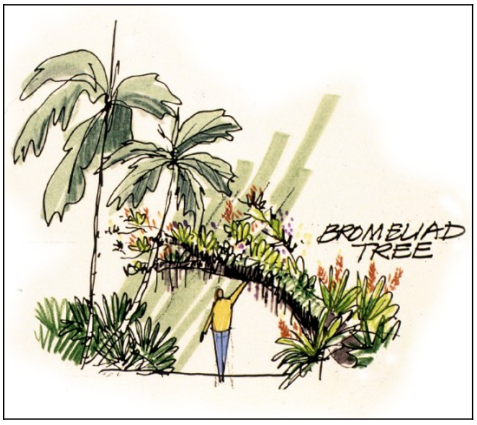






Figure 69. Upper row: New York Botanical Garden's restored Enid Haupt Conservatory showing the dark pool I designed to reflect the 30m, (100') height of the great dome. Second row left and center: my conceptual sketch of the lowland rainforest artificial 'fallen limb from the forest canopy' covered with bromeliads and my photo of the result. Second row right: my use of a simulated shaman's hut demonstrating medicinal and economically valuable plants placed to unite two separate pavilions withing the lowland rainforest theme. Third row left: connecting gallery displaying aquatic plants and swags of flowering vines. Note the use of local Fordham Gneiss geology for construction. Center: CLRR interpretive design leader Barbara McGraw in the cloud forest dominated with native ferns, bromeliads. and mosses. Right: Overlook to mountain stream with mist system simulating cloud forest conditions and adding atmospheric and acoustic qualities to the cloud forest simulation.

The magnificent dome of the Haupt Conservatory, opened in 1902, is 30m (100') high, with the same diameter at its base. The upper dome is supported by a 15m (50') diameter compression ring clearly visible from inside the Palm House entry. I wanted visitors to appreciate this amazing space and so I placed a dark reflecting pool of the same diameter directly below. Visitors looking down into the pool see the reflection of the high dome above. This is a special example of the use of "sight-line design" I had developed in my zoo work. I also introduced an acoustic dimension by having water from the pool spill out into special drains (third of the Palm House photos above). The overall result proves my assertion that botanical displays can be both scientifically accurate and educational as well as aesthetically pleasing.

New York Botanical Garden Children's Adventure Garden was our second project, again working with partners Geoff Roesch and Gary Lee. We were challenged to make

botany fun and understandable to children. Local researchers had found that some children growing up in the nearby South Bronx neighborhoods did not realize that trees were any more alive than utility poles. Our plan was based on developing discovery areas around natural site resources such as geologic outcroppings, a marsh and lake, and developing discovery trails connecting these play and learning opportunities. Gary also designed a charming and kid-friendly learning center.



Figure 70. Gary Lee's birds eye illustration of the plan and some final developments.

Alice Springs Desert Park Australia -1993. Mr. John Wright, an American landscape architect living in Australia, visited our Philadelphia office in 1992 to learn about zoo design. He was planning a new open-range zoo in Werribee, Victoria, near where I live today. Then in 1993 John and Mr. Tony McCormick from Hassell Architects, a major interdisciplinary Australian firm, invited me to join them in planning a new desert wildlife park in Australia's Red Centre. Our team was joined by noted ecologist and award-winning science writer Dr. Penny Van Oosterzee, whose illustrative book The Red Centre was our inspiration. Canadian born local ecologist Dr. Bill Low guided us to iconic outback habitats such as sand and gypsum hills, gibber plains, mulga woodlands, chenopod and spinifex plains, red stone gorges and chasms. Imagine being paid to visit and learn about such amazing landscapes! Our plan was to recreate highly accurate representations of these biomes, placing them at the base of the picturesque MacDonnell Ranges ridgeline.

Our detailed site analysis included an important dimension. This has been the homeland of the Arrernte people for at least 30,000 years and possibly much longer. The area had numerous sacred sites. Cultural communications can be complex and nuanced. Initiated Arrernte men have sacred knowledge not available to outsiders or even to Arrernte women. Women's knowledge is likewise hidden from their men and outsiders. How were we to locate and protect sacred sites when traditional custodians were not allowed to show them to us? I reasoned that since such sacred areas are ancient and timeless, they would be unusual and imperishable geological features such as dramatic rock formations. Such features were common on this picturesque site. Any could be sacred, but which ones were? I arranged a walk through the site with male Arrernte Elders, showing them the locations of proposed constructions. "We were

thinking of building a viewing pavilion connected to this dramatic rock", I said. "What do you think?" If the Elders had long faces and their body language suggested negativity, I asked "Is this a better location over here?" "Yes", they answered. "That would be a good place". We adjusted all building locations to avoid men's sacred sites. A few days later, a female anthropologist from our group who was known and trusted by the female Arrernte Elders led a similar walk. Thus, we assured that women's sacred sites were also protected without disclosing specific locations. I believe the Arrernte Elders appreciated our respect for their biophysical and spiritual land and they supported our development plans.

I made three visits to the site as well as attending meetings in Sydney. Our detailed master plan was approved by the Northern Territory Government. Unfortunately, as seems common in international work, development phase design was awarded to a more local firm and several of my best ideas were never realized. Nevertheless, the outcome remains excellent. Respected naturalist Sir David Attenborough, after a visit, is said to have proclaimed Alice Springs Desert Park to be his favorite zoo!

Territory Wildlife Park Australia -1998. I again joined John Wright of Hassell Architects and award-winning science writer and ecologist Penny van Oosterzee for work in Australia's Northern Territory. This time we developed a master plan for the Territory Wildlife Park in Berry Springs outside the city of Darwin. Mr. David Larson, of the Parks and Wildlife Commission of the Northern Territory, was our client. At 15 degrees south latitude, this is a tropical monsoon climate with distinct wet and dry seasons. As with the Alice Springs Desert Park, we located characteristic biomes on this 400 ha (988 ac) property where examples already existed. Examples include evergreen rainforest, monsoon forest (dry woodland), billabong (a pond left by floodwater surrounded by trees), and open marsh. As with the Alice Springs Project, I was privileged to visit outstanding natural examples in Arnhem Land with ecologist Penny van Oosterzee as my guide. We flew in a light plane to Camp Borrodaile, a remote barramundi fishing camp on Aboriginal land just south of Kakadu National Park. This camp is jointly owned by the local Aboriginal community, whose ancestors arrived there about 60,000 years ago. Mr. Brendin Bainbridge, the camp's knowledgeable young guide, led us to ancient quartzite (metamorphosed sandstone) cliffs decorated with some of the earliest and best-preserved rock art ever created. We followed Brendin into a grotto where Aboriginal bones, carefully wrapped in paper bark, had be placed on stone ledges. I respectfully asked him if we were permitted there. He answered, "Oh yes, just do not step on anything." He also showed us two more resent drawings (perhaps only 4,000-8000 years ago) of life-sized Thylacines (Tasmanian tigers) who likely became extinct on the Australian mainland after dingoes arrived.



Figure 71. Upper left: pandanus sketch from Barry Springs.

Another fine memory from this visit was swimming in Barry Springs, near the city of Darwin. Here a substantial flow from natural hot springs cascades over a low waterfall into an extensive marsh. Swimming in the clear warm water with native archer fish, usually seen in tropical aquariums, was a treat. Outflow channels were regularly monitored with crocodile traps. The most recent croc was trapped two days before my visit.

Coimbatore Zoo and the Central Zoo Authority of India -1994. Mr. Chuck Coburn, then Zoo Horticulturalist at San Diego Zoo and I were invited by Ms. Sally Walker, a zoo animal welfare activist in India, to help plan a new private zoo in Coimbatore in the Western Ghats state of Tamil Nadu. British Airways had a program called “In Support of Conservation” and Sally had arranged complimentary airfare on a space-available basis. I could only have carry-on luggage and needed to check in early to be first on the standby list. I was cautioned not to schedule any flights out of India on Sunday nights because these were always overbooked. Our travel agent booked my return flight on a Monday. My flight to London was guaranteed but I was the last to board the flight to Mumbai. The connection south to Coimbatore was paid for by the clients, Mr. and Mrs. Rangaswami. Mr. Rangaswami was a wealthy textile manufacturer and a gracious host, but no match for is wife’s quick intelligence. Mrs. Nadini Rangaswami was one of the most intelligent and insightful people I’ve ever met. Nadini came from an old important family. Her mother ran a girls’ school. She was the prefect traditional Indian hostess and during evening conversations in their home, while she was serving drinks, she would ask a seemingly casual question bringing important subjects into perfect focus. On one of the few times I spoke to her alone she confided she had asked her personal astrologer about my coming and had been assured I would be very helpful to her. Therefore, she trusted my judgement completely. I soon learned to trust her judgement as well. She was a beautiful and formidable woman. Of the technical members on their team, I especially recall Mr. Brij K. Gulpta, who later became a member of the Central Zoo Authority (CZA) of India and along-time student and colleague of mine and Dr. Vet. N. V. K. Ashraf whose energy and commitment were important to the project.

Sally Walker was an American from North Carolina. She had spent much of her life in India, first as a student of Sanskrit and Yoga in the 1970s, and later in the cause of zoo animal welfare, and conservation. She founded the Zoo Outreach Organization in 1985, whose informative newsletter I still receive. Sally also made the first comprehensive list of zoos in India and was influential in establishing and serving on the Central Zoo Authority. Sally was an outspoken woman and a demanding foreigner in a culture where women were expected to speak through their husbands, if at all. She was very effective.

The Central Zoo Authority is a statutory agency of the National government and controls Indian zoos as a central policing agency. Their initial mission was to close inhumane zoos. This was good. But they had an imbedded distrust of both private zoos and new ideas, feeling that if anything could go wrong, it would go wrong. Most Indian zoos are

operated by State Departments of Environment and Forestry. They felt that these were easier to control than private zoos, which they assumed would always put profits above animal welfare. Restrictive ordinances prohibited public animal demonstrations and restaurants on zoo grounds. At that time, the Central Zoo Authority was dominated by Mr. Pushp Kumar, known as Mr. Zoo Man in India, who designed the large naturalistic exhibits at both the Nehru Zoological Park, Hyderabad, and National Zoological Park in Delhi. Both had large display areas but extremely limited animal night quarters where big cats spent sixteen hours each day while the zoos were closed. He visited our highly naturalistic exhibits at Woodland Park Zoo twenty years earlier and became a supporter of our heavily planted and open moated approach. I met him briefly on a tour of US zoos. I recall he seemed very skeptical, perhaps because I was so much younger than he was at that time. Sally told me Mr. Pushp Kumar had previously been paid by Mr. Rangaswami to design a plan for their site, which she found poorly developed. They had visited his work at other zoos and found it boring, she said. This led to my being invited to do their planning, which Sally believed he resented and therefore opposed. “He didn’t want any other zoos better than the ones he himself had designed” she told me.

The Rangaswami’s had purchased a 100ha (250 acres) property from the government which had been part of a vast elephant and other wildlife reserve but had been considered unsuitable because it was a treeless goat and sheep pasture used by a village of “Tribals.” I learned these Tribals were a low-caste indigenous ethnic group whose pastureland had been taken by the government. Our plan was to employ and train these people from their nearby village to work at the new zoo.

We prepared a master plan for the proposed Coimbatore Zoo which the Rangaswami’s submitted to the Central Zoo Authority for approval. It was disapproved because it was to be a private zoo. Also, a solid “proper puka wall” (stone masonry) was required around the entire 100ha property. When we responded that in the remainder of the world most zoos had wire mesh perimeter fencing, they responded the local Tribals would simply steal the mesh fencing. The frustrated Rangaswami’s decided to proceed with reforesting the entire property with native plantings, using local Tribals to both plant and weed the new areas. Eventually the project became a botanic garden. To my knowledge, they never opened a zoo, and a quick look online does not show any zoo of the size we planned in the area.

Later the Central Zoo Authority of India invited me to participate in zoo director planning and design training programs in Bhubaneswar (2006), Hyderabad (2011), and New Deli (2012). They seemed keen to hear about the many zoo innovations we had made in North American zoos, but the “old guard” always responded: “You don’t understand, this would never work here in India!” I tried to explain that conditions in American zoos were not so different when I started, but we had advanced and so could Indian Zoos. India is a very creative and competent nation in many areas of science and technology, but it is the distrustful Indian bureaucratic mindset together with ancient cultural limitations on

gender rolls and caste which limit the evolution of Indian Zoos. Things are gradually improving as a newer generation of Central Zoo Authority managers emerges.

I had my travel agent schedule my return flight from Mumbai on Monday and was dismayed to discover she had scheduled it for 2 am Monday morning, which was the departure time for the overbooked Sunday night flight! I checked in three hours early and was told I could wait in the business class lounge, but there was little chance I would have a seat, as Sunday flights were always overbooked. An hour later I again visit the British Airways counter and told the English attendant I was working with Sally Walker and flying courtesy of the BA In Support of Conservation program. She nodded and gave me these instructions: “Stand in plain sight at the back of the room during boarding and watch me. When I give you a nod, board immediately.” Boarding became increasingly chaotic as passengers with tickets in hand realized they were being left behind. I finally saw the BA attendant’s subtle nod and boarded with the last passengers. I suppose this was an example of neo-colonialism, but I was happy to be on my way.

Louisville Zoo -1995-2003. The senior staff at Louisville Zoo as an especially friendly and open-minded group. Then Director Dr. Jim Foster, DVM, managed overall policy and external affairs with the City and Zoo Board. General Curator (and later director) John Walczak effectively managed internal affairs from animal care to visitor services. Then Mammal Curator Steve Taylor was very supportive of our ideas. Director of Education Marcelle Gianelloni was a leader in zoo education at the US national level. She remains a friend to this day., Curator of Birds Gary Michaels was especially passionate about his charges. Sometimes zoo veterinarians are skeptical of untested ideas, but Dr. Roy Burns, DVM, was very supportive of our work. This group was open to change, and we had visionary ideas. However, it was Animal Training Manager Jane Anne Franklin, with a “can-do” attitude and practical creativity, who devised means to ensure the zoo animals contentedly and reliably complied with our ideas. I list these key participants to underline the value of an integrated, team-based planning and design process (I also highlighted this approach with Woodland Park Zoo) compared to some other projects led by a dominant leader without gaining enduring staff understanding and support.

Master Planning. Louisville Zoo had just received a master plan report completed by another zoo design firm specializing in low-cost planning. This plan was unbuildable. It must have been developed in their office and not on the zoo grounds. An ornamental lake was suggested on a steep hillside, and proposed pathways would be impossibly steep if built as shown on this plan. Unfortunately, this same situation occurred with two previous clients of ours. Yet despite this disappointment, the Louisville Zoo remained positive and excited to proceed.

Architect and Planner John Rogers, Gary Lee’s, and my partner at CLRdesign, oversaw the master planning stage. Priority new projects were identified, as well as the overall visitor experience, educational themes, and public and service circulation concepts. All

were based upon a thorough understanding of site topography, aspect, existing tree cover and location of existing buildings and underground utilities. Once the master plan was approved, the first project was a new zoo entry and plaza, these set the scene for improvements to come. My largest design contribution was the Islands Exhibit and, later, the Gorilla Forest.

Islands followed a storyline of an Indonesian village along a small stream such as I had visited in Sumatra. Traditional village buildings (animal viewing stations) were designed by CLRdesign architect John Collins. Visitors passed through tall timber bamboo for outdoor viewing. A cluster of evergreen magnolias was positioned to imitate a banyan tree. Traditional Indonesian art and craft features were imported to decorate the buildings by Education Director Marcelle Gianelloni, who had previously visited Indonesia. Thai Buddhist monks sanctified the spirit house during opening ceremonies.

This was the world's first mixed species rotation exhibit as far as I know. It included three outdoor mesh covered habitats and one indoor exhibit area time-shared by Sumatran orangutans, siamang gibbons, Malayan tapirs, babirusa pigs and Sumatran tigers. There also were a large indoor aviary, classrooms, and support areas.

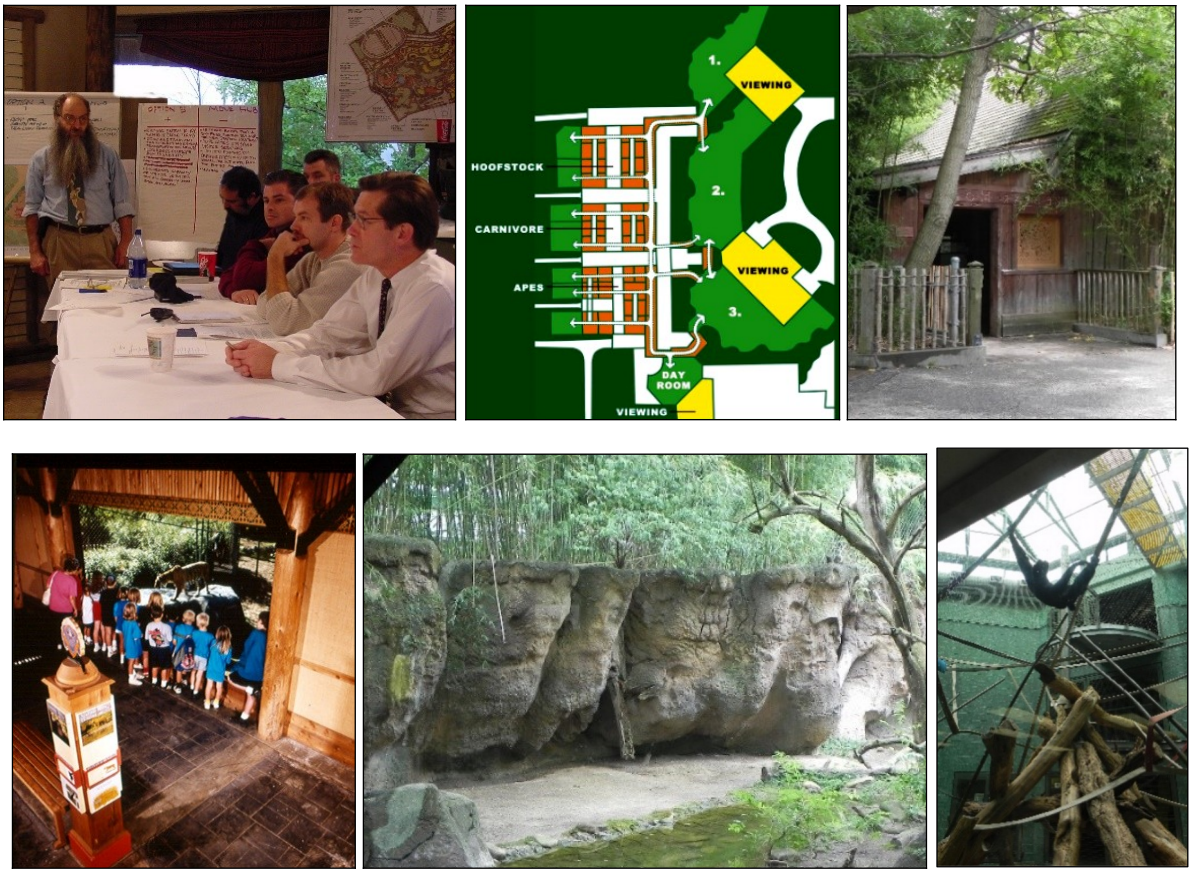


Figure 72. Upper left: I'm leading a planning workshop with then Director Bill Foster on the near right. Upper centre: plan showing three exhibits and indoor day room with viewing shelters and raceways connecting night holding areas and exhibits. These allow any animal to be transferred to and between all exhibit areas. Upper right: Indonesian style viewing pavilion. Lower left: inside view of Indonesian shelter

with views of Sumatran tiger (photo: Louisville Zoo). Lower centre: view into rotation exhibit with stream, used alternately by tigers, tapirs, and babirusa pigs. Lower right: two-level indoor day room being used by siamang gibbon, but alternately available to all the exhibited species. The window in the upper background allows apes to view people in a meeting room where we later held planning sessions.

In 1997 Gary Lee and I published the concept of **Activity-Based Design and Management** in a paper called “Entertaining Zoo Animals and Zoo visitors, an Integrated Approach”[25] supported by the success of this exhibit. The idea was that engaging recent advances in reward-based animal training enabled zoo animals to access and use far more behavioural opportunities. This encourages increased animal activity which in turn improves visitors’ experiences. This is a win for animal welfare and a win for visitor experiences, two realms long considered in opposition and contention.

The first element of this concept is animal rotation through multiple exhibits We first developed this with the gorillas at Zoo Atlanta, but mixed species rotation was first widely implemented by the Louisville Zoo. The concept was advanced by increasing the number of species and including both predator and prey species. Animal welfare concerns have been expressed that the mere sight of a predator would stress prey animals. Indeed, the Central Zoo Authority of India prohibits their zoos from displaying predator and prey animals in sight of each other. This concern is not supported by observations in nature. Prey species such as zebra and antelope show little fear of a lion obviously passing nearby on its way to a waterhole. Prey species judge the lion’s intentions by its behaviour. In our Islands exhibits animal areas are separated by double fencing several meters apart. Prey species soon learned the tiger couldn’t reach them. I observed a tapir feeding calmly while a tiger in the adjacent exhibit, tail wagging excitedly, focused its full attention on the tapir. As further evidence of the tapir’s adaptation to the tiger, researcher B. C. White et al., during a two-year behavioural analysis, observed the tapir entering the area recently left by the tiger. Undaunted by the tiger’s recent presence, the male tapir placed his own scent mark over the tiger’s previous mark. The tapir was saying, in animal language, “I now claim this area to be mine!”

The White et al. study noted that when an animal enters a space previously occupied by a different species, its first response is to explore the area, seeking olfactory signposts left by the previous occupant. This activity seems undiminished by years of familiarity. For example, on a visit fifteen years after the exhibit opened I observed the tiger wading downstream, apparently following the scent the tapir had left just before.

Animal rotation also adds complexity to facility design. We developed a two-level animal raceway network connecting the night quarters and exhibits. Agile animals like orangutans, gibbons and tigers used the upper level. Tapirs and babirusa pigs used the lower level. The upper-level raceway passed above staff doorways. The lower-level raceway needed to decent under staff doorways and return the ground level. Large, heavy, semi-aquatic animals like Maylan tapirs are not comfortable going down

[25] https://joncoe.net/wp-content/uploads/2022/04/EntertainiZooVisit.pdf

unfamiliar stairs. Using her knowledge of animal behavior and creative thinking lead animal trainer Jane Anne Franklin understood tapirs would rather swim across than climb down unfamiliar stairs. She simply covered the drain and flooded the stairwell. When the tapirs were comfortable swimming across she lowered the water level a little each day until the tapirs were comfortably using the stairs.

How was the complex rotation movement with multiple animal gates and dangerous species safely managed? Jane Anne Franklin organized the four-person Islands management team with an innovative strategy. Reasoning that accidents most often occur from inattention during routine practices, she made each caregiver “curator for the day.” That is, on Monday, person “A” decided the entire day’s routine, which animals would rotate into which enclosure, when and in what order. How often and when would each move to a different exhibit area? On Tuesday person “B” takes overall responsibility, alternating staff throughout the week. Jane Anne reasoned that when it’s your day to be in charge, you will pay full attention to every detail. As a second precaution, she insisted two people attend each animal transfer, the gate operator, and an observer. While safety was the first concern, Jane Anne also wanted to optimize the randomness of the animal’s experience. While both animals and staff have been shown to favor routines, unpredictability and novelty favor resilience, adaptability, and reduce boredom. At least this is our approach, which the White *et al.* study confirmed to be enriching to the animals, although even this stimulation diminished over time.

Another benefit of Jane Anne’s system was to encourage early professional staff development by giving even junior staff, under supervision, the responsibility normally held by a senior manager or curator.

Visitors also became more engaged, actively seeking animals in unpredictable locations. Animal identification graphics illustrate all species and visitors matched the animals they saw to the identified animals illustrated. This supported the storyline that when looking out the window of a remote Indonesian structure you could see any resident species passing by.

Gorilla Forest. At this time John Walczak was Director of Louisville Zoo, which did not have any gorillas. Lincoln Park Zoo needed somewhere to house their large gorilla colony while they redesigned their own facility, where I also assisted. Louisville Zoo’s new facility could house the Lincoln Park Zoo gorillas during this period.

Our project included a forest trail connecting an African-themed restaurant, village garden (children’s) area, and pygmy hippo exhibit leading to the gorilla conservation centre. Inspired by the gorilla exhibit at the Apenheul zoo in Apeldoorn, Netherlands with their “gorillas in the round” arrangement, we surrounded the indoor central visitor area with two large and two smaller indoor gorilla activity areas from which the gorillas could chose or they could circle the three areas with overpass above the visitors. Long climbing ropes attached to cargo nets extended beyond the animal rooms, crossing

over the public. When a gorilla in one area climbed using this rope, it tensioned the rope across the hall and the cargo net above the visitors was moved.

Soon after construction was completed, a large group of gorillas arrived from Lincoln Park Zoo with their very able Manager Roby Eisner. He and Jane Anne Franklin collaborated in training the new arrivals to use their new facility and settle in.

There is a long, on-going contention among zoo animal welfare advocates over whether highly naturalistic or highly artificial habitats best meet the gorilla's needs. My approach to this project was to provide both opportunities and let the gorillas themselves decide which they preferred at any given time. Louisville has a continental climate, meaning it is cold in winter and warm in summer. The gorillas, enjoying comfort, chose the climate-controlled indoor facility much of the time. I was told by facility manager Roby Elsner that he was once approached by an irate visitor asking why the gorillas were locked inside on such a pleasant day. His response was: "Lady, the gate is open. The gorillas can go out whenever they want to!" This is an early example of designing to provide the animals themselves with more choice and control over their own lives.





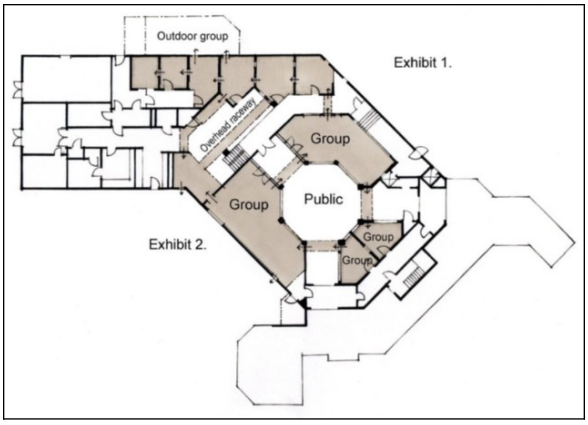






Figure 73. Upper left: pygmy hippo exhibit with a jacuzzi pool integrated into a cascade. I designed the pool to be activated when the animal entered it, but the installation was activated by a timer instead. Upper right: the upper of two large outdoor gorilla habitats. Note that no barriers or buildings are in view. Unfortunately, over time horticultural maintenance crews lost the plot. The manicured lawn and flower bed resembles a garden rather than a rainforest clearing. Middle row left: our floor plan for the Gorilla Forest building showing gorilla activity rooms surrounding the central public space as well as variety of indoor areas available to gorillas' day and night. Middle row right: central public space surrounded by high gorilla activity rooms. Note that the gorilla activity areas are placed well above zoo visitors so the people look up to the gorillas. Lower left: Mammal Curator Jane Anne Franklin training gorillas in the flexibly designed non-public management area. Roby Elsner is shown below. This facility is now considered one of the best in North America. Lower right: the CLR designed zoo café with an African theme. We arranged for the thatch roof to be provided and installed by Zulu thatchers from South Africa. The second and fifth photos are by Louisville Zoo.

Philadelphia Zoo PECO Primate Reserve[26] -1996. The terrible 1995 Christmas Eve fire destroyed Philly Zoo's World of Primates, killing a gorilla family of six, three orangutans, four gibbons and 10 lemurs by smoke inhalation. Working with then Director Pete Hoskins, Primate Curator Andy Baker, Animal Program Manager, Karl Kranz, and senior zoo staff, John Rogers, and I, with our CLRdesign team, developed plans for a much larger new facility. It would also house many smaller primate species. We were aware that the Bronx Zoo was planning a far larger gorilla facility (2.6 ha, 6.5 ac) called Congo Forest. It would house around twenty gorillas and other African forest species. These outdoor exhibits would be spectacular, but indoor holding areas were likely to be limited. We only had 1 ha (2.5 acre) and wanted to house and display eleven primate species, providing better year-round amenities for the animals in spacious indoor facilities. Substantial outdoor areas would be provided for gorillas and orangutans to use during summer. But what should such a large building look like and what story should it tell? We needed to invent a completely different direction from the tropical habitat simulation proposed by the Bronx Zoo.

Building upon the storyline we developed for the Los Angeles Zoo chimpanzee exhibit, I suggested theming the building to represent an old tropical lumber mill. The story would be that the "Equator Lumber Company" had exhausted the local timber resources and

[26] https://clrdesign.com/project/peco-primate-reserve/

its building had been converted to a primate sanctuary while the surrounding forest was restored. It would be known as the PECO Primate Center named for the principal donor, formerly the Philadelphia Electric Company. Our strategy was to advance our activity-based design and management strategy developed earlier at Louisville Zoo. This featured the integration of facility design with behavioral enrichment, animal training, husbandry, and habitat to create a memorable experience for both animals and visitors. Described as: “Better than a behind-the-scenes tour,” visitors are surrounded by the primates in bright, spacious community day rooms. All animal areas were interconnected with gates and raceways. On warm days when the gorillas and orangutans were outdoors, their spacious day rooms could be used by smaller primates to explore novel experiences and increase physical activity.



Figure 74. Upper left: PECO Primate Reserve entry with walk-through ring-tailed lemur exhibit in foreground and “Lumber mill” building beyond. Upper right: colorful, two-level visitor corridor. Lower left: spacious orangutan day room with industrial-themed climbing furnishings. Monkeys perched on overhead gantry rail designed to move lumber through old the old mill. “Howdy crate” designed to encourage positive interaction between children and apes (concept sketch and actual use). Note gorilla behind the window interacting with child.

Our design also incorporated advances in “affiliative design” (described earlier). For example, the “howdy crate” pictured above is a less expensive variation on the “howdy log” built into the Los Angeles Zoo chimpanzee exhibit. The crate is assembled on both sides of the viewing glass and allows children to sit inside or on top of one side while

young gorillas can do the same on their side. One day I observed Demba, a female gorilla, sitting on the crate and playing “paddy cake” through the glass with a child on the other side. Spontaneously, all the parents in the area formed a reception line with their children, patiently waiting for their children to meet Demba and play paddy cake with her. This is the best example I know of demonstrating affiliative visitor/animal interaction specifically supported by design intention.

The PECO Primate Reserve was a success with the primates living there. They multiplied immediately. It was a failure with the zoo’s educators, who chose to ignore the lumber mill storyline and used their very substantial budget on telling stories featuring “Conservation Heroes”. It was a failure with visitors, who bypassed the conservation hero videos, complained exhibits “were not naturalistic” and did not even notice the “lumber mill” storyline. It was also a failure with the animal care department who chose not to use the animal transfer and rotation opportunities. Lessons learned include the need to obtain buy-in from educators and operating staff before proceeding with design innovations. Also, it is dangerous to go against public expectations, including some we ourselves created earlier with highly naturalistic animal summer habitats. I now believe that as zoo sentiment shifts from visitor experience dominance to animal wellbeing emphasis this facility will be recognized as a pioneer.

Philadelphia Zoo Master Plan 2009-2016. Under innovative Philadelphia Zoological Foundation CEO Mr. Vikram Dewan, Philly Zoo launched a new vision for their future. Earlier, in 1996, I worked with General Curator Dr. Andy Baker and my firm CLRdesign to develop a system of interconnected exhibits as an animal rotation strategy for the PECO Primate project. Andy liked this idea but found after the project opened zoo staff were not inclined to use this built-in enrichment opportunity for the primates. Later, CLRdesign adopted an animal exhibit rotation concept for renovation of their old Big Cat House (the final design was done by another firm) which this animal care staff fully embraced. Andy had also seen a short overhead connection for orangutans at Cologne Zoo in Germany and had been thinking along the same lines. To expand upon this exhibit-by-exhibit rotation strategy I had suggested to Andy Baker a zoo-wide overhead animal trail system. I argued that, based upon zoo biologist Heini Hediger’s depiction in 1950, a wild animal’s territorial is not so much a space as a system of habitually used trails connecting critical resources. Could a zoo be designed on this basis? Why must an animal spend all its time in one place? We believe that apartment dwelling pet dogs can have a good life if taken on frequent walks through a park. Could zoo animals in small existing displays also benefit from taking themselves on walks along defined overhead and surface trails through the zoological park? Could these trails be shared with other animals (not at the same time) to access a variety of social, feeding, resting and surveillance areas and opportunities? Importantly, experiencing the environment and human activities seen from the trail can also be enriching to bored zoo animals. Animals, like people, may need rewarding reasons to exercise their bodies and intelligence. Accessing distant benefits can provide such incentives. Finally, the animal

trails (we called these “trailways”) themselves become linear exhibits from the public’s perspective.

Earlier I had proposed a sanctuary-wide rotation system to the Center for Great Apes in Wauchula Florida. At my suggestion, Andy visited Ms. Patti Ragan, Center for Great Apes founder, and observed her trailway system in action. The Great Apes in Florida sanctuary now have 2.4km (1.5 miles) of aerial trailways connecting twelve night houses and nineteen outdoor enclosures, as well as their clinic and quarantine area. This visit convinced Andy that a zoo-wide animal trail and rotation scheme was manageable and he saw firsthand how much the great apes enjoyed moving around their park along these elevated trails. Andy then convinced CEO Vikram Dewan this startling departure from traditional zoo design was both feasible and desirable. Thus, the innovative concept of a zoo-wide animal trail system became the basis for the for Philadelphia Zoo’s 2009 Master Plan by CLRdesign. Their new marketing slogan emerged: “Zoo 360 – As you move through the zoo, the zoo moves around you!” CLRdesign not only developed the master plan but, with the help of their structural engineering subcontractors, designed the trail structures in detail following my initial sketches.

Philadelphia Zoo is surrounded on three sides by railway lines with a busy road and freeway forming the other side. It cannot expand beyond its present 17 Ha (42 acre) area. However, overhead animal trails passing over their beautiful park areas expanded the animal’s opportunities for exploration and exercise without enlarging the zoo. Visitors were surprised and delighted to see zoo animals passing overhead.

This was a revolutionary concept. For a century and a half people have visited parks called zoological gardens to see exotic animals. In the 1820’s London Zoo and Garden des Plants in Paris became the first ‘scientific zoos’, organizing animals according to their taxonomic families and species for scientific research and later opening to the public. 1905 Carl Hagenbeck created the first “barless zoo” in Germany, organized geographically by the continents with stylized landscapes representing their habitats, a concept called zoogeographic zoo organization. In late 1970 with Jones & Jones I helped introduce zoo visitors to natural biome habitat and landscape immersion exhibits. Today most visitors expect these types of zoo exhibits. Philadelphia Zoo, “America’s first Zoo” now presented a simpler story advancing our concept of “Activity-Based Design:” “These animals live under our care, and this is how we give them more opportunities to live their lives more fully.”

At this time, I had my own Australian firm when Philly Zoo hired me to collaborate with CLRdesign on both a Zoo 360 master plan and concepts for all the trail systems developed. I greatly enjoyed returning Philadelphia and collaborating with my old firm. Mark Beauchamp, Jeff Sawyer, and Larry Dame where the principle CLR contributors.



Figure 75. Upper left: the circular trail around the historic Impala Fountain Court was the first of the “tree top trails” used by over fifteen species of small to medium-sized primates in the Rare Mammal House. Note the activity pod build around the adjacent tree on left edge of this photo. Upper right: Storm the mangabey was the bold explorer assessing the tree top trails. Middle left: this photo of a tiger crossing the Big Cat Bridge went viral. Right: six species of big cat use the Big Cat Trail, of which the overpass is only a small section. Lower left: interesting encounters; a gorilla in the Great Ape Trail encounters a tiger in the Big Cat trail. Lower right. ‘Kids Zoo U’ (designed by others) with overhead trials for children and domestic goats and sheep. Shown here during bare winter, it is much more attractive in summer when most people visit.

Tree Top Trail (upper photos): The first project scheduled for renovation in the new plan was the old modernist Rare Mammal House and their staff also requested rotation opportunities such as the big cats enjoyed. This trail circled the adjacent Impala Fountain Court near the main zoo entry, becoming the first zoo feature encountered by visitors. It connected all existing indoor display areas, making the trail available to all fifteen existing species of small to medium-sized primates. Five, 5m (16') diameter activity pods with food dispensers were built around large existing trees near the trail so animals could use them while other species passed by on the trail. Tree top trail was extended through several construction stages to a total length of 500m (1640') connecting to the PECO Primate building where we initiated this rotation concept with Philadelphia Zoo. This made it available to many more primate species. Image being a family of tiny pigmy marmosets exploring a kilometer-long roundtrip journey.

Big Cat Trail (middle row left): this photo went viral, being republished in newspapers and online globally. Soon zoos in China copied this idea. While visitors flocked to see this sight for themselves, many were disappointed because the big cats often passed quickly over the bridge and down the 78m (255') long Big Cat Trail (partly elevated and partly on the ground) to the elevated lakeside overlook at the far end. Six species of big cat take turns using this enrichment feature.

Great Ape Trail: this106m (350') elevated trail is used alternately by gorillas, orangutans, and gibbons. The photo above showing the gorilla looking down at the tiger is misunderstood by some people accustomed to seeing zoo exhibits arranged by continental or biological habitats. Seeing species from different areas of the world together seems "unnatural." The intended message is not about biogeography but rather to display ways animals in zoos can have varied and interesting experiences in a beautiful park landscape.

Ungulate Trail: Working with CLR, we also suggested a long terrestrial trail of the zoo's large, hoofed animals including white rhino, giraffe, zebra, antelope, and hippo. But this was determined to be too expensive for the time.

Kids Zoo U: Philly Zoo designed this innovative children's facility using other designers while integrating the mixed species trail concepts for domestic species such as ponies, sheep, goats, and children, as well as many small species.

Philly Zoo completed about one-half of the total animal trails shown on their master plan between 2009 and 2016 with staged funding and construction every few years. A total of 613m (about 2000') of trailways have been opened. This innovation was a popular success, with increased visitation and city cultural status. Elevated animal trailways have now been built by zoos and primate sanctuaries all over the world. This approach has won praise from animal behaviour scientists like Dr. Robert John Young:

"I really like this concept, as an animal behaviorist it totally makes sense, and I am sure it must be very good for the psychological wellbeing of the animals. Not to mention that the zoo is no longer a static place - it is dynamic like the wild and the public will need to

seek out the animals. Great to see that you keep pushing the boundaries on enclosure design and modification."

And zoo managers like Ms. Wendy Husband:

"I find this so interesting and innovative and see enormous opportunities for zoos of all sizes - the animals display such confidence and comfort and I especially LOVE when we get to see the animal totally engaged its own activity. Bravo…I'm sure this will inspire many new trails in zoos around the world."

Philadelphia Zoo holds their annual fundraising Gala in November every year. In 2016 they flew me round-trip all the way from Melbourne Australia to present a brief inspirational speech (one of only three, seven minutes each) for their Gala. Zoological Foundation CEO Vikram Dewan was pleased with my talk and with the funding level achieved that evening. We are both retired now and remain in occasional contact. Andy Baker, who has retired now, became Chief Operating Officer and managed zoo staff with both vision and patience. He offered innovative opportunities but did not implementing them until he was himself confident of the details and front-line operating staff were in support. Vik Dewan's leadership was also exemplary, leaving in-house management to Andy Baker and managing his Board and city officials expertly.

Taronga Zoo Wild Asia Elephant & Coastal Precinct[27] -1999. Mr. Tony McCormic, landscape architect and my friend at Hassell Architects in Australia, invited me to join their team in tendering for the design of new Asian elephant and marine mammal facilities at the famous Taronga Zoo in Sydney, Australia. This required me to participate in the interview with zoo officials by telephone at one-thirty in the morning from my home office outside Philadelphia.

In those times most zoos still used punitive 'full contact' elephant training systems in which trainers asserted their dominance over the elephants beginning at a young age. "Protected contact" was a training system developed by colleagues Tim Desmond and Gail Laule with elephant expert Alan Roocroft, then at San Diego Zoo. In the protected contact system, trainers used reward-based training. They remained out of elephant reach and emphasized elephant welfare and independence without human dominance. This was a far superior system. Its use was then becoming more common in the USA, although it was still resisted by traditional elephant trainers around the world, including in Australia. I was asked during the interview if I would design a facility under the old full contact management system. I answered I would be willing to design a facility which could be operated under either system, allowing them to transition to the protected contact management system in the future. We were selected and I was delighted to discover they had also hired elephant management expert Alan Roocroft as our specialist advisor.

[27] https://zoolex.org/gallery/show/1186/

The Hassell team was headed by Tony McCormick, the most professionally thoughtful and thorough design and planning professional I have had the pleasure to work with, often challenging clients and designers alike with essential hard questions. During the required project briefing for all competing design firms few offered any questions to the client. Tony had over thirty questions, exposing weaknesses and inconsistencies in the client's tendering materials.

I think of Taronga Zoo as the 'view with a zoo'. The vistas from the zoo across the harbor to the famous Sydney Opera House and city skyline are world class. But they come at the expense of a very steep site with plentiful exposed Devonian sandstone outcrops. Access both for construction machinery and later for animals and visitors is expensive to build and difficult to use. We also experienced early resistance from the Zoo's elephant care staff headed by Mr. Joe Haddock. We were immediately asked: "Why have you questioned our plans?" "You weren't listening". We patiently explained our brief was to produce the best outcome not only for animal care staff but also for elephants and visitors, using the world's best practice as well as their own experiences and priorities.

The area designated for the new exhibit was very small, only about one hectare (about 2 ½ acres). How could the elephants get enough exercise in such a small area? I recalled how people and horses are exercised in pools; a process called aquatic aerobic exercise. Such exercise should also be beneficial for older elephants with painful foot and joint problems from being kept on hard surfaces. Most elephant exhibits have circular pools providing little incentive for vigorous exercise. Instead, I designed the elephant pool to be more like a river oxbow meander. I made it 60m (about 200') long, 3m (10'deep) and 3m wide, with gradual slopes for elephants to enter and exit at both ends and in the middle. It was too deep for elephants to stand in, so swimming, or at least lunging up and down would be required. What would motivate the elephants to exercise vigorously in their river? There was a shallow verge along the outside where a trainer using a long "target pole" would train elephants to follow in exchange for frequent favored food rewards. I hoped this would encourage lap swimming by the elephants if animal care staff were willing to undertake parallel exercise themselves. Also, we designed a lower elephant paddock accessible by boulder lined slope which would also provide exercise. In presenting this scheme to our clients I emphasized the elephant exhibit would only be of an acceptable size in the future if the management program continuously provided abundant aquatic aerobic exercise.

Following the riverfront storyline, we designed a riverside Thai village with some buildings on stilts to avoid floods on one side and with the elephants on the sandy river flats one the other side of the river. This explained why the elephant area was paved with sand, which benefited the elephants. One stilted structure extends across the river into the elephant area. This provides shade for the elephants and VIP viewing for selected guests.



Figure 76. Upper left: view from Taronga Zoo's aerial tram of elephant exhibit 'river meander' with visitor bridge to VIP overlook, which is also a shade structure and area to hang enrichment features for the elephants. Upper right: visitor overlook of river and VIP bridge. Lower left: lower elephant yard with waterfall for elephants to bathe under. Lower middle: boulder-paved slope to the upper yard. Lower right: my diagram showing elephants lunging through 3m (10') deep water following trainer's target pole to encourage aquatic aerobic exercise and develop elephants' physical fitness.

The Hassell team, guided by Tony McCormick, developed the final detailed plans, which were excellent. After our final presentation we received applause from Joe Haddock and the originally recalcitrant zoo elephant staff.

Coastal Precinct Exhibit (now the Seal Show) for fur seals was also part of the Hassell brief, with assistance from aquarium specialist architect Cam Crossley, and life-support system expert Cris Warner. Working with Cam, we developed an accessible pathway connecting surface and underwater viewing as well as a rather small demonstration pool and seating area. The results came out well considering natural site limitations. Hassell architects also designed a large Thai-themed café and restaurant forming a major element in the riverside village we designed.

People-mover concept. The Seal Slow complex was proposed on the same two levels as the elephant exhibit. I noted most visitors entered the zoo from the upper end (many by the overhead gondola from the ferry terminal far below) and experienced their visit

walking downhill on the steep zoo site. This suggested many visitors to the elephant exhibit would need to backtrack uphill to also see the Seal Show complex, restaurants, and other exhibits on this level. Working with our Hassell colleagues, I suggested the zoo install two escalator/elevator (people-mover) facilities to provide convenient visitor access to all attractions in the multilevel visitor hub area. This feature, not a part of our original project brief, has proven to be very successful.

Unfortunately, Taronga Zoo then hired less expensive local firms to complete construction documents with no further work from our teams. The 4500 sqm (48438 sf), elephant exhibit opened in 2005 with only minor departures from our plans. A 2000 sqm (21,528 sf) bull elephant outdoor facility, including a 500 sm (5,382 sf) exercise yard, was added in 2008.

I visited this exhibit three years later with elephant staff member Joe Haddock, who was very pleased with the results. I asked Joe if he could get the young elephants to go swimming so I could make a video. He complied by first spraying two elephants with a hose, which they clearly enjoyed. The young elephants then entered their mud wallow for group mud wrestling and progressed to the river to swim. Joe explained this was their daily routine. For the next 30 minutes the two youngsters vigorously wrestled underwater. Finally exhausted, they climbed out, strolled to a hill of loose sand and fell asleep. For these young elephants our aquatic aerobic exercise strategy was clearly successful. I am not aware of any studies of how well this feature was used by the elephants as they matured. The strategy of using target training to encourage elephant lap swimming was never utilized.

As a consultant driven to advance and integrate both the physical design of environments (hardware) and the ways they are used and managed (software) I often find myself and designer colleagues in the unfortunate situation that once things we design are built our project influence ends. We have no authority to ensure our intended long-term management systems are followed. I accepted the small site for the Taronga elephant facility based upon the hope elephants would receive as much or more exercise as a large site would provide through the regular scheduled use of aquatic-aerobic and land trail exercise. These advances were championed by international elephant expert Alan Roocroft during our first design meetings, and I had hoped he would find a continuing advisory role. He told me later he had never heard from Taronga Zoo after the first meeting. Alan and I both advocated for a “protected contact” elephant training system. In 2012 elephant trainer Ms. Lucy Melo was needlessly crushed and nearly killed by a young male elephant during a traditional training session. Our protected contact system was then installed, too late for Ms. Melo.

Our vigorous exercise regimen was never followed and two decades later the zoo acknowledged the facility was too small to provide sufficient exercise for the elephants. The elephants were moved to join a larger herd at the expansive Western Plains Zoo in Dubbo New South Whales. The exhibit we designed is now used by Indian greater one-horned rhinos, for which it is better suited.

California Science Center, Los Angeles, California 2000-2004. Mr. Howard Litwack, a noted science educator and project manager, invited me to join a consultant team to work on a new project, the World of Ecology, at the California Science Center (CSC) in Los Angeles. This was my first opportunity to expand my design ideas with a major science museum. CSC had been an important museum of science and technology and wanted to expand into the biological sciences. I thought I could help build that bridge. I was joined by Jim Peterson, a specialist in marine exhibits with his then company Bios. We collaborated on the design of the Riverbanks Zoo Aquarium-Reptile Exhibit and the New York Aquarium Sea Cliffs Exhibit. Jim's Bios Partner, Scott Horner would develop the hands-on exhibit features. Dr. Paul Martin an educator from the Science Museum of Minnesota was also part of the team, which was headed by Architect Ed Rubin of EHDD Architects in San Francisco. Director Jeff Rudolph, Project Manager Barbara Punt, Deputy Director Operations Tony Budrovich, and Ecologist Dr. Chuck Kopczak headed CSC. Jeff and his staff were very welcoming and actively seeking innovative ideas, which the design team supplied in abundance. Unfortunately, they seemed to enjoy the creative frenzy more than the decision making. I spent more time on transcontinental flights and in meetings during this four-year period than for any other client. I designed an indoor California desert exhibit with insects supplied by Ray Mendez, and we took the planned outdoor rainforest exhibit through design and construction documents. The intended results were meager. While the small desert exhibit was completed, the areas designated for outdoor tropical forest exhibits, including two large fig trees, were eventually used to display the retired Space Shuttle Endeavour. However, several side projects turned out very well indeed.

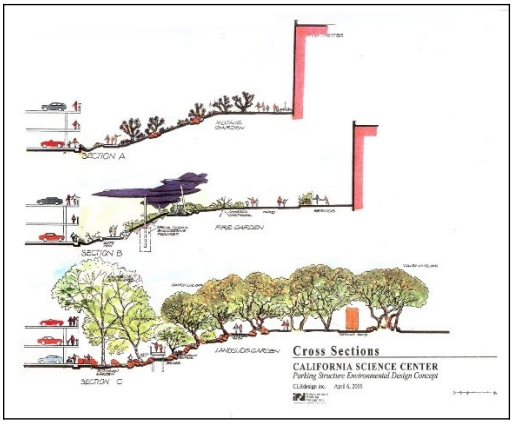
The California Science Center shares a campus the Los Angeles County Natural History Museum (a favorite destination when I was a child), the California African American History Museum, and the heritage listed Los Angeles Memorial Coliseum. Opened in 1921, it hosted both the 1932 and 1984 Olympic Games. Architectural heritage considerations limited possible developments on the site. CSC required greatly enlarged parking capacity but was not allowed to increase land area for parking. Thus, they planned a sunken three-level parking structure with each level the same dimensions as the existing parking area. I was asked to design the landscape around this large structure. To save the cost of retaining walls and improve natural ventilation, I suggested the area around the sunken structure be sloped with pathways leading up through my recreated Southern California native plantings resembling the original landscape of the site. I developed general grading, pathway and planting plans. Final plans and native plantings were then designed and installed by a local landscape architect and contractor. This work turned out very well and the plantings have matured nicely.

Director Jeff Rudolph asked what planting I suggested for the upper level of the parking structure. This would be a very difficult artificial environment for living plants, so I suggest shading the car park with photovoltaic solar power cells mounted as large leaves on a structure resembling a grape arbor. This was a decade before rooftop solar

became popular and the sort of technology the CSC should demonstrate. Jeff enthusiastically took this idea to the Los Angeles Department of Water and Power, who liked the idea so well they offered to design and install it themselves as a test model. Unfortunately, the Cultural Heritage Commission would not allow this innovation in their heritage-listed district.

The vast Memorial Coliseum campus is nearly flat and had no overall drainage system, a big problem in a region prone to flash flooding. Hoping to build on the success of the native California landscape restoration around the buried parking structure, I developed a regrading plan for the entire museum campus suggesting recreation of the natural intermittent surface stream system with riparian replanting which had originally flowed through the area according to soil profiles and old maps I researched. This could have been an early example of “rewilding” projects which over twenty years later have taken hold in Southern California. This concept too was blocked by the Cultural Heritage Commission.

Director Jeff Rudolph also invited me to select the display location of their full-sized SR 71 Blackbird hypersonic aircraft. This was a retired example of the aircraft which still holds global speed (3,540 km/hour, 2200 miles/hour) and altitude records. I located the plane elevated above the newly planted canyon as if were about to soar over the car park. In this position it can be admired both from below and from eye level.



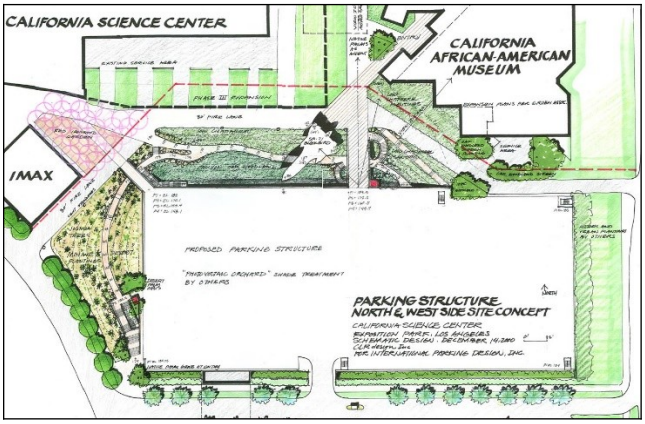




Figure 77. Upper row: my cross sections and plan for the sunken parking structure with SR 71 Blackbird hypersonic aircraft placement and surrounding Southern California native garden. Lower left: photo of the Blackbird with the California Science Center beyond. Lower center and right: photos of the completed installation and established plantings along the pathways leading up from the sunken car park levels and resembling the native hillsides I had explored as a child in Southern California.

Looking back, my work with the California Science Center leaves me with mixed feelings. I enjoyed the people very much and have stayed in touch with several. The opportunity to investigate the wider field of science exhibits was certainly welcomed. Projects like the interior desert exhibit, sunken car park landscape rewilding and placement of the hypersonic aircraft, not part of my original brief, turned out very well. The advanced ideas for the overall museum campus rewilding, sustainable stormwater management and solar parking cover, had they been realized, could have put Los Angeles a decade or two ahead in its present climate change adaptations. Moreover, the major work, World of Ecology, was never realized. I wonder if all those hours of work and meetings and travel could have been more productive in other endeavors. I will never know.

Brookfield Zoo Wolf Woods 2002-2004. Dr. Tim Sullivan, animal training specialist and project manager at Chicago Zoological Park-Brookfield Zoo, contacted me about designing a new wolf exhibit. He was supported by animal behavioralist and curator Dr. Joan Daniels. Dr George Rabb, legendary Brookfield Zoo Director, had studied wolves in the previous large enclosure with his wife Mary Rabb decades before. I and the zoo

wanted to do a new facility to honor them and to support the international Mexican Wolf Recovery Program[28] of the U.S. Fish and Wildlife Service. By 2021, 387 Mexican wolves were managed in approximately 61 facilities in the United States and Mexico.

Their program was to breed this endangered species using methods minimizing habituation to humans and maintaining natural wild behaviours. The offspring of these zoo wolves would be introduced to very large natural enclosures in New Mexico and their offspring would be released into the wild as hopefully self-sustaining packs. This required two 0.4 ha (1 acre) enclosures, one for visitor viewing and one as a retreat area. Therefore, our design should minimize the impact of visitors on wolves and optimize the wolves' positive impact on visitors, seemingly contradictory requirements. To solve this challenge, I suggested designing an enclosed public viewing pavilion using mirror glass (on-way glass). This would allow the wolves to approach the visitors without seeing them and visitors to have close views of the wolves. There was also provision for food release from the building to encourage the wolves into the viewing area. We provided a simulated wolf den in the building for children to crawl into with views into the exhibit. This heated and air-conditioned building also supports year-round public viewing and after-hour research observation of wolf activities. I wanted to integrate this building into the site. Jon Stefansson and the CLRdesign team used geo-textile fabrics to support plantings banked against side walls, as well as some roof-top plantings.





[28] https://www.fws.gov/sites/default/files/documents/Mexican-Wolf-2021-Progress-Report-Final.pdf



Figure 78. Upper left: entry to Wolf Woods viewing pavilion with planted sides. Upper right: viewing exhibit through mirror glass, suggesting wolves are not aware of proximity to humans (photo: J. Schultz - Chicago Zoological Society). Lower left: public view from pavilion through mirror glass with no animal barriers in sight. Lower second image: wolf's view of viewing pavilion mirror glass obscuring visitors within. Lower third image: outdoor viewing area with wolf den in the distance. Lower fourth image: view of wolf den hill from visitor overlook. Bottom right: close photo of Mexican wolves in wolf den hill.

Recently I received this update from Dr. Joan Daniels Tantillo, Senior Director of Hooved Mammal Care and Conservation

"We have exhibited over 40 different individual wolves with varying responses to the glass. Overall, most wolves ignore their reflection in the glass and after acclimating to seeing it, they readily approach the area and are comfortable. Some have even taken to sleeping up against the glass when it is not noisy in the visitor building. A few wolves have aggressed towards their reflection. We are using food chutes on either side of the viewing window which draws the wolves up to the glass in a positive way – I feel this has increased their comfort and acceptance of the area significantly."

Phipps Conservatory[29] - 2002. Since 1994, Richard Piacentini, President, and CEO had guided Phipps Conservatory and Botanical Gardens in Pittsburgh Pennsylvania from public to private management and was keen to transform its facilities and operations, to become both a profitable attraction and a deeply sustainable facility. Mr.

[29] https://www.phipps.conservatory.org/green-innovation/at-phipps/tropical-forest-conservatory

Jim Taylor, from IKM Architects invited us to join their design team for the new Tropical Forest Conservatory as an addition to the existing historic conservatory.

Although I was hired as a landscape architect and botanical exhibit designer, my initial design influence was as a sustainable architecture advisor. Recalling ideas from my conceptual design of the domed town in northern Alberta thirty years earlier, I developed a building shape with a high south facing glass wall arching east and west to track the sun's path. The roof sloped to the north at the winter noon sun angle so that all winter light came through the front glass and the roof glazing could be insulated in winter. Summer sun hit this roof at an acute angle and most infrared light bounced off rather than entering the building. The building was placed on a south-facing slope, and the gardens inside were terraced with masonry walls which absorbed heat during the day and reradiated warmth to the plants at night. As the design phase advanced the architects used computer simulations to refine the sun angles I developed. They also added important features such as double glazing and automated insulation blankets for winter and vent openings for summer.

They followed my suggestion and installed six long, large diameter tubes buried 4.5m (15 feet) below ground where the temperature remained constant at 13C (55F) degrees. These open onto the slope below the building. Make-up air was cooled as it was drawn through these tubes into the building by hot air rising to the roof vents. Insulated concrete western and northern walls and paving below the south windows provide thermal mass, collecting heat and releasing it at night. After opening, this 18m (60') high,1,115 square meter (12,000 square foot) conservatory functioned wonderfully year around without artificial heating and cooling. It was the first major greenhouse in the USA to be awarded a LEED Platinum EBOM Certification.

I recently contacted Director Richard Piacentini to confirm the information above. He disputed my role in anything but the exhibit design, crediting others for the architectural and climate design features. Nevertheless, what I report above reflects my clear memory of this work.

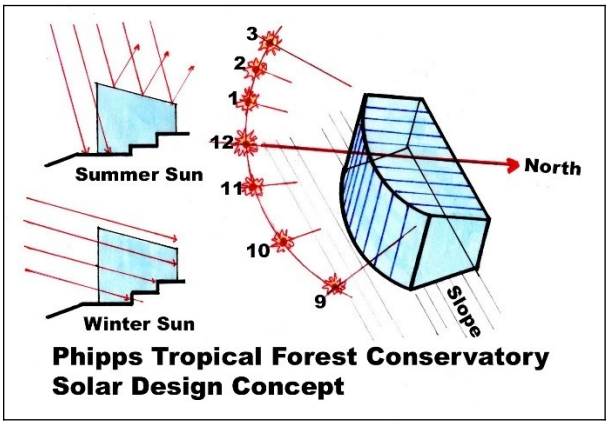






Figure 79. Upper left: diagram of my early concepts setting the building into the south facing slope, arching the building front to follow the sun's path, and pitching the roof at the winter sun angle to optimize solar gain and light penetration during winter. Upper right: photo of the completed building Photo by Denmarsh Photography, Inc**.** Second row: interior photos showing the 18m (60') high south facing glass wall seen from lowest level and view of sun plaza and pool. Lower left: my sketch of the proposed cliff and cascade on the west end of the conservatory and photo of the finished work. Lower third image: hidden vent introducing cooled air from deeply buried tubes I had recommended.

Lincoln Park Zoo Regenstein Center for African Apes - 2003. In 2000 I attended a workshop on facility design for bachelor gorillas with respected gorilla experts Dr. Kristen Lukas (previously at Zoo Atlanta), Dr. Dwight Scott from Oklahoma City Zoo (a facility I had helped to design) and Dr. Steve Ross from Lincoln Park Zoo's pioneering but now old Fisher Great Ape Center. One result was that in 2006 I was lead author with Lukas and Scott on a paper on this subject.[30] A second result was that I was invited by Lincoln Park Zoo in Chicago to help them design a new trend-setting great ape facility, collaborating with Steve Ross and Kristin Lukas. The new facility would house many of the gorillas which had been on loan to the successful facility we designed at Louisville Zoo.

While highly functional, the Fisher Great Ape facility was entirely underground. It had soaring, ape accessible height and adequate skylights, but no outdoor areas for the

[30] Coe, J., Scott, D. and Lukas, K., (2009). Facility Design for Bachelor Gorillas. Zoo Biology 128:144-162.

apes. Dennis Pate, then curator and project lead for the zoo, wanted to demolish this old facility to make room for the new. But highly respected Dr. Les Fisher, past Zoo Director who had designed the old building, pleaded with me to find some way to save his still pioneering and still functional facility. I agreed, for it is usually more sustainable to adapt and reuse than to demolish and build again. I suggested the existing facility be kept as a public back-of-house area, with new outdoor exhibits designed around it. The apes were certainly capable of making vertical connections.

Unfortunately, this approach was dismissed out of hand by Dennis Pate. He envisioned an indoor tropical environment for the apes in winter magically converting to open outdoor habitat during summer. Somehow, using some mechanical technology, the roof and walls would disappear and then be reassembled on a seasonal basis. The Zoo had hired a top Chicago architectural firm for this work. They agreed with me that even if such a facility were possible, construction costs would far exceed the project budget.

I continued to work with Steve Ross and Kriston Lukas on the best possible arrangement of the functional areas they proposed until we arrived at an ideal overall concept plan. At this point I received a letter from Dennis Pate informing me that my services had been terminated because I lacked the creativity to fulfill the Client's project requirements! This was the first and only time I have ever been fired by a client. Not long afterward I heard that Pate himself had left Lincoln Park Zoo to become a zoo director elsewhere. The Chicago architects completed the 2,694 sm (29,000 sf) project in 2004. In 2006 the Regenstein Center for African Apes was awarded the AZA Significant Achievement Honor Exhibit of the Year. I was toured through the project in 2012 by Steve Ross who told me: "Much of Jon Coe remains in this building".

Woodland Park Zoo Long-Range Physical Plan – 2003. I was honored to be invited to update the pioneering 1976 Woodland Park Zoo Long- Rang Plan twenty-eight years after I had drafted most of this plan with Jones & Jones. This was a physical plan update and contained all the overall guidelines and biomes from the original plan. No other clients had followed their master plans as ardently or as long. Staff had mastered detailed naturalism in exhibits (I called these "hardware") but had not kept place on other major zoo trends such animal behavioural enrichment, reward-based trailing, or animal rotation ("software") to increase the effectiveness of the exhibits. They would also benefit from visitor accommodation improvements and innovations I suggested. These advances could be integrated within their exhibit design style but would require changes to their animal management systems. The new plan also showed extending Northern Trail exhibits I helped to design with CLRdesign as a cul-de-sac, to become a complimentary loop through my proposed Asian Highland Trail. This would add exhibits specified in the 1976 plan for Amur tigers, takin, red panda, and other species of this biome.

This new plan was accepted and officially replaced the earlier plan. However, lack of public parking limited the Zoo's earned revenue growth and resulted in loss of public support. Major new exhibits like my proposed Asian Highland Trail were not fundable.

An excellent new entry was added as recommended. Some remaining exhibits from the old plan were added. I didn't find them to have the quality of the earlier exhibits, perhaps because of limited funding. My greater disappointment was the Zoo's seeming disinclination to take on the "software" opportunities we had found so successful at Zoo Atlanta and Louisville Zoo.

Mandalay Bay Las Vegas Casino - 2003. Mr. Mike Ensign called inviting me to visit the casino he was managing in Jean Navada, just past the California border. He wondered if having exotic animals around his East Indian style casino would provide interest and amenity for the families of guests staying there. When I visited this casino I immediately liked Mike's sincerity, completely opposite of what I expected from a casino manager. I quickly drew some sketches based upon ancient Mughal garden traditions which he liked. About a year later Mike called me again. This time he was Director of Circus Circus, one of the older but still dominant casinos on the Los Vegas Strip. The story was that Mike had been Executive Director, but in a previous Board of Directors insurgency he had been deposed and sent into exile in their remote Jean Navada casino. Now he was back in power and wanted to build a state-of-the-art casino and hotel with over 3,200 rooms on the Los Vegas Strip next to their Luxor casino and hotel property and opposite two other 2000 room hotel-casinos. This was a different world! Mike explained their twin objectives: 1). Lift their public offerings to a very high level of quality in concept, construction, and operation, and 2). Introduce something not seen on the Strip before. He explained that casinos and hotel rooms were all the same. It was novelty which drove attendance and thus profits, at least for the first years. Could a high-quality living animal attraction work on the Strip?

I was skeptical. I also considered the opportunities to positively influence even a small percentage of the vast expected crowds. There were then two animal attractions on the Strip, the dolphin feature and tiger show at the Mirage. The dolphin facility had evolved into one of the world's best, with frequent successful births and reward-based training as exercise for the dolphins rather than scheduled shows. The tiger show was not to my taste, though the tigers were well cared for, albeit in very restricted spaces. I was also encouraged by Mike's repeated insistence that the facility and guest experience must, to use his words, be pristine. Therefore, it would be immaculate, intact, and natural, his proud legacy.

We developed a two-level plan with a large underground aquarium and restaurant and above it a domed habitat for animals I believed would not be concerned with large crowds, such as grizzly bears, desert big horned sheep, ravens and other easily trained species which would have lived in the area in ancient times. I explained American Zoo and Aquarium Association accreditation would be essential. This may require that every animal acquired by the casino be provided with a life-long endowment. If the casino decided to close the facility, the care of every animal would be funded wherever it was rehomed. Mike Ensign quickly agreed to these conditions.

Working with local architects we developed convincing models, illustrations, and cost estimates. Finally, during the deciding board meeting other board members, unfamiliar with managing wildlife, voted to proceed only with the aquarium project. I passed the work on to long-time friends and aquarium experts Jim Peterson and John Nightingale to complete. The result was the Mandala Bay Seascape Restaurant and the Shark Reef Aquarium with 6,056,650-liter (1.6 million gal) tanks.

I was relieved with this result. Mike Ensign would soon be retiring, and I had no confidence his replacement would have the same vision and goodwill he expressed. Also, I learned the accelerated construction schedule common in Los Vegas would require me and several of our staff to move there and forsake all other work to meet their deadlines. None of us were willing to do this. However, as another example of my cross-over career, ranging from West African national park planning to science centers and Los Vegas attractions, I am happy to have had this unusual experience.

Dubai Zoo Planning - 2003. CLRdesign was contacted by the British architectural and engineering firm WS Atkins to work with their office in the United Arab Emirates on planning a major new zoo in Dubai. Our application was awarded and CLR principals Greg Dykstra, and I flew to Dubai several times. We were joined on one trip by Mark Beauchamp and by Rick Biddle, our zoo strategic planning advisor. I had worked in several deserts but was not prepared for a region with both 40C-45C (104F-113F) temperatures and 90% humidity. To compensate, we followed the locals taking advantage of slightly cooler evening temperatures (30C, 80F) to walk through the old gold and spice souks and bazaar, to Old Town, the wonderful, unassuming restored original city. This had been only a fishing village and the local centre for pearl diving as recently as when I was in university before the local discovery of oil.

A previous zoo master plan had been rejected because it didn't provide sufficient shelter from the heat. The Atkins firm, headed by Mr. Andrew Thomas, were congenial, but we soon found that we were doing all the work. The Dubai Municipality client team headed by the Director of Parks were professional and expected the same behaviour from us. We got off to a poor start because, travelling with the Atkins team, we were late to every meeting. Dubai traffic is slow, but being late was both unprofessional and disrespectful. During our first week I asked Andrew Thomas when we would schedule a social dinner with our Arab clients. His response: 'Why would you want to have dinner with them?' shocked me. This was the first and only time I encountered such neocolonial prejudice in an international prime consultant. Contractually, all communication to the clients was to go through the Atkins firm. But when I learned their attitude, I arranged to visit the Dubai Park Director on my own in his office. He welcomed my visit and told me they previously had poor experience with the Atkins firm but had decided to give them another chance. Now they were disappointed, but they were pleased with CLR's work thus far. I also visited the sad old 2ha (4.9ac) Dubai Zoo built in 1968 (considered an embarrassment by city officials) to meet the director and learn about his aspirations and possible management abilities for a next-generation zoo,

Their large, proposed site had been planted as an irrigated forestry project on a sandy hill by the Forestry Department. They were proud of their accomplishment and preferred to keep it as a nature park rather than converting it into a zoo. Water for irrigation was supplied from petrol burning desalinization plants which were both financially and environmentally expensive. Extensive irrigation also resulted in the trees being planted in rows. These were not suitable for the creation of highly naturalistic landscapes, although large trees could be relocated using heavy equipment. I gradually learned through observation that Arab governments spoke forcefully about supporting conservation, but to them conservation didn't mean habitat preservation as it did to us, but rather greening, turning deserts to irrigated, managed woodlands.

We advanced our plans during our several visits, resulting in what we thought was a beautiful vision showing how different vernacular cultures had adapted to living sustainably with local wildlife. My designs were beautifully illustrated with John Collin's excellent sketches.

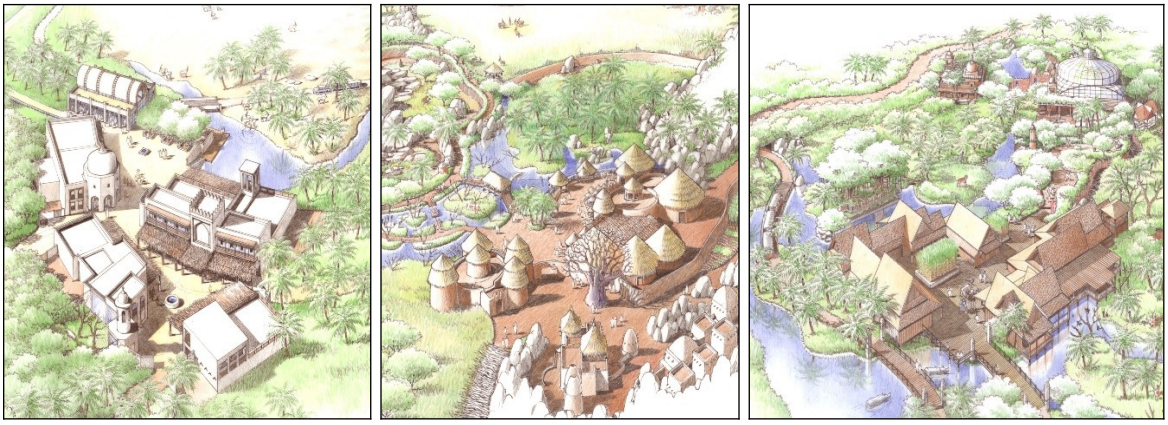


Figure 80. For Dubai Zoo we proposed vernacular villages illustrated here by CLRdesign architect John Collins. Left: Arabian village. Centre: African village. Right: Thai village. These were intended as hubs for visitor amenities leading to wildlife discovery trails (images: CLRdesign).

On our final meeting we entered the room to find our Emirati clients in a notably displeased mood. During the previous meeting they challenged us to develop something unique with high impact on visitors. We had assured them our plans were unique, but our emphasis had been on living sustainability with nature. Other consultants had announced plans to develop a domed and climate-controlled snow skiing facility in Dubai. Why hadn't we thought of something this original? I didn't know how to answer. The amount of energy required, and greenhouse gases produced for long-term chilling such a dome in this climate would be, to us, an inconceivable and irresponsible recommendation. Yet it would have been disrespectful to the Emirates to openly question their values in their country. I had previously advised them that to create the natural and cultural landscape we would need to relocate sixty of the over 1000 existing trees. This did not please them and increased the Forestry Department's resistance to using their site for a major development like a zoo.

Not surprisingly, our master plan was not accepted. We were the second master planners for the project. At least four further master plans by other international consultants, some on other sites, were also rejected. It wasn't until December 2017, fourteen years later, that Dubai Safari Park was opened on a larger site outside the city and is operated as a private business.

One exciting memory from this project was a four-wheel-drive expedition up Wadi Bih led by Jeremy Trotman, a young Atkins engineer. Wadi Bih is a dry riverbed and at times a dramatic steep-sided canyon through the Al Hajar Mountains to Oman for about 72 km (45 mi). The round trip back to Dubai took most of a summer day. This was a real desert.

SAGA Primate Symposium, Tama Zoo, Tokyo - 2003. I was invited to speak at this conference along with distinguished primatologists Dr. Jane Goodall, Dr. Ian Redmond who had worked with mountain gorillas with Dr. Dian Fossey and was noted for his work in gorilla conservation, Dr. Tetsuro Matsuzawa chimpanzee behaviour expert from the Primate Research Institute of Kyoto University, Dr. Roberto Delgado, orangutan conservationist, Ms. Debby Cox, founder of the Tchimpounga Chimpanzee Rehabilitation Center in the Republic of the Congo, and other distinguished speakers.

I had the opportunity to chat with Dr. Jane, who I first met in 1979 and helped with her initiative to close the inhumane treatment of lab chimpanzees at LEMSEP in 1991. I had been keynote speaker at her Chimpanzoo conference in Los Angeles in 1998. I recall that Jane said the growing demand for her international speaking tours had exhausted her. Today, twenty years and millions of travel miles later, 89-year-old Jane Goodall is still actively speaking, traveling approximately 300 days a year, for her nonprofit organization, the Jane Goodall Institute (JGI), and JGI's youth program, Roots & Shoots.

After the conference I took the amazing bullet train from suburban Tokyo to Osaka escorted by Dr. Masato Takeda, the veterinarian at Osaka's Tennoji Zoo. We transferred between six different trains, over four travel hours, yet we never waited more than ten minutes between trains which were all exactly on time. My hotel was opposite the famous Osaka Castle, a wonderful example of stone wall construction, the best I had seen since visiting Cusco, Peru. I was taken on a tour of Osaka's Tennoji Zoo by an old friend, Dr. Kenji Wako. I enjoyed seeing the elephant and African Savanna exhibits Kenji had designed. These were by far the most beautiful, yet functional zoo exhibits I had seen in Japan. Kenji had collaborated with Professor Masahiro Yoshida, an old master of Japanese landscape architecture. With Kenji translating, Professor Yoshida remarked on how similar my zoo design theories, particularly design of sightlines, and circulation experiences, resembled traditional Japanese garden design theory. I responded that I had learned about these traditional Japanese methods and philosophy while a landscape architecture student and integrated many into my zoo design practices. I also delivered a lecture to Kenji's students. Kenji is a very gracious host, paying for my meals and local transportation himself.

Mr. Yoshida guided me around three iconic Japanese gardens in historic Kyoto, including Katsura Palace, a small, austere Zen garden in a Buddhist temple and the expansive Shunga Kuin Palace with distant forested hills resplendent with autumn color, used as “borrowed landscape” in the garden’s composition. It was informative to see these classical gardens through the vision of a modern master like Mr. Yoshida and hear what he liked and disliked about their original designs and present maintenance. We had wonderful Japanese dinners together on several evenings after our tours. The next day Kenji and I took the local train to nearby Inuyama District and met Dr. Yoshikazu (Yoshi) Ueno a behavioural researcher at the Primate Research Institute (PRI) of Kyoto University who I had met at the SAGA Symposium. Yoshi kindly became my guide. PRI had developed a highly artificial chimpanzee enclosure featuring three 15m (50’) high steel towers connected by large ropes. Vegetation between the towers included many plant species known to be toxic to humans. Yoshi explained that researchers assumed the primates could identify potentially toxic plants by taste and used them for nest building. There had not been any incidents of apes suffering from plant toxicity. This approach was opposite to my experience in Western Zoos, where veterinarians refused to take any risks with potentially toxic plants in animal enclosures.











Figure 81. Upper left: Katsura Palace Garden. Upper Right: Shunga Kuin Palace Garden. Middle left: Tennoji Zoo, Osaka. I am on the left, Dr Kenji Wako in centre and Professor Masahiro Yoshida, far right. Middle right, my lecture to Dr. Kenji Wako's landscape architecture students in Osaka University. Lower photos: 15m (50') high chimpanzee climbing towers at the Primate Research Institure of Kyoto University. Lower right: plantings at base of tower including species listed as toxic such as *Robinia pseudoacacia* planted among the towers.

Later we observed noted primate behaviour expert Dr. Tetsuro Matsuzawa demonstrated chimpanzee self-awareness by placing a white mark on a young chimp's forehead as they played together and then providing the chimp with a mirror. The ape immediately saw the white mark and touched his forehead, proving he recognized his own reflection. This test has now been widely applied to great apes, elephants and dolphins; the only non-human animals known to be self-aware. I later had lunch with Dr. Matsuzawa, Yoshi and Dr. Kim Hathaway, an American primate researcher. Dr. Matsuzawa told me he had been trying to get me invited to speak in Japan for four years, so he was the influential source of my SAGA speaking invitation. He said they had many of my academic papers in their library.

A few days later I had to again navigate the Japanese train system back to Tokyo Narita Airport for my flight home, this time without a guide. Everything went well until arriving at the four-level Tokyo Central Station. I arrived by bullet train on the top level, descended the seemingly endless escalator and by chance saw a hand-written note in English taped to a column informing foreigners that the airport train departed from the lowest level.

Woodland Park Zoo Greater One-horned Rhino Exhibit - 2004. Ironically, my first Jon Coe Design (JCD) work was back at the Woodland Park Zoo in Seattle where my zoo design career began thirty years earlier. I happily collaborated with my old firm CLRdesign. The zoo wanted to add an Indian rhino exhibit in their Jones & Jones designed and now wonderfully mature Asian forest area. Old friend and CLRdesign colleague Larry Dame very ably assisted me. The assigned area was not large enough and we recommended they convert one of their elephant yards to a rotation area which elephants and rhinos could alternately inhabit. After I made two international visits, and we completed quite detailed drawings the zoo decided to abandon the project. They

correctly decided there was not enough space for both species. They were also concerned the Seattle climate would be too cold for tropical Indian rhinos. Almost eighteen years later their elephants were relocated to a large elephant sanctuary and Indian rhinos now occupy the entire old elephant area. Although I hate to do uncompleted work, this was the best outcome. I also learned a good deal about this interesting species.

Adelaide Zoo, Australia - 2006-2018. My friend John Wright with Hassell Architects invited me to join their team to design new Sumatran tiger and orangutan facilities, working with enthusiastic Director Mark Craig. Adelaide Zoo is an attractive, small city zoo and didn't really have sufficient space for both exhibits, but Mark was confident the orangutans could use O-lines to access air space above the tigers. Mark also wanted the tiger night holding building connected to the service area behind the exhibit. I warned Mark this may cause the tigers to stay near the back of the exhibit waiting to be fed and thus well away from visitors. To remedy this, I designed the tiger exhibit with a long, hidden raceway connecting their night dens to the exhibit front area. My idea was they would wait near the front of the exhibit. This strategy had worked well in the Zoo Atlanta lion exhibit I had designed a decade earlier. These were unfortunate examples of designing physical features requiring changed animal management methods not embraced by animal care staff. Mark Craig moved on to work at Sydney Wildlife World and wasn't present to change management procedure. Orangutans were never allowed to enter the O-lines over the tiger area; staff said the apes were terrified to go there. Thus, the orangutan area was too small. One timid and fearful Sumatran tiger refused to turn a right-angle corner in the raceway and never went into the exhibit. Staff blamed me for a design flaw that I see as a training flaw.

Giant Panda Exhibit - 2009. I again teamed with Hassell, John Wright and Sharon McKay, to design the blockbuster Giant Panda Forest. Then General Curator Kevin Evans was an active member of our design team. Based upon my experience with several giant panda exhibits in the USA I admonished the zoo not to fall into this costly trap. Chinese authorities then charged USD$ 1 million per year for ten years to rent their pandas. They always kept their best breeding stock at home and sent incompatible pairs. New facilities were very expensive to build and maintain. Zoos opening such new attractions experienced "boom and bust" attendance and all eventually lost money unless cubs were born, which very rarely occurred. Adelaide Zoo senior management at that time ignored this advice, saying they had a special deal through the Australian government to acquire the pandas. Although the giant panda lease agreement was favorable, the zoo went heavily into debt for construction expenses and eventually the zoo nearly became bankrupt. A significant part of this expense was the fine new entry location and building, gift shop, cafe and administration building by the Hassell Adelaide office opened in 2009 which won awards for 'Green Architecture'.

In 2012 Ms. Elaine Bensted, a banker, was wisely hired as the new CEO. Elaine led Adelaide Zoo out of debt and, after some difficult years, into a renaissance.

Master Planning - 2017. Elaine was a successful team builder, delegated, and oversaw the sensible staging of new work. An area next to the new entry was developed as a two-level Nature's Play area designed locally, which opened in 2015. Elaine Bensted and Zoo Horticulture Director and later Operations Director Jeff Lugg invited me to guide their in-house master planning initiative in 2017. I participated in two planning workshops with zoo staff and advised local planning consultant Ms. Vicky Jo Russell, who shared workshop management and developed the actual plan.

The next new attraction linked in the development sequence was the Variety Children's Zoo Farm in 2019. I was again invited to join early brainstorming and update zoo staff on the latest ideas in children's domestic animal areas in zoos. My major contribution was to suggest that domestic goats and children be positioned on two levels connecting to the successful Nature's Plan construction. Adelaide Zoo was an early adaptor of my ideas for elevated animal trails. Jeff Lugg and zoo staff designed and constructed an overhead trail system for golden lion tamarins as a test of concept for larger, longer and more complex colobus trail systems that opened in 2020. I mention these dates to demonstrate a sensible development schedule for a small zoo, recovering from the cost of a blockbuster panda and entry projects and then opening a planned new attraction every few years to hold and increase attendance. This was a part of my original advice Elaine Bensted took to heart and executed very well.









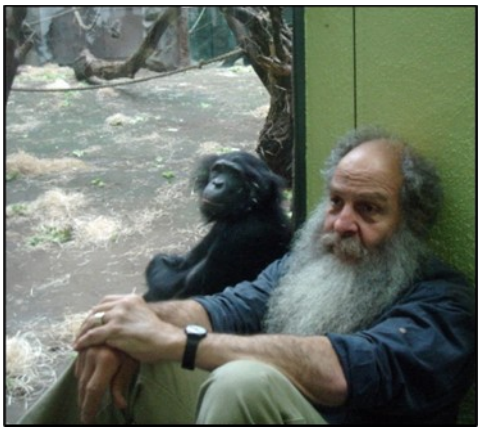
Figure 82. Upper left: giant panda demonstrating their noted rest-and-digest behaviour in the garden I helped to design with Kevin Evens and John Wright. Upper right: we develop this mechanically chilled “cool rock” rest area for warm days which can be enjoyed by both pandas and visitors on opposite sides of the glass barrier. I hoped this would bring the animals closer to the visitors, but no research has tested this notion. Lower left: planning workshop session with “break-out groups”. CEO Elaine Bensted is in the centre of the photo. Lower right: the overhead trail I suggested, and Jeff Lugg and zoo staff designed and constructed for golden lion tamarins in 2015 (Photo: Zoos South Australia). They have expanded it several times since then. I’m told the tamarins spend most of their days on the trails rather than in their old outdoor enclosures.

Zoos Victoria, Australia 2008-2018. Zoos Victoria (ZV) includes Melbourne Zoo, Werribee Open Range Zoo, Kyabram Fauna Park and the nearby Healesville Sanctuary. Most recently I completed the master plan for Kyabram Fauna Park just before they joined the Zoos Victoria family. My work with ZV, like work with Sydney’s Taronga Zoo, consisted of developing alternative conceptual plans with illustrative sketches.

My Zoos Victoria work was done under five ZV executive directors and several park directors. Projects included Melbourne Zoo Vision Plan with then Director John Wills 2008, Orangutan Island & Tiger Trails concept with then General Curator Dan Maloney 2008, Lemur Exhibit 2011, Predator Precinct Concept 2011, Growing Wild 2013, Predator One & Two 2014- 2018. Healesville Sanctuary concept design included Koala Exhibit with Director Glenn Holland 2015. Werribee Open Range Zoo began planning their entry area with then Director Jenny Gray 2008, followed by Werribee Elephant Design Survey, Gorilla Shelter and Savanna Shade Studies under Glenn Holland 2022.

Once a direction I developed was approved and a construction budget established, larger design firms develop final designs and construction documents, completing the work. While I enjoyed these challenges, the completed work was usually very different than I had envisioned. When we settled in Healesville I thought of developing a very long-term relationship with Healesville Sanctuary, which is only four kilometers from our home. But soon I was working on different continents and across Australia and never got around to promoting my services to the sanctuary.

Frankfurt Zoo, Germany - 2009. Ms. Monika Fibi, an Austrian landscape architect approached me in 1991 for advice on becoming a zoo designer. I suggested she return to university to do her thesis on improving zoo design through scientific evaluation and increased knowledge of zoo biology and visitor studies. In 2000, after completing her excellent thesis and degree, she and her husband Hanz opened the non-profit ZooLex Zoo Design Organization. Their Vienna-based consulting firm also publishes the ZooLex Gallery, an in-depth reference to zoo exhibits built around the world. I am pleased to be one of their editors and have enjoyed regular communication with Monika ever since.



In 2009 Monika invited me to collaborate with her in master planning Frankfurt Zoo in Germany, collaborating with Curator Carston Knott. Carston understood the need for a master plan, which the zoo director ignored, preferring to put resources into conservation projects in Viet Nam. Carson cleverly talked him into a compromise in which Monika and I would be hired to provide workshops in training zoo staff in planning. The result would be a conceptual master plan.

Figure: 83. Tired after long hours of workshops and late nights drawing our results, I rested next to a sympathetic zoo bonobo on the other side of the glass at Frankfurt Zoo. Photo: M. Fibi

We arrived at the zoo to find a new bear exhibit under construction designed by architects who had never done a zoo project before but had won a City managed architectural competition. Such competitions favor academic architects with exciting ideas, little experience and no knowledge of zoo biology. Monika said this is how city zoos were managed in Germany. Carston told us zoo management had no role in architectural selection and very little input into the design. This was one reason he was keen to use us to help develop a staff-driven master plan. Monika and I developed a decent plan and enjoyed working with the keen staff members, but I don't know if anything came from our collective plans.

Kabul Zoo Master Plan, Afghanistan - 2011. While in Kabul I developed an interest in the renewal of the war-torn Kabul Zoo resulting in my pro bono 2010 Kabul Zoo Vision Plan, which proposed a high quality yet small and sustainable zoo and a large flood plain central park for Kabul. In 2011 I was hired by KCI-Tetra Tech, a US planning firm under the direction of Mr. Bradley Baxter, to develop an official master plan for Kabul Zoo. Funding was from USAID, the US foreign aid agency. This plan included zoo operational Standards and Norms as well as development plans, cross sections and staging, recommendations for parking, entry, food and beverage, education, visitor circulation, animal displays and support areas, conservation, and administrative offices, and veterinary centre. This planning was done in close coordination with Mr. Aziz, the zoo's young Director.



Figure 84. I planned the Zabul Zoo to remain small and affordable for the city to operate well, while demonstrating ambitious standards of animal welfare and rewarding visitor experiences. I then went on to develop plans for a suggested Kabul Central Eco-Park for the adjacent Kabul River Flood plain. This would have been an amazing contribution to the city.

During the month of my work in Kabul, Bradley and I attended weekly open meetings in the mayor's office but were never called on to present our work. We met twice with the Assistant Mayor who liked our work but had little power. We were finally awarded an audience with the mayor requiring me to extend my visit for a week. His Honor did not like my work and lectured me on proper zoo design. His vision was to build a mega-zoo with the flood-prone Kabul River flowing through it and extending to the already populated steep hills beyond. His zoo would have massive ornamental wrought iron gates like the Berlin Zoo of the 1930s. I knew US aid to Kabul was already drying up. Existing programs were being cut back. The mayor's plan had no chance for funding and would be far beyond the city's capacity to either build or operate. My plan went into the bin. Lesson learned: challenging, visionary yet sustainable plan explorations like this are worthwhile in the same way post-graduate design studios are, for the enjoyment of the search and the experience gained. Take pleasure in work well done regardless of the outcome.

North American Past Project Evaluation Tour - 2012. For some time, I had been wondering what could be learned from projects I had helped to design in previous years

and decades in North America, some over 35 years earlier. I had my favorites, and many had been award-winning. But how did their operators evaluate them over time? Very few zoos and botanical gardens undertake, much less publish, scientific evaluation of projects after they open. Informal information is in the minds of zoo managers and the only practical way to learn from them is to tour their facilities with them. Also, I wanted to learn how North American zoos were preparing for climate change and sustainable 'green' operation. So, as a self-education initiative I organized my own tour of twenty-two zoos in the USA and Canada where I felt my colleagues and I had done our best work. Many of these projects have been described earlier in this narrative. However, I included visits to places I admired but had not done work with, including Disney's Animal Kingdom, Sea World Tampa, and Cincinnati Zoo. My travel route was complicated by fitting into the schedules of the facilities I wanted to visit. Also, my wife Susan had planned her dog show schedule for late in my travels, so we arranged to combine one section of our trip. I had arranged with Mr. Michael Noonan from the Anthrozoös Program at Canisus Collage to join him and his students in an animal welfare tour of six zoos on the US Upper Midwest. I fitted this into the last part of my trip. The resulting schedule required me to cross the USA four times.



Figure 85. Travel map illustrating my 2012 evaluation tour of facilities I had designed in North American zoos and other projects.

Lessons learned from North American zoo project tour:

1. User satisfaction. Gratifyingly, all the people I interviewed, from directors to curators and frontline animal caregivers, some third generation of operators, remained

very satisfied with the functionality, popularity, and animal suitability of the projects we had designed. Several remarked they wished they had more such projects.

2. Preparation for climate change. I questioned senior zoo staff about their plans and actions for resilient responses to climate change. I framed this in terms of sustainability in energy, water, food, animal availability, wildlife conservation and civil security. Very few of the zoos I visited had made any preparations at all. Several zoos have done outstanding work in one of these area, but not the others. Toledo and Cincinnati Zoos had built large solar panel shaded car parks supplementing their energy supply and Cincinnati Zoo had done a thorough water and energy audit, greatly reducing waste. Disney's Animal Kingdom had secured local sources for food for both animals and visitors.

3. Animal welfare perceptions. Several of the exhibits we visited have been designed to provide enrichment opportunities for the species living there. The Toledo Zoo had built their elephant exhibit (by other designers) around the concept of varied feeding opportunities for the elephants. The result functioned well for the elephants, but the hard, industrial appearance of heavy steel cables and I-beam barriers caused the animal welfare students I accompanied to react negatively. This reminded me of our design of the PECO Primate Center at Philly Zoo. It also was designed around the animals functional year around needs, but it's intentional industrial look was not popular. Perhaps this supports our original concept that, from the human perspective, zoo exhibits need to look natural to satisfy visitors or at least be immersed in nature as the Philadelphia Zoo's Tree Top Trails were.

Zoo Guadalajara Mexico - 2012. Earlier in the year Dr. Michael Noonan from Canisius University in Buffalo NY organized a landmark conference on "The Future of Zoos". I was a featured speaker. Later in the year Vet. Dr. Luis Soto Rendón of Zoo Guadalajara held a Mexican version, El futuro de los zoológicos, inviting me, Michael Noonan, and Ron Kagan (former CEO of Detroit Zoo), along with Mexican zoo speakers. I delivered two lectures, El Pasado Y El Futuro De Los Zoológicos —Una Perspectiva International Integrada and El Futuro de Los Zoológicos en Epocas Cambiantes, los próximos 50, 75 y 100 años. I presented the talks with the help of simultaneous translation but translated the Power Point slides into Spanish myself. There were about one hundred attendees from countries including Mexico, Central America, Colombia, Peru, Chile, Argentina, USA, and Qatar.

During our tour of Zoo Guadalajara, I suggested the idea of overhead primate trailways and orangutan lines (O-lines) to Luis and in the following days developed an overall concept plan for improving their zoo. During the next several years Luis implemented their elevated trailways system, 60m long (200') Senderos Aereas (Aerial Trails). He also developed a 200m (656') long, up to 25m (82') high O-line for their orangutans, both based upon conceptual sketches I had sent, and they developed.

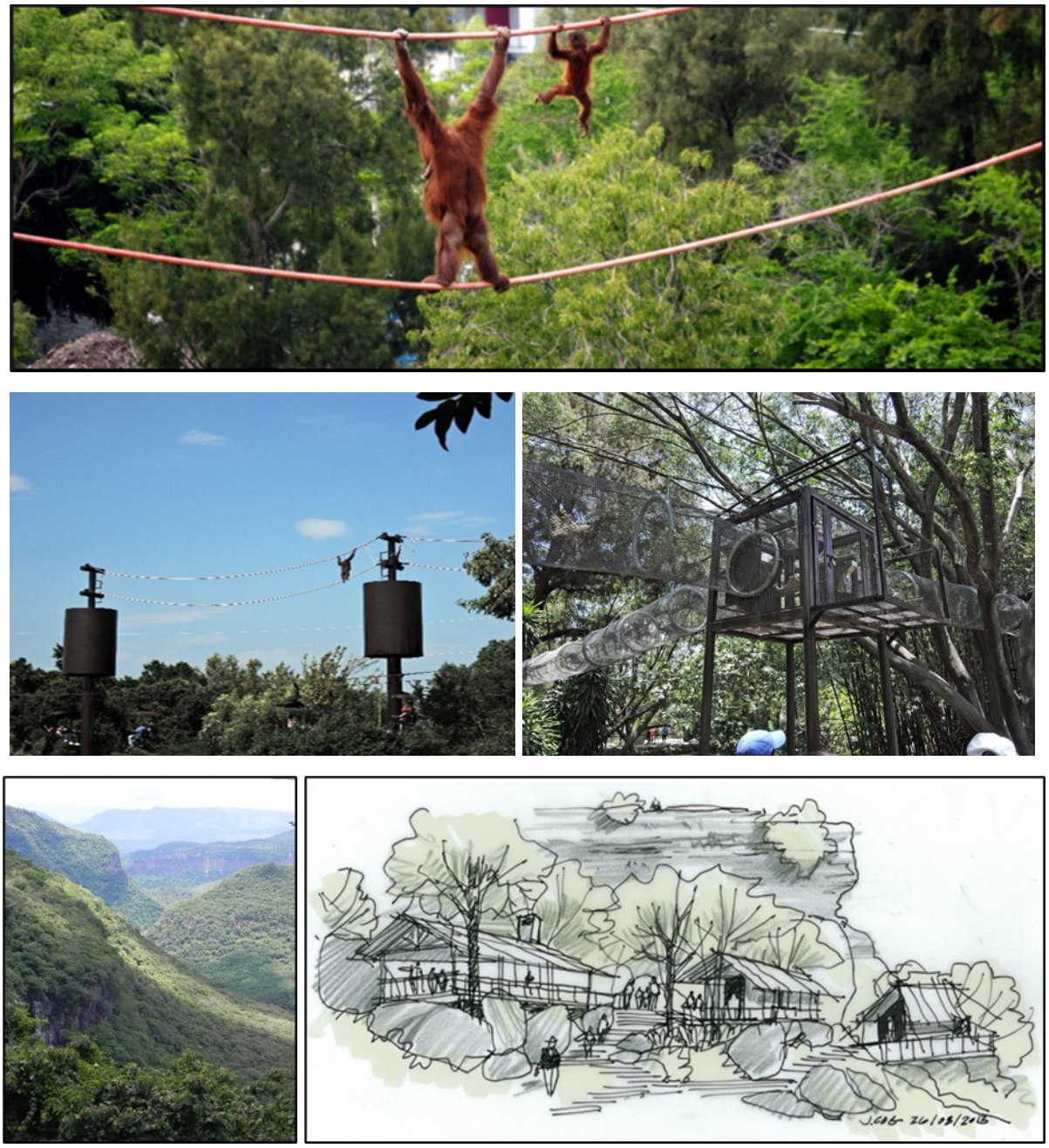


Figure 86. Upper photo of mother and young orangutan 25m high above Zoo Guadalajara (Photo: L. S. Rendón). Middle row left: another view of an orangutan on their O-line. Right: intersection control gates for the Senderos Aereas. This was a practical arrangement but should have been controlled from the ground. This trailway formed a loop, a better arrangement than the up-and-back system we designed at Philly Zoo. Bottom left: view from the north edge of the zoo looking into the Rio Grande de Santiago Valley and Barranca de Huentitan National Park. Botton right: on my 2018 visit I sketched ideas for overnight accommodation on property they owned just below the cliff forming the north edge of the zoo. These facilities would have this view.

I made my second visit to Guadalajara in 2018 and was amazed at Luis's progress. I also developed some ideas for cliff-side overnight accommodation and a river ride

exhibition. Neither has gone ahead to my knowledge. I have stayed in touch with my friend Dr. Luis Soto Rendón, who is now Zoo Director.

Thrissur Zoo India 2012- present. I mentioned previously contributing to training programs for Indian zoo directors sponsored by the Central Zoo Authority of India (CZA) in Bhubaneswar (2006), Hyderabad (2011), and New Deli (2012). After the New Delhi training I was recommended by CZA as a paid consultant to assist the Thrissur Zoological Park in Kerala, South India with the planning their new zoo. My friend Dr. Brij K. Gulpta, who I met collaborating on the Coimbatore Zoo design, was with the CZA at the time and may have been influential in assigning me this work.

I was concerned about the vast Indian bureaucracy and being limited by the tradition-shackled CZA of the time. Yet, I realized the only way real progressive change could come to the CZA and Indian Zoos was through creation of a successful new example in India. Once a model new zoo was built would they recruit and train zoo staff in the Western style of zoo management where front-line staff are skilled and trusted by senior management and female staff are welcomed at all levels. Could this project lead to a new generation of zoo design and operation in the vast Central Asian subcontinent? It was worth a good try.

I contacted Mr. Adit Pal, a long-time friend and previous CLRdesign employee who taught landscape architecture at the University of New Delhi. Adit strongly recommended Idea Design in Cochin, near the project site. Idea Design is an architectural and landscape design partnership headed by Mr. Biley Menon, his wife Ms. Chitra Biley, and American expat Mr. Michael Little. Adit said Biley and Chitra were among his best students and had later worked with David Hancocks (from my Woodland Park Zoo experiences in the late 1970’s) on later planning for the Coimbatore Zoo I had initiated with zoo activist Sally Walker in 1994. I was delighted when Idea Design agreed to enter a joint venture agreement with me for this major work. I developed the overall zoo design. Idea Design managed the contractual and legal complexities of work in India and transformed my free-hand drawings into standardized computer documents. I have never been happier with a collaboration! Idea Design are world-class environmental designers, architects and landscape architects specializing in site and culturally sensitive sustainable design. Their environmental and business ethics are admirable, and they are wonderful hosts, cultural guides, and companions.

Biley and Chitra introduced me to Old Kochi, an important spice trading port since Greco-Roman times and home to Jews and Christians fleeing Jerusalem during the Roman occupation. St. Thomas is said to have established Christian churches there in AD 52. An old church still stands next to an ancient synagogue and a mosque. Marco Polo visited in 1292, and Vasco de Gama arrived in 1498, beginning the European colonial period which later passed to the Dutch and finally to the British before Indian independence. The second highlight was our houseboat tour of a vast above ground canal and lake system created by the Dutch to connect Kochi Port to the Indian interior and now a major tourist attraction.



Figure 87. Biley and Chitra took me to see a large series of elevated canals and lakes created during the Dutch colonial occupation. We toured these waterways in old commercial barges locally converted to travelling tourist accommodations with wonderful meals of local seafood.

The existing Thrissur Zoo, established in1885, was a small substandard menagerie attached to the State Museum focused on local art and natural history. Poor conditions for the animals resulted in public complaints and inspired the idea of building a new world-class zoo. The State Forestry Department identified the new zoo location in the Sholayar Forest Reserve near the town of Puthur partially developed as a bamboo plantation for an unsuccessful paper making initiative. This was an aesthetically spectacular and physically demanding site comprised of three steep hilltops with abundant exposed granite-gneiss bedrock outcrops and small tors. Expensive and disruptive rock blasting was required for installing underground utilities and roads. The steep central hill and a lower saddle area together comprising 50 ha (124 ac) were selected for the new zoo site. The remaining area, too steep for future zoo expansion, was designated a Conservation Zone.

Our client was Mr. C.S. Yalakki, Additional Assistant Chief Conservator of Forests, Government of Kerala, based in the state capital of Thiruvananthapuram. I learned to be wary of projects where I was not in direct contact with the senior client, especially of government work in bureaucratic India. However, I was immediately impressed with the genuine interest and integrity of Mr. Yalakki when I met him, and we explored the project

site together. He was a forester and knew his field. He was not informed about the design business and the work required to design a major new zoo. According to his approval letter, he had already prepared his own master plan. He agreed to hire me to review his plan and prepare, in only seven days, the following:

1. Master layout plan indicating the visitor flow, individual enclosures

for zoo animals and birds, infrastructure for zoo offices, veterinary

health care, quarantine, waste treatment, offsite captive breeding

and research facilities, water, and electric supply layouts etc.

2. Detailed design drawings for every individual enclosure for all

animals and birds proposed for display in the zoological park.

Mr. Yalakki was supportive of our early plans, and he was a pleasure to work with. Unfortunately, his departmental workload doubled when he received a second major assignment and later his health began to fail, and he retired. There followed a succession of State project directors and managers with no deep understanding of the project or of our work.

During my first visit I met Dr. P.O. Nameer, Head of the Centre for Wildlife Studies, College of Forestry, Kerala Agricultural University, Thrissur. Nameer (in India people usually go by their last names in informal communications), a friend of zoo activist Sally Walker, was keen to collaborate with us.

In a November 2015 visit to the USA, I met with Ms. Pat Simmons, then Director of the North Carolina State Zoo (NCZ). She was willing to support an intern training program for Indian zoo care givers at her facility and to send some of her staff to India for training programs at the Kerala Agricultural University under Dr. Nameer. In return, Pat was planning a new Asian section for her zoo and hoped this relationship would help them locate and import animals from Indian Zoos. Being a state operated zoo, NCZ was an ideal “sister facility” to collaborate with Thrissur (State) Zoo. I then suggested this opportunity to Dr. Nameer. His university wildlife program seemed an ideal venue for organizing a zoo animal care certificate program in collaboration with an American Zoo. No such program existed in India at the time. Nameer was keen to collaborate, but all this would need approval and funding from our client, the State Department of Forestry. Our zoo training recommendation disappeared into the State bureaucracy and was never seen again.

Another concern I raised was for the State to hire the zoo’s new director or at least curator, so we designers would have a leader and project champion to collaborate with during zoo planning. I was informed no manager would be hired when there was not yet any facility to operate. I feared a 21st Century zoo, operated by what I considered to be India’s 19th Century top-down management system, would not meet my expectations or be a successful proof-of-concept. The CZA, expecting corruption during long

directorship tenures, distrusted career zoo directors. It mandated all state-operated zoos (most zoos) be operated by Forestry Department foresters or wildlife zoologists seconded for a maximum five-year period. Private zoos were discouraged, as my friends at the unsuccessful Coimbatore Zoo discovered.

Curators and veterinarians manage internal zoo operations. In India, animals were cared for by uneducated laborers. CZA required animal holding buildings to have a locked room for tool storage because they expected laborers to steal equipment (perhaps because they were so poorly paid). There was no tradition of professional animal care personnel, male or female, as there is in the West. And this sad condition is codified in State labor statutes. State run facilities have low established salaries for unskilled laborers (who take care of animals) and higher pay levels for trained professionals, such as curators and veterinarians. There was no intermediate pay level for professional daily animal care staff. I was told It would require a change of state employment standards to establish an intermediate pay scale. Even if we could have organized an exotic animal care certificate program at the local university, graduates could not afford to work at the existing pay level.. Establishing a bottom-up transition for animal management skills, as I had observed in North American Zoos over the past fifty years, could be done with private zoos, but would be difficult with this State client.

Our first visits to the site were exhausting in the tropical heat, but areas of the land suggested themselves as ideal locations for needed features such as the arrival, parking and entry area, a giant aviary, and areas for alpine species. After the first week, with the help of Biley, Chitra and Michael, we had an exciting overall layout plan to present to Yalakki and Nameer which was well received.







Figure 88. Upper left: photo with the entire Idea Design staff taken by Biley Menon with partners Chitra Biley and Michael Little on the left. The office was on the ground floor. Biley, Chitra and their family lived upstairs in a wonderfully climate-adapted building they had designed. Upper right: on-site work session with C.S. Yalakki on right and Chitra Biley in pink cap. Middle left: with P.O. Nameer. Middle right: with Biley Menon in front row. Lower left and centre: Michael Little and Biley Menon demonstrate large granite-gneiss outcrops, the site's deep geologic bones. Lower right: my photo with the local mayor. She was a strong project supporter with the prospect of local job creation during construction and later operation. Sorry, I did not note her name.

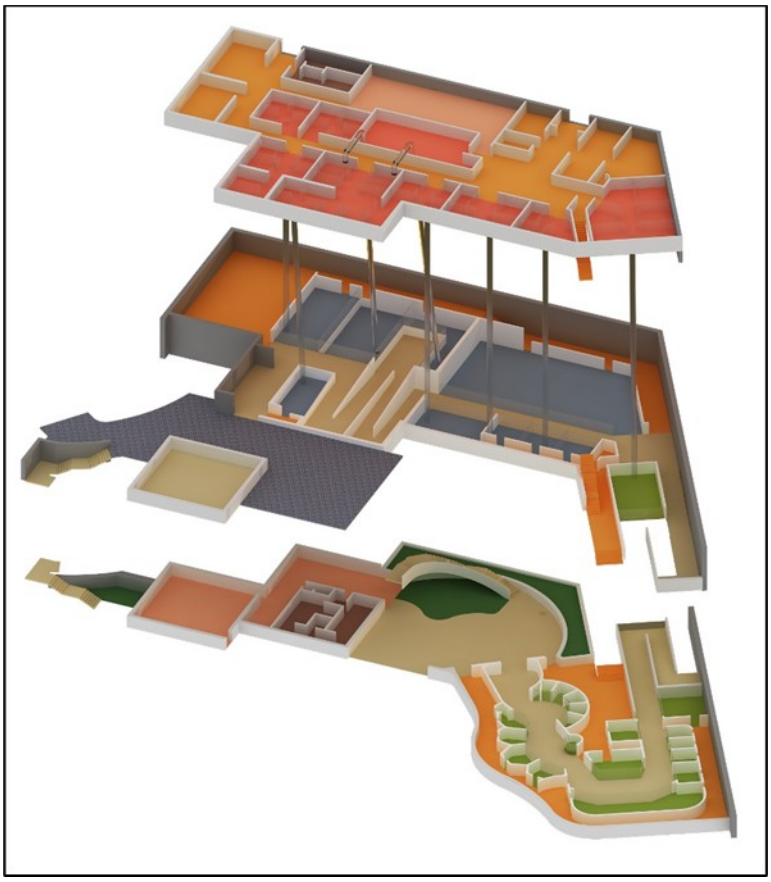


Figure 89. Idea Design's depiction of the three-level Conservation Centre building I designed to step up the existing hillside minimizing bedrock excavation. Lower level has a central banyan tree courtyard entry with toilets on the left and reptile exhibits on the right. Ramping up to the second level visitors experience nocturnal animal displays, existing onto an elevated terrace and café. The third level provides considerable non-public space for breeding endangered species. Public facing exterior walls would become "living green walls" based upon Michael Little's designs.

We completed our Master Layout Plan in record time. Perhaps the physical constraints of the site, its steepness and abundant bedrock, made the best design choices obvious. We used existing solar aspect, orientation and microclimates to locate exhibits from similar climate zones. The level African savanna exhibit was in the only large level area available. Circulation would be a complete loop "around the mountain," about 4km (2.5 miles) to see everything. This distance in a warm climate requires a tram service and separate tram road, also used for service vehicles.

CZA provided their mandated animal management Standards and Norms, which had some obsolete provisions in my view. For example, these provided only two areas for the animals, small individual feeding cages to prevent strife during feeding, and generously sized exhibit areas. Carnivores such as lions, tigers and bears were required to be locked up at night, spending sixteen hours in twenty-four, their most active times and two-thirds of their lives, in these cramped cages. We added spacious

off exhibit sheltered outdoor exercise pens where animals could spend their hours when the zoo was closed.

Our master plan was sensible dived into two construction stages, but the client insisted on building everything during a single extended construction period which continues today (thirteen years after our plan was approved at this time of writing). In India it is common for political parties to alternate in power. Project progress was deferred when the supporting government was out of power. Thrissur Zoo is now scheduled to fully open early in 2026.

For the best outcome, zoo design teams need to participate during construction as art directors and inspectors, insuring that important less tangible aspect of the initial design are properly executed. In this case, once Idea Design submitted CZA approved final drawings our work has finished, The Forestry Department used their own engineers and designers (with no zoo design experience) to supervise construction. One initial result was that Idea Design was flooded with requests for additional information without additional pay for their service. Based upon on-line photos, I expect the outcome to be sound, well organized, practical to operate, with larger areas available for the animals. I will be disappointed with some final finishes, poor quality artificial rockwork and sightlines. Salvation depends upon final plantings, and plants grow very quickly there!





Figure 90. Above: our final 2012 approved Master Layout Plan. Below: Google Earth photos of construction achieved by 2022. Below right: zoo entry, garden, gift shop, and education complex are on the lower left. Three-level Conservation Centre (grey concrete construction) is the only major building. The Great Aviary is shown on the upper right with blue-roofed bird holding pens around the outside.

Final thoughts on Thrissur Zoo. Collaboration with Idea Design was a singular success. Together we produced a good plan on a difficult site in a short time. Idea Design's high quality construction documents ably guided constantly changing construction managers for well over a decade. My focus for the last three decades has been the integration of advanced physical design features with advanced operational and management design programs. When this was possible, as was the case with the Louisville and Philadelphia Zoo animal rotation and trailway programs, outcomes have benefited all stakeholders. On the Thrissur Zoo project, as with many other projects, I had no influence over animal management programs or staff requirements and training. Thus, I expect great zoo popularity but limited initial success in achieving its full potential. We built-in opportunities for greater advancement, such as animal rotation and environmental enrichment. When Indian State zoos advance their staff entry and mid-level hiring and training programs and especially when female staff finally are encouraged to make professional contributions as they have in Western zoos, we will see major improvements in all areas. There is recent good news on this front. The Forestry Department hired a woman as their first Director. Ms. R. Keerthi was likely a student of our original colleague Dr. P.O. Nameer, Head of the Centre for Wildlife Studies, College of Forestry, Kerala Agricultural University. They also hired five female zookeepers. There is now much media attention to the proposed opening, often referring to it as a "designer zoo." This is a quote from *The New Indian Express* from November 8, 2025:

Designed by international artist Jon Coe, the facility, officially the Thrissur Zoological Park, Wildlife Conservation and Research Centre, is a dream project of the state. Zoo director R Keerthi says the zoo will follow the landscape immersion model as advised by Coe, which will offer tourists a memorable experience. "We are trying our best to make the spaces, housing the animals, as natural and beautiful as possible, so that people feel like they are watching the animals in their natural habitat," says Keerthi.

Perth Zoo Planning - 2018. The 17-hectare (41-acre) Perth Zoo was founded in 1897 as a botanical garden and is now managed by the State of Western Australia, which also manages their amazing King's Park. I made two visits to Perth Zoo, 2006 and 2010, unsuccessfully pursuing design opportunities when I was contacted by Vet. Dr. Katja Geschke, Manager of Strategic Projects. She was interested in planning a new veterinary centre and realized a new master plan was needed first. Soon after Ms. Wendy Attenborough was appointed Executive Director. Together with Operations Manager Brad Horan, who I had worked with on a project at Royal Botanic Garden Sydney and John Lemon who managed exhibit design projects, we undertook development of a new vision plan. Together we developed an overall concept integrating an overhead trailway system for lemurs and gibbons around their historic central green and an animal rotation system for their large African hoofed mammals. Our Vision Plan was approved by the Perth Zoological Authority Board and later the State funded a "proper master plan" by the Perth office of my old colleagues Hassell Architects and Landscape Architects. I participated in this planning as a zoo advisor, along with my old friend John Wright from the Hassell office in Brisbane. Local creative architect Finn Pedersen joined the Perth team to help with smaller projects.

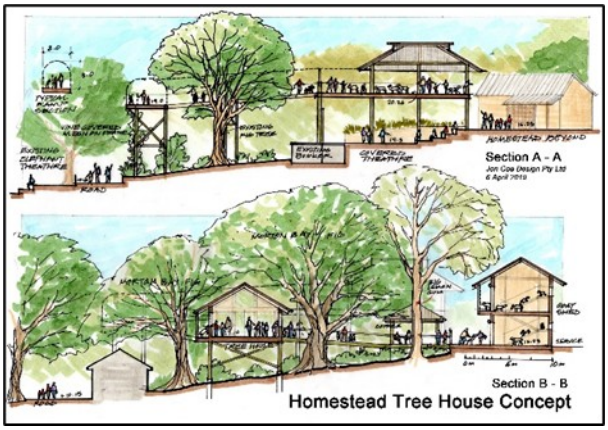
During master planning the zoo continued improvements such as naturalizing the edges of their park lake and later building a new restaurant and visitor hub. They are now working on the first stage of an overhead primate trial around their central green.



Figure 91. My free-hand drawings were developed into this poster by then intern Ms. Danae Belson, providing an excellent public summary of our innovative ideas.

Two of my favorite projects yet to be realized are the redevelopment of the old Homestead Children's farm into a tree house and multi-level goat area built around large existing fig trees and the new veterinary, conservation hub and endangered species breeding centre. There has been an unfortunate divide among zoo animal welfare advocates who tend to focus on the wellbeing of individual zoo animals and the wildlife conservationists who primarily address the welfare of endangered animals at the species level with breeding programs and field research. They compete for funding within zoo operations and perhaps in external fundraising. These partisans do not realize they represent different sections of the same spectrum; a rainbow of concern and action aimed at improving the lives of both individual animals and species of wildlife in zoos and globally. Perth zoo could physically represent this relationship by arranging spaces and activities in their proposed Animal Health and Conservation Centre (Figure 92 lower right). Veterinary care represents the ultimate in individual animal health, both acute and chronic, followed by zoo nutrition, positive animal staff relationships, enriching enclosures and management programs, zoo and field research and zoo-based and in-situ wildlife conservation facilities. I suggested these subcenters be organized in an arc around the visitor centre I called the Zoo Animal Wellness Centre with direct visitors' views into the different activities when appropriate. The term and concept of having a zoo "wellness Centre" was first developed by my colleague and client Dr. Terry Maple. I really liked this idea, but the Perth Zoo master plan team didn't take it up.







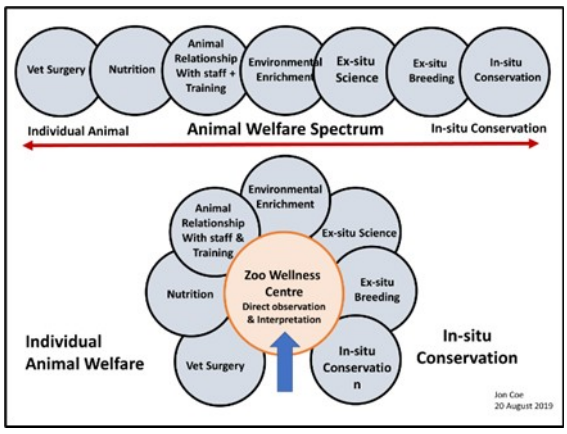


Figure 92. My concept for the Homestead Tree House Kid's Centre with elevated walkways and platforms for both families and dairy goats built around and through existing trees. Lower right: diagrammatic representation for organizing zoo veterinary, animal welfare, management, and conservation activities around a proposed central Perth Zoo Wellness Centre.

The Perth Team was one of my favorite groups to work with throughout and I remain in contact with Katja and her family who generously lodged me on nearly all my visits.

CHAPTER EIGHT – LEARNING FROM LAND AND WITH PEOPLE; VARIED INTERNATIONAL WORK

Introduction. Chapter Four described active touring and passive interaction and descriptions of lands being explored. Other chapters described international work where the land was the key factor, or the subject was designing humane and delightful habitats for residents of zoos and botanical gardens. This chapter includes some previous themes, but the focus is the profound influence unique local landscapes, cultures and colleagues had upon my active participation and resulting work.

US Peace Corps Volunteer adventures -1966-1968.

In 1966 the Vietnam War raged more terribly than ever. I had just graduated and I was again vulnerable to being drafted. I had just spent seven years in university learning how to benefit people and landscapes with hard-earned design and planning skills. I was not going to forsake this and contribute to killing people and destroying urban, rural and wild landscapes. I had three choices: 1) to pursue a PhD degree, but none was offered in landscape architecture, which was then considered a professional degree rather than a research profession; 2) go to work in a professional office and eventually be drafted into the Army or, 3) find employment helping people while also providing continuing military deferment.

In 1961, five years previously, President John F. Kennedy created the US Peace Corps as a Cold War initiative to provide educational and technological support to developing countries through the work of trained, American volunteers (mostly college-aged) for two-year periods. It later expanded into more than sixty countries and continues to exist. The Peace Corps (PC) is part (the lowest part) of the American Foreign Service coordinated through US embassies and consulates but managed by PC administrators in each country. Volunteers work for free for two years but receive cost-of-living allowances about equal to that a native schoolteacher would receive in their community. All medical and dental costs are also covered. Importantly, this allowance is pegged to local inflation, which can become severe. In those days Peace Corps Volunteers (PCV's) completing their tour of duty each received USD$ 2000 to help settle back into civilian life. Most importantly, PCVs received draft deferments. I supported the idea of universal public service, in the military or elsewhere, depending upon individual skills and interests. Susan and I applied for a PCV housing program for which we were professionally qualified in Tanzania opening soon.

We had not heard back from the Peace Corps about our Tanzania public housing program application, so I contacted them, only to learn that our application had been misfiled and the program had closed. The next opening was to organize 4H clubs (rural youth programs) in Brazil, starting in August. While we had doubts about fitting in with this program, we hoped my horticulture background and Susan's experience on her grandparents' California Central Valley farm would suffice, at least compared to compulsory military service. We signed up. Our six-week in-country training began at

the Center for International Studies in rural Brattleboro Vermont. We joined another group preparing for a Brazilian program in urban community development with 8-10 students in each group. Training was managed by returned PCV's who emphasized the physical and cultural difficulties they had faced. We could expect to live among the poor in a developing country. We were frequently challenged to consider if we wished to 'deselect' ourselves from the program if we had any doubts. Immersive Portuguese language training alone was 6 hours a day, 6 days a week with all instructors being native Brazilians with different regional accents. What followed was the most effective language training I have ever experienced. Over fifty years later I can recite dialogues we memorized. The system favored spoken fluency over grammar and spelling, though these were not neglected. My high school Spanish soon came back, and I eventually became conversationally fluent in Brazilian Portuguese with a Spanish, but not an Anglo accent.

One of our surprise weekend exercises was to be individually dropped outside small Vermont communities, find our way into town, meet the right people to understand local politics and personalities, find places to stay for two nights and make our way back to the training site on Monday. We were provided with $10 for expenses. We were allowed to say we were Peace Corps trainees. I was picked up by a farmer hauling slop for his hogs and dropped off at the local farmers association. An association leader invited me to have dinner and spend the night with his large family. The next day he dropped me off at a local labor union chicken barbeque where I learned about the union's concerns with local factory conditions. One of the union leaders invited me to stay with his family that night and arranged for a colleague to drive me back to Brattleboro on his way to another destination. The farmers and union workers supported different politics but were happy for me to hear from both sides and small-town hospitality came above local politics. I spent $5 buying beers for new friends at the union barbeque.

An important part of our travel preparations was receiving an abundance of vaccinations including one big gamma globulin shot in the buttock just before takeoff on our 12-hour flight from New York City to Rio De Janeiro. We arrived in tropical summer and soon learned about the strong, highly sugared Brazilian espresso called 'cafezinho'. We flew north to Belo Horizante in the state of Minas Gerais and then drove on to the Agricultural College in the small town of Viçosa. Our second six-week training program was held during college holidays. The intensive language program continued, mixed with visits to meet government agriculture officials and local farms. Our highlight was an overnight bus trip to the historic town of Ouro Preto which is a legendary example of 18th century Portuguese Baroque architecture and sculpture. This was an expensive tourist town, and we all agreed to save money by sleeping together in our bus seats. I recall there were eight of us in our training group at this point.

After completing our final training, we returned to Rio de Janeiro to transfer to the rural towns we had been assigned. I was disappointed with the town selected for us because it offered none of the horticultural opportunities I was qualified for and because my heart

was set on doing work like low-income housing, where Susan and my design educations and skills could be productively engaged. We wanted to complete our volunteer service in Brazil, but in the most productive way possible. We presented this as an ultimatum to the PCV Country Director. He admitted being disappointed but said he would check with state directors and see if appropriate opportunities could be found. We spent ten days staying at the cut-rate Hotel Florida in Rio, visited the local zoo and wonderful botanical garden and the usual tourist attractions, acclimatizing to the tropical heat, humidity, and food (beans, rice and farofa, a course flour made from mandioc). Eventually we heard that Mr. Ralph Gut, Peace Corps Director for the state of Bahia had a client interested in housing and we were flow up the beautiful city of Salvador, Brazil's colonial capitol.

The favela year. Salvador's vibrancy was mesmerizing. It seemed like we had been transported to a port city in West Africa. We were to live in the favela of São Caetano. Today Brazilian favelas are known as places of danger run by criminal gangs at war with police. In those days' favelas, or squatter settlements of economic migrants, were just forming. These were poor, illiterate rural peasants from the interior escaping drought or simply seeking economic opportunity. They were religious, hospitable, trustworthy, and extremely hard-working. Although they could not understand why wealthy educated foreigners were living among them, we were honored guests. The community saw to our safety. I doubt such work would be possible today.

São Caetano was a forty-five-minute crowded bus ride outside the city. Sr. Alberto Shindler, a Brazilian of mixed German descent, was the patrão or head man. He built and ran the local schools and wanted to learn about building public housing for favela residents. Mr. Gut's last words when we left the PCV office in the city were to make ourselves useful and do not come back to the office until we had progress to show or needed something special. Sr. Shindler suggested a street to look for a house to rent, and we knocked on doors along the dirt street and were guided by surprised and helpful residents to a suitable house. Like the neighborhood, it was built of brightly painted mud plastered on a frame of woven branches with a rough timber frame and a clay tile roof. Importantly, it had water and power, although the power wires extended to serve small huts down the side lane. Our windows were usually open to breezes off the bay and were usually lined with curious, half naked children. Privacy was not valued, or simply not available in favelas. There was a popular barber shop next door where young men gathered, and one could catch up on local gossip.



Figure 93. Left and centre: a beautiful and imposing Mai da Santo, or priestess of Candomblé, the local African animistic faith. She cooked and sold local food outside our door during the day and led neighborhood animistic religious gatherings at night. I can still hear the drums. Right: street scenes in front of our home on Rua Ripaldo Filho in the favela of São Caetano.

We started work by mapping the area as I had done at university, noting hazard areas (flood, mudslide, unstable slopes), community assets (churches, gathering places, local market) and different qualities of housing. Seeing our large maps displayed openly created rumors despite our explanations. Some said we were foreign real estate developers or even American spies planning an invasion by American Marines. Susan worked with a local woman designing patterns for her to embroider and sell as a livelihood. Also, simple housekeeping is slow work without modern appliances and with long bus rides to the main markets. During periods of inactivity (progress can be very slow), I remained active building our furniture. Here are examples of our community work.

I developed plans for very low-cost row housing using a central prefabricated module with water, power, and brick common walls. Owners could extend rooms with mud walls and, eventually replace them with permanent brick walls as opportunity provided. The front room could be for living or used as storefronts, bars, or barbershops, as commonly occurred in every favela. Public housing, when provided, belonged to the government, was located far outside town and employment opportunities and was not valued by renters. Private ownership was the key to success. Owner occupants could invest their own work and materials over time with a feeling of assurance. I showed these drawings to Sr. Schindler, but no action was taken.

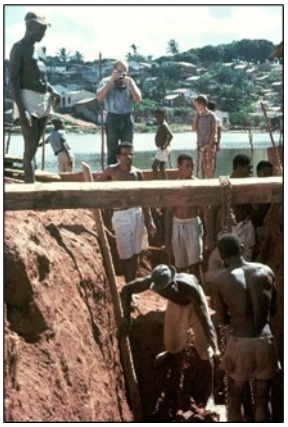


Figure 94. My neighbors in São Caetano hand digging the stormwater outfall pipe system I designed for water overflowing from the pond in the background.

Sr. Shindler told us of a reservoir in the area without a properly engineered overflow and now was surrounded by new illegal housing. If the earthen dam washed out downstream lives could be lost. I walked down to the area on a Sunday afternoon and introduced myself to local community leaders and discussed this problem. I asked if they would provide the labor to resolve the

problem if I designed the engineering structure and the city provided the construction materials. We talked it over and they agreed. I prepared the drawings and arranged to meet the city engineer. In the favela an educated man is considered either a doctor or an engineer, so no one questioned my competence and I had learned enough site engineering for this simple work. A key part of my strategy was to insist that three men from the community join me in meeting the city engineer and present the project themselves, pretending my Portuguese language was too poor for such important meetings. My strategy was for the local leaders to gain credibility with city officials so that, if successful, they would not need my presence in the future. The goal of community development workers is to make themselves eventually unnecessary.

The city's engineer agreed and the needed pipes and mortar arrived. Over six Sunday mornings local men with hoes dig the 30m (100') long ditch, 5m (16') deep where it crossed the top of the dam They placed the pipes and the soul city worker, a mason, supervised and grouted the piper together properly. The local workers filled the excavation and finished the work. The city engineer and a local politician came to the completion party and took credit for everything. Everyone cheered.

During this party I asked my favela colleagues what they wanted to do next. They said a local school was needed, so I suggested we build one. This amazed them. I suggested Sr. Schindler would run the school if we built it and may even provide building materials. When I spoke to him later, he agreed. My colleagues selected a clear area for the school and guarded this area from other home builders looking for an open site. The Peace Corp sent a new volunteer to help us who used my school plans for an application to a private American School to School foundation who organized a fund-raising program in their schools which helped fund our school construction.

By this time Susan and I were active as resource people to PC volunteers throughout the state of Bahia, an area the size of France. We also went camping with the local PCV around the historic diamond mining town of Lencóis and camped near the top of what was then called Glass Falls (or Caeté Açu in the native language) on several occlusions. At 400m (1400 ft) this is the highest waterfall in Brazil, although the flow is small and seasonal. I prepared field observations, photo surveys, and a map of the canyon area around the falls, now called the Fumaça Waterfall. Susan and I explored the base of these falls with a local guide who told us we were the first 'outsiders' he knew of to reach this point. My photos and survey work eventually contributed to the formation of Chapada Diamontina National Park in 1985.
http://www.infochapada.com.br/en/chapadadiamantina-nationalpark/

After our first year in Salvador with a new volunteer taking over the work in São Caetano favela, we next served as planning and project resources for PVCs throughout the Bahia. To be nearer the Peace Corps office and transportation, we moved into an apartment overlooking scenic Bahia do todos os Santos on the edge of the upper level of the historic city of Salvador. We were in the colonial zone with ancient churches near

the famous Ladeira do Pelourinho the Afro heart of the city, and near the elevator leading to vast bayside market district below.



Figure 95. Upper row: my still life oil painting next to a window. Lower left, Colonial Era Street and Ladeira do Pelourinho, a famous open space in the Old City. Lower right: Susan in a garden in scenic Teresópolis in the hills overlooking Rio de Janeiro.

I taught two courses in favela redevelopment to university architecture students from upper class families who were terrified to enter favelas themselves. I led them into a beach front favela, introducing them to local leaders (who insured our safety) and had them survey local living conditions and recommend long-term plans for renewal, collaborating with residents as we had done in San Caetano. Many university students were leftists and suspicious of America. Eventually they told me they trusted me but were sure the CIA would read my reports. I explained I had authored no regular reports, and my final decommissioning report would have no details about them.

We developed a town growth plan for the progressive city of Itapetinga in the south of the state, making three visits there. This required ten hours of dangerous driving along a poorly maintained highway. Burned-out wrecked buses were a common sight. We once stopped to give aid to a car wreck in which all five passengers had died.

Into the Sertão -1967. On another adventure a PC Volunteer asked us to design a storage building for a hamlet he was helping deep in the dry woodland interior of the Sertão arid region. This is an area rich in Bahian folk history of cowboys (vaqueiros),

bandits (bandidos) and religious crusades (religious mystic Antonio Conselheiro). They could build this structure themselves with local materials but to arrange funding from an international charity they needed official drawings I could prepare. We traveled by bus with the volunteer north to the town of Remanso on the São Francisco River (fourth longest in South America), spent the night, took another bus upstream for 4 hours, boarded an ancient woodburning paddle boat (they said it had started on the Mississippi River) for another 4 hours, and reached the riverside village of Pilão Arcado, where we spent the second night.

The next morning, we met an Irish priest who took us into the interior in his jeep as he made his village rounds. We traveled barely defined tracks through the dry forest. Tropical dry forest trees lose their leaves during summer rather than in winter as deciduous trees in temperate forests do. At night, the dry twisted, leafless trees and white sand reminded me of abandoned New England orchards in the snow. The priest instructed us not to arrive in a village at meal or bedtime, because poor families could not afford to feed us or give up their few beds. These were peasants living 17th Century rural lifestyles around the few oases. Late one night the priest was too tired to continue driving and stopped in the middle of the track. Susan slept in the back seat, the priest in the front seat and the other Peace Corps Volunteer, and I crawled under the jeep to sleep on the sand. I asked if we should not at least pull off the track, but the priest said there wouldn't be another vehicle along for at least two weeks.

We shared the priests' life of intentional depravation for four days and nights, with little water, less food and even less sleep. We reached our destination, met the builder, and visited the site. I measured the length of the man's hand and later dimensioned my drawings in meters and spans, knowing he was unlikely to have modern measuring tools. I also built a model of the building out of sticks and cardboard for his use in case he was illiterate and could not read my drawings. The people we met were welcoming, of slight build, and of mixed Portuguese, African and Indian ancestry. They spoke a diminished Portugues with no future tense. Nothing ever changed in their lives.

In 1970 the Sobradinho Dam was built across the Rio San Francisco above Remanso, the reservoir measures approximately 320 km. (200 mi) long and flooded most of the area we traveled through, opening a vast irrigated industrial farmland. Today, Novo Pilão Arcado can be found along the lake shore. Certainly, many of the displaced Sertão residents fled to the favelas of Salvador. During our last Peace Corps months, I wrote a program to recruit city planning graduates and helped in their in-country training.

Taman Safari International - 2005. While attending a joint conference of the then ARASPA (Australian/New Zealand Zoo Association) and SEAZA (Southeast Asian Zoo Association) in Melbourne I was approached by Mr. Jansen Manansang, Managing Partner of Taman Safari International (TSI), and his sons Willem and David, who both had been educated in American Universities. The Manansang family are amazing people with a wonderful family story. They are a Mandarin speaking, Indonesian, Christian, circus family. The patriarch, Pac Hadi Manansang was a circus aerialist and

raised his sons Jansen, Franz, and Tony in this art, beginning in Manila. As the Japanese captured the Philippines in World War Two, he led his family south to Sulawesi Island in Indonesia. After the war they settled in Jakarta and eventually opened the Oriental Circus in 1972, including animal acts. They purchased their Bogor property in the highlands above Jakarta in 1980 as winter quarters for their animals and as a breeding and training facility. A visit to an Australian safari park by Tony convinced them their future was as a public wildlife attraction and endangered species breeding facility. Later they opened a second safari park in Prigen, near Surabaya in eastern Java. They have been generous in supporting sanctuaries for endangered native tigers, elephants, and rhinos in Sumatra. I later visited several of these facilities, managed in coordination with the Indonesian Ministry of Environment and Forestry.

Jansen invited me to help them plan a new safari park on the fabled island of Bali. Their previous parks had evolved without professional planning and, while popular and profitable, had many built-in problems with visitors and service circulation. They were keen to adapt the newest and most progressive ideas in animal display. It was their openness to trying new ideas which first attracted me to them. Here was also the opportunity to work directly with the decision makers themselves.

In June I made my first trip back to Bogor, Java, to visit their home facility, and then flew to Bali. I had visited both locations briefly seventeen years earlier. I met on their new property with Pak Jansen, Willem, and David and with Hans Manansang, son of Jansen's brother Franz. Their site was about forty ha (100 acers) of elevated rice paddies with wonderful sea views across the coast highway in the town of Gianyar. The site was generally level or terraced but divided by two steep forested ravines. Their initial general plans for the site were sound. We then visited several historic Balinese temples, baths, and gardens and jointly took the easy decision to use these wonderful religious and vernacular traditions as central features of the new park. In the early days we all slept in a small cabin on the property and ate at the food stand across the street. I was made to feel like a family member.

Denpasar Airport in Bali had an excellent bookstore. I found several highly illustrated and informative books on Balinese traditional design and architecture which descended for Hindu and Buddhist traditions introduced from Southern India. Every feature has meaning not only in its placement, appearance, and implied references, but also in the methods and sequences of construction required. While we had mimicked vernacular architecture from East Africa and Indonesia in several American zoo exhibits, here was the opportunity to build authentic Balinese architecture using Balinese craftsmen and materials. It was possible to draw from the rich tradition of Balinese storytelling to develop a storyline explaining the park's purported mythical creation and layout, done respectfully within their tradition. Here are two descriptive texts I wrote at the time.

Village by the Sacred Spring. Long ago artesian waters sprang from volcanic cliffs forming cascades and pools attractive to both people and wildlife. Tenth century Buddhist and Hindu missionary priests taught the people to respect and protect all

creatures in this sacred place, which became a pilgrimage centre. A village grew to provide for the pilgrims and later for tourists. Today this village still attracts tourists to see the animals and the courtyards around these cliffs and pools and to see theatrical recreations of great Hindu Sagas.

Traditional Bali comes to life in this realistic recreation of a traditional Balinese market, sacred garden courts, and Ganesha Grotto leading to the Bali Agung Theatre, where ancient Hindu sagas come to life.. A rice temple, formally dedicated to Dewi Sri, built, and used regularly by local inhabitants, forms the park's centre. From this Balinese central focus, explorers take safari journeys to explore wildlife of India and Africa, dine with lions at the Tsavo Lion Restaurant, join the night safari and spend the night in the African Mara River Lodge. The attraction includes a major marine park under construction, with the underwater theatre opening soon.

My plans were developed in my office, but actual conditions varied widely from the survey plans provided, so I located everything including pathways and roads, exhibit features and market areas directly in the field. This was a rediscovery of the methods I had used thirty-two years before with my very first zoo project, Northwest Trek. After studying the area, I set out the centerline of the two-kilometer-long safari road with bamboos poles, assisted by three local helpers carrying more bamboos poles and followed by the three Manansangs. With minor alterations they approved the alignment. The next day I sat behind the bulldozer driver guiding him as he cleared the roadway. Taman Safari had their own experienced construction team and there were no delays for tendering or permitting. From my first visit to the opening day for the entire safari park was only eighteen months. A project this size in the USA would have taken 4-5 years to complete. Of course, several major elements were designed and built by the TSI team and local architects. These include the entry area and arrival pavilion, Ina Restaurant, Fun Zone, Bali Agung Theatre, which can host up to 1200 people, and the non-public animal care facilities.


Veterinary Centre
Lion
African Safari
Hippo
Elephant
Indian Safari
Kandang Gajah
Lion
Tsavo Lion Lodge
Future Hotel
Mara River Bungalows
White Tiger
Sumatran Tiger
Discovery Trail
Bali Theatre
Indonesian Safari
Toraja Terminal
Bali Village
Sacred Courtyards
Market
Uma Restaurant
Temple
Lobby
Fun Zone
Bali Safari and Marine Park
Marine Park
Ticketing
Service
Master Plan
Entry Terminal
Entry
Taman Safari Indonesia
Jon Coe Design P/L
February 2008
100 M GRID

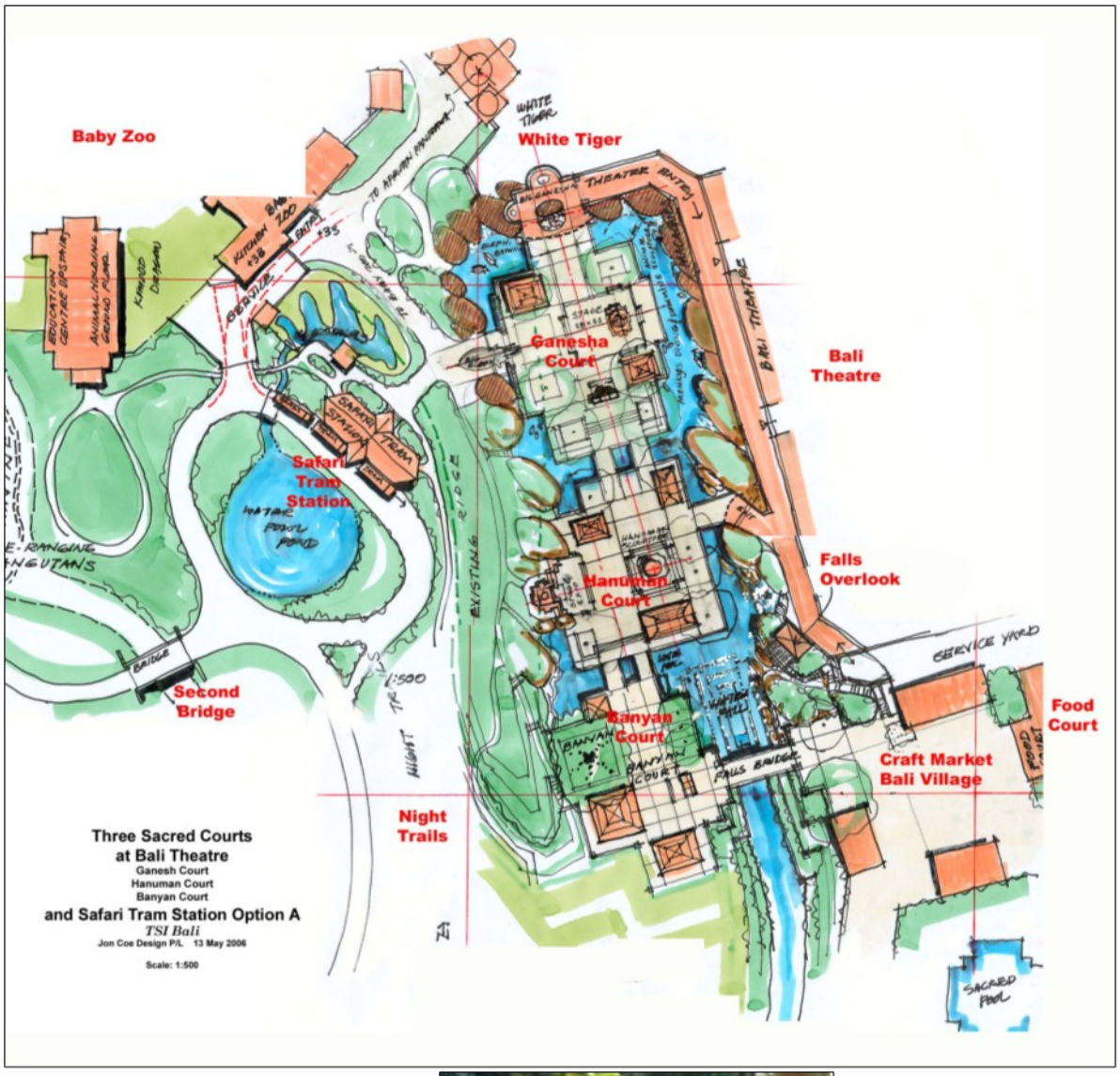

Baby Zoo
White Tiger
Ganesha Court
Bali Theatre
Safari Tram Station
Falls Overlook
Hanuman Court
Second Bridge
Banyan Court
Food Court
Craft Market Bali Village
Night Trails
Three Sacred Courts at Bali Theatre
Ganesh Court
Hanuman Court
Banyan Court
and Safari Tram Station Option A
TSI Bali
Jon Coe Design P/L 13 May 2006
Scale: 1:500









Figure 96. Upper image: master development plan. Second row: early plan of village market and three sacred gardens leading to Ganesha grotto and Bali Agung Theatre. Third row: gateway to sacred gardens

with local religious celebration, sacred baths. Fourth row: central feature, the Dewi Sri Rice Temple. Fifth row: entry to third, highest and most sacred garden after ten years of plant growth.



Figure 97. Upper left: early plan of upper park area showing central Tsavo Lion exhibit and restaurant (labeled Safari Lodge) and Masai Mara Bungalows overlooking African safari area. Upper right: view of safari area from a bungalow. Middle row and lower row left: lion outside the Tsavo Lion Restaurant and views of lions from within the restaurant. There are even views into the lion grotto from behind the bar and from the public restrooms. Lower row right: I was given the honor to award Pak Jansen Manansang special recognition upon his retirement as long-time president of the Southeast Asian Zoo Association (SEAZA).

The authenticity of the Balinese Rice Temple, market architecture, baths, sculptures. and plantings were achieved simply. We had them all built by local artisans. After I suggested building an authentic rice temple as the park's central feature, Pak Jansen Manansang went to the local leaders in the town of Gianyar. They told him anyone could dedicate a temple, but no one could ever take it down. Jansen then asked, if TSI purchased all the materials and paid for the labor, would the community build the temple, consecrate, and manage it? Local leaders visited the site and found my selected location suitable on "clean land," oriented properly and with Holy Mount Agung volcanic peak in view. I had done my homework to ensure these needs had been met and the temple was built by native craftspeople. Park employees provide the required daily cleaning and offerings, and members of the local community have free access on holy days, including the annual reconsecration ceremony. As to the many wonderful sculptures and architectural treatments, I simply traveled around Bali taking photos of wonderful and suitable examples and provided plans locating where I wanted the specific feature I photographed to be located. Local artisans carved the dragon bridge and sculptures from the soft volcanic stone from memory and without drawings.

After opening I continued developing additional areas such as the freshwater River Aquarium, Ranthambore Tiger Fort, and Elephant Theatre. A special later project was the large Marine Park, a special interest of Hans Manansang. For this work I was joined by Mr. Ken Shular of Oceanis International, a specialist in marine animal life support systems, and Active Environments, animal training and marine mammal show specialists. My work was limited to conceptual design and Ken's firm provided technical drawings and engineering services. While we developed innovative ideas such as an underwater dinner show, problems emerged in translating Western technology to local designers and builders. During my last visit in 2017 the Marine Park area was under construction.

The Bali Safari and Marine Park are my favorite projects of the last two decades, both for the people I collaborated with and the results we accomplished. Just as my aesthetic values require artificial recreations of nature to appear accurate to knowledgeable geologists or botanists, I wanted the Bali Safari environment to feel proper and appropriate to Balinese neighbors and cultural leaders. Over a decade after opening Jansen Manansang was showing the Governor of Bali through the park. Jansen later told me the governor was amazed that everything had been designed by a Westerner.

Dongkoucao Giant Panda Project - 2006. Earlier, I introduced Mr. Andrew Scanlon, a multilingual Irish geologist, and geographic information system (GIS) while describing our work in Afghanistan. I first met Andrew when he was a GIS specialist working for Jiuzhaigou National Park Director Zhang Xiăopm in Sichuan, China. Andrew contacted me about designing the world's best giant panda exhibit. National Park Director Zhang, a Tibetan Chinese, was to manage the design and public aspects of the work. Animal management was to be operated by the Wolong Giant Panda Base which, together with the Chengdu Giant Banda Base, were the two major breeding centers in China. Andrew

Scanlon's role was unofficial, but extremely valuable to us. He not only managed our in-country travels and affairs, but with his fluency in Mandarin language and culture, gave us insights into what our Chines co-workers and clients were saying to each other when they didn't realize he could understand them.

> "There are two giant pandas, one that exists in our minds and one that lives in its wilderness home". George B. Schaller

Giant Pandas were nearly extinct in the wild Min Mountains and Crouching Dragon Mountains of Wolong following a massive dieback of their main bamboo food supply plants during 1974-1976. Pioneering wildlife scientist Dr. George Schaller, who had supported our work with naturalistic gorilla exhibit at Woodland Park Zoo in the mid-1970, led giant panda field research in Wolong during 1980-1983, assisted by his Chinese colleagues. In two years of field work, George had only seen pandas in the wild twice. They are extremely reclusive, yet humans insist on making them rock stars, surrounding them with inquisitive and adoring zoo visitors.

The Chinese government planned to profit from this popularity by building a major new giant panda attraction above the small town of Dongkoucao. Their admirable strategy was to create employment opportunities through tourism to replace jobs lost when they phased out logging and large-scale land clearing. The government promised to display thirty baby pandas and forty adults, certainly a compelling tourist magnet. They also proposed a separate non-public breeding center in the area with very large enclosures.

Nelson Byrd Woltz (NBW), an excellent landscape architecture firm based in North Carolina, had been selected as principal design firm based upon their recent design of the giant panda exhibit at the US National Zoo. Mr. Warren T. Byrd, FASLA, headed the project, assisted by Ms. Mary Wolf and Mr. Jeff Afton. We shared the opinion that the many giant panda exhibits around the world including those in China were too much like traditional zoo exhibits and not enough like real giant panda habitat. We were keen to use the large steep site surrounded by mountains to create a convincing natural context for seeing and better understanding these unique animals. We also advocated for the display of other endangered regional species such as takin and lesser panda.

Together we made site visits in February, April-May, and Aug-Sept 2007. Dongkoucao is a potato farming area with small, stoney, terraced fields laboriously built and maintained into steep unstable terrain. During one visit during Chinese New Year's Day, ethnic Tibetan families greeted us with peanut brittle candy and choruses of "Xinnian Kuaile!" "Happy New Year!" Knowing the government would buy their properties, farmers planted hundreds of small fruit trees around their fields to increase resale value. The government asses the value of orchards more than potato fields.



Figure 98. Upper photos: Dongkoucao valley and farm. This steep valley and surrounding hillsides could make a spectacular setting for wildlife of the region. Lower left: Wolong National Reserve, the natural landscape of the giant pandas and site of George Schaller's field work. Lower right: Wolong Giant Panda Station featured popular giant panda displays, most very zoo-like despite the remarkable steep natural setting. This steep valley restricted growth, resulting in the government's desire to develop the much larger Dongkoucao site.

During our formal initial meeting with Director Zhang and associated dignitaries, Warren Byrd and I asked the clients to share their visions for the project. This is a question we usually ask Western clients, believing our role is to help them clarify their goals and visions, resulting in plans meeting both needs and expectations. To our surprise, the question resulted in lengthy internal discussions in Mandarin. Finally, the translator expressed their confusion and concern. "You are the foreign experts. We brought you here to tell us what we should do!" We were now in the Eastern World of "master knows best" and not the Western approach of integrative team-based design. In our local travels we had seen, to our eyes, wonderful examples of sustainable, culturally appropriate, vernacular Tibetan architecture. These images strongly influenced our architectural design recommendations. Again, our Chinese clients were displeased. "We don't need foreign experts to design buildings in local styles. We could do this ourselves!"

There were many other difficulties. We were made subcontractors to a local engineering and construction firm and an architectural firm with their own agendas. The contractors

were mostly interested in getting profitable construction started and the architects in doing as little as possible while getting paid. The contractors provided our translator. Andrew Scanlan, with his knowledge of Mandarin, kept quiet around the contractors and architects and would later tell me what they said. It became clear that our translator, rather than accurately communicating what I said, communicated what she thought the Chinese officials and employer wanted to hear. Commonly, a person will speak several sentences or even a paragraph or more. The translator will try to remember everything and may take notes before translating. There follows a pause while the translation is given in Mandarin followed by the response, which is equally long, translated back in English. This provides ample time for the translator to change meaning if she wishes. To prevent this, I reduced my speech to a single simple sentence and demanded she translate one sentence at a time. Since the translator couldn't tell what was coming next, she couldn't easily alter my meaning. She resisted this approach, but in the end had to comply. Lesson learned: international consultants should provide their own trusted translators unless their clients are already proficient in English.

Another problem was that the Chinese Government department which hired us only built things. An entirely different government department oversaw park management after it was built. I requested permission to work with the veterinarians and senior caregivers at the Wolong Giant Panda Base to understand their service needs, but we had no direct contact with them. Finally, Vet. Dr. Zhang Gui Guan agreed to meet with us unofficially, reviewed our preliminary plans and gave us a general idea of their needs These were like giant panda management programs in North American zoos, except there was much more handling of the animals by staff, especially early removal of young animals for hand rearing. While I opposed this inhumane practice, we had no influence on management practices.

We had relaxed intervals in Chengdu, staying at the Wolong Hotel and spending evenings at Bookworm, a coffee house bookstore and expat hang out. I even gave an evening lecture there. Andrew and I were usually joined by Mary Wolf, and Jeff Afton of NBW (Warren Byrd only came for the first visit). I also met resident expat Bret Sparling, and his wife Yin Chi, a Chinese federal judge. They kindly helped draft a consulting contract which would be reasonably fair according to Chinese legal processes. Fortunately, this was never needed. I visited the Chengdu Giant Banda Base several times and met with a scientist from Zoo Atlanta doing research there. One highlight was visiting the Chengdu Animals Asia Bear sanctuary where bears are rescued for the terrible bear bile trade. I was able to meet with founder Ms. Jil Robinson and her senior staff and observed the best environmental enrichment program I had seen anywhere, an inspiring experience.



Figure 99. This is a region of ethnic Tibetan Chinese whose sustainable vernacular architecture greatly impressed us and had a strong influence on our designs. Upper photos of Zhong Che village with characteristic cedar architecture and prayer flags and my sketch from this visit. I found these structures very similar to the Northwest Native American coastal village architecture of cedar planks. Middle row: my preliminary sketches of the proposed park entry intended to emphasize geology with giant glacial, and stream washed boulders framing the view up the valley. Bottom row: early plan of entry resembling a Tibetan village and cross section showing use of slopes to immerse visitors and hide upcoming exhibits.

Eventually our plans were approved by Director Zhang and the final presentation to the Provincial Secretary (like a state governor) was scheduled. Our group was made up on Director Zhang, his assistant, our translator, the engineer, architect, Andrew Scanlon, and our American design team. We were joined by a prominent giant panda expert

known in China as Mister Panda, representing the Wolong Giant Panda Base (I don't recall his full name, but his family name was also Zhang). The large meeting room was filled with perhaps two hundred people waiting to present their programs to the Secretary, who sat in the center of the head table lined with a dozen or so senior government officials. The Secretary was a younger man and, we were told, new to this elevated position. When our time came Director Zhang and Dr Zhang stood and made brief statements in support of the project, and I presented our plans through our translator. The Secretary seemed satisfied but felt the need to ask some questions. "How large is the new park?" he asked our local architect, who knew very little about the project. This was an unexpected problem. I knew how large the area we planned was, but Director Zhang, at the last minute, instructed us to draw the park boundaries along surrounding ridge lines. This greatly inflated the park's size with undevelopable slopes. This new size hadn't been measured. I didn't want to give the smaller size against Zhang's wishes, and no one knew the full size. This confusion was obvious to the Secretary and his head table, who immediately ganged up and began verbally attacking Director Zhang. Andrew Scanlon whispered urgently in my ear: "Jon, you have to do something now!" As the senior (white bearded) member of the design team I stood up, slid along the wall until I was directly opposite the Secretary and stood silently, an island of calm composure and confidence amid the outcries and chaos. The Secretary immediately called on me and the room fell silent. I affirmed: "I am the world's international expert on giant panda parks brought over for this work. Beside me is Dr. Zhang, Mister Panda, the foremost Chinese giant panda expert, and Zhang Xiăopm, Director of Jiuzhaigou National Park, the premier nature park in China. The three of us support this plan and recommend the Honorable Secretary's approval. Any remaining questions will be promptly answered in full and in writing." This strategy worked. The room returned to quite deliberation and after Director Zhang submitted the park's full size our plan was approved. Sometimes your job as lead communicator is to be a confident, grounded lighthouse in a raging storm.

As often happens in China, Nelson Byrd Woltz and I may have been "trophy international consultants" brought over to show projects had high style, but the actual plans are then developed locally, with no further expensive foreign participation. I expect this to happen with the giant panda park. But the entire undertaking ended with the horrible Sichuan 2008 magnitude 7.9 earthquake. The Wolong Giant Panda Base was also destroyed. Surviving animals were moved to another facility in Yaan and our Dongkoucao Giant Panda Project was abandoned.

"The big idea is simple. Look for conflict. Go there. No one has the answers and the current system is failing." Grant Jones.

United Nations Environmental Programme (UNEP), Afghanistan 2009-2016. Forty-three years after completing Peace Corps service I again became immersed in international community service planning and development in difficult poor areas, but this time as an experienced planner. One of the most interesting and challenging areas

of my work, professionally and personally, resulted from the eleven forty-day missions I made to Afghanistan supporting of work of the United Nations Environmental Programme (UNEP, nine of the eleven visits), Wildlife Conservation Society (WCS) and USAID (American foreign aid organization). I was contacted by Mr. Andrew Scanlon, who I had worked with in China, asking for advice about an offer he received to join UNEP in Afghanistan as a project manager. Everyone said he was crazy to go to war-torn Afghanistan. I could tell he was keen. I told him he had already decided to take on this work and just needed to accept intellectually the decision he had already made emotionally. He soon left for Kabul. Not surprisingly, he called me a year later, inviting me to join him there as an environmental planning consultant. I needed to consider the professional and financial cost of working for the UN. They only pay for five eight-hour days per week at one-half my normal rate. Considering I worked at least six 12-hour days each week on forty-day missions, I would be working two free hours for every paid hour. Each trip took over two days of travel time. The UN provided tickets at economic rates, but no allowance was provided for travel time. Why did I decide to go? I saw this as a continuation of my Peace Corps Volunteer service, but at the peak of my career rather than at the beginning. I would again be collaborating with amazing people, Afghans rather than Brazilians, many in real need, yet born to hard work with courage and resilience. I would meet extraordinary expatriates who also chose to work in hardship and conflict zones. They have amazing stories. I would experience challenging yet magnificent high-altitude desert and alpine landscapes. We would all learn by doing and sharing. Such experiences were beyond traditional professional considerations.

I also had to decide how much personal risk I was willing to take for a very worthy cause, developing Afghanistan's second national park in the Central Highlands of Bamiyan Province. At the time the Taliban were a threat everywhere in Afghanistan, including the capital of Kabul. The UN headquarters and other compounds were patrolled by Gurka guards with layers of security. Our study site was in the province and town of Bamiyan, homeland of the Hazar, a Shia minority in the Sunni majority country. The Hazar had long suffered oppression and genocide. Only a decade earlier the mountain villages where we would work were overrun by Taliban Uzbek Sunnis. They burned village mosques with aged Hasara sheltering inside and killed any villagers they could find. For this reason, the Hazar enjoyed the protection of the Western armies holding back the Taliban. We were both welcomed and completely safe under the protection of the Hazar elders in Bamiyan. When you had tea and then shaken the hand of a warlord descendant of Genghis Khan you know promises would be kept. I learned the terms "respected elder", and "warlord" were interchangeable, depending upon which faction one favored.

My work was split between Kabul where the main UN facilities were located and Bamiyan town and province. Bamiyan is ancient. Alexander the Great marched through during his invasion of India 327–325 BC. It became was an important stop on one line of the Silk Road (used for 1,500 years from 130 BCE until 1453) passing through the mountainous Hindu Kush. Buddhist monks developed an important center here. The

famous giant Buddhas were carbon-dated to 591–644 BCE. The tallest was 53 meters (175 feet). The Taliban considered them to be sacrilegious graven images and destroyed them in 2001.



Figure 100. Upper photos from UNEP Bamiyan office roof showing the remaining Giant Buddha grottos with Hindu Kush in the background. Lower left: showing the amazing colors and numinous light of these landscapes. Lower right: old caravansary in Sayalyak Valley.



Figure 101. Left: I am with colleagues Asadullah Asad and Irish land planner Conor Skehan (a former top student of mine at the University of Pennsylvania) at about 3900m (12,800ft) elevation at Sare Ahangaron after a breathless two-hour uphill hike. What a place to hold an alfresco workshop! Right: slate pinnacles

above Chapdara village at about the same elevation (see poem: “Ghost Man of Chapdara in Appendix 3). Andrew Scanlon and Sardar Amiri were climbing the peak in the background when I took this photo.



Figure 102. Bamiyan village elders Amed Hussin, Chapdara village, proud and flamboyant. Abdul Ghani, Jawkar village, quiet and thoughtful, he invited his two young daughters to observe one of our informal meetings in his home…most unusual in Afghanistan. Photo with Hadji Qadir from Chap Qulak, very active in implementing our check dam and forestry projects. Zekria Ahmadi, our translator, and two elders we met in Alibeg village. My long grey beard and senior years were well received among Afghans.

UNEP was requested by Prince Mostapha Zaher, then General Secretary of the Afghanistan National Environmental Protection Agency (NEPA) to develop a master plan for the proposed Shah Foladi National Park in the Koi-e Baba (Grandfather) Mountains above Bamiyan. This would become the nation’s second national park, an International Union for the Conservation of Nature (IUCN) Category Five Protected Landscape, supporting existing villages and livelihoods. We began by developing an understanding of the larger landscape of the Bamiyan River Valley and drainages between the Hindu Kush to the north and Koh-e Baba Mountains to the south. This included learning about the cultural history of the region. While we used Andrew’s and UNEP’s skill with GPS mapping technology, we also drove the narrow roads up each stream valley and visited the highest villages at 3000m (nearly 10,000’) elevation, which we called the “Gateway Villages” to the planned national protected area. There we met with village Shuras, councils of elders. Andrew Scanlon, with our translator Zakria Ahmadi and driver Sardar Amiri and project manager Ernie Wijanco had visited and met with these elders and explained our mission before my arrival.

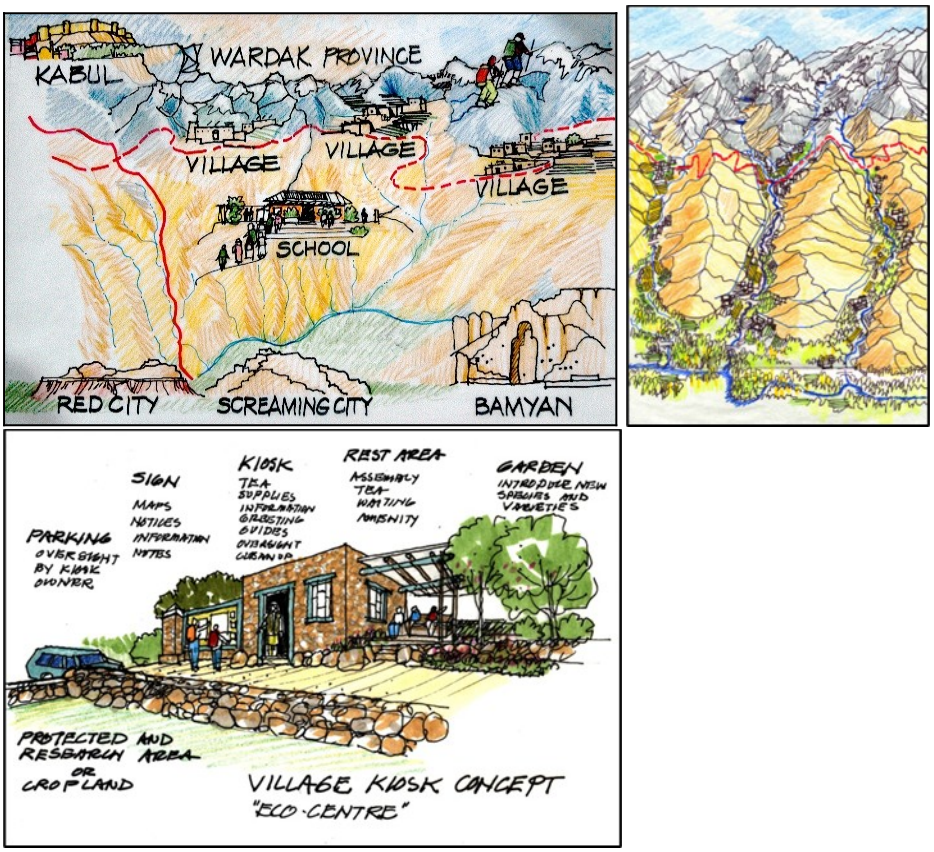


Figure 103. Upper row: sketches showing the stream valleys and farm villages extending up to the Koi-e Baba mountains. The proposed Shah Foladi National Park would include these mountains and the highest “gateway villages.” The upper right drawing also shows the proposed ‘Sky Trail’ (red colour) connecting these villages, sections of which were later built through our programs. Below: sketch of a proposed village eco-centre with provisions, toilets, and primitive accommodation for tourists. Facilities like this were to be built outside each willing village and managed, along with a guide service, by a local operator as an income source.

In order not to overwhelm remote conservative villages with alpine tourists (students and perhaps a few international adventurers) we planned to distribute them among many gateway villages, each with simple accommodations and kiosks just outside the village. Foreigners would not enter villages. Pathways and guides would lead summer alpinists and winter skiers on day trips into nearby mountains to visit alpine lakes or climb local peaks. The next day they would take the new Sky Trail over the ridge to the next village to experience what it had to offer. Some ambitious alpinists may even tour the entire series of villages.

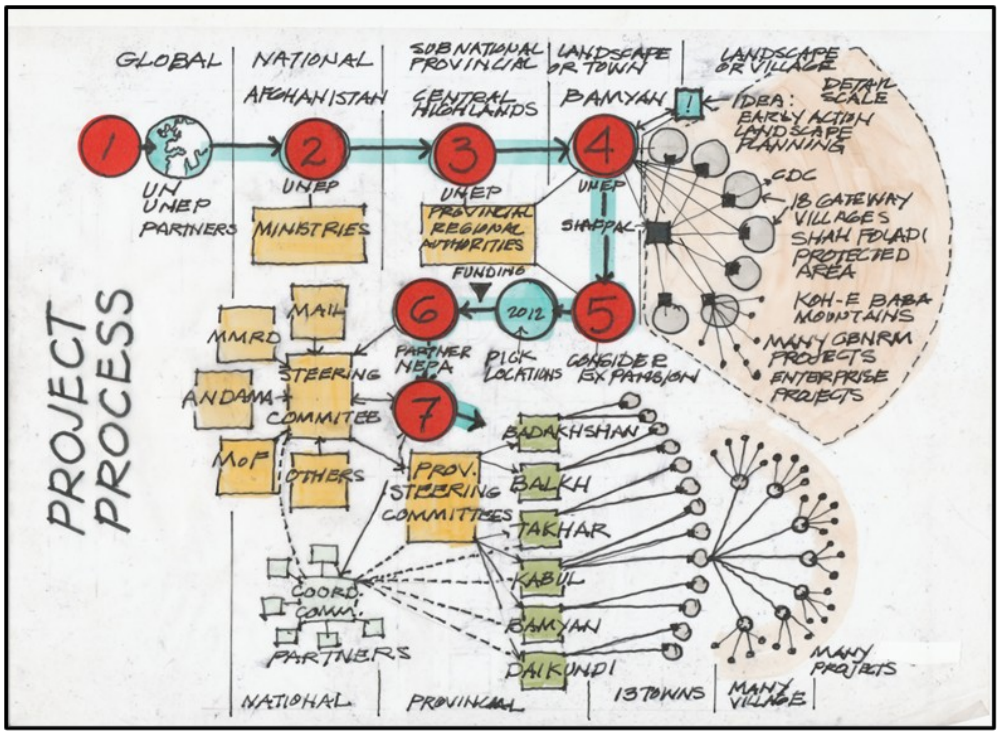
Visiting these subsistence farm and herding villages, with livelihood subject to drought, flood, avalanche, and earthquake, convinced us we must first help them improve their livelihoods and environmental security before there was any hope of forming a national park. This changed and diversified our plans.

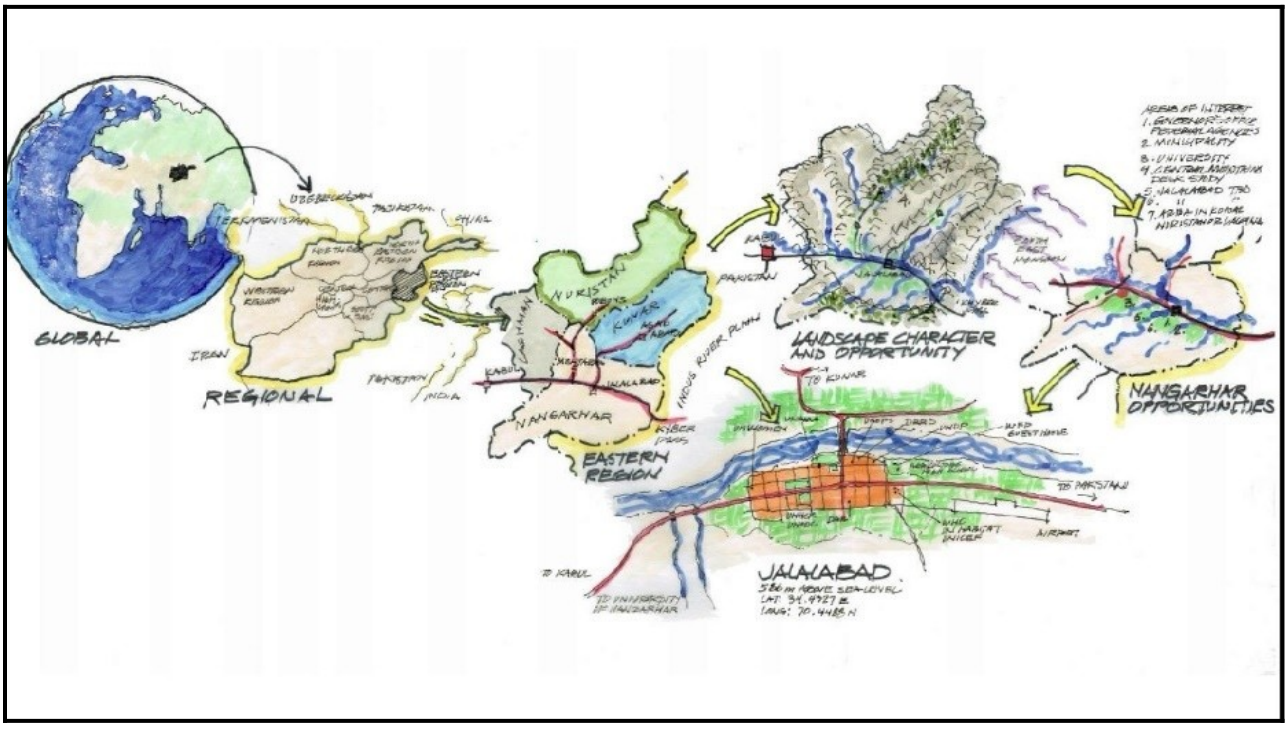
I suggested many policy and practice strategies from my own experiences to Andrew, and he added ideas from his background. Then through intense collaboration practical

integrated community and ecologically based programs emerged under Andrew's leadership.

Our team's resulting work can be considered in two stages, 1) strategic and 2) tactical and practical. UNEP is primarily an environmental research, policy making, and national government support organization. For example, under the leadership of Ms. Belinda Bowling, Head of the Afghan office when I arrived, UNEP developed the legal framework to create the Afghan National Environmental Protection Agency (NEPA). UNEP's ongoing role was to partner and support NEPA, who made and policed environmental policies (including national parks) and the National Department of Agriculture, who managed these land areas. UNEP usually did not do detailed village development and livelihood projects. But we saw both strategic and practical areas as inseparable and interactive. Our strategic objectives were to provide both "why to" and "how to" environmental policy documents to related federal and provincial ministries (a normal UNEP activity). In addition, we planned to increase community livelihoods and resilience with useful information, organize community master development plans, design and find funding for local field projects, and assist UNEP field staff in communicating design intent and construction methods to local workers. We proposed to develop these case-by-case projects as a proof-of-concept test, to provide actual projects as sites for training Afghan government and UNEP staff and to provide attractive and result-oriented models to attract international funding.

While we developed and tested this strategy first in the Bamiyan area, we later expanded "Flagship" programs to Daikundi, Badakhshan, Balk, and Nangarhar Provinces. We also organized training programs for colleagues in related Afghan government departments at the federal, and provincial levels. Later these strategies were expanded, and collaborations organized with several international aid groups to carry on development stages. But implementation of these programs, other than in Bamiyan and Daikundi Provinces, was limited during my period of involvement.


GLOBAL
NATIONAL
SUBNATIONAL PROVINCIAL
LANDSCAPE OR TOWN
LANDSCAPE OR VILLAGE
AFGHANISTAN
CENTRAL HIGHLANDS
BAMYAN
DETAIL SCALE
DBA: EARLY ACTION LANDSCAPE PLANNING
UN UNEP PARTNERS
UNEP
MINISTRIES
UNEP
PROVINCIAL REGIONAL AUTHORITIES
UNEP
SHAPPAL
CDC
18 GATEWAY VILLAGES
SHAH FOLADI PROTECTED AREA
KOH-E BABA MOUNTAINS
MANY CBNRM PROJECTS
ENTERPRISE PROJECTS
PROJECT PROCESS
MAIL
MMRD
STEERING
ANDAMA
COMMITEE
MoF
OTHERS
FUNDING
2012
PARTNER NEPA
PICK LOCATIONS
CONSIDER EXPANSION
PROV. STEERING COMMITTEES
COORD. COMM.
PARTNERS
BADAKHSHAN
BALKH
TAKHAR
KABUL
BAMYAN
DAIKUNDI
MANY PROJECTS
NATIONAL
PROVINCIAL
13 TOWNS
MANY VILLAGE


GLOBAL
REGIONAL
LANDSCAPE CHARACTER AND OPPORTUNITY
NANGARHAR OPPORTUNITIES
EASTERN REGION
JALALABAD
TO KABUL
TO PAKISTAN
AIRPORT

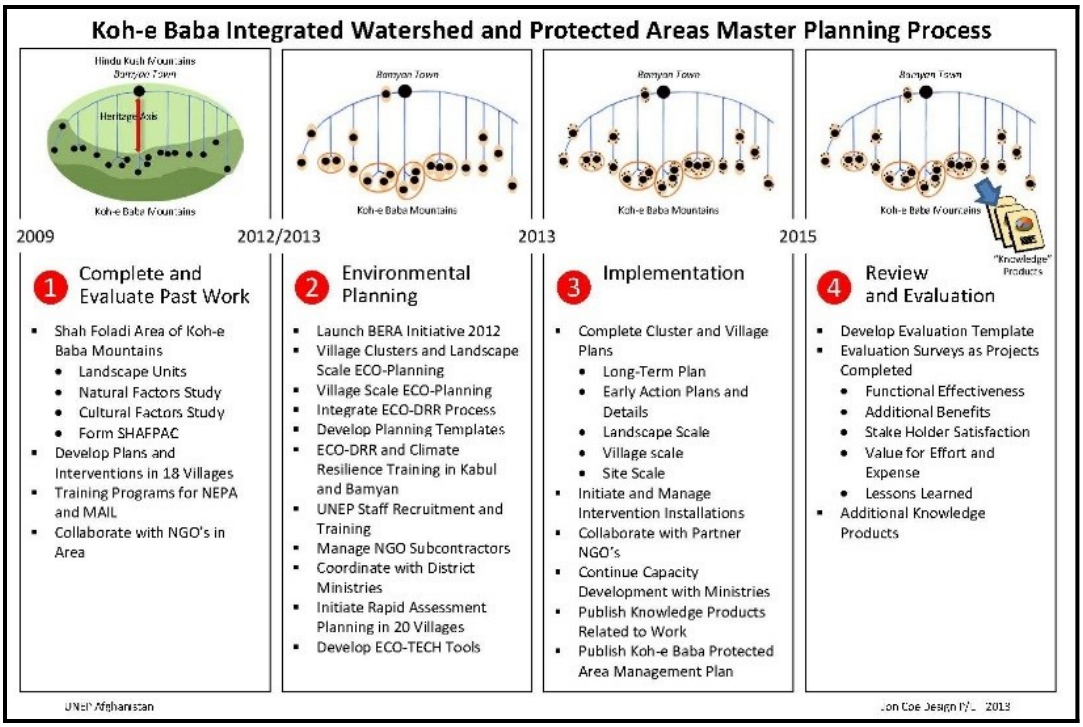


Figure 104. Upper left: my diagram showing the policy planning process from global to local scale for proof of concept (steps 1 to 5), coordinated with overlapping national agencies (steps 6 and 7) then expanding to five other Afghan provinces down to local community levels. This diagram does not show the essential lessons-learned reporting back to the UN and global scale. Upper right: my drawing illustrates the planning process from global to local in Nangahar Provence and the city of Jalalabad. Lower level: graphic recommending step-by-step watershed and protected area (including villages) planning for Bamyan Province.

Eco-based planning strategy begins at the global level, interacting with national laws, policies, and priorities, as well as natural, cultural, economic, and environmental resource and security conditions. National policies are often implemented through provincial ministries and governor's offices and on to city governments, Community Development Councils (CDC's) and shuras (elder's councils). This flow is then reversed with knowledge learned through monitoring and evaluation at each level affecting policy and programs at higher levels. Simply stated, our planning process was to develop a flexible chain of communication and understanding connecting all levels of stakeholders from international donors and support groups down to elders at the community level and back again.

Traditional foreign aid was top-down. Experts came to your town, built something you may have needed but you did not understand how to maintain it, and then they left. There was also an international bias for mega projects. We developed the opposite strategy. UNEP went to your area and stayed as long as possible. We helped you to build what you said you needed yourself with materials at hand. Since you have built it with local materials you can maintain and repair it indefinitely. We also focused on the power of decentralized diversity. Rather than building one big expensive downstream

dam, we suggested creating a thousand small check dams along upstream water courses, each returning erosive surface water to replenish more dependable groundwater.

Another connection to my earlier US Peace Corps experience in Brazil was the realization that many people living at subsistence levels think of the future as something that happens to them, rather than something they can to some extent control themselves. Working with the Koh-i Baba villages, we assured them we would help with appropriate development projects, but first they must prepare a community development plan. Participatory community planning was a tool to empower them to act in shaping their future. Their plans provided a decision-making framework for integrating and prioritizing actions and a foundation for seeking funding from a wide variety of government and private aid organizations.

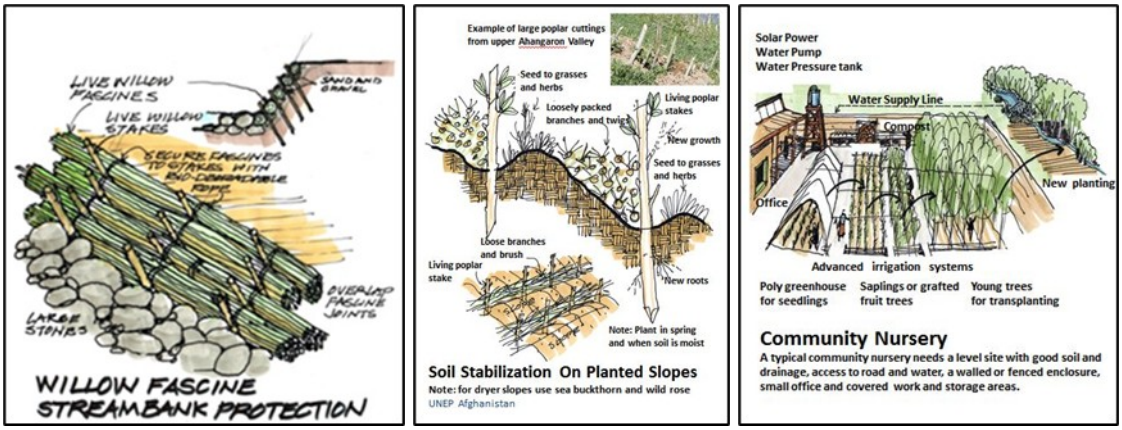
Walking around their land with them we asked them to identify natural hazards. “How high had flood waters risen in your grandfather’s memory? Where did the avalanche extend the farthest? Where were the trails to high pastures, where was the cemetery and the mosque on the map?” They developed their own community maps based upon deep knowledge. Then we asked what they needed most, where on their land (and their map) should it be built and at what priority? They were creating their own future. In some cases, proceedings were dominated by a few elders, others were more openly participatory. We also held training workshops in Bamiyan on market days when most village leaders would be in town, with elders from many communities learning and sharing ideas.. Having led countless similar planning workshops in the West, it was wonderful seeing people living a semi-medieval lifestyle fully able to participate in modern planning activities. The only problem was limiting long speeches. Afghan elders are great orators! Our successful planning strategy framework was to empower them to be their own planners, skills they could carry into the future, rather than planning for them and developing a dependent relationship. Nobody loves crutches.







Figure 105. Upper row, I'm leading a community meeting in Ahangaran explaining our suggested planning approach. Zakria Ahmadi, well known and trusted among the villages, is my translator (white hat) and Laurie Ashley, a sociologist and an international ski tour developer in her red scarf joined us. Photos: S. Amiri. Second row left and centre: two community plans drawn by local elders. Central photo of Sadjadi, elder from Borghasun with his hand-drawn community map. He was an eloquent orator we worked with planning an alpine tourist guest house. Second row right: community planning training workshop in Bamiyan town. Third row: left and centre, officials from the National Departments of Agriculture and Environmental Protection participating in a field training exercise we organized. Lower right: Earth Day celebration outside the UNEP Bamiyan office. Andrew hosted local peace and eco-sustainability meetings.



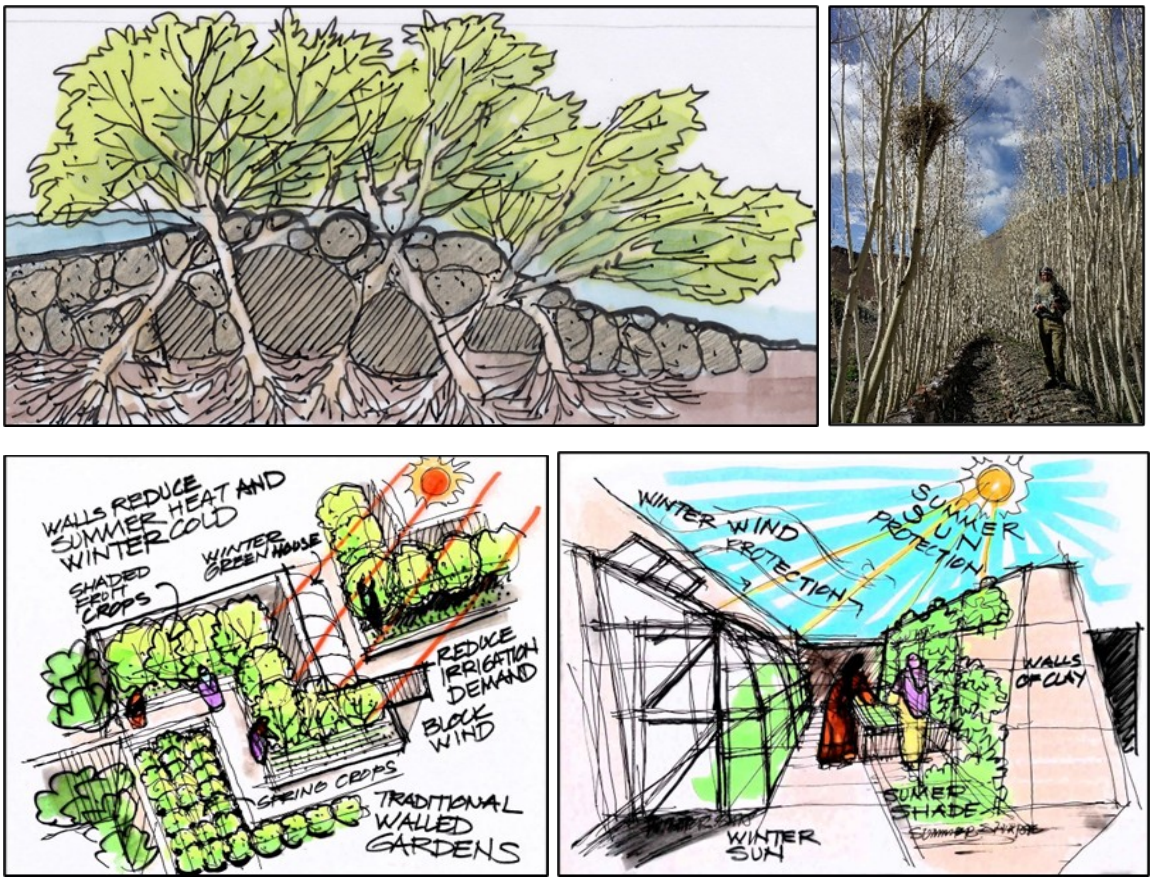


Figure 106. Typical examples of my ecotech construction systems. Upper left: one of three systems using native willow to stabilize riverbanks during heavy spring snowmelt runoff. Upper centre: using native poplar cuttings to stabilize slopes. Upper right: typical community plant nursery layout. Middle left: cross section of a stone check dam reinforced with native willow branches taking root. These willows will eventually seed downstream banks beginning riparian revegetation. Middle right: poplar cuttings planted by Hadji Qadir along an irrigation channel in Chap Qulak. Note raven nest showing wildlife returning to the area. Bottom row: plans I developed for a new NEPA office in hot arid Balk Province using traditional walled gardens. Traditional mud walls provide shade in summer and act like radiators in winter.

As village planning and early project designs progressed Andrew began investigating international funding sources. Two prominent categories of funding, Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) fit our work perfectly. Because our strategies were based upon working with local ecology and vernacular technology, we referred to projects as Eco-CAA and Eco-DRR. This approach won strong support from donor countries included the European Union, Estonia, and Japan.

The practical stage of our work was development, teaching, and application of what we called eco-technologies, or “ecotech” (also called bioengineering). Some of the systems I used were imported from timeless vernacular practices among Navaho, Peruvian, and African traditions and of course successful uses we had observed in similar Afghan villages.

I organized these ecotech suggestions in the following subjects. Note overlaps, for example, native poplar and willow planted for flood and slope control also can be sold as lumber, generating income, fuel wood, livestock fodder, afforestation and return of native wildlife.

- Water management: upland runoff, erosion and resulting downstream flooding could be reduced by diminishing need for native shrub fuelwood harvesting through village afforestation. Flood reduction through construction of many native living willow and poplar reinforced checkdams, resulting in groundwater recharge. Living willow stream bank stabilization. Poplar and willow seeds carried downstream would reforest stream valleys, creating wildlife habitat.
- Slope management (terracing, retaining walls, erosion protection planting). Once established, these afforested slopes would help stabilize loose boulders and act as snow fencing.
- Planting: (nursery development, orchard management and pruning, afforestation). Villagers found that plants grown in Bamiyan valley were not cold hardy at village elevations. We supported villages to build their own nurseries and grow their own plantations and orchard trees such as apples and apricots.
- Trail building.
- Pit privies. Improved designs for harvesting human waste as fertilizer.

My sketches were then translated and used in training programs for government agency staff and village work teams. I eventually compiled them into an unpublished draft I called the Ecotech Handbook and Andrew called The Big Green Book.. Our hope and expectation was that these small but frequently applied landscape investments would prove inexpensive, practical, and effective and be copied by neighboring villages and thus spread organically through the area. We would no longer be needed. My Afghan colleague Sardar Amiri recently sent photos of continuing ecotech applications nine years after I left and several years after the Taliban takeover.

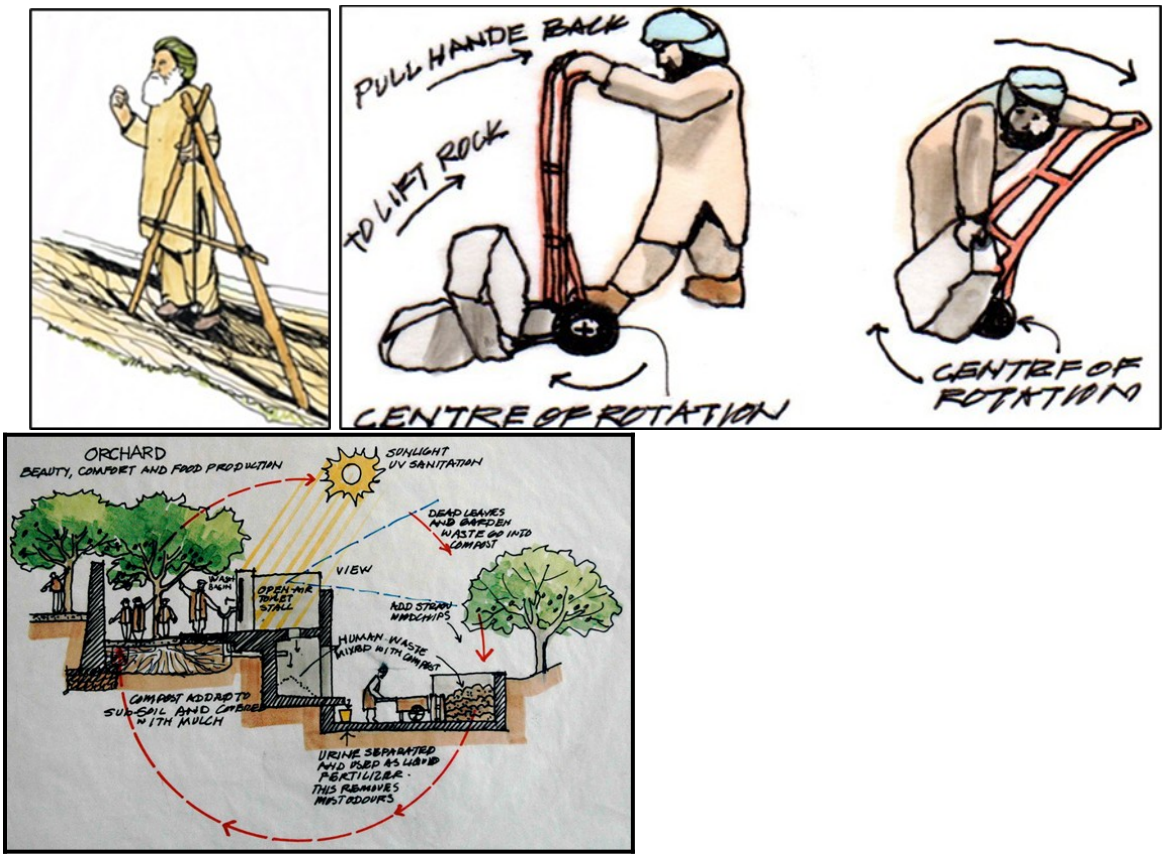


Figure 107. Sketches showing use of traditional A-frame plumb-bob level for locating contour lines on hillside and methods for moving boulders using a sturdy furniture trolley large boulders into place. I made these sketches by first having photographs of myself taken while doing this work and then tracing these photos to resemble sturdy Afghan workers. Below: diagram showing human waste from easily cleaned pit privies in an orchard being composted for use as valuable fertilizer and demonstrating a renewable circular nutrient path. Open-topped privies benefit from solar sanitizing.



Figure 108. My typical office work environment. On my last visit in 2016 Andrew had me assemble all the worksheets I had prepared with and for him while making more to record our thinking. While my work as an illustrator was useful, these sheets recorded our most important strategic collaborations.

“Just what is it you do here?” I was asked this several times, but this time the questioner was Mr. Amiri Ashrif Zaidi, the head of the UNEP office in Geneva in charge of UNEP operations in Afghanistan. He was on a review visit to the Kabul office and had meetings with then Head of Mission Andrew Scanlon and all expat and Afghan office staff. Ashrif was from Pakistan and spoke Afghan Dari fluently. He, along with Belinda Bowling, had established this UNEP Afghanistan program in 2003. The most visible aspect of my work was the two hundred or so illustrations I had generated and perhaps Ashrif assumed I was hired to illustrate Andrew’s ideas, but he suspected there was more to it. I took this opportunity to describe my role in brainstorming with Andrew many of the planning and development strategies Andrew adapted to local needs and implemented with the help of my illustrations.

Andrew invented the concept of an “Information Galaxy”. Working with information management and graphic designer Ms. Mareile Paley, we prepared a flexible text and drawing system used to publish everything from UNEP policy white papers to translated posters, educational materials and technical glossaries. The idea was eventually to have a foundational “Mother Document” establishing and documenting overall ethos, policy and process. This document remained aspirational, but the idea guided all our publication activities. Documents which were published include policy documents such as “Climate Change Threats and Vulnerabilities in Afghanistan,” “Afghanistan’s National Biodiversity Strategy” and Action Plan” as well as practical guides such as the “Little Green Phrase Book of Ecological Development,” Anthony Fitzherbert’s “Guide to traditional Afghan Fodder and Forage,” and many “how-to” posters and pamphlets, in English and Farsi. I also drafted the “Big Green Book” (Ecotech Handbook) mentioned earlier.

Here follows a selection of my drawings and illustrations from my consultations with UNEP.

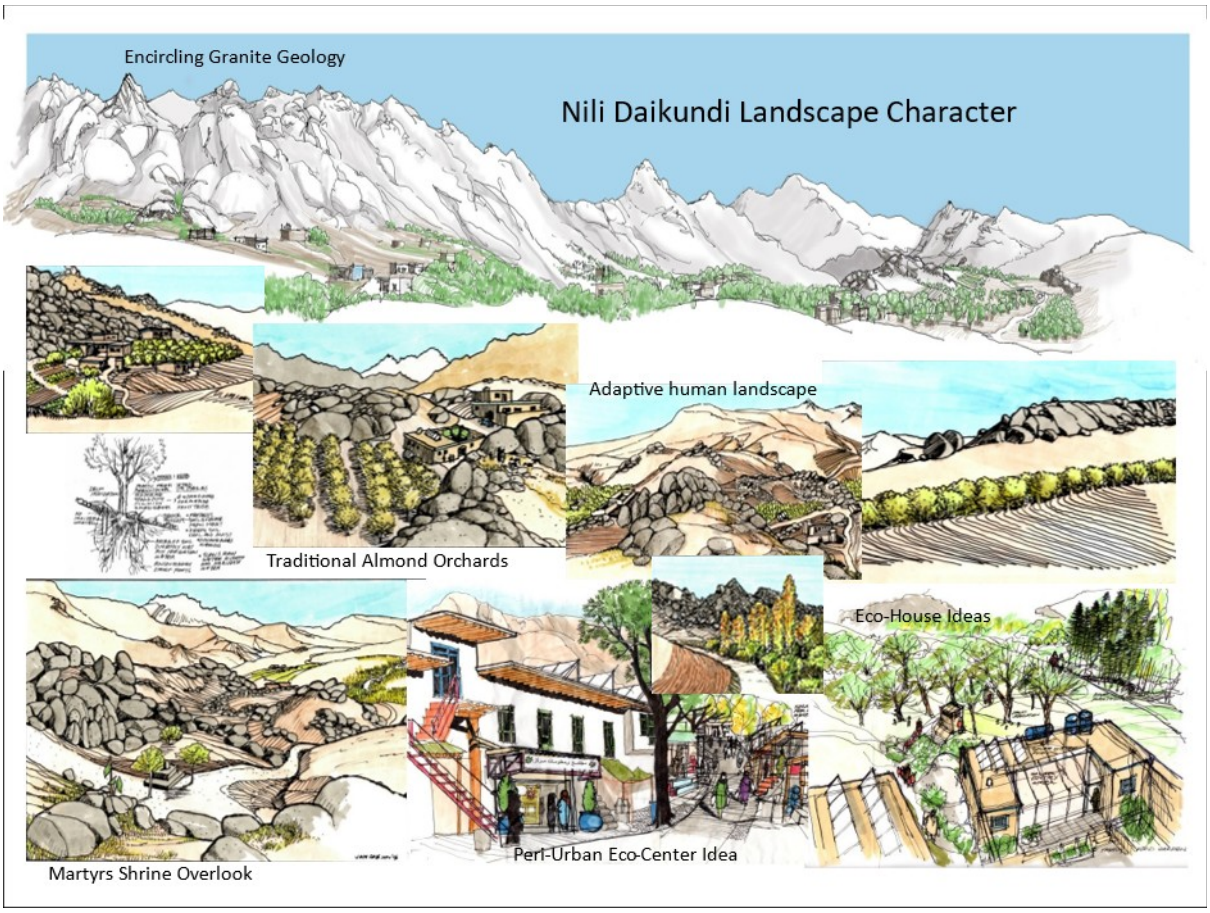


Figure 109. Sketches from my two visits to Nili in Daikundi Province in 2015.





Figure 110. Upper drawing of an aspirational, prosperous rural ecotech landscape with high pastures draining snow melt to lower forestry areas which add nutrients to runoff and ground water supply for lower orchards and crop terraces. Lower drawings left: an abandoned house converted into a village eco-centre, meeting room, guest accommodation and storage area for emergency supplies. Right: drawing of the geological formation we called the “Red Gate” creating the scenic entry to upper Khushkak Valley

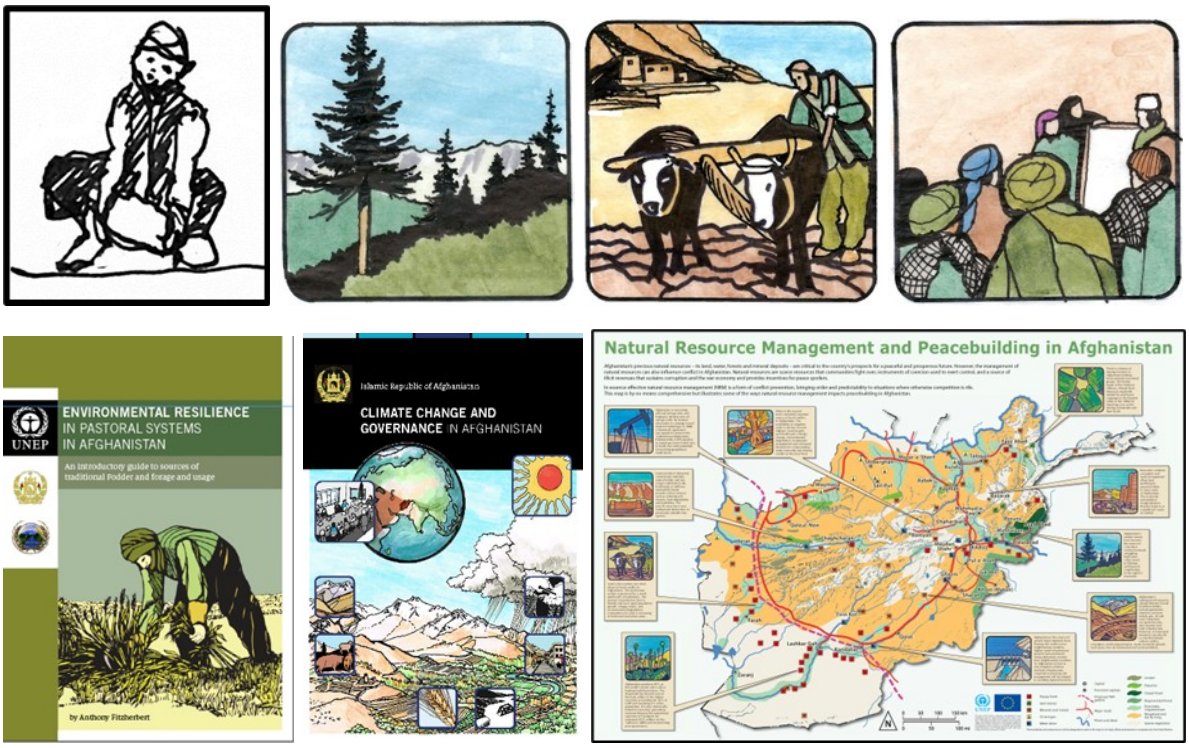




Figure 111. Upper row: I developed dozens of symbolic icons which we used on many posters and reports. I found the standard UN report graphics too mechanical and lacking in character and introduced a more handcrafted “woodcut” style for our work, which Andrew supported. Second row: examples of my illustrations used in UNEP policy documents originating in the Kabul office. Third row: examples of illustrations I made for other organizations or uses. Left: my poster for the Afghan Sustainable Land Management Institute the UNEP was assisting. Middle: a sketch used in several UNEP education projects. Right: one of many native wildlife sketches I shared with UNEP and the Wildlife Conservation Society.

As I mentioned previously, one of the wonders of working in conflict zone is the amazing people, both locals and expats you have as professional colleagues and friends. I can fit in only a few outstanding examples. Certainly, the most influential was Andrew Scanlon with his energy, challenging intellect, remarkable memory, and deep friendship.

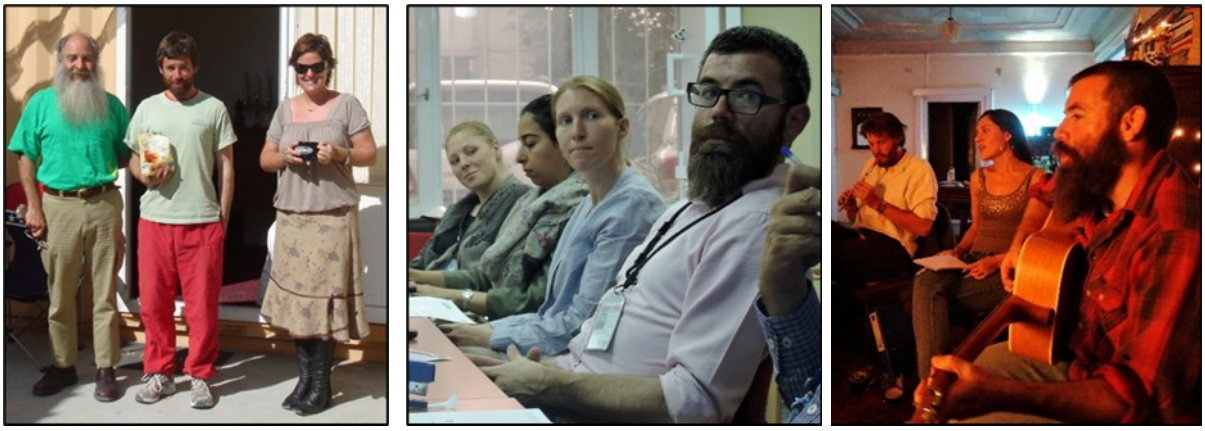


Figure 112. Left: early in my missions I am standing outside one of the shipping container accommodations in the UNEP compound with Andrew Scanlon and then Head of Office Belinda Bowlen. Centre: an office meeting on my last mission with (left to right) Aoife Franklyn, Safira Lakhani, Kelly Franklin, and Andrew Scanlon. Right: while we worked long hours during the week, Andrew usually hosted Friday night singalongs for expat visitors and residents. Many brought their own instruments. Shown here are Jon Rider, adventure film maker and Leila (sorry, do not recall her last name) I really enjoyed these sessions.



Figure 113. Upper left: photo with National Environmental Protection Agency (NEPA) Director General His Highness Prince Mustafa Zahir, grandson of Afghanistan's last King. Centre and right: Wali Modaqiq had worked for UNEP when I first joined them and later served as Head of office before becoming second-in-command at NEPA. Right: Angeraq village elder Said Hodshim drawing a village map in the sand for Wali Modaqiq. Wali was an important federal government official visiting a poor farm village yet was comfortable to kneel and draw in the sand with the local leader. Planning does not get any more basic or effective than this. Lower row: our Bamiyan office cleaner Fatima, a widow with three children, lived in an extremely poor area partly carved out of the cliffs near the Bamiyan giant Buddha grottos. Lower right: my photo of Milou, Andrew and Sardar (far right) having dinner with Fatima and her family in their semi-dugout home. We brought the food which Fatima served.

During my last two visits in 2015-16 While we expanded our work to other provinces, I focused on completing the Koh-e Baba Mountains Protected Area Management Plan we had started in 2009 with assistance of our expanded staff. Ms. Kelly Franklin was especially helpful in finalizing and publishing this extensive document after I departed. This area became Shah Foladi National Park, Afghanistan's second national park.

While my work in Afghanistan was rewarding. It was not without risk. I received excellent UN security training and briefing updates each time I arrived. A key suggestion was to avoid habitual schedules kidnappers or insurgents could use to predict your movements. We were admonished to select hotel rooms on the second floor, preferably away from the street. These were safer from break-in than on the ground floor but not too high to jump out of in case of attack or fire. Wherever we went we should plan two

escape routes and always maintain situational awareness. On my first visit I was staying with Andrew Scanlon at a guest house serving international visitors including aid workers and UN staff. We got up at 4am to prepare for an early meeting. At 6am we heard an explosion followed by automatic gunfire. Military helicopters were soon circling nearby. A similar guest house a kilometer away was attacked by Taliban insurgents. Several UN and USAID workers were killed. We were on lockdown for the day with our emergency “grab bags” at hand. That night we experienced an earthquake sending us both running out of our building.

During one visit sponsored by USAID I stayed at the Green Village, a highly fortified enclave used primarily by private international security specialists and international civilian police training Afghan police forces. To travel to meetings, I was provided with a trained Afghan driver and a guard, both armed. We traveled in a massive, armored Toyota Land Cruiser. At a major road intersection we were caught in a massive traffic jam, a common occurrence. I checked to confirm all car doors were locked. A car behind bumped solidly into us. Suddenly my highly trained guards forgot their training, rushed out to angerly confront the other driver leaving both doors wide open. Having one car cause a minor accident while kidnappers in a second car carry out the obduction is a very common ploy my guards had forgotten. I quickly closed and locked the care doors and phoned the security office, who sent out a relief car for me. Fortunately, this had been a common accident and nothing more serious, but it is an example that personal safety is always a personal responsibility. Two years later Green Village suffered a major Taliban suicide attack it successfully resisted at the cost of the lives of several Afghan guards.

During my many visits two “security approved” restaurants and the Park Palace Hotel I had enjoyed using were attacked with many fatalities. Fortunately for me none of us were present at those times. During my last visit Andrew and I were working upstairs at our UNEP intown office next to a UN compound when at 4pm an explosion blew out the windows next to us. Blast film had been applied to all windows to keep them from splintering, but we now had our desks covered in glass as automatic gunfire sounded from across the street about one hundred meters away. Taliban were attacking an office they suspected of housing CIA staff. Stray bullets and ricochets buzzed past but were not aimed at us. Gurka guards on the adjacent UN walls returned fire and Afghan forces arrived in numbers. The battle next door continued with increasingly heavy weapons until 6am. We were on lockdown and could not leave. Some of us slept on the floor in our safe room that night while Andrew continued to work at his desk next to his blown-out window.

On another occasion we visited Chapdara village in the Koh-e Baba Mountains. On the drive up with Zekria Ahmadi, our translator, we had given a ride to one of the village elders and our visit was pre-arranged and approved. After the meeting I took a hike up into the mountains above the village I settled myself on a slate outcrop and had been drawing when I noticed a fellow rapidly and agilely descending the boulders above me

wearing a head cloth across his face, not a good sign. He ran up to me yelling aggressively in his own language. I only understood his anger but knew better than to reflect it back on him. I simply kept sketching as if completely unconcerned. This gradually quieted him, and he sat beside me to watch me draw. I then noticed he had a large knife pointed at my ribs. He gestured with his hand across his throat. I responded pointing to myself, “Me?” He nodded “yes.” I kept drawing. Eventually he left and, not seeing him in the distance I assumed he was hiding nearby. I keep drawing. After additional time I casually packed up my materials and headed back down toward the village, meeting Zekria and Amed Hussin, the local Hazara war lord. I explained what had happened and we found the fellow hiding in the rock above. His explanation was that he had his knife out to protect me from wolves, which had been extinct in these mountains for decades. Now faced by the village chief he seemed terrified of the consequences of his actions. I assured everyone that I was there as a friend and had no ill will for anyone, including this fellow. We shook hands and I left his management to the village chief. I later gathered from Zakria that he had a history as a local troublemaker. I speculated he was suffering from post-traumatic stress attack seeing an unexpected stranger high in the mountains where only a decade earlier enemies had attacked their village and killed many of their families.



Figure 114. Left photo shows where I was sitting and sketching, looking up the valley between the jagged pinnacles to the more distant central peak, as shown on my sketch on the right. I was pleased my pen lines remained sure even was I was being threatened.

What has become of our work after the conservative Taliban took over in August 2021? The UNEP office remains closed, and all international staff and some Afghan staff have escaped. Wali Modaqiq, previously Assistant Director of The Afghan Environmental Protection Agency is now in Wisconsin working for the International Crane Foundation. Kelly Franklin, who now lives in Colorado, helped several UNEP Afghan staff apply for admittance to the USA as refugees and at her request I personally applied to the Australian government for a UNEP staff worker and former World Food Program employee Ali Rahimi and his family to be admitted to Australia as humanitarian refugees. After a year-and-one-half processing period their application was denied.

I stay in contact with Haji Sardar Amiri, who began as our driver and emerged as a most effective project manager and Bamiyan eco-entrepreneur. He tells me that the national park program we developed is dead but in gateway villages our eco-tech projects are both flourishing and spreading organically, just as we planned. Sardar confided that things are sometimes bad in Bamiyan in terms of anti-Hazara persecutions and he has moved his family to the northern Afghanistan city of Mazar Al Sharif and even briefly relocated his family to Pakistan with his sister so his girls could get an education (Taliban don't allow girls to receive a high school education). This stay was short. Pakistan authorities forced all Afghan refugees back to their country. Sardar Amiri founded Ecology and Conservation Organization for Afghanistan (ECO-A) to carry on our collaborative work.

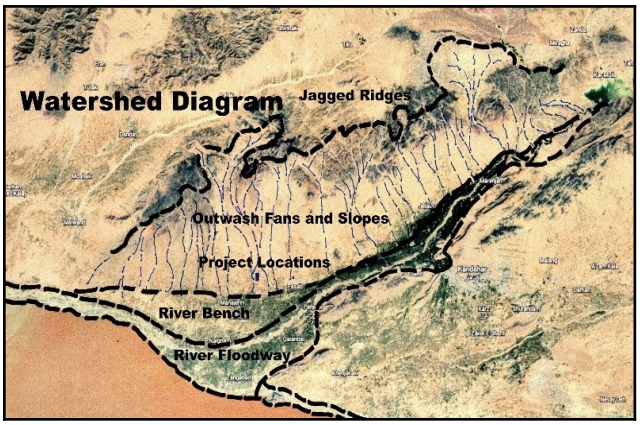
Today the magnificent people and landscapes of Afghanistan face an uncertain future, both immediate and longer-term. Their political and financial situation, massive internal and external refugee situation, drought and food shortages combine to challenge even to most resilient of people. Yet Afghans and their desert and mountain neighbors have been defined by their resilience for millennia. Compared to industrialized populations, most Afghans live rural and community-based, self-sufficient lives. They can teach the overdeveloped world lessons in sustainable lifestyles.

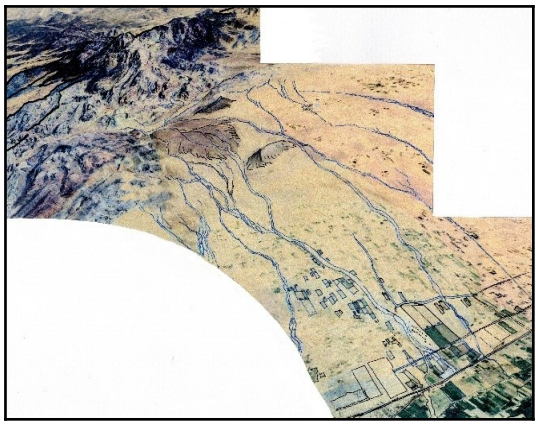
Afghanistan update - 2024. Andrew Scanlon returned to Ireland and has worked on refuge settlement sanitation for the Gates Foundation in Palestine, Jorden and Iraq and with the HALO Trust, a Global military explosive and mine clearing organization in Cambodia, Congo, and elsewhere. He is now a freelance advisor on ecological planning in post-conflict areas around the world and heavily engaged in Ukraine monitoring war related pollution for the UNDP Environmental Damage Assessment Project. Andrew invited me to join him and several other colleagues in the formation of a non-profit group provisionally called the BraveEarth Alliance which will focus on environmental planning and restoration, including restoring sustainable livelihoods working with local communities in difficult and fragile areas around the world, building on our work with UNEP in Afghanistan and Andrew's subsequent work.

Zheray, Kandahar. Our first pro bono project together was working remotely advising and supporting our colleague Hadji Sardar Amiri and his Ecology and Conservation Organization for Afghanistan (ECO-A) in planning and delivering a project for installation of micro-irrigation systems and teaching mined land safety and regenerative agriculture in the southern Kandahar Province area of Zheray. The contract was administered by the Halo Trust with a grant from the Kraus Foundation. This required Sardar and his ECO-A staff to travel from Bamyan (Hazar Shia religious and ethnic homeland, speaking Dari-Persian) south to Kandahar, (heartland of the Suni Pashtun ethnic group speaking Pashto) and Taliban home ground. The dominant Pashtun have long persecuted the minority Hazar. The Kandahar area suffered some of the worst fighting in the recent war. Yet Sardar's collaborative approach and the Taliban government's openness to international assistance allowed eventual signatures of approval from the

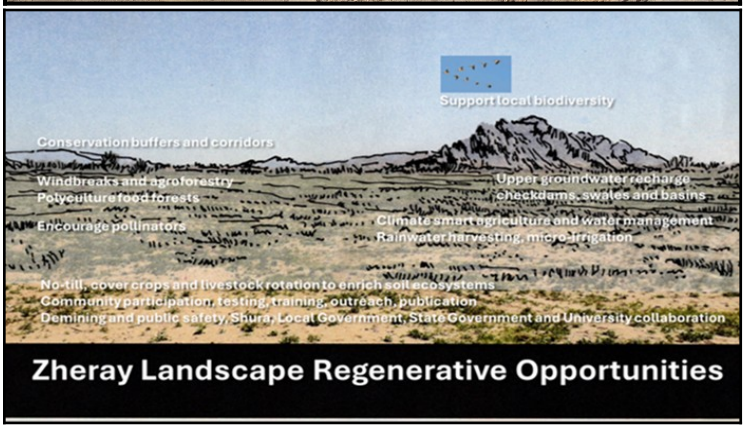
District Authorities, and support from the local university. Professor M. A. Faiz was especially helpful, both as local expert and with his agricultural construction team who built the facilities we designed. The people of two poor villages, Hawz-e-Madad and Hadji Shah Mohammod, and five surrounding communities of this study area were the beneficiaries of the two pilot project demonstration sites.

Our practical-minded HALO Trust managers focused on project specifics, delivery of working micro-irrigation systems. We, on the other hand, were determined to use the project as a teaching guide to environmental planning leading to practical actions, such as the training programs and built facilities require by the project. Andrew and I insisted on doing landscape scale environmental analysis to understand the complex and active regional geology and soils, arid climate, sparse and degraded vegetation and, especially important, watershed and seasonal drainage patterns and ground water conditions. Traditional and emerging agricultural practices, processing opportunities and markets were also considered. And of course, it was essential to meet, understand and gain the trust of the local population, largely composed of poor, postwar, resettled internal immigrants. This work informed the design of the two pilot sites. Moreover, we combined these findings into the “Zhari Micro-Irrigation and Mine Action Initiative (MIMI) in Kandahar Afghanistan: An Operating Guide.” We intended this document to be both a detailed project report with recommendations for ongoing maintenance and additional opportunities, and a study guide on how to properly undertake such projects for local government officials, university students and other NGO’s.








Support local biodiversity
Conservation buffers and corridors
Windbreaks and agroforestry
Polyculture food forests
Encourage pollinators
Upper groundwater recharge
Checkdams, swales and basins
Climate smart agricultura and water management
Rainwater harvesting, microirrigation
No-till, cover crops and livestock rotation to enrich soil ecosystems
Community participation, testing, training, outreach, publication
Demining and public safety, Shura, Local Government, State Government and University collaboration
Zheray Landscape Regenerative Opportunities



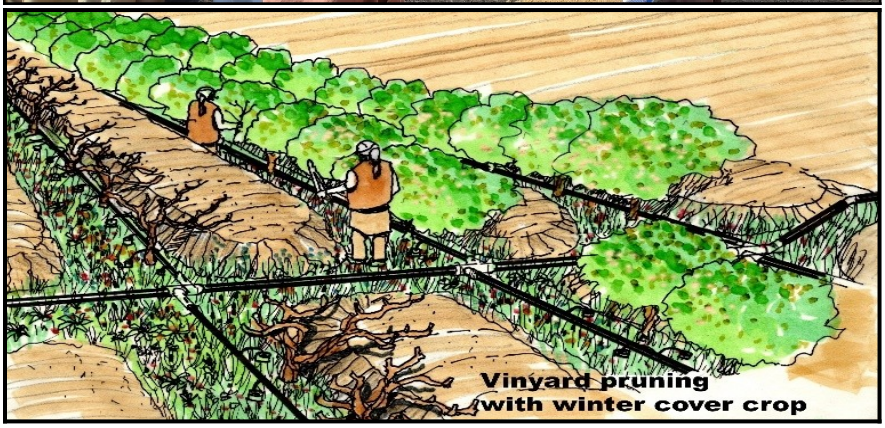

Vinyard pruning
with winter cover crop



Figure 115 Upper row: my drawings over Google Maps showing regional geology and watersheds in Zheray project area. Second row: Hadji Sardar Amiri with local residences surveying upper areas of the project site and showing present aridity. Third row: my graph illustrates landscape opportunities for the area. Forth row left: Haji Sardar Amiri with Jamshed Alizi from ECO-A explaining our plans to village residents. Fifth row: my sketch illustrating use of micro-irrigation and regenerative agriculture using poly culture and beneficial cover crops in a vineyard. Sixth row: finished reservoir filled with a deep well powered by solar energy after completion. Seventh row: Jamshed Alizi with Hawz-e-Madad owner and local leader after installation of micro-irrigation to a field where orchard seedlings will be grown.

For poor desert farmers struggling for every drop of water, sight of the newly built and filled reservoir shown above must have seemed like a vision of paradise. However, such facilities, built to required government standards, are not ideal. They are shallow and exposed to extreme surface evaporation, algae growth and pollution. The black exposed waterproof membrane will deteriorate from sun exposure. A better solution would be to have a much deeper reservoir with a cover membrane, but these opportunities were not available. Typically, existing reservoirs are surrounded by windbreak trees which reduce evaporation but add leaf fall, eventually blocking pipes. A global problem is that wells such as these draw out more water than declining rainfall and mountain snow melt supply, further lowering water tables. Wealthier farmers can afford deeper wells while poor farmers lose access to water.

Further work we suggested included development of enclosed kitchen gardens supporting women and girls and improving home nutrition, and upper catchment improvements such as we helped to develop in Bamyan Provance to increase

groundwater infiltration and reduce downstream flooding. We were joined by a student group from the Massachusetts Institute of Technology (MIT), who used our project to develop a practical and low-cost system for monitoring soil moisture in micro-irrigated crop areas which will be made available to the communities we worked with.

BraveEarth Alliance opportunities - Ukraine and Ireland. Andrew Scanlon and a group of colleagues have come together as the “BraveEarth alliance” to pursue regenerative opportunities for practical action, science and communication, on environment and livelihoods near his home in Wicklow, and Wicklow Mountains National Park, Ireland and near Lviv and within the Carpathian Mountains in the west of Ukraine and two other areas in this war-torn country, as well as building on previous and ongoing work in Afghanistan. I have been involved in many preliminary discussions and expect to contribute as a remote environmental planning and design advisor. BraveEarth also has longer-term opportunities in the Mekong region, the Democratic Republic of the Congo and elsewhere. Our approach is to propose and lead “flagship” opportunities, demonstration projects developing proof of method and concept, repeatable elsewhere by others, and “lighthouse” projects with which we support organizations, local leaders and experts without fulltime commitment. At present, local organizations work in difficult areas and experts, working for large organizations and universities, have limited field experience or physical access to sites. Our point of difference will be a combination of our and colleague’s “boots on the ground” experience, field participation and our proven integrative and participatory planning processes. We will focus on multiple small, strong inputs, as well as ensuring a whole systems approach is taken, and that “access to tools” is available. Need is great and opportunities abound.

CHAPTER NINE - FAMILY AND COLLEAGUES

Introduction. To this point I have described activities and important colleagues and clients in relation to specific projects and travels. For readers with interest in the personal side of my activities, this chapter will have a family focus, including business colleagues I considered almost family. Picking up from Chapters Two and Three, which told my story through high school and university, here you will hear about homelife in four additional locations in three countries, as well as about business partnerships and office life.

College Life in Cambridge Massachusetts -1965. I arrived in Cambridge Massachusetts in February 1965. Having completed her Bachelor of Landscape Architecture degree at the University of California in Berkeley, Susan drove across the US and joined me in June of that year. She was hired by Olmsted Associates, the remaining firm of legendary Fredrick Law Olmsted, founder of our profession in the United states. Coming from Southern California, Susan and I had never experienced driving in snow and Susan's California car did not have a suitable heater. Nevertheless, in all seasons during weekends and holidays, we explored New England, camping in New Hampshire's White Mountains, Vermont's valleys and canoeing on Maine's Moosehead lake.



Figure 116. Left: Susan during our canoeing visit to Moose Head Lake, Maine. Right: together on the shore of Lake Louise in Banff National Park in 1966. We had no idea we would move to this area three years later.

Drive across Canada -1966. Trading open space and national parks for a prestigious Harvard University graduation ceremony, Susan and I overloaded her old Dodge Valiant and traveled north from Boston to Quebec. We then drove across southern Canada to Calgary, north through Banff and Jasper National Parks to Edmonton, west to Vancouver, south to San Francisco where we visited my parents. Susan continued south to San Diego to visit her family, a total distance of 6600 km or 4100 miles. We camped along the way and had a wonderful unhurried adventure after the academic pressure of Harvard and urban crowding of Boston.

Our Wedding. In September 1966 we returned to New England to begin our Peace Core Volunteer training, described in the previous chapter, at the Center for International Studies in rural Brattleboro Vermont. Upon completion of training and being accepted as Peace Core Volunteers, we were married in a quiet ceremony at the Center.



Figure 117. Wedding in Vermont and wedding reception at Susan's parents' home in San Diego 1966. The Peace Corps made me shave off my beard, saying I looked too much like Fidel Castro. I grew it back soon after arriving in Brazil.

Our brief Return to the USA. The Vietnam war was continuing when we returned from our Peace Corps and South American adventures. My many draft referrals during my studies and Peace Corps service meant I could be drafted for another three years. Overall, we were ready to settle down with more normal occupations, but not yet ready to reside in the USA. I had contacted two classmates from our student days at the University of California, Berkeley, James Taylor, and Cameron Man, who had opened the landscape architecture office of Man Taylor Muret in Winnipeg, Manitoba, Canada. They were happy to hire both of us to help staff the office they were then opening in Calgary Alberta. We were moving from the tropics of Brazil to the prairies and mountains of Alberta. After visiting Susan's relatives in San Diego and mine in San Francisco, I flew to Calgary, started work, found an inexpensive apartment, and was joined by Susan a week later. We lived there for four years and my work there is described in Chapter 5.

The Canadian Phase - Calgary Alberta 1969-1973. Calgary is cold in winter. When temperatures dropped below -35C (-30F) car tyres became too stiff to drive and we walked, heavily bundled, for about 40 minutes to work. It required almost as much time holding hot mugs of coffee in the office for our hands to warm enough for productive work. On one memorable New Years Day, visiting friends in Edmonton, the temperature dropped to -45C (-50F). We took a rapid walk around the block so we could brag about this experience. We also found that deciduous trees lose their leaves well before the best autumn weather arrives and remain bare during lovely spring weather. This bare season was very long and discouraging.

We used this opportunity for summer backpacking and winter ski touring in the nearby Rocky Mountain National Parks of Banff, Lake Louise, and Jasper. A favorite lake campsite requiring a day-long hike during summer could be reached and returned from on skis across the frozen lake in only half of a short, cold winter day. My hiking speed was much more rapid than Susan's. She solved this by putting something from her pack into mine every time I got too far ahead. Our speeds some evened out.



Figure 118. Backpacking in the Canadian Rockies with Man Taylor Muret coworker Don Sigsby, who immigrated to Australia thirty-four years before we did. I recall heavy packs at high altitudes.

I became active in the National and Provincial Parks Association of Canada. Representing them at a public hearing on future development of the Rocky Mountain National Parks, I gave a presentation so novel it was reported in the Canadian edition of Time Magazine. I also worked with a group which successfully blocked development of an international high-rise ski resort development proposed for Lake Louise in Banff National Park. During this time, our office designed an alternative ski development outside the park which much later became the site of the 1988 Winter Olympic Games. I also helped to coordinate an international conference titled 'The Dynamics of Change' held in Banff which included discussions of global population projections based upon the 1972 Club of Rome report: "Limits to growth". We are still discussing these very real global concerns 50 years later. I recall a particular event at this conference held at the prestigious Banff Springs Hotel. As conference organizers, we invited representatives of the local Nakoda people (then called Stoney Indians) of the Crow Nation to participate in our program and to perform traditional dance ceremonies for us. Today this would be common respectful practice. It was not common during our conference and hotel management refused to serve our first Nations participants at our conference banquet, claiming they were simply entertainers. Eventually they were served last of all. In quiet protest, all one-hundred-and-twenty other attendees refused to eat and sat while their expensive banquet plates cooled in front of them until our First Nations quests were served.

We purchased our first house, a modest California-style bungalow on a small lot on a lovely inner-city street near the Elbow River. We fixed it up ourselves and later sold it for 3 times more than we paid for it. Calgary was a boomtown. We also purchased two basenji dogs, an ancient, semi-domesticated bred from the Central African rainforest. For our first dog, we took a mid-winter drive south to visit the breeder in Logan Utah, where I was born. The second we purchased in Calgary. Susan and I began attending dog shows, which soon became her primary interest. From this small beginning she has become a world expert on the breed, and we enjoy being a basenji household to this

day. Later we drove back to California visiting saluki breeders and got Red, our first saluki.

In 1970, with three other couples, we purchased a 57 Ha (140 acre) abandoned farm in the Rocky Mountain foothills east of Red Deer, a town midway between Calgary and Edmonton. During many weekend visits we slept on the floor of the windowless old farmhouse, repaired the spring, grew Indian corn and squash, harvested native blueberries and bucket loads of saskatoon berries (serviceberry) for pie and wine making. I especially recall our wonderful group Thanksgiving turkey dinners cooked in a woodburning oven and stove purchased at a local country auction. We also visited on day trips when the land was covered with fresh snow. During bright cold mornings, while we waded through knee deep snow, the dogs scampered lightly over the frozen surface. By late afternoon, the dogs crowded behind us as we broke pathways through wet snow.

I was still vulnerable to the US army draft, so I went to a Canadian Forces doctor to have an old ankle injury x-rayed. I had (and today still have) a screw in my right ankle from fracture repair surgery. He wrote a letter to my draft board with the x-ray stating that in his medical opinion I was now unfit for service. I never received a response from my US Army draft board in Southern California. Perhaps they had finally given up on drafting me.

Calgary work. Man Taylor Muret (later renamed Lombard North Planning) had three specialties: environmental planning, regional park planning and site planning for low-income housing. Environmental planning was headed by geographer Claude Muret, an expert in air photo interpretation. This skill in 3D viewing of aerial photos showing landforms and vegetation, supported by ‘ground-truthing’ site visits, informed the planning of rural areas including highway construction. Our work focused on the identification of possible environmental impacts of proposed development. This was long before modern satellite-based Global Information Systems (GIS) or Global Positioning System (GPS) were available. Today most cars uses GPS to tell exactly where we are on planet earth.

Return to the USA – Bainbridge Island WA. During 1973 Susan and I decided it was now time to move on from Calgary. She had retired the previous year and I had finished my design responsibilities with Lombard North Planning described in Chapter 5. Grant Jones and Ilze Jones, a couple of outstanding architects and landscape architects I had met while at Harvard and who visited us in Brazil had opened an office in Seattle the year before and were happy to hire me. We flew to Seattle to meet them and were directed to an old farmhouse on 1.9 ha (4.6 acres) on Bainbridge Island, a thirty-five-minute ferry ride across Puget Sound from Seattle. This old farmhouse and property was ideal for our back-to-the-land aspirations but needed major renovation. We purchased it at once and moved there soon after.



Figure 119. Top row: Susan and I with our baby daughter Alyssa outside our home on Bainbridge Island in 1973, with Alyssa about 1975 and me pruning my small apple orchard with my father Francis and daughter Alyssa in 1979. Francis was 78 years old at the time, which I then thought remarkable. Now I'm 84 and still climbing my orchard trees for pruning. Bottom row: Alyssa naturally followed her mother Susan in dog showing as she grew up.

Back-to-the-land days. In September 1973 our daughter Alyssa was born. At first the home only had a wood burning heater and the waterline from a spring on the property was subject to freezing. Raising an infant in a construction site wasn't easy for Susan while I tried to balance home repairs with work in Seattle. We milked our two goats twice each day, rain, or shine (mostly rain in Seattle), and raised sheep, chickens (Araucana chickens from Southern Chile), turkeys, ducks, and rabbits. We had a large veggie garden. Susan made yogurt and tried to make cheese from the goats' milk. I learned to shear the sheep and slaughter and butcher sheep and poultry. I loved commuting to Seattle on the ferry, chatting with friends and having coffee. It was a short walk from the Seattle Ferry Terminal to the Jones & Jones office in Pioneer Square. We lived on the other side of Eagle Harbor 6.5km (four miles) from the Bainbridge Island ferry terminal in the small town of Winslow. Susan needed our only vehicle, often traveling to distant dog shows on weekends. I purchased a motor scooter to commute to Winslow and the ferry, but use was weather dependent, not good on winter icy roads as I discovered when finding myself lying in a ditch one winter morning. I also hitchhiked frequently and sometimes walked, especially coming home at night. My favorite form of travel was crossing Eagle Harbor to the Winslow ferry terminal with a kayak I built from a kit with

my brother Phil's help during a visit. At low tide I waded barefooted into the cold mud to launch it, but paddling home on a dark night and seeing phosphorescent glows in the water disturbed by my paddles was magical. Without realizing it we had settled at the same 45-degree latitude and same wet temperate forest as the Chilean and Argentine Lake district we had traveled through and admired.

Susan's profession now became editing the US Basenji Magazine which she purchased from the retiring founder. This was a monthly national dog breed publication for lovers of the basenji breed throughout North America. Publication then required laborious manual layout long before computers made self-publishing relatively easy. She also bred and showed basenji dogs, gradually becoming a top basenji breeder in the US and internationally.

I joined a local poetry class led by an experienced poet and found I had success in this form of communication and in some short fiction I had written for Susan's Basenji Magazine. Eventually, I completed over seventy short poems, mostly related to travel experiences around the world, especially in wilderness areas. Some poetry editors I sent examples to responded that these were not poetry, but poetically composed descriptive narratives, lacking compelling meaning or message. I thanked them for their judgement but chose to believe they simply missed the implied irony or reverence my poems expressed because they were unfamiliar with such experiences. My goal was to communicate with fellow naturalists and nature lovers rather than academic poets. In this I have not been successful. I found one receptive audience. In the winter of 1991, while living in Philadelphia, I was invited by a literary group in Rochester, NY to do a poetry reading for them. They flew me up and I did the reading in the classroom of a new polar bear exhibit we had designed at the Senica Park Zoo. Unfortunately, it snowed heavily that night and only a dozen or so listeners braved the weather, but the polar bear seemed to enjoyed my presentation.

Jones & Jones. Working with Jones & Jones architecture, landscape architecture and planning firm in Seattle was a delight and highlight in my career. Now, over fifty years later I think of them as old friends. Ilze Jones' designs for historic Pioneer Square triangle and nearby Occidental Square were deserved award winners celebrating Seatle's heritage and providing humane habitats for residents and tourists alike. Grant Jones, my Harvard classmate, continued his work in landscape planning, inventing new fields like visual resource management to guide the locations of state and federal highways. He did a study showing how to locate nuclear power plants to minimize their visual impact. I illustrated Grant's article in Nuclear Technology Journal (published April 1975). This was my first publication as a co-author soon after joining the firm. A landmark study Grant completed before my arrival was a comprehensive analysis of the natural and cultural landscapes of the Nooksack River in northern Washington. In all these studies Grant was very ably assisted by landscape architect Brian Gray, who also excelled as an astrologer. Other well-remembered colleagues and personal friends included Peter Harvard, and David Walters, both generalists, and Kazuto Makami, with

a wonderful talent for working out essential construction details. While we worked hard and later travelled extensively, Jones & Jones provided an excellent working environment, gave great parties and were generous to their staff. J&J had a strong moral compass. We were in the old area of town near missions for people who were homeless and had alcohol addictions, including many Native Americans. While the city government wanted to keep these people out of sight to increase tourism, J&J designed park benches to be comfortable places to sleep. Later, when the firm had the opportunity to win a profitable contract designing facilities for the new Trident Nuclear Submarine Base, J&J declined out of respect for the objections of pacifists in the firm. In 2003 the American Society of Landscape Architects (ASLA) awarded Jones & Jones with its highest honor, as the first recipient of the Firm of the Year Award.



Figure 120. Left: I'm having coffee at Jones & Jones. Centre: Grant Jones was a "Virgo" and a worrier, so I drew this cartoon for his 37th birthday. Right: Ilze Jones struggled mightily to convert the old Sand Point Naval Air Station into a park. When her plans were finally approved in 1976 I drew this cartoon of Ilze as a Sagittarian Centaur warrior shooting down her opponents.

I led or participated in ten zoo-related projects in my ten years with J&J, including my first wildlife project Northwest Trek and the trend-setting planning and design work at Woodland Park Zoo described in chapter 7. In addition to the zoo projects, I also prepared master plans for Esther Short Park in Vancouver, Washington, Washington Park in Portland, Oregon, Battle Point Park on Bainbridge Island and Gene Coulon Memorial Park in Renton Washington. On a larger scale I led or participated in two regional environmental impact or restoration projects in Alaska and two large nature parks in Washington State described in Chapter 5.

Move to Philly -1983. In about 1979 Professor Ian McHarg, then Chairman of the Department of Landscape Architecture, Graduate School of Fine Arts at the University of Pennsylvania, a highly rated Ivy League university, began offering me a teaching position in his department. At this time, I was enjoying working with J&J. I was now a junior partner, and not keen on leaving our rural Bainbridge Island lifestyle. As Westerners, we had no interest in relocating to the US east coast. However, I eventually became interested in university teaching and Ian McHarg was internationally respected in the field of ecologically based regional planning from the sales of his influential book

Design with Nature. As an environmental planner, he wanted me to bring this ecological emphasis to teaching at the project design level. As a historical footnote, it was Grant Jones' Harvard regional planning thesis presentation, which Ian attended, which stimulated Ian to hastily publish his own book before others like Grant or Phil Lewis beat him to it.

Ian tried to recruit me annually and by 1983 I decided to accept this full-time university teaching position. Jones & Jones were moving away from the zoo work, and managing partner Ilze Jones once instructed me sternly when returning from project travel, 'Don't bring back any more Midwest zoo work!' While I enjoyed the city park and national park design, the zoo field was in much greater need of improvement. Still, I didn't want to break ties with Jones & jones, who had become a second family. So, when I left Seattle for Philadelphia it was on a medium-term basis. I agreed to teach for only four years, and I returned to work with J&J during the following summer.

I flew ahead to begin the semester, leaving Susan and daughter Alyssa, now a ten-year-old, to rent our property, arrange transport for our belongings, and drive across the country with our four dogs. The Penn Fine Arts Department, which included architecture, landscape architecture and city and regional planning, owned an art retreat estate near the Delaware River in historic New Hope, Pennsylvania. We were given a small secondary residence rent-free in return for its upkeep, until we could find a suitable new home. This was a lovely area but was at best a one-hour drive each way to the university. We lived in New Hope about one year before finding a larger house on an .8 ha (2 acre) property with open space around it on two sides in Newtown, Bucks County PA. While not quite large enough to obtain a legal kennel license, at least we could keep our growing number of basenjis out of sight. Susan soon became emersed in the east coast dog showing world, which offered her far more opportunities than she had in the Pacific Northwest. Susan's book, The Basenji, Out of Africa to You, which she had researched and written on Bainbridge Island, was published in 1984. It has been updated and republished twice more, becoming the standard reference on this remarkable dog breed.





Figure 121. Left: Susan and I with our basenjis after moving to Newtown Pennsylvania in 1984. Middle: Susan at a family reunion in the same year. Right: Susan and I with eighteen-year-old daughter Alyssa and the dogs at home in 1991.

Our daughter Alyssa developed an interest in archaeology and attended two summer programs at the Crow Canyon Archaeological Center in Southwestern Colorado while she was in high school. She graduated high school in 1991 with excellent grades and wanted to study archaeology at university. The University of Pennsylvania where I taught had a noted archaeology program where she could study at faculty discounted rates. However, Penn's program specialized in Mayan prehistory and Alyssa wanted to study the archaeology of the American Southwest. She entered the University of New Mexico in Albuquerque with a scholarship, avoiding higher out-of-state tuition. Alyssa had always been independent and self-sufficient, so moving to New Mexico seemed her natural choice. After two years of study Alyssa realized that employment opportunities in the fieldwork she enjoyed were limited. She decided to change to a more practical and high demand profession, nursing. Susan and I helped celebrate her nursing degree graduation in Albuquerque in May 1997. Alyssa went on to become a specialist chemotherapy nurse in Southern Illinois and later in San Diego California, and still later, Australia.

Coe & Lee. In 1984, soon after we settled into our home in Newtown PA, I was contacted by my old firm Jones & Jones about a master planning project at Turtleback Zoo in New Jersey. J&J was not interested in the work but thought I might be. I contacted Gary H. Lee, who I had enjoyed working with at J&J and had recently left to open his own architectural office in Oregon. Gary agreed to fly out and collaborate on the Turtleback project. This was a small zoo with limited resources and our plan was not especially noteworthy but for one thing. It led to our founding the firm Coe & Lee Associates in my Newtown homes' garage.

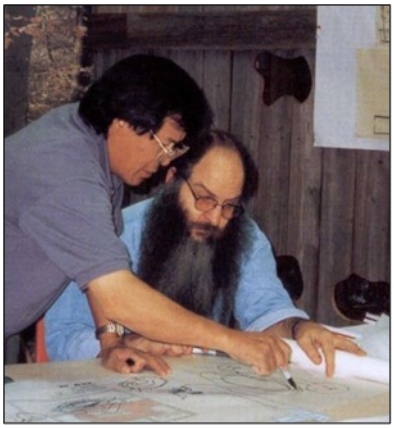


Figure 122. Gary Lee and I collaborating. Photo: CLRdesign.

Gary Hang Lee. Gary is Chinese American, born in Hong Kong of Cantonese descent. His undergraduate architecture degree was from the University of Oregon and his Master of Landscape Architecture from the University of Pennsylvania. I mentioned Gary earlier in relation to our collaboration on the J&J Pardisan project in Iran and later the award-winning Beaver-Otter exhibit in Oregon. Gary is the most talented and innovative designer I've ever worked with and an accomplished cartoonist and illustrator. He also had a business background from growing up in and later managing his family's Chinese restaurant. Gary was an early adapter of technology. I recall traveling with Gary and his first portable computer, about the size and weight of a heavy suitcase. Gary recruited computer savvy recent Penn graduates such as Rapheal, a Basque from northern

Spain, Arif Wiriadunata from Indonesia, Jon Steffensen from Iceland, and Aditya Pal from India. I especially enjoyed long conversations with Adit, who had been very well educated in India about the history and culture in his homeland. We have stayed in touch for over forty years. This international group provided a rich flavor to our office community and assured us we always had the newest and best computer software and gear.

During our twenty-year partnership Gary and I divided roles into complementary areas. Gary had an Ivy League look, played golf and tennis, spoke business lingo, and fit in well with zoo directors, board members and donors. He also mastered the business skill of appealing to socially dominant clients (we called them ‘silverbacks’ referring to dominant male gorillas) as a non-threatening court jester. He beguiled them with his ever-ready cartoons, golf matches and in other informal venues, including numerous African Safaris with zoo director cliques who became his lifelong friends. Gary produced amazing, illustrated travel journals for all participants. These contained his cartoons of everyone in the safari group as well as wonderful animal and ecological sketches.

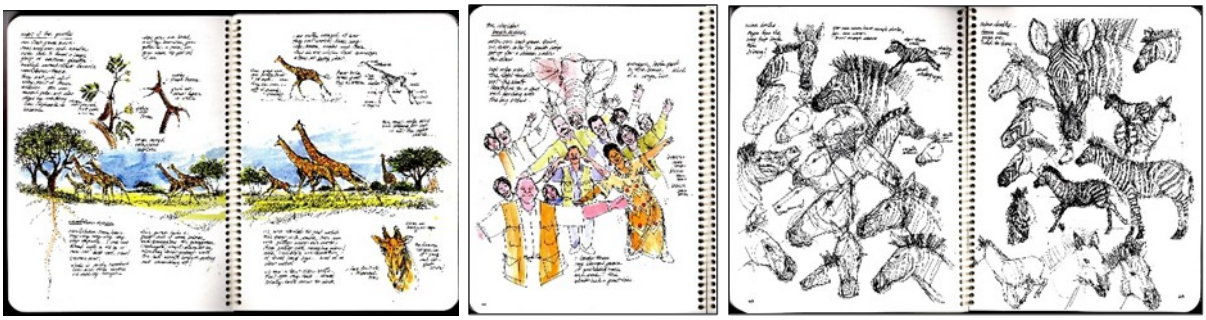


Figure 123. Examples for Gary Lee’s Safari Sketchbook from his1999 Botswana safari with Toledo Zoo Director Bill Denler and his family. Gary prepared such sketchbooks on a dozen safaris, providing them pro bono to all participants on each safari, including many zoo directors and board members. This was a unique and amazing marketing strategy as well as a deep personal connection to all the safari participants. What a talent!

Gary also stage-managed our business encounters at zoo conference cocktail parties, ensuring his friend’s and client’s drinks were refilled. He had the ability to read peoples’ characters, identify their motivations and frame relationships accordingly. For example, he soon learned I appreciated praise and provided it in suitable and well targeted ways. I soon became aware of his subtle manipulations of both me and others but had no objection because we all benefited. I got what I wanted, less business time and more time and scope for design. Our clients received tailored, attentive service and award-winning project outcomes. Gary received more control of business management and projects.

Gary believed, perhaps with good reason, that some establishment zoo directors were put off by my hippy beard, often greater zoo biology knowledge and radical ideas. I got along with the progressive workers, animal caregivers, and hands-on curators. Gary encouraged me to be the voice of our firm, giving most conference presentations,

magazine, newspaper, and TV interviews about our work. Gary managed from the background. Ironically, the radical ideas I published often originated with Gary himself. Ideas like animals rotating through multiple zoo display areas (“animal rotation”, Gary calls these “flex exhibits”) or following constructed trails through the zoo, either originated with Gary or from our joint brainstorming conversations. I then developed these concepts and published them with conference presentations and academic publications.

At the beginning of our partnership, we collaborated in designing zoo projects exploring and refining these opportunities, enabled by talented and generally experienced staff. As time passed Gary and I began dividing the work, each with our special interests and clients.

Coe & Lee becomes CLRR and then CLRdesign. Soon after opening our two-person office in my garage, I began getting calls from east coast zoos, beginning with Philadelphia Zoo, where I contributed to the design of their Carnivore Kingdom exhibit in 1984. After about a year Gary Lee tired of flying back and forth and we opened an office on Cherry Street in the Chinatown area of Philadelphia. Gary brought in two additional partners, classmates of his from the University of Pennsylvania. Landscape architect Rodney Robinson lived in Delaware with a specialty in high-end garden design and botanical gardens. Architect Geoffery Roesch had a small office on Union Square in New York City. We became Coe Lee Robinson Roesch, or CLRR, with two offices.

Key early staff included Mr. Larry Dame, an excellent overall designer and genius at working out complex mechanical details like cable-driven animal gates, but also naturalistic landscape details such as caves and cliffs. I have not known anyone better at picturing something in his or her mind and mentally turning it to visualize every angle. Other notable early staff included Ms. Julie Marquart, now artist and photographer at Marquart Creative, and landscape architect Robert Levy, a very able and enthusiastic design assistant. Landscape architect Nevin Lash was a top project manager as well as a capable designer, also providing an essential service in overseeing construction quality. Nevin later opened his own office, Ursa International, in Atlanta in 1994. He and his wife Gail resettled in Belize in in 2022 and he remains a great friend. Landscape architect Sally Coyle joined us in1987, worked with Nevin on the Zoo Atlanta and with Bob Levy on the Staten Island work and later formed her own firm Coyle & Caron with her partner, excellent exhibit design, fabricator, and artist Quentin Coyle.

Ms. Barbara McGraw headed our education and graphics work. Barbara was notably skilled in developing kid-friendly features as well as handsome and user-friendly interpretive graphics and for several years she managed two other zoo interpretive specialists and graphic artists, Ms. Alice Domert, and later Ms. Polly McKenna-Cress. Later Barbara completed her career heading the graphics and exhibits department at Philadelphia Zoo and Polly still teaches museum exhibit design at the University of the Arts in Philadelphia.

I enjoyed working with and learning from them, doing everything from copy writing to illustrating interpretive graphics, in addition to my general work organizing and writing project proposals, master plans, detailed construction specifications and legal contracts, all in collaboration with outstanding colleagues. We had the first full-service zoo design firm in the world, I believe, combining architecture, landscape architecture and graphic/educational design, with collaborating animal behaviorists, ecologists, and engineers on call.

In 1994 CLRR had serious financial difficulties, The Philadelphia office did well, but the New York office, with high overhead costs and less work, was operating at such a loss it was sinking both ships. We made the difficult decision to cut Geoffery Roesch's New York office and staff free, giving them all their clients and other transitional benefits. We felt we were being generous, but it was heartbreaking to lose our loved, talented, and respected New York friends and colleagues. During this change Rodney Robinson left to open his own firm in Delaware specializing in estate and botanical garden design. Urban planner and architect John Rogers, another of Gary Lee's classmates, became our new managing partner. John oversaw the management transition and set us on a financially sustainable and rewarding footing. We three partners became Coe Lee Rogers simplified into CLR design. During the twenty-year period I was with them CLRdesign designed over ninety project for forty-three zoo and botanic garden clients, winning six exhibit awards in various categories from the American Zoo Association. The firm retains this name and a dominant presence in the field to this day, over thirty years later.

Deciding to Move to Australia 1999. My wife Susan and I began considering if it was again time to move on. CLRdesign was well positioned for my retirement. Partner John Rodgers' excellent business planning assured a smooth ownership transition. I was professionally discouraged by the multiple spurious yet serious lawsuits we had been hit with and expected more in the future. Susan and I both were concerned with the polarization of American politics. I believed deeply in collaboration and compromise, both in business and in politics. However, since the Regen Administration moderates had been cast aside by what I called "the warrior caste" on both political factions. Susan's dog showing and breeding business was at a point of inflection as well. But if we were to leave, where should we go? The USA was becoming too crowded. Breeding show dogs required living in the peri urban fringes with endless commutes. Australia seemed the reasonable destination. The language and culture were unique and yet similar. Geographically, Australia is about the same area as the lower 48 US states but with less population than Southern California. Financially, the favorable currency exchange rate meant that everything in Australia we purchased with our US dollars, including property, would be discounted by one-third. I had already made three working visits to Australia and enjoyed what I had seen and people I had met and confirmed I could find exciting work opportunities.

During my second visit to work at Taronga Zoo on their Elephant and Coastal Precinct Exhibits we arranged for Susan and daughter Alyssa to join me during a break between design sessions. After showing them around Sydney we drove south along the coast, turned inland visiting Mt Kosciusko, Australia's highest peak, of 2,228 meters (7,310 feet). We also visited Canberra, the national capital, and the Gippsland lakes. Our destination was to visit the Healesville Wildlife Sanctuary northeast of Melbourne. This is a native animal park operated by Zoos Victoria. I had read about it thirty-four years earlier when working on my university thesis. I had friends there including David Hancocks with whom I had collaborated on the Woodland Park Zoo Long-Range Plan.

On Thanksgiving Day, 25 November 1999, we drove into Healesville Victoria and happened to park next to the Brown Real Estate Office. Glancing at their window displays we saw an interesting-looking property being advertised. On a whim we entered and met with sales representative Ms. Jill Olive. The six-acre hillside property looked promising, and we decided to visit it with Jill. After exploring the property, enjoying the wrap-around mountain views into Yarra Ranges National Parks and the comfortable residence, Susan and I decided to purchase it on the spot. Daughter Alyssa concurred. The next day we visited a local lawyer, confirmed non-citizens could purchase property and commenced the financial and legal paperwork. I then flew back to Sydney to complete my consulting at Taronga Zoo and Susan and Alyssa drove back to Sydney visiting nature parks and then flew back to the USA. While in Sydney I negotiated the final cost of the property with the owner. The sale was completed even though we had no assurance we would be granted permanent resident visas by the Australian government. Since we would not be able to even attempt to emigrate for some years, the real estate office managed the property for us as a rental, with excellent tenants.

Australian Immigration application - 2001. During my visit to Sydney, I utilized the services of an Australian immigration lawyer. The first step was to apply for a Permanent Residence Visa. An Australian citizenship application could be made four years after becoming a permanent resident. Government immigration visa policy favored active professionals and self-employed small business operators, but only those under the age of 45. Financially self-sufficient retired people were welcome but could not be employed or self-employed. The government feared older people would take advantage of the excellent public health system without having paid for it during their working lives. There was only one category I might qualify for, “Distinguished Talent”. This was intended for those of proven superior ability in fields not well represented in Australia. Was I confident enough to apply as a distinguished talent? It was the only immigration opportunity for us. While Australia had excellent landscape architects, there were few qualified to design cutting-edge zoos, as proven by my recent history of being imported to do Australian zoo projects. I prepared an impressive portfolio of work and media coverage and gratefully received letters of support from three leading Australian zoo directors. Importantly, Hassell Architects, who frequently sponsored foreign architects as employees, very kindly agreed to sponsor me as “an eminent person” even without

being employed by them. Of course, I enjoyed many later collaborations with Hassell both before and after receiving their support. There were two other required steps. Susan and I must pass health tests which could be completed in the USA, and we must pass a national security evaluation by the FBI. We had all the required material in the immigration lawyer's office in early August, just before he went on a four-week holiday. He submitted our application for the FBI report on Sept 18, one week after 9/11 New York World Trade Center attack. The FBI was inundated with priority security check requests. We received FBI clearance about nine months later and our Permanent Resident Visas arrived about a year after filing.

Leaving CLRdesign - 2003. John Rogers, CLRdesign managing partner, began to worry about transitioning our firm's management as we founders reached retirement age. His study began in about 1998. John researched past examples and hired a strategic planner in this field. This expert interviewed all twenty or so employees, asking each of them who in the firm they would look to for future firm leadership if partners Gary Lee, John Rogers and I together were hit by a bus and were suddenly gone. Each employee answered "No one!", showing we had installed followers rather than leaders in our senior management positions.

John's expert noted there were two common architectural business transition models. In one, architects who are good at business and marketing hire good designers, who may come and go, to develop their practice. The second model is for charismatic young designers to leave larger firms to open their own design firms. This describes our firm. We have hired good managers and technicians to support our designs rather than promising young designers who would compete with us. This meant that to replace ourselves we needed to advance mid-level designers with leadership potential over senior level managers who did not show strong design and business leadership qualities. We accomplished this with John's guidance over a six-year period and were very sad to lose the passed-over staff whose dedicated and effective service we deeply appreciated. I tell you this now as a lesson learned for future designers planning to open their own firms. Business decisions can be hard and successful transitions take time. I have often observed this among our client organizations and we experienced it firsthand.

I officially left CLRdesign in 2004 and John Rogers retired soon after. I am pleased to say that now, twenty years later, our process has been successful. The present version of CLRdesign is headed by co-founder and senior advisor Gary Lee, with Mark Beauchamp, Greg Dykstra and Gregg Leicester. The firm we founded in 1983 is prospering and remains a leader in the zoo design field four decades later.

Leaving America in 2004 involved fixing up and selling our property and vehicles, arranging shipping and quarantine for our three dogs, and shipping household goods. Susan managed all of this for us while I sold my interest in CLRdesign, finished projects, and required road trips, and traveled to Japan for the SAGA International Primate Conference.

Saying goodbye. My return travel from Japan took twenty hours. When I arrived in Philadelphia I stayed in a downtown hotel because Susan, as planned, had sold our house while I was gone. She was attending out-of-town dog shows. I returned to the CLRdesign office for a few days to finish work and enjoyed a wonderful farewell party. Geoff Roesch, my old New York partner, and his wife Marcia travelled down from New York to see me off. What a pleasure it was to see them again.

The next day I flew to Pittsburgh and visited the zoo with Director Dr. Barbara Baker. I was pleased to see how well our exhibits had matured since they were built twenty-two years earlier. The next morning, I attended my final meeting with the Phipps Conservatory staff where my colleague Jeff Sawyer presented our detailed exhibit model.

At 12:30 in the afternoon I said goodbye and met Susan, who had driven there from her dog show circuit with our three basenji dogs. We began our twenty-two-day cross-country farewell drive to California on our way to Australia.

We organized our tour to visit past projects enroute, and to drive through the only two US states I hadn't yet visited, Alabama and Mississippi. I could then brag that I had visited all fifty US states. Stops along the way included Louisville Zoo, and Chimp Haven (then under construction in Louisiana), as well as the Grand Canyon. We then drove to Los Vegas to see the aquarium in the Mandalay Bay Casino, which was closed when we stopped by. Entering California, we stopped in the Los Angeles area for our dog's final physical examination. We left them with our shipping agent to fly to Melbourne the next day and begin their required six-week Australian quarantine upon arrival. We then visited Aqua Caliente, my favorite desert oasis near Palm Springs on our way to visit my older brother David Coe in Twenty-Nine Palms. Next we drove north across the Mohave Desert where I hiked and camped as a child, to visit my sister Emily Diggles in Lake Isabella. We visited the giant Sierra redwoods, combining family farewells with favorite landscape farewells. Finally. we drove south to San Diego to visit Susan's family and our daughter Alyssa and have a last look at San Diego Zoo.

On 17 December 2003 Alyssa drove us on a leisurely and scenic drive up the Pacific coast to Los Angeles. We then flew to Aukland (crossing the Date Line) on New Zealand Air and on to Melbourne, arriving the evening of the 19th.

The Australian Phase. Here we were at last. Exhausted, we slept at an airport hotel. The next day we rented a car and drove to the empty house we had purchased four years earlier in Healesville. Our kind neighbor, Mr. Frank Orenshaw, greeted us at the back fence. We met when we surveyed the property and corresponded from time to time, informing him of our progress. Knowing we would arrive too late in the Aussie spring to plant a vegetable garden. Frank had added several rows for us in his own garden. Frank was a retired diesel truck mechanic, lumber jack, masseuse, wood worker and pilot. He had traveled widely in Australia and subscribed to Australian Geographic Magazine. Frank taught me how to use and sharpen a chainsaw and

helped me buy my old ute (Aussie pick-up truck). I couldn't have found a better guide to rural life in Australia.

During the weeks we waited for our furnishing to arrive from the USA we had the carpeted floors replaced with local sandstone paving, planted an orchard, and began building our gardens, beginning with a vegetable patch. Since Susan and I were both garden designers, we divided areas of design responsibility. I took the long entry drive, areas in front of the house and the large open paddock and woodland areas (about two hectares, five acres). Susan oversaw the 0.6 hectare (1.5 acres) intensively developed garden below the house. I quickly fenced much of the property for our three basenjis and Susan soon joined the local basenji club and resumed her dog show career. She continued to support the American club with breeder information and training and annually traveled back to join her friends in dog show circuits in the USA.







Figure 124. Upper image: property when we purchased it in 1999. Middle image: view of oval lawn in 2022 from about the same area but looking farther to the left, after over twenty years of our design, construction, and maintenance work. Lower image: recent aerial view of our property from Google Earth.

We set up my Jon Coe Design (JCD) consulting business in a spare bedroom and Susan managed the paperwork to get the company incorporated. I purchased my first computer and Susan instructed me in its use. I had been one of only two professionals at CLRdesign without computer skills. I had put off learning because I could produce work so much faster freehand, and I had a secretary to do my typing and spell checking. This was the time to catch up. Now, twenty years later, I can do basic computing, but I ask Susan for help frequently and she does technical work like publishing and designing my website.

My Jon Coe Design business plan was simple. I would spend one-third of my time working on planning and design projects, one-third on communications, including emails and publications, and one-third of my time gardening. These divisions certainly did not work out on a daily or weekly basis. For example, during my work with the United Nations in Afghanistan described earlier, I worked fourteen-hour days for four to six weeks each visit. But then I would return to work in the garden and on communications for several weeks. Over the past twenty years this three-way allocation has been very satisfactory.

AZA & ZAA. My long relationship with the American Zoo and Aquarium Association (AZA, previously AAZPA) was uncomfortable. Membership was limited to those professionally employed in a management role in a member zoo. Zookeepers had their own active national organization, so a clear separation between management and labor was and remains recognized. Commercial members like me were not allowed to hold positions in the organization or to vote. We were often treated like underclass purveyors by many old-school members. We were expected to pay very high fees to have product display booths in the commercial hall and buy drinks and host dinners for real members. I refused to play this expected underclass role. Fortunately, newer members like Dr. Terry Maple and many of our clients supported me and my ideas. I was allowed to present a paper at my first conference in 1983, only the second commercial member ever allowed to stand at the speaker's podium. Every year at annual national and regional conferences I presented technical papers, careful to avoid any commercial appearance and developed a following which filled meeting rooms. Later I organized panels of speakers around an important topic, but, being only a commercial member, was then forbidden to moderate the panel I had organized. Gradually, more commercial members, consultants in academic fields such as education, were welcomed as speakers. Today the AZA even has an optional annual award recognizing the contributions of an outstanding commercial member. Gary lee was deservedly so honored eventually.

After relocating to Australia, I attended my first Zoo and Aquarium Association (Australasia) ZAA meeting held in Christchurch NZ. As a commercial member I still couldn't vote or hold office but was made completely welcome. I happened upon a group of members during a lunch break working on important and controversial regulations requiring accreditation inspections. These were to be introduced in the upcoming business meeting. I was invited to join the discussion and several of my suggestions were included in their amendments. A similarly important discussion among AZA members would have been held in the backroom and certainly not open to commercial members. In 2005 I was invited to be a member of the annual ZAA exhibit awards jury, which has occurred four times since. I've also given many ZAA conference lectures.

Daughter Alyssa joins us in Australia. One year after our arrival daughter Alyssa also emigrated to join us. Being a highly qualified chemotherapy nurse, she was on the

Immigration Ministries desired occupations list and she had already been hired by a major Melbourne hospital who sponsored her. She continued her education, earning her master's degree in nursing. Aalyssa later resettled in Brisbane as a project manager for a software firm working with hospitals around Australia installing systems for integrating and managing chemotherapy data.

Black Saturday Bushfire - 2009. Our home in Healesville, Victoria, like much of Australia, is in a very fire prone landscape. Australian climate is influenced by the interplay of the El Nino climate oscillation in the Pacific Ocean, and the Indian Ocean dipole. It has two climates: "The Dry" (less than 550 ML per year here) and "The Wet" (over 1000ml per year here). In 2009 we had endured twelve years of "The Dry." On February 9th, after five days in the mid-40's C (113F) the temperature was 46C (116F), warmest day ever recorded here. Strong winds were gusting out of the northwest. Wildfires started by powerline failures rushed towards us in ember-spreading leaps 10 kilometers long, hilltop to ridge, often jumping over valleys. The fire was so directed, it resembled a conveyor belt of flames, very fast, very hot and not very wide. Unstoppable. Hardened by generations of bushfires, may Aussies "stay and defend" their properties. This works for some rural properties in some fires, but the intensity of this fire was off the scale. I was wetting down our property when chard leaves and twigs began to rain down. Then a 5m (16.4 feet) long warm ribbon of chard eucalyptus bark spiraled down in front of me. The bounding flames had reached the western edge of town. I watched it alight in the distance from our hilltop location. We were packed to leave when a neighbor told us that only one of the five roads out of Healesville was still open. The others were already blocked by the fire.

I realized the future is more important than the past. It is more important to save ourselves and our futures than to save our things, our past acquisitions, however memorable. We escaped on the remaining backroad, and it was also closed soon after we passed the last checkpoint. Just as we were leaving around 6 pm the driving northeasterly wind turned ninety degrees toward the northwest. Healesville was saved. Kinglake, Marysville, and several smaller hamlets were destroyed. 272 people lost their lives on Black Saturday 2009. Close to our home, The massive pyrocumulonimbus clouds towering above the fires caused lightening to set fire to Mt Riddell, the high ridge only a kilometer from our property. But the fire, now burning north, was moving away from us.

We stayed two nights with a friend in the suburbs, returning each day to check on conditions. For the next ten days the fire, now formed in a broad but less intense band, moved into the national parks, watershed forests and timber properties in the ranges beyond us. Nevertheless, I rose several times each night and climbed a ladder onto the roof of our large shed for a territorial view to assure myself the wind had not reversed the fire back toward us. When a cool change came with light, drought-breaking rain, 400,000 hectares (nearly a million acres) were burned. The climate change augmented Black Saturday bushfire was so intense that a new higher category, "catastrophic", was

added to the fire severity rating scale. Top-down fire management systems were turned upside down, with on-the-ground teams leading local decision making. Soon after these events the Dry turned again to the Wet for the last fourteen years. Now, with dense regrowth vegetation everywhere, we await the next big fire as we enter a new dry period.



Figure 125. Black Saturday bush fire as seen from our Healesville property about two kilometers (1.2 miles) away.

Alyssa and Mark's New Zealand Wedding - 2015. Life and travel were not all work related. Our daughter Alyssa took up endurance sports, starting with long-distance swimming and graduating to Iron Man Triathlon competitions. These include an open water swim of 3.9 km (2.4-miles), plus a 180.2 km (112 miles) bike ride and a 42.2 km (26 miles) marathon, a total of 226.3 km (140.6 miles), as a continuous twelve-hour event. Alyssa completed all nine of the trials that she entered. Susan and I went with her to events followed by recreational travel in northeast and southwest Australia, South Africa, and New Zealand, as well as attending locally held competitions. As a result of this arduous passion Alyssa met Ironman champion Mark Smoothy, who has now completed over fifty-five Ironman-length competitions. Mark proposed marriage to Alyssa at mile-20 of the marathon stage at the Melbourne Ironman in 2014 and they were married at mile-20 of the marathon stage Ironman at Lake Wānaka on South Island New Zealand.





Figure126. Upper row from left: daughter Alyssia completing the marathon leg of the 2012 Ironman Triathlon in Busselton Western Australia. Formal wedding photo of Mark and Alyssa at Lake Wānaka, Me as father of the Bride, I am “giving away” Alyssa dressed in her special bridal-designed running outfit after just completing the first 204 km of the Ironman competition. How can she look so fresh! After the ceremony the now-married couple and their friends finished the last 22 km of the marathon run. Upper right: Susan radiant as both Mother of the Bride and Bridesmaid. Lower photos: I’m enjoying my speech of fatherly advice at the wedding banquet, as if they needed any instructions on living a full life. Alyssa with baby granddaughter Estelle. Estelle growing up actively. She will be an athlete like her parents. This year Alyssa and Mark reconfirmed their marriage vows during the 2025 half-Ironman again held at Lake Wānaka, NZ.

As a sad conclusion to this chapter, Susan died of pancreatic cancer in 2025.

CHAPTER TEN - LESSONS LEARNED.

Introduction. Back casting over four score years of active life and three score years of formal education, travel and work what have I learned? I will begin with suggested foundations, problems and opportunities, my definition of “good design” and design process, visions of zoos of the future and finish with some parting advice for global generalist designers. While some of this advice is directed towards the specific field of zoo design, most applies to planning and design in general and environmental design in particular.

Years of intensive travel. An important lesson is that those engaging in this type of work must expect significant time spent in airports and on overnight flights. In 2007, for example, I made eleven international trips, followed by eight in ‘08, six each in ‘09 and ’10. As a more extreme example, in 2013 I recorded 120 days of international travel including South Africa, Afghanistan (two trips), USA (two trips), Brazil, Indonesia (two trips), plus many flights around Australia. I have circled the globe on two occasions. As international travel connections become more available and convenient and especially as online communication to even remote areas improves, it is likely that both national and international travel time will be reduced in the future. Nevertheless, there is no substitute for being on the ground with local colleagues learning firsthand from both the landscape and the people you are serving.

Ethical foundation. Even as a student you can ask yourself where is my North Star? Who do I serve? Design objectives can be achieved meeting client’s needs, but are these needs and is this design worthy? Does it also serve the diverse needs of wider stakeholders, people, animals and wild nature? What is the measure? Worthy design is founded upon your **ethos**, your character, as demonstrated by your work, guiding beliefs, attitudes, and aspirations. What are your ideals? **Pathos**, your passion and **Logos**, your logic and knowledge, are also essential to success, but they are guided by **ethos.** Perhaps it is easier for a senior practitioner to view these considerations retrospectively. However, students and emerging designers will benefit from exploring such questions throughout your careers.

These ethical epigrams, mottos and admonitions have guided me.

- *“Collaborate in the creation of delightful and sustainable habitats for people, plants and animals.”* This is how I described my work on my website.
- *“Exceed expectations!”* One of my favorite mottos.
- *“Good design joins inspiration, empathy, and science in service to someone or something.”* I’ve used this assertion in several academic papers to remind scientists there is more to design than fact-based policy and to caution designers to support their claims with evidence.
- *“The future is not some place we are going to, but one we are creating. The paths to it are not found but made, and the making of these pathways changes*

both the maker and the destination." Dr. Peter Ellyard "Commission for the Future. I use this quote to introduce planning reports.

- *"Ultimately, the goal of sustainable landscapes is the transformation of culture – the taming of technology, the emergence of a new environmental ethic, a new measure of life quality, and a substantially broadened sense of community including not only humans, but all of life."* Robert Thayer (1994)[1]

Absolutist or incrementalist? What is your stance on things you want to change? Appling the philosophical (and not the political) use of these terms, these quotes are from two excellent zoo design absolutists.

"Rather than settling for incremental, iterative improvements, it's essential to seize the rare opportunities each new habitat represents to take a fundamental leap forward in animal welfare." Jake Veasley - Care for the Rare. Jake once told me:" *Do it right, or don't do it at all."* Available time, financial and technical resources, policies, staff, design and construction capacities all place limits on achievable results. Sometimes, when finances, knowledge and human support resources are limited, the best result, according to Jake, is to *"Do Nothing."*

"Don't copy other zoos. They have nothing to teach us. Nature is the norm. Copy nature." David Hancocks.

My first encounter with this design philosophy was when I met David Hancocks in 1975 to collaborate on the Long-Range Plan for Woodland Park Zoo and their gorilla exhibit. I began the project wanting to make the zoo better, based upon improving zoo facilities. David the absolutist admonished us to forget what other zoos had done and seek answers and inspiration from nature. Dennis Paulson, our ecological advisor, and Grant Jones, our nature poet, became excellent guides. Thus, the gorilla, African plains and other exhibits we designed revolutionized zoo design theory and practice by doing it right following nature. We compromised by improving the animal's overnight accommodations areas better than other zoos had done, but not reconceptualizing them as we had done with exhibit areas. It didn't occur to us then to reinvent these areas as well. Today, designing for optimal animal welfare day and night in all seasons is a preoccupation of mine. I am pleased that many of the previously described projects I contributed to with Jones & Jones and CLRdesign, were all-or-nothing projects, especially the gorilla habitats at Zoo Atlanta with Terry Maple, Northern Trail at Woodland Park Zoo and the Zoo360 overhead trail systems done with Andy Baker at Philadelphia Zoo.

The more zoo exhibits I helped to design, the more I became an incrementalist when I believed it necessary. The results will be great improvements, if not optimal. As an example, in 1999 I chose to help design the new elephant exhibit at Taronga Zoo in Sydney, knowing their area was not large enough and their management system was not ideal. David Hancocks, the absolutist, publicly opposed moving young elephants

[1] Thayer, R. 1994, Gray World Green Heart, John Wiley & Sons, Inc., New York.

from Thailand to this new exhibit and to the new elephant facility at Melbourne zoo in 2006 on the grounds that neither zoo could provide an ideal new facility and management program for these young elephants. To the contrary, my design at Taronga Zoo and the excellent design of the new Melbourne facility introduced groundbreaking innovations such as aquatic-aerobic exercise to zoo elephants (Taronga Zoo) and elephant rotation (Melbourne Zoo). My design also allowed the zoo to eventually transition to an ideal management system. My incremental approach provided a very good (but not ideal) home for these elephants for twenty years, until they were relocated to join the large herd at Western Plains Zoo. The same can be said for the elephants at Melbourne Zoo where three elephant calves were born. This growing herd has now been moved to a very large new facility at Werribee Open Range Zoo. Thus, I supported incremental growth over time.

I regret some mistakes I made designing improved exhibits which were still too small. I should have opposed the unrealistic requirements of some zoo clients trying to fit too many species in too small a space for example. Even incremental improvements must be significantly better than previous conditions. But overall, I am pleased my incremental approach did much good, while I support the absolutists for demanding an ever-higher standard of zoo design and animal care.

Problems and opportunities. It is easy to remember barriers encountered and list them as problems. Seeing them as opportunities is more difficult and more useful.

Innovation is one of my passions when it supports my ethos of solving real needs with broad-based benefits and long-tern sustainability. What are some of the problems I have encountered obstructing positive progress through innovation?

Fear of failure. From infancy we are taught not to be wrong according to prevailing standards. “Colour within the lines of the coloring book. Spell words correctly. Know your place.” Fit in your socially, educationally and economically predetermined box. Failure to comply with one-size-fits-all rules is to be avoided. Failure itself is to be avoided. Yet failure is the natural cost of learning in the “learn-by-doing” growth model. Today we hear much about the importance of developing resilience, yet resilience is simply the ability to overcome failure resulting from obstacles and setbacks. I clearly recall three professional situations were fear of failure obstructed innovation.

- When first working with Zoo Director Howard Hayes on planning new exhibits for the Pittsburgh Zoo in the 1980’s I suggested an innovative exhibit idea. Howard’s immediate response was: *“Where has this been done? I wouldn’t want to have anything to do with it if it didn’t work!”*
- During a planning workshop at the Al Ain Zoo in Abu Dhabi I suggested a novel advance in facility design and animal management. One colleague on their advisory panel and director of operations at one of the world’s major zoos, responded: *“I don’t like change. Change causes problems!”*

- *“Why risk it.”* While designing the chimpanzee exhibit at Detroit Zoo I had specified planting thousands of horse radish roots to create a tropical appearance at ground level. The zoo veterinarian found a single citation of toxicity from this plant when fed to hogs by the bushel. I countered that horse radish is a staple of many human cuisines with no concerns of toxicity. Her response was: *“Why risk it. Have them all removed.”* Many of these plants survived and have not caused any damage to my knowledge. Many animal management standards are directed at removing all stress and danger to zoo animals, when overcoming obstacles is essential to developing natural competence and avoiding welfare dependency.

Copies of copies. In my travels and in some cases while studying at Harvard University, I encountered educational systems based upon the old master-disciple model. Students copy the master until eventually becoming a master themselves. When teaching at the university of Pennsylvania there was a talented Thai student from this educational heritage. During one of my class studios, he kept coming up to me asking: *“Is this how it is done?”* I would reply that this was his project to design. He must decide the best way to solve this problem himself self.” He could not understand that he had permission to be creative in his own way and continued to come up to me several times with the same question: *“Is this how it is done?”*

Thus, it is no surprise that many zoo and other facilities are nearly direct copies of earlier models. I expect this is a problem in most fields. Both failure and learning are minimized by copying. Confidence and courage are required to pioneer. Earlier examples of our work at zoos in Seattle, Atlanta, Los Angeles and Louisville are examples of successful innovation. My 2012 North American Zoo project tour confirmed their success over decades of use and generations of operators. Afghan colleagues confirm our innovative initiatives in eco-planning and sustainable land use continue to spread despite Taliban takeover, and UNEP departure.

Best practice is defined as methods accepted as being most effective. I once received a project brief from a prospective client stating: “We aspire to best practice”. This was a limiting aspiration, an admission they were below par with only enough ambition to catch up with the standard. During my years with Lombard North Planning in Canada, Jones & Jones and CLRdesign in the USA, it never occurred to any of us to catch up. We aspired to break new ground exceeding all existing standards, especially among zoos. We invented best practices without considering it.

Once, feeling a little overconfident, I suggested to a client in Dubai that we could deliver his design at any of four levels.

- Business as usual, we will suggest someone else for this work.
- Best practice, a twenty-year-old revolutionary idea the field has caught up with.
- Cutting edge, emerging concepts being tested in one or two other facilities.
- Next generation. Untested ideas we have developed on the drawing board.

In my experience, the time between when we introduced a positive zoo design innovation such as landscape immersion or animal rotation and it being followed by another zoo, other than our own clients, was seven to ten years. By the time this innovation was accepted by the zoo industry as “best practice” was apt to be one-two decades. Therefore, if you follow best practice you may be following a ten-to-twenty-year-old idea. Newspaper photos of the “Tiger Crossing” bridge and elevated trailways we designed for Philadelphia Zoo in 2016, went viral. It was copied immediately and globally, yet I doubt it is considered best practice in standard manuals today nine years later.

Inflexible standards. Standards in all fields intended to remove poor practice also perpetuate existing practice and impede innovation. Standards favor the average and create an acceptable norm while blocking both the worst and the best.

- Standards tend toward requiring higher levels of performance over time. If your plans barely meet today’s standards it is likely your facility will soon be obsolete.
- National standards are set by panels of industry leaders, often from the major institutions with personal and commercial interests, not to make their own facilities obsolete. Alternatively, standards are set by government regulators focused on eliminating offenders rather than encouraging progress. These are rarely updated.
- Area standards for animal exhibits seem to be set within the range of what zoos have provided and can reasonably expect to develop rather than what animals need based upon suitable natural wild habitats.
- Area and other standards are based on present industry practice rather than independent scientific inquiry.
- While standards are clearly noted as minimums, many designers and clients use them as practical sizes, something I have also been guilty of in the past.
- Most animal enclosure standards are given in areas rather than volumes. Square meters of usable areas may be a useful measure for terrestrial giraffes. Volumetric measures would be much more useful for arboreal animals, birds and aquatic species.

Inability to visualize the unfamiliar. Like all youngsters I grew up seeing the world in certain ways, confident that everyone saw it the same way. It was not until my college years that I realized some of us see novel concepts first in mental pictures we manipulate, seeing from many angles and positions or as imagined walk-throughs and then translate and communicate these images into words and illustrations. This is a capacity often ascribed to dyslexics like me. Others first read, see, or hear descriptions and piece together images. Of course, individuals vary widely in their capacity in both areas. While it is the designer’s responsibility to communicate effectively to the client, the inability of a client or user group to visualize the designer’s intent can become a hindrance to progress. One counter to this problem is the client’s trust in the designer’s mastery and character. Looking back, I recall great clients like David Towne in Seattle, Washington, and Satch Kranz in Columbia, South Carolina, who I’m sure didn’t clearly

understand the pioneering and even daunting innovations being proposed yet put trust in their designers and were well pleased with the results.

Design professional as artist. A perennial trend occurs when architects, landscape architects and other design professionals see themselves as artists. This embodies the flawed assumption that as designers we first serve ourselves for the good of those affected by our work. This philosophy presupposes elite designers know what is best for society. This is the elitest-modernist approach I resisted as a student at Harvard Graduate School of Design. Fortunately, many of my professors had a more modest and service orientated approach to design.

Artists use clients and benefactors to achieve the artist's own needs and vision. Design professionals are service providers. Our work is to help our clients satisfy their own needs and obtain their own visions. For design professionals, "artist" is an honorary title awarded, it at all, by users in appreciation for excellent work, beautiful in concept, application, and use. The best service is to design with rather than for clients, including cultural, animal and landscape clients.

Styles du Jour. Novelty drives sales. Planned obsolescence drives sales of the new, while fueling the failing throw-away economy of limitless growth. This is as true in architecture as it is in clothing fashion, sporting equipment and cosmetics. Too often design schools and journals support the latest superficial styles or today's hero designers rather than taking a deeper dive into discovering the most humane, functional, delightful, and sustainable design outcomes.

Generational exceptionalism, the fallacy that everything designed by the last generation was false and wrong and everything designed by your generation is true and superior is a driver of change. Does this result in useful change or just another style du jour?

Management styles. Top-down management speeds up work and supports or limits creativity based upon the risk profile of the leader. Also, their approach may be somewhat one-sided, depending upon their areas of interest and expertise. Several dominant zoo directors (we called them 'silverbacks' after male gorillas. Aquarium designers used the term 'beach masters' after male elephant seals) have done outstanding work and are justly held in high regard. Others have embraced tradition and delayed progress. When frontline operators feel left out of the design process or plans are imposed from above, uptake can be limited. Male dominated top-down management was the universal style for the first several decades of my practice.

Once, while working with Chinese officials on plans designed to create a premier giant panda park, Our Western consultant team began the first meeting, as we would with Western clients, by asking the Chinese management team through our interpreter what their vision for the project was. This question was followed by a long discussion within the client group in Mandrin. Finally, the interpreter conveyed their response that we were the international experts, and we were to tell them what to do. They clearly saw

their job as implementing but not conceiving. the vision and ultimate design. Later, as we explored the Sichuan area (described in Chapter 8, Figure 98) we greatly admired the traditional Tibetan vernacular architecture we encountered in this area of Western China. Our plans envisioned entering through a Tibetan village, then penetrating the mountain forest beyond to observe the giant pandas. One response from the clients was “We don’t need foreign experts to build local architecture.”

Inclusive leadership based upon team-building interdisciplinary discussion and consensus has become more common in Western-style zoo management. This decision-making process usually takes much longer but results are more balanced and more widely supported. In my experience this type of leadership coincided with the immergence of women in leadership positions. Designers do not get to determine management styles of their clients and must find ways to optimize results for their clients and collaborations.

Remote leadership in which the designer has limited access to decisionmakers guarded by official gatekeepers should be avoided. This is why I no longer work for government agencies, large corporations, or royalty unless I have direct access to key decision makers or our government work is in remote areas and local government officials are free to innovate. This was my experience as a US Peace Corp volunteer in Brazil and with the UNEP in Afghanistan.

Designers don’t know the literature. My old friend, colleague, and client Dr. Terry Maple used to say: *“Jon is the only zoo architect who knows the scientific literature.”* Terry, with co-author Dr. Don Lindburg wrote the book “The Empirical Zoo”, making the point that zoo design and management should be based upon science rather than tradition and informal anecdotal observations. In most zoo design projects zoo clients are responsible for preparing project briefs describing both staff and animal needs in detail. However, a particular zoo may only develop a single new primate facility for example, while a zoo design specialist may have designed many, having worked with noted primatologists and thus having more diverse and up to date information than a client zoo. I chose early on to give empirically supported conference presentations resulting in further familiarity with published research on zoo biology, informal education, and visitor studies. Recently I asked my network of zoo designer friends around the world how much they relied on scientific findings, either evaluations published in conference proceedings or peer-reviewed journals and books. All answered they seldom relied on such sources. Why not?

- Zoo clients do not request or encourage research evaluations, saying these are expensive, may take months or even seasons to complete. Clients are keen to move on to their next project.
- I have found published research is compartmentalized into subjects such as animal welfare, visitor studies, education, conservation, and human resources. Integration of research across these specialist boundaries is rare, yet such integration is key to the designer’s success.

- The growth of published frameworks for assessing animal welfare in existing facilities represents a useful trend in identifying problems but offers little insight into creative design solutions.
- Scientific papers exploring perceived problems in animal welfare or other fields are more available. Why are there no papers independently evaluating design award winning zoo exhibits and facilities, suggesting successful strategies to follow?
- For zoo designers, specific terms such as “landscape immersion”, “realistic simulation”, “naturalistic”, “functionally naturalistic”, “modernist”, and such have specific meanings. A leading reptile manager listed five terms ranging from “nature” to “totally artificial”. Yet, I have found researchers using terms interchangeably or imprecisely making their findings less creditable. A standardized glossary compiled across these fields would be useful, but I have not found support for compiling this.
- Lack of prototype testing & reviews. Zoo staff are increasingly designing environmental enrichment devices for entertaining bored animals. Infrequently these are being developed using formative (early) testing using inexpensive prototypes to assess animal responses early and often before investing in construction of durable permanent devices. This is a promising direction, commonly used in museum exhibit design, but rarely involves zoos and even less zoo architects. I have only convinced one client, the California Science Center, a museum, to sponsor such a test.
- **What’s the message?** This question affects a wide range of themed zoo and aquarium activities. I believe it is also important in more mainstream design work as well. How does your park or building design communicate your client’s and the public’s interest?
    - Embedded communications. Everything has an embedded meaning, sometimes subliminal and often unintended. The way we dress, groom ourselves and our speech mannerisms all convey communication about ourselves. I once engaged Ms. Penny Beattie to assist the Nashville Zoo Boosters in their financial planning. Before beginning a public presentation Penny and I were at the head table. I was reviewing my talking points while Penny observed the audience entering the auditorium and finding seats. Penny whispered to me *“See the older woman on the left side of the twelfth row? Note how many people come in and focus on her or greet her. She is the person with real power in this audience…probably old money.”* Penny could *“read people”,* the ways they dressed and comported themselves and were regarded. She read their embedded communications. Good equestrians can *“read horses”* for example, and I can *“read trees”*, identifying distant trees species on the skyline. Really seeing is an important learned skill.
    - Everything we design express messages and good design is intentional about intended communications. I previously discussed landscape immersion design and the extreme realism we employed to ensure the landscape visitors

traversed “looked and felt” just like the characteristic natural habitat of the species being displayed. Our embedded message was *“Wildlife and wild landscape are inseparable.”* You can only understand the animal in the context of the habitat with which it has co-evolved.

- Most zoo exhibits are designed with a mishmash of zoo design clichés such as theme park artificial rock formations defying nature with magical waterfalls emerging from their peaks. I call the most extreme examples cartoon immersion. Visitors are surrounded by cartoon abstractions of nature. The message to most visitors, I expect, is *“This place is a zoo!”*
- When visitors see obviously confined animals pacing restlessly before mealtimes or sleeping the day away they are likely to experience the implied message *“This place is a prison”*. When zoos commonly use terms like *“keepers”, “captive animals”,* and *“animal collections”* in my opinion they undercut their intended message of zoo staff as *“caregivers”*, and animals as *“protected endangered species*” within conservation programs.
- Animal managers, intent on improving the wellbeing of animals in their care, are often keen to add environmental enrichment features. If they work within ordinary zoo exhibits featuring clichéd and mixed messages, adding artificial-looking enrichment features, giant pumpkins, or old cardboard boxes, simply adds a positive message about engaged animals and caregivers or a negative message of excessive clutter. However, when obviously artificial enrichment features like large blue balls, children’s playground equipment or pet store animal toys are added to highly realistic artificial animal habitats they unintentionally undercut the original intentional message, developed with great care and considerable cost, of being transported to a place in wild nature.
- If the enrichment boosters and scientists testing their work simply met with the zoo’s educators and original designers, highly effective and enriching features could be designed and installed using natural materials and mimicking features found in the animal’s natural habit.[2] Too often, rather than supporting the exhibits intended message, caregivers complain that the director won’t let us use enrichment features!
- Research publications focus on the effectiveness of the enrichment feature on the animals without considering ways it’s use affects visitor’s experience. A few studies of public perceptions of artificial enrichment features chose venues where exhibits were not immersive, with one small exception, which was deemed inconclusive.
- Explicit action messaging. While I believe that embedded, even subliminal messaging has educational value connecting to emotional and experiential learning, calls to action whether in terms of visitor behavior or conservation

[2] https://joncoe.net/wp-content/uploads/2021/12/NaturalisticEnrichment2006.pdf

action, must be made explicitly, with implicit support from embedded contextual and immersive features.

How do we communicate? It is the consultant's responsibility to communicate, give and receive information, confidence and assistance with all clients and stakeholders, humans, and animals. What languages, including body language are most effective? How do we work through translators? Answers to these questions are as varied as situations, but all effective communication is based upon respect, empathy, and intention.



Figure 127. Getting down with gorillas. When meeting other great apes, I always lower my body below theirs, sometimes turn my back and avoid direct eye contact, thus following their natural version of good manners. This always brings them forward to investigate me politely (left photo: avoiding aggressive eye contact) or with a measured display of dominance (right photo). Note in the right photo I placed my hand on the windowsill and the orangutan at Louisville Zoo placed his hand next to mine. My behaviour is called "modelling", demonstrating with body language the behaviour you wish to see in the other. Left photo: Luis Soto Rendón, right photo: Marcelle Gianelloni.

Good Design Good design meets or exceeds the symbiotic, reciprocal needs of all principal stakeholders, plants, animals, carers, conservationists, educators, all types of users, business, and community, balancing functionality and delight, underpinned with timely, integrated science.

Planning & Design process. This planning and design process Project Hierarchy Diagram and following description were developed with Andrew Scanlon during our visualization of the BraveEarth alliance he was forming. In the introduction of this memoir, I introduced the diagram of the virtuous cycle around a triangle of learning, doing, teaching (and repeat). Here I use the same concept of a three-step cycle, a spiral through time, but now representing 1) practical action, including internal housekeeping management activities 2) science and technology and 3) communication (publishing, storytelling and other methods). Each step in the planning or design process entails some form of these three integrated stages. Each step may take many cycles including circling back to confirm or enlarge on an earlier step. When that step is completed the cycle spirals to the next stage as the diagram below shows. However, it can also spiral back for further research and revision. Planning is a highly iterative journey. Each step can also be visualized as a reasoned approximation, each step homing in on finding and activating the targeted ideal solution.

The diagram shows moving from initiation on the left to completion on the right for Westerners used to reading from left to right. For languages read from right to left it could be reversed. My first conceptual version of this process was drawn with initiation on the bottom and future completion on the top because I visualize the future as “up.”

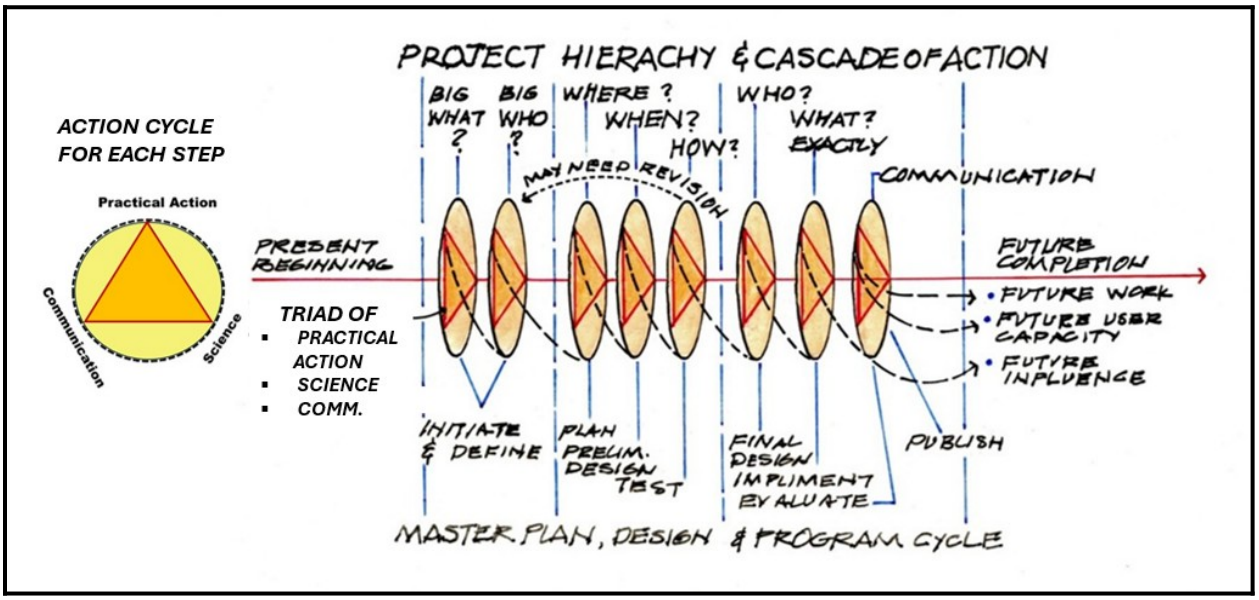


Figure 128. Project Hierarchy and Cascade of Action Design Process Diagram.

First two cycles

1. Initiation & vision
    a. Project evaluation and selection (Is it needed, are we qualified, are we good at it, will we enjoy doing it, can we afford it, will it set a positive new standard (test case - flagship potential?), are their local champions to see it through, what is our chance of being selected?
    b. Mission, Vision, Values, goals, methods
    c. Empathy, having both an emotional and cognitive understanding of the client stakeholders and their needs (the big who).
    d. Define the problem (good problem understanding provides 80% of the solution. The big what).

Second three cycles

2. General discovery (where, when, what)
    a. Initial Inventory (extensive data collection, not too deep yet)
    b. Initial Analysis (identify broad patterns and connections, opportunities and constraints - so what?)
3. Synthesis (creative step, ideation, giving conceptual form - how?)
    a. Preliminary design (develop at least three variations of initial concept)
    b. Formative evaluation (early prototyping and testing and selection of most promising form, direction or strategy)
    c. Documentation

   d. Estimates of time and expense
   e. Client review and approval

Third three cycles

4. Design development to fix and describe intended strategies, programs and objects
   a. Detailed discovery (intensive data and analytical research and for factors affecting initial concepts)
   b. Further prototype and simulation testing
   c. Documentation
   d. Estimates of time and expense
   e. Client reviewal and approval
5. Final design (for constructed features. Will vary for other types of uses)
   a. Design of subunits and overall integration
   b. Documentation
   c. Estimates of time and expense
   d. Client reviewal and approval
6. Contract documents
   a. Contracts, specifications, schedules, tender documents)
   b. Technical drawings
   c. Final estimates of time and expense
   d. Final client reviewal and approval
7. Implementation
   a. Tendering when appropriate
   b. Construction
   c. Operational training
   d. Commissioning and post commissioning modifications
   e. Client reviewal and approval
8. Opening and use
9. Post occupancy evaluation (summative evaluation) and publishing (lessons learned).

Thoughts about the future of zoos. Zoo evolution, like other forms, is branching, and not linear. Past forms will persist or evolve as newer forms emerge[3]. Next generations of designers and their attitudes and audiences are an interesting and often frightening subject. Our early habitat immersion designs were based upon our own experiences actively exploring wild nature alone or with quiet, respectful colleagues. I later discovered such exhibits are ineffective when overcrowded with hurrying visitors, such as tour groups taking quick selfies. I visited the wonderfully designed Madagascar Exhibit at the Bronx Zoo on a Tuesday when zoo admission is free. Thousands of noisy

[3] Design and Architecture: Third Generation Conservation, Post-Immersion and Beyond
FUTURE OF ZOOS SYMPOSIUM, 10-11 February 2012
Canisiuand Fernandesalo, New York

urban youngsters with no solitary experience in nature overflowed the building and the exhibits failed to hold their attention.

Changing audience attitudes. Some time ago I was contributing to a discussion of zoo and museum exhibit design. I described an example of managed habitat immersion design with a concept for a waterhole exhibit with a succession of different species coming down to the water. A younger designer charged that such an exhibit was too boring. He said his generation was impatient and wanted far more action. This may be true for nearly all zoo visitors, especially on busy days at the zoo or aquarium. Most zoo visitors today are urban with little or no previous connection to wild nature. Much popular social media relies on sped-up experiences, and instant emotional payoffs. How will zoos and aquariums respond? Some facilities are developing digital connectivity between quiet natural animal exhibits linked digitally to videos (or future holograms) of the species in action. The Philadelphia Zoo 360 concept providing multispecies overhead animal trails crisscrossing the park almost assures that some species are active overhead much of the day.

Culturally appropriation and insensitivity. Working with CLRdesign in the late 1980's, we designed the Primate Panorama exhibit at Denver Zoo. Our design intention was to show how traditional Africans in tropical environments lived sustainably using local materials as admirable alternatives for our modern high consumption lifestyles. Also, such village architecture would still be seen by American eco-tourists visiting Central African villages. Earlier I told the story of encountering an older woman standing outside the zoo service gate. I saw she was dark skinned wearing an African print and was in some sort of emotional distress. I approached her and asked what the problem was. She said she had recently immigrated from Ethiopia. When she saw this thatch hut in the zoo she was moved to tears. It was just like her home village!



Figure129. Recreations of African village buildings. Left: Denver Zoo Primate Panorama exhibit complex. Right: Louisville Zoo Gorilla forest African village. Both were intended to be respectful representations of sustainable cultures living with wildlife, with zoo visitors “transported to another place and time.”

Recently an American professor[4] charged our design firm and Denver Zoo as being racist/colonialist because we built a simulated African mud-walled thatched-roofed hut for the Denver Zoo Primate Panorama exhibit. He charged we presented Africans as primitives and thus (in his mind) inferior.

At the time we used Irish thatchers for the construction work in Denver. Later at Louisville Zoo we designed an African themed safari lodge café and nearby African rural village using Zulu thatchers. Their wives harvested and dried the reeds and the men travelled to the USA to install the thatch. They did excellent work, singing joyfully together as they thatched! Their work became a popular folklore exhibit.

I designed the African Plains exhibit at Woodland Park Zoo with the principal overlook above the grass-roofed zebra holding building. Much later Mr. Pat Jankowski was hired to design a simulated African village at the overlook. He designed a village school with windows overlooking zebra and giraffe. This was an accurate recreation of an actual African village school. Today this village has been closed as “culturally inappropriate.” How will future zoos and designers deal with such culturally charged environments?

As visitor studies expert Steven Bitgood pointed out, an essential feature of Immersion design is the theatrical and emotional translocation of viewers to “another time and place." They are emotionally transported from the city zoo to the (simulated) African savanna, Sumatran rainforest, or Masoala Reserve in Madagascar for example. But as soon as designers add cultural artifacts or buildings representative of that time and place someone is apt to be offended and charge “cultural insensitivity.” Yet it is the village edge where human-wildlife conflicts occur and where sustainable habitat conservation action is required.

Summary messages for a global audience of generalist environmental architects, landscape architects, engineers, planners, and zoo designers, as well as those teaching or seeking such services.

- Follow your passion, enjoy the exaltation of creatively “being in the flow”, taking satisfaction from challenging work well done, whether recognized or not. Awards and recognition are rewarding but fickle.
- Clearly define elevated and ethical goals,
- Dedicate yourself to the service of others. Help clients and coworkers improve their competence and realize their dreams by your example and define your own success accordingly.
- Design together with them rather than for clients.
- The essence of communication is intent. If you truly want to exchange communication you will find a way.

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[4] Why are there African huts at the zoo? The racialized spectacle of conservation
Jessie K. Luna, Department of Sociology, Colorado State University, Fort Collins, CO, USA
2023. Environmental Sociology https://doi.org/10.1080/23251042.2023.2218950

- It is the designer's obligation to communicate with clients in ways they understand.
- Synergy, reciprocity and choice are keys to successful interactions.
- Good design balances empathy (emotional connection), intuition (subjective insight), art (application of creative skill and imagination with emotional power), and science (cognitive inquiry and rigor, testing and knowledge).
- Use design to elevate practice and thought leadership rather than designing down to satisfy transient popular styles or limiting client expectations.
- Exceeding today's standards, envisioning and manifesting tomorrow's "best practice."
- Question authority.
- Define the problem. If traditional solutions are insufficient, turn the problem on its head. Seeing it differently can lead to solving it differently.
- When faced with opposing dualities, find a third path.
- Connect the boxes, build bridges not silos.
- Form a collaborative design team with both policy makers and direct users, including members knowledgeably able to champion the interests of both human and non-human stakeholders.
- Follow an open, iterative "learn by doing" design process utilizing early mockups and prototype testing.
- Carry out and publish post occupancy evaluations integrating benefits (or not) to all stakeholders. Share lessons learned from failures as well as successes.
- Information management: the best thing to do with information is to share it.

This narrative has recalled many of the bridges and passages I have collaborated in finding or building and then crossed between traditionally distinct and distant professions and cultures, enlarging the vision of what landscape architects and environmental planners can do. The tools of my trade have gone from hand drawings, bedsheet posters and plans, and long international flights to computer graphics, GPS, GIS, and global virtual conferences. Soon planning and design will be further accelerated by Artificial Intelligence. Will we use these tools wisely or will these tools use us? Who will guide these processes and outcomes? Personal skills in communication, empathy, insight, trustworthiness and service will never become obsolete. Planners willing to be a little different, combine old wisdom with new knowledge, guided by mutual respect, reciprocity, informed creativity in process and product and having a little courage will be needed more than ever. Who will follow, or better still, invent their own paths, identify opportunities, build bridges, passages and networks, develop action strategies making the world a better place for people, plants and animals? What are you waiting for?

END.

APPENDIX ONE.

PUBLICTIONS

While developing planning and design projects I also found time for writing, lecturing and publishing on related topics. These are essential features of the learning-doing-teaching triad. Preparing and delivering publications and lectures embodies all three elements, and the resulting teaching impact on the readership and audience supports their learning and doing adventures.

My first attempt at scientific publishing was the preparation of my master's thesis at the Harvard Graduate School of Design in 1966. For the next decade most of my technical writing was in the form of master plan publications for large Canadian provincial parks. As described earlier, my collaboration with Grant Jones, David Hancocks and Dennis Paulson resulted in the award-winning 1976 Woodland Park Zoo Long-range Plan, now an international zoo book collector's prize. While I was a co-author, most of the text and many of the illustrations were my work.

My most influential paper Design and Perception was published in 1985 in the Journal of Zoo Biology with the support of Founding Editor Dr Terry Maple. It described ways to use human behaviour and psychology to design more arresting and memorable exhibits. Other authors use it as the standard reference explaining "immersion design" and it has received over 160 citations and over 10,500 "reads" on Research Gate as of January 2024.

Others of my papers I consider most influential include:

- "Zoo Animal Rotation: New Opportunities from Home Range to Habitat Theater" 1995.
- "Increasing Affiliative Behavior between Zoo Animals and Zoo Visitors"1999.
- "The Unzoo Alternative" 2005.
- "Third Generation Conservation" 2009.
- "Embedding Environmental Enrichment into Zoo Animal Facility Design" 2019.
- "Design and Architecture: Third Generation Conservation, Post-Immersion and Beyond" (Future of Zoos) 2012.
- "Confronting Back-of-House Traditions: Primates as a Case Study" 2022.
- "Welfare Through Competence: A Framework for Animal-Centric Technology Design" 2022.
- Jon Coe Design. Susan helped me design and code this zoo design text as an interactive website in 2021.

As of mid-2025, I've published eighty-three papers related to zoo planning, design, and management. Subjects include zoo history, design methods and styles, zoo horticulture, animal welfare, including environmental enrichment, design for aging and infirm animals, primates and great apes, visitor experience and zoo education, use of computer technology in zoos, and zoo management systems. Most have been delivered to zoo conferences, many published in conference proceedings. I've also authored or co-authored twenty-three peer-reviewed papers and published book chapters. At this point the Research Gate website records over 35,000 "reads", 532 citations, and 26 recommendations on my informal and formal papers available there and not copyright protected by original publishers. These scores rank in the top 87% of papers published on Research Gate.

Inventing the Environment published 2003. A year previously, Dr. Joyce Bedi, Senior Historian from the Smithsonian Museum of American History in Washington DC, was organizing historic tours of America's capitol. She invited me to lead a tour of the National Zoological Park from the perspective of the history of zoo movements and trends, rather than the history of specific zoo buildings. I took the train from my office in Philadelphia to Washington DC, had an interesting lunch discussion with Joyce and led her tour. Some months later Joyce again contacted me about a new book they were developing through their Lemulson Center for Studies in Invention and Innovation. This book was to be called "Inventing the Environment" highlighting positive examples of environmental invention and innovation. There would be sections relating to different subjects such as "What Role Does Innovation Play in Urban Landscapes?" and "How Do Innovations in City Planning Shape Environments?" Each section was to have two essays and a profile of someone demonstrating positive innovation in that field. There would be six sections and six practitioners profiled. Dr. Michael Robinson, recently Director of the National Zoo and most outspoken proponent of "Bioparks" combining zoos, botanical gardens, and science museums (what we were attempting with the California Science Center) would write one of the essays in the section on Urban Landscapes. Would I be willing to be the innovator profiled in the first section? Of course I would! Biographer Martha Davidson then interviewed me and wrote a ten-page biography including one of my poems on creativity. "Inventing the Environment" was published in 2003.

LECTURES

I've had the opportunity to present lectures at universities and conferences in twenty-one countries. Venues included not only zoo groups but also the American Association for the Advancement of Science, American Museum of American History, American Museum Association, American Institute of Architects, American Society of Landscape Architects, American Veterinary Medicine Association, Art Institute of Chicago, Australian Primatological Society, and the Smithsonian Institution.

A major benefit of these engagements is the amazing colleagues one meets and friendships gained, some lifelong.

HONORS & AWARDS.

We work to achieve goals and for the joy experienced from well-crafted creation shared with collaborators. If fortunate, we support ourselves and our families while following our passions. Having one's ideas accepted, tested, found worthy, and then spreading based upon their merit is the best reward. Having one such achievement in a professional lifetime is rewarding. I'm especially pleased to have collaborated on four major zoo design innovations:

- Landscape immersion design with David Hancocks, Grant Jones, and Dennis Paulson.1976. The resulting *Long-Range Master Plan for Woodland Park Zoo* was awarded the American Society of Landscape Architects (ASLA) President's Award (their highest award).

- Activity-based design & management (zoo animal rotation or habitat alternation) with Gary Lee and CLRdesign.1995.

- Affiliative design.1999.

- Animal trail systems with Andy Baker and CLRdesign. 2009.

American Zoo and Aquarium Association (AZA) Exhibit Awards (in various categories between 1981-2017). I was lead designer for eleven Awards. I doubt any single designer has won more.

Formal recognition has followed.

- Awarded a Fellow of the American Society of Landscape Architects.1993. I have been a member of the American Society of Landscape Architects (ASLA) since the1970s. When I lived in the USA I regularly attended their regional and national conferences. I served on the ASLA Magazine Editorial Board for one year. I am a proud member but didn't serve the society on any committees. To my surprise, I was nominated to become a Fellow by the Pennsylvania State Chapter. I suspect this was thanks to a nomination by colleague Mr. James Pashek with whom I had collaborated on the design of exhibits at Pittsburgh Zoo. About 10% of members achieve this honor. I was recognized for "Mastery of design in significant works of landscape architectural design or planning design, which have advanced the art, stewardship, science, and social responsibility of landscape architecture."

- Awarded to become a Bracken Fellow by Pennsylvania State University. 2000.

- Profiled in Inventing the Environment, Lemulson Center for the Study of Invention and Innovation, Smithsonian National Museum of American History. 2003.

Esquire Register Award. In 1988 I was informed by the editors of Esquire Magazine that I was among thirty-eight men and women "…whose vision and determination are reshaping our professions and thus determining the future course of American life…" to be honored on their 5th Annual Esquire Register. This was awarded during a special

dinner Susan and I enjoyed at New York's swanky "21" Club. My photo and accomplishment summary appeared in their December issue that year.

END