CENTRAL ASIA

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افغانستان
COMMUNITY-BASED ECO-PLANNING IN HIGH DRY REGIONS

THE UNEP AFGHANISTAN MODEL

This is the second of a two-part series article [Context & Strategy, and Practical Applications] describing my work as a landscape architect and environmental planning consultant to the United Nations Environment Programme [UNEP] in Afghanistan collaborating with the Afghan National Environmental Protection Agency [NEPA] and several other government bodies at national and state levels. This work, of Practical Applications, occurred during nine of the eleven visits I made to Afghanistan from 2009–2016.

LEFT |
The author at work in the UNEP Kabul office
PHOTO CREDIT: ***A. Scanlon***

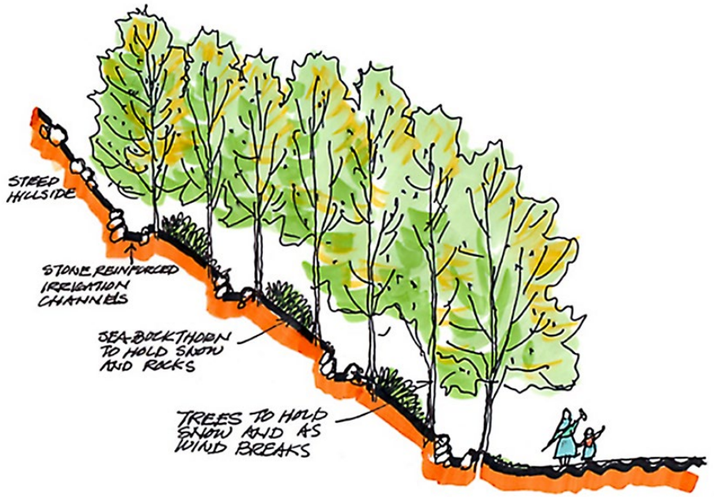
PREVIOUS PAGE |
Five-year-old poplars line an irrigation channel in Afghanistan. Note the raven nest, showing these plantations also benefited wildlife as the author intended.

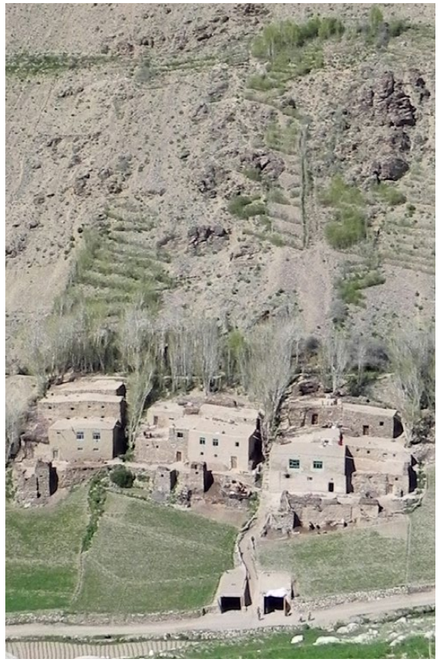
2

PRACTICAL APPLICATIONS OF COMMUNITY-BASED LANDSCAPE ECO-TECHNOLOGY

ABOVE |
The author's idealized sketch for a productive and sustainable rural landscape for the Afghan Central Highlands

I am reporting on our environmental planning and design work in Afghanistan in two stages, the strategic, the subject of the first article, and the practical. It is important to remember that both areas are functionally inseparable, each stage informing the other. Both aspects of our work were guided by principles ofrespect for traditional knowledge and community-based decision making [bottom-up programs with top-down support] and ecologically based, regenerative, restorative, and self-sufficient [eco-tech] programs. The resulting outcomes were funded by international aid agencies under two main programs, **Climate Change Adaptation** and **Disaster Risk Reduction**. The UNEP is principally a scientific support, research,and policy organization in the fields of climate action, nature action and chemical and pollution action. However,they believed developing and field testing practical and detailed ecologically based rural land management applications fordryland mountain villages along the 3000m contour was an important proof-of-concept for our sustainable rural livelihoodstrategies described in the first article.

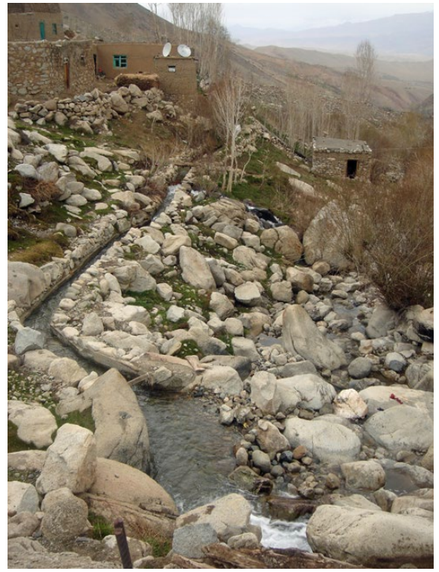




ABOVE LEFT & RIGHT |
Example of overlapping opportunities. Steep slopes terraced to reducerisk of rockfallsalso can be afforested. Plantings can stabilize snowdrifts, harvesting upslope melt water for crops as both a climate change mitigation and disaster risk reduction. The author learned this practical application of land forming and planting from one remote valley [second image] and introduced it to other remote valleys in the same region.

During my twice annual visits Andrew Scanlon (who became UNEP Afghanistan Country Director) and I met with village elders in many communities, supported by UNEP field staff and translators, assisting villagers in their preparation of village development masterplans [see previous article, LA-68] and identifying the types of detailed land improvements they thought useful. During these periods I developed and illustrated a wide range of sustainable development [ecotech] methods. A select few are illustrated here. Many were later translated and reprinted as manuals used for field implimentation, usually supervised by a qualified local builder, with detailed budgeting and accountingby UNEP field staff. However, given my travel schedule, I was seldom present when actual works were being installed and so I have little firsthand knowledge of results, and especially long-term outcomes. While NEPA officials, UNEP field staff, and village elders I later met were enthusiastic with their results, readers should consider the information following as somewhat aspirational.Although I would like to credit many specific individuals and locations for their amazing efforts and kind hospitality, sadly, I have omitted names and photos of specific people and places for security reasons. Today, past UN staff report being hunted by Taliban operatives for "collaborating with the foreigners."

For convenience, we divided our work into these categories of land management: **water, slope, forestry & orchards,** and **special projects,** although each overlapped many of the others.



Water Management

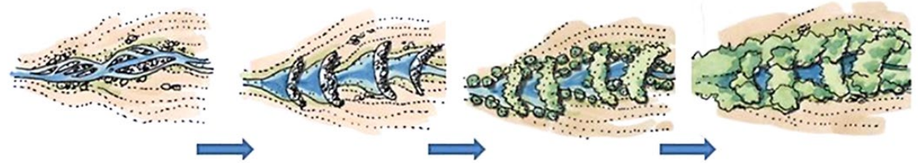
1. Water conservation, especially detaining fast-moving and increasingly brief seasonal meltwater streams to infiltrateand supply longer lasting groundwater systems.
2. Reducing damage done by rapidrunoff such as erosion and flooding. Both approaches support the traditional wisdom: The best place for water in arid regions is underground.

Upper catchment check dams or weirs

Our strategy was to encourage construction of hundreds of small check dams on meltwater streams, built by local labour with local materials whichthey could repair seasonally.This is the sustainable alternative to construction of larger downstream engineered dams built by outside experts with imported materials.

TOP LEFT & RIGHT |
Afghan mountain farmers are masters of meltwater irrigation on steep slopes, as these existing examples attest. The goal was to build on this and other examples of local and international ancient knowledge.

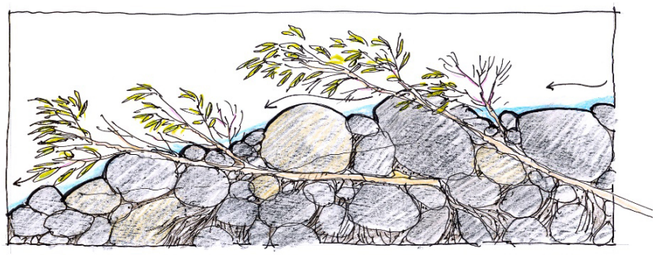
LEFT & RIGHT |
Simple dry-laid stone check dams used to repair erosion channels. A simple pendulum level was useful for establishing contour lines and calculating slope angles and drainage



1. EXISTING STREAM

2. CONSTRUCT CHECK DAMS USING LIVING WILLOWS

3. ENCOURAGE TREE GROWTH



Living check dam cross section. Boulders are placed over dormant willow branches across stream courses. Nearly the entire lengths of willow branches are covered to prevent them being washed away. Some of these branches will root among the boulders, helping to stabilize them and growing trees will later form living weirs. Eventually willow seedings will colonize the downstream corridor, creating wildlife habitat and abundant fuelwood and animal fodder.

Boulder check dams

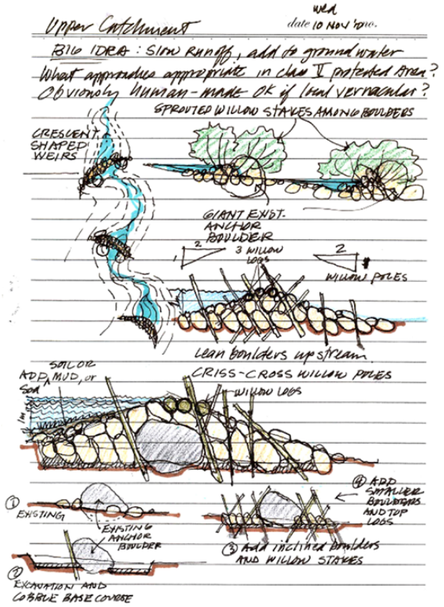
Reduce flow velocity andneed not be watertight [they are also called "leaky weirs"]. They are broad based, wider than high, enduringfast moving water flowing over them. Detained water contributes togroundwater recharge until water borne sediment eventually forms fertile terraces behind dams. Were these ideas new to Afghanistan? I did not see any existing checkdams, but it seems likely they would have been known to such masters of irrigation.

Living check dams

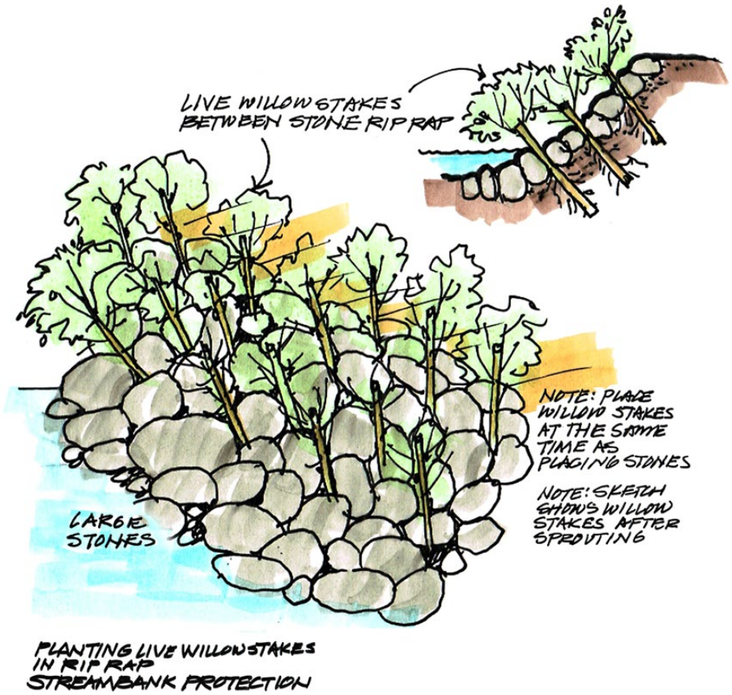
The integration of willows as living, self-repairing biological structures within the checkdams was a new concept, as was the notion of using willow and poplar reinforced streambank protection as a long-term stream corridor revegetation strategy.Engineers caution against planting trees on earth-fill dams because water may escape along old root tunnels, undermining the structure. However, checkdams only slow or briefly detain water rather than storing it and need not be fully waterproof.

Streambank protection

Rapid snow melt and spring flooding can be very damaging even with check dam mitigation. We developed a variety of solutions with locally available materials and labour. The following are are two examples.

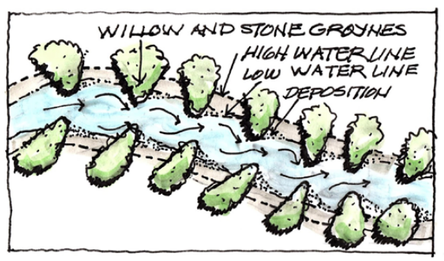


More robust upper catchment check dams can be built around existing large boulders and reinforced with living but dormant willow branches, some of which will sprout.



RIGHT |
Streambanks can be protected with tightly placed stone rip rap interplanted with willow cuttings near the water and sea buckthorn or saltbush in higher, drier locations

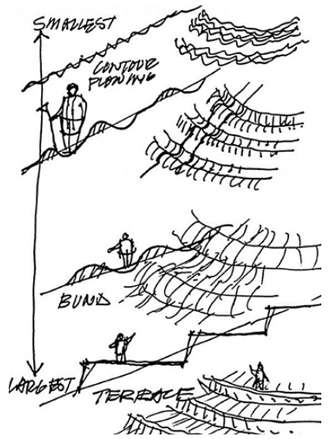
BELOW |
Living groynes can protect slopes along larger water courses at lower elevations



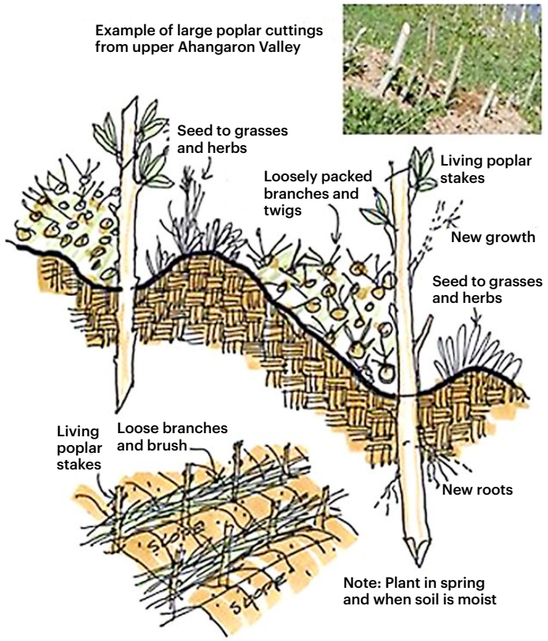
RIGHT |
Fords and roads crossings irrigation channels and small streams can be reinforced by tightly placing large oval shaped stones on end as the Romans did millennia ago

Slope Managemet

Slope management reduces surface erosion with contour-aligned changes ranging from contour ploughing or simple lines of stones to walled terraces.



LEFT |
Contour manipulation designed to slow surface runoff and recharge ground water

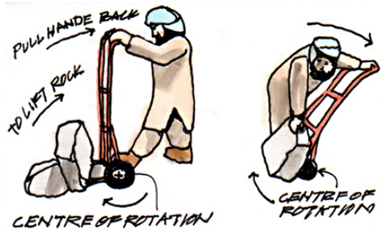


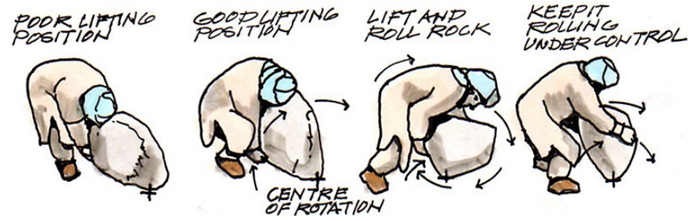
Soil Stabilization on Planted Slopes
Note: For dryer slopes use sea buckthorn and wild rose
UNEP Afghanistan

LEFT AND ABOVE |
Workers reshaped moderate slopes into contour bunds and planted poplar cuttings during early spring while soils were moist from snow melt. The resulting thickets helped stabilize snowfields and could be thinned for firewood and animal fodder or eventually converted to woodlots. This approach combined slope stabilization with forestry

Working with large stones

This is a fundamental activity and skill in both water and slope management in the highlands.



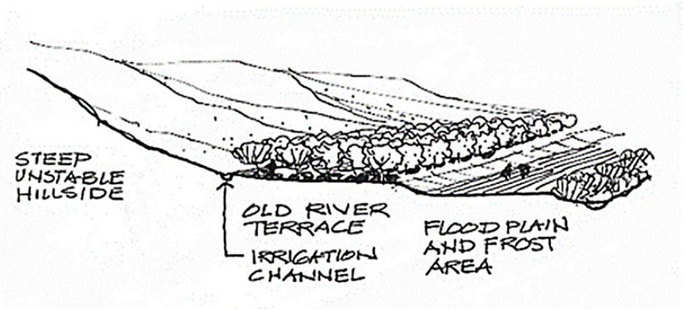


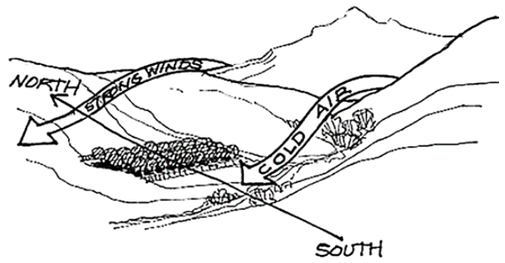
ABOVE |
While the author's eco-tech details included many stone wall, rampart, and paving construction drawings not shown here, the author included the above advise on moving large stones based upon his own successful experience building stone walls and paving. Indeed, he built and assessed many of the ecotech details himself at home between missions to Afghanistan

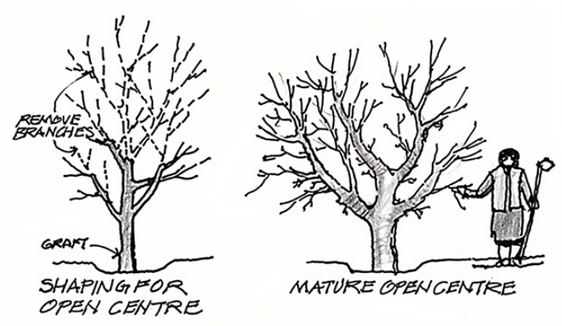
Village Afforestry

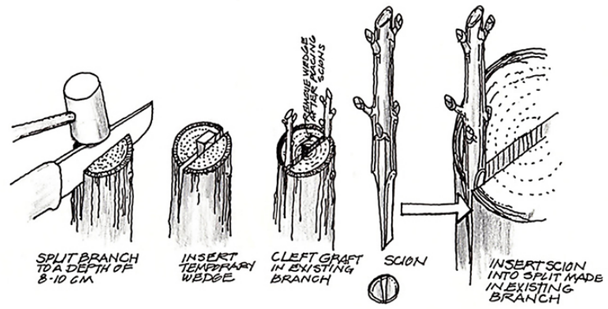
It included hillside terrace plantings illustrated above to save more level fields for traditional cash crops such as wheat and potatoes. However, when poplar logs became profitable, some higher elevation field areas were converted to plantations of a fast-growing hybrid poplar closely related to native species. Under ideal conditions timber is harvested in as little as seven years and stumps soon resprout for successive crops. We considered the poplar and willow as "first generation" plantings. Eventually insect pest species will arrive and reduce harvests. We suggested eventual transition to more durable and varied species tolerant of high elevations as "second generation" tree crops. Research for suitable species was ongoing by others at that time.

RIGHT |
Five-year-old poplars line an irrigation channel while a newer plantation occupies an adjacent field previously used for grazing. This location is near the natural treeline elevation and villagers were experimenting to see to what elevations tree crops could be profitable.









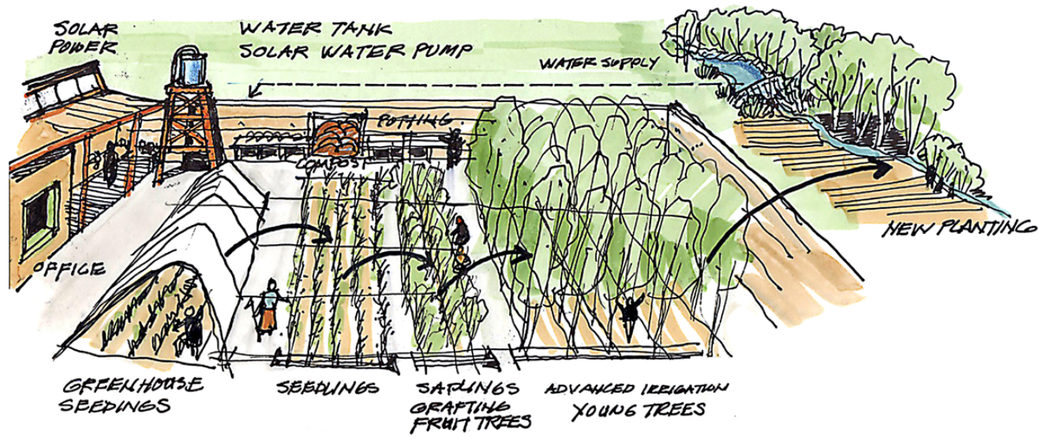
Village orchards

During the 1970's Afghanistan was a major fruit exporter,especially of dried fruits,such as raisins, apples and apricots. Wild, pre-domesticated native apple species originated in nearby Kazakhstan and native almonds still grow in the Central Highlands.We visited only one isolated village with mature apple orchards. However, re-establishing village orchards in the regionwas an important trend. These helped both to diversify livelihoods and improve local diets.

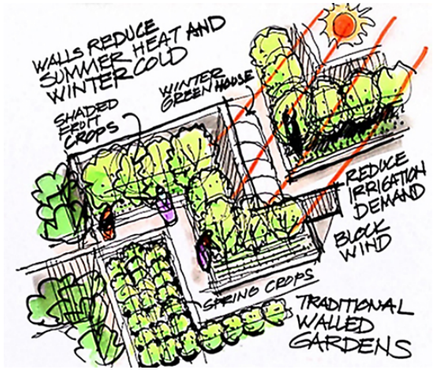
Village Nurseries

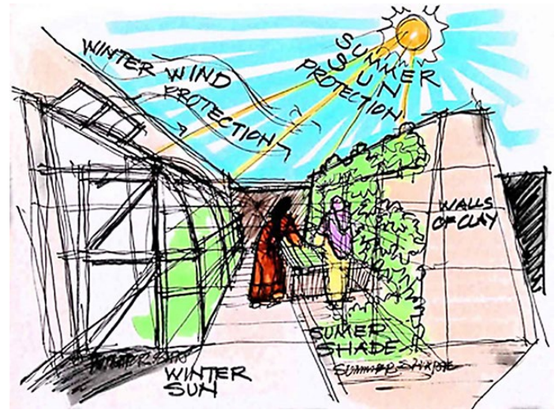
Villagers found that fruit tree seedlings brought up from the Bamyan River valley to their land above 3000m elevation were not sufficiently cold hardy. UNEP worked with interested villages to establish high altitude nurseries managed by local landowners to supply plants for their valleys. This required negotiating contracts allowing locally producedcuttings and grafted saplings to be freely available to local villagers for the first five years and sold for profit thereafter.

ABOVE |
Books on traditional orchard management were difficult to find, so the author prepared many how-to illustrations. Above are only a few examples



COMMUNITY NURSERY





TOP |
The author's sketch illustrating a typical nursery arrangement

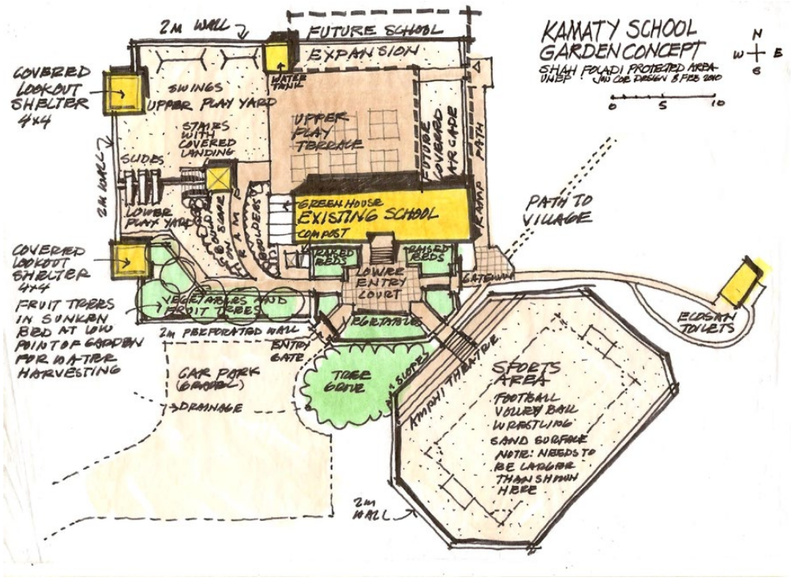
ABOVE LEFT & RIGHT |
Following ancient European models, carefully oriented common mud walls can create sun traps to extend the growing season for intensely managed fruit trees and vines, both dwarf species and espaliers, for small scale family and commercial use

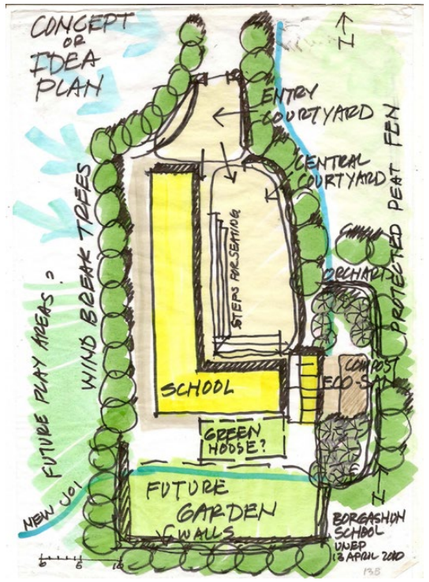
Walled orchards

In the northern Afghan State of Balk [ancient Bactria] I developed conceptual plans for a NEPA sustainable farmeducationcentre intended to demonstrate ancient uses of common mud walls [combined with modern plastic greenhouses] to shelter plantings from cold dry winter winds, collect and reflect heat from the low winter sun and shade plants fromsummer sun. Regrettably, security concerns prevented further development of these concepts.

Special Projects

While our focus was on helping mountain villagers develop sustainable livelihood projects of their choice, our ecotech approach was applied to many needs identified by communities.

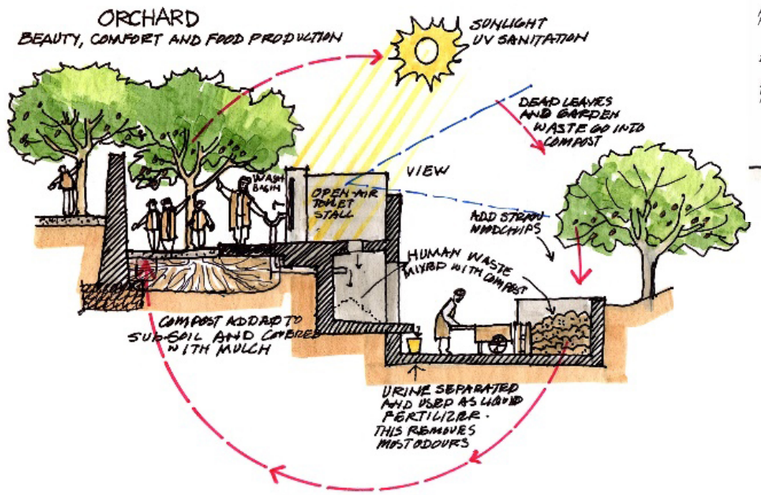


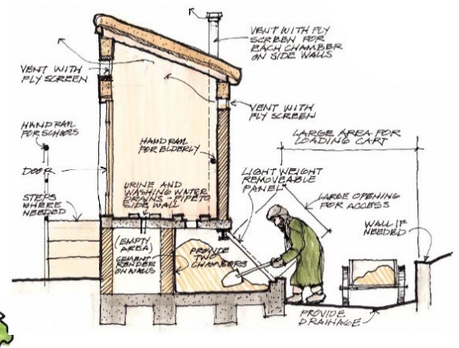


ABOVE |

GREEN SCHOOLS

Smaller villages had no schools and even young students commonly walked long distances on mountain trails to distant schools. Existing schools rarely had developed outdoor areas. The author and Andrew Scanlon worked with several local communities planning "green schools", including small plots for student gardens as well as windbreaks, assembly, and play areas.





LEFT & ABOVE |

COMPOSTING PRIVIES

While pit privies were common and diluted urine and composted human excrement was sustainably used as fertiliser, it was found that removal of the waste was unnecessarily difficult because of poor access. This was especially noticeable with recently constructed school toilet facilities. Here is the author's proposal for improved design with a large opening for cleanout access

ABOVE RIGHT |

A logo the author designed for a private group working in parallel with UNEP which offered conferences and training programs in sustainable land management in Afghanistan

Illustration

In addition to illustrating ecotech concepts, I illustrated a wide variety of UNEP publications ranging from high level policy papers toposters, wildlife art, project fact sheets, how-to pamphlets, and educational curricula. Illustrations found multiple and repeated uses.

What's next?

With the elected Afghan government gone, key departments like NEPA greatly limited or disbanded, and international development aid lost, the villages in the high dry regions of Afghanistan's Central Highlands are once again on their own. It is my fervent hope that ideas we introduced, and villagers implemented, will continue to sustainlivelihoodsas communities once again become more isolated.

While the Afghan Central Highlands where these ideas were developed is only a small part of the nation, it is a mere speck in the vast high arid zone of Central Asia. Climate forecasts for the region predict from +2.0C to as high as +5.7C degrees of warming by 2085[1]. Some areas are expected to receive increased winter precipitation, much of which will be lost to increasing evapotranspiration. It is my hope that ecologically based land restoration and management strategies presented in these two articles will find their way into the tool kits of landscape architects, environmental planners, and other readers of this journal for testing and application in similar needy areas of India and Central Asia.

Author's Note

In the first part of the series of this article, in LA-68, I described my collaborative relationship with Mr. Andrew Scanlon who became UNEP Afghanistan Country Director during this period and guided my work, including initiatives described in both articles. I wish to acknowledge the guidance and support that I and Andrew Scanlon received from then NEPA Director-General and Assistant Director, but regret omitting their names because of ongoing concerns for their security during these uncertain times.

[1] Climate Risk Profile Central Asia. USAID Fact Sheet https://reliefweb.int/sites/reliefweb.int/files/resources/2018-April-30_USAID_CadmusCISF_Climate-Risk-Profile-Central-Asia.pdf