

Globally Important Agricultural Heritage Systems

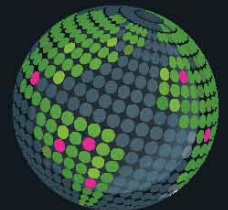
A Legacy for the Future

Parviz Koohafkan and Miguel A. Altieri



GIAHS

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Introduction

For millennia communities of farmers, herders, fishers and forest people have developed complex, diverse, and locally adapted agricultural systems. These systems have been managed with time-tested, ingenious combinations of techniques and practices that have usually led to community food security, and the conservation of natural resources and biodiversity. Agricultural heritage systems can still be found throughout the world covering about 5 million hectares, which provide a vital combination of social, cultural, ecological and economical services to humankind.

These “Globally Important Agricultural Heritage Systems-GIAHS” have resulted not only in outstanding landscapes of aesthetic beauty, maintenance of globally significant agricultural biodiversity, resilient ecosystems and a valuable cultural heritage. Above all these systems sustainably provide multiple goods and services, food and livelihood security for millions of poor and small farmers.

**GIAHS are defined as
“Remarkable land use systems and
landscapes which are rich in globally
significant biological diversity evolving
from the co-adaptation of a community
with its environment and its needs and
aspirations for sustainable development”**

(FAO 2002)

The existence of numerous GIAHS around the world testifies to the inventiveness and ingenuity of people in their use and management of the finite resources, biodiversity and ecosystem dynamics, and ingenious use of physical attributes of the landscape, codified in traditional but evolving knowledge, practices and technologies. Whether recognized or not by the scientific community, these ancestral agricultural systems constitute the foundation for contemporary and future agricultural innovations and technologies. Their cultural, ecological and agricultural diversity is still evident in many parts of the world, maintained as unique systems of agriculture. Through a remarkable process of co-evolution of Humankind and Nature, GIAHS have emerged over centuries of cultural and biological interactions and synergies, representing the accumulated experiences of rural peoples.



Agricultural Heritage Systems

GIAHS are selected based on their importance for the provision of local food security, high levels of agro-biodiversity and associated biological diversity, store of indigenous knowledge and ingenuity of management systems. The biophysical, economic and socio-cultural resources have evolved under specific ecological and socio-cultural constraints to create outstanding landscapes. The examples of such agricultural heritage systems are in the hundreds and are home to thousands of ethnic groups, indigenous communities and local populations with a myriad of cultures, languages and social organization. Examples of GIAHS could fall into:

1. Mountain rice terrace agroecosystems.

These are outstanding mountain rice terrace systems with integrated forest use and/or combined agro-forestry systems, such as the agroforestry vanilla system in Pays Betsileo, Betafo and Mananara regions in Madagascar; Ifugao rice terraces in the Philippines; and many more. These systems also include diverse agricultural and other elements: for example, integrated rice-based systems (e.g. rice-fish culture, rice-fish-duck, rice-fish-taro) with numerous rice and fish varieties/

genotypes; and integrated forest, land and water use systems, especially found in East Asia and the Himalayas.

- 2. Multiple cropping/polyculture farming systems.** These are remarkable combinations and/or plantings of numerous crop varieties with or without integration of agroforestry. They are characterized by ingenious micro-climate regulation, soil and water management schemes, and adaptive use of crops to deal with climate variability. These practices are heavily dependent on their rich resources of indigenous knowledge and the associated cultural heritage e.g. *maize and root crop-based agroecosystems* developed by the Aztecs (Chinampas in Mexico); *waru-waru* systems or *suka collos* in and around Lake Titicaca in Peru and Bolivia (Incas in the Andes region).
- 3. Understory farming systems.** These are agricultural systems using combined or integrated forestry, orchard or other crop systems with both overstory canopy and understory environments. Farmers use understory crops to provide earlier

returns, diversify crops/products and/or make efficient use of land and labor. These practices are common in the tropics, e.g. in taro-based or root cropping systems, planted along with other endemic plant varieties from local genetic resources. These are common in Papua New Guinea, Vanuatu, Solomon Islands and other Pacific small island developing countries.

- 4. Nomadic and semi-nomadic pastoral systems.** These are the rangeland/pastoral systems based on adaptive use of pasture, rangeland, water, salt and forest resources, through mobility and variations in herd composition in harsh non-equilibrium environments with high animal genetic diversity and outstanding cultural landscapes. These include highland, tropical and sub-tropical dryland and arctic systems such as Yak-based pastoral management in Ladakh and the high Tibetan plateau in India and China; highly extensive rangeland use in parts of Mongolia and Yemen; cattle and mixed animal based nomadic pastoral systems, such as of the Maasai in East Africa; reindeer-based management of tundra of the Saami and Nenets in the temperate forest areas of Scandinavia and Siberia. The landscapes formed by these systems often provide habitats for wild species including endangered species.

- 5. Ancient irrigation, soil and water management systems.** These are the ingenious and finely tuned irrigation, soil and water management systems most common in drylands, with a high diversity of crops and animals best adapted to such environments: (i) the Qanat ancient underground water distribution systems allow specialized and diverse cropping systems in Iran, Afghanistan and other central Asian countries with associated home gardens and endemic blind fish species living in underground waterways; (ii) the oases of the Maghreb in deserts of North Africa and the Sahara; (iii) traditional valley bottom and wetland management such as the water management systems in Lake Chad, the Niger river basin and interior delta e.g. floating and flooded rice systems; and (iv) other ingenious irrigation systems in Bamileke region, Cameroon; of Dogon tribes in Mali and Diola tribes in Senegal; as well as the village tank system in Sri Lanka and India.

- 6. Complex multi-layered home gardens.** These agricultural systems feature complex multi-layered home gardens with wild and domesticated trees, shrubs and plants for multiple foods, medicines, ornamentals and other materials, possibly with integrated agro-forestry, swidden fields, hunting-gathering or livestock, such as the home

garden systems in China, India, the Caribbean, the Amazon (Kayapó) and Indonesia (e.g. East Kalimantan and Butitingui).

7. Below sea level systems. These agricultural systems feature soil and water management techniques for creating arable land through draining delta swamps. The systems function in a context of rising sea and river levels while continuously raising land levels, thereby providing a multifunctional use of land (for agriculture, recreation and tourism, nature conservation, culture conservation and urbanization) e.g. Polder or dyke systems in the Netherlands; Kuttanad wetlands in Kerala, India; floating gardens in Bangladesh and South Asia.

8. Tribal agricultural heritage systems.

These systems feature the various tribal agricultural practices and techniques of managing soil, water and crop cultivars in sloping lands from upper to lower valleys using mixed and/or a combination of cropping systems and integrating indigenous knowledge systems e.g. Seethampheta in Andhra Pradesh, the Apatani rice

fish culture, the Zabo system, Darjeeling system in the Himalayas, and many other systems in India.

9. High-value crop and spice systems.

These systems feature management practices of ancient fields and high value crops and spices, devoted uniquely to specific crops or with crop rotation techniques and harvesting techniques that requires acquired handling skills and extraordinary finesse e.g. Saffron systems in Iran, Afghanistan and Kashmir, India.

10. Hunting-gathering systems. This features unique agricultural practices such as harvesting of wild rice in Chad and honey gathering by forest dwelling peoples in Central and East Africa.

There are numerous other agricultural heritage systems around the world meriting identification, assessment and dynamic conservation. One of the main tasks of GIAHS partnership initiative is this work in collaboration with local communities, national governments and other national and international institutions.

Custodians of Our Agricultural Heritage

Many of these remarkable agricultural systems and associated landscapes, too heterogeneous for intensive agriculture, are managed by an estimated 1.4 billion people, that are mostly family farmers, peasants and indigenous communities. They harbor ancestral and local varieties of plant species and animal races through their own knowledge systems and with little access to external inputs, capital, or modern agricultural technologies. They produce between 30-50% of the domestic food consumed in the developing world, thereby contributing substantially to food security at local, national and regional levels.

Despite the fact that market penetration, migration, population growth, political reform, introduction of new technology and other factors have accelerated the pace of change in rural areas, many of these traditional systems have stood the test of time testifying to successful and resilient indigenous agricultural strategies, representing models of sustainability. They promote biodiversity, thrive without agrochemicals, and sustain year-round yields in the midst of socioeconomic upheavals and environmental variability. In fact, many scientists acknowledge that traditional agro-ecosystems have the potential to provide

solutions to the unforeseeable changes and transformations facing humanity in an era of climate change, energy and financial crisis.

However, GIAHS are rapidly shrinking, victims to modernization and unsustainable technological and economic changes. Challenges and issues such as the lack of promotion of diversified and environmentally friendly farming and integrated management practices, as well as the neglect of research and development and rural services for the indigenous and ingenious agricultural systems, threatens the foundation of agricultural “culture” and associated biodiversity. Other challenges and threats that need to be addressed include erosion of rural values closely linked with out-migration and loss of youth, overexploitation of resources and declining productivity, and imports of exotic domesticated cultivars leading to severe genetic erosion and loss of local knowledge systems. In some areas, there are spillover effects from marginalization and increasing poverty in productive landscapes onto wild biodiversity. The penetration of global commodity driven markets often creates situations in which local producers or communities in GIAHS have to compete with agricultural produce from intensive and often subsidized

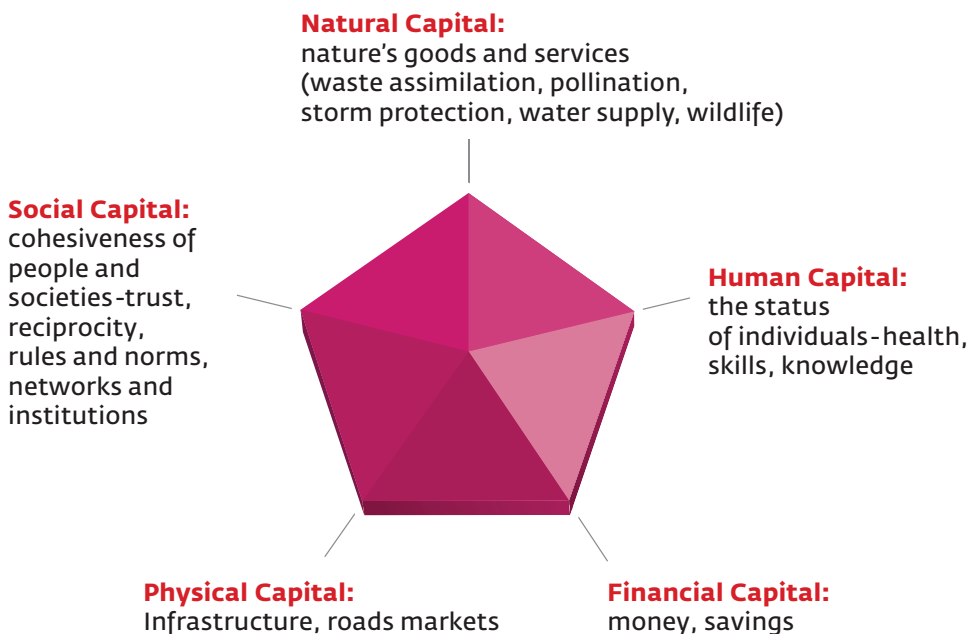


agriculture in other areas of the world. All of these threats and issues contribute to the risk of loss of unique and globally significant agricultural biodiversity and associated knowledge, land degradation, poverty, and thereby threats to the livelihood security and food sovereignty of many rural and traditional farming communities.

As poverty alleviation and food security remain elusive for nearly a billion of the world's population, and with climate change threatening major disruptions with particularly strong effects on the poorest and most marginalized, it is clear humanity will need new models of agriculture in the immediate future that should include forms of

farming that are more *biodiverse, local, resilient, sustainable* and *socially just*. Inevitably, modern farming will have to be rooted in the ecological rationale of traditional farming systems since the future of the world's population will undoubtedly depend on key components of biodiversity and ecosystem services that are still found in these cradles of agricultural diversity. Promising pathways shaped on traditional farming systems can help in increasing on-farm food production and improve rural livelihoods thus substantially contributing to the Millennium Development Goals of combating hunger and poverty. This is at the heart of the global development agenda.

▼ **Figure 1. Five Assets of Rural Systems (livelihoods, communities, economies)**



A Global Partnership Initiative

In response to the global trends that undermine family agriculture and traditional agricultural systems, in 2002, during the World Summit on Sustainable Development (WSSD, Johannesburg, South Africa), the Food and Agriculture Organization (FAO) of the United Nations launched a Global Partnership Initiative on conservation and adaptive management of “Globally Important Agricultural Heritage Systems”.

The overall goal of the partnership is to identify and safeguard Globally Important Agricultural Heritage Systems and their associated landscapes, agricultural biodiversity and knowledge systems through catalyzing and establishing a long-term programme to support such systems and enhance global, national and local benefits derived through their dynamic conservation, sustainable management and enhanced viability.

To achieve this goal, the main objectives are to:

1) Leverage global and national recognition of the importance of agricultural heritage systems and institutional support for their safeguard:

- global recognition through the creation of the Agricultural Heritage Systems category with support of governments, FAO governing bodies, UNESCO, World Heritage Centre and other partners;
- national recognition, awareness and improved understanding of threats that such agricultural systems face, of their global importance and of the benefits that they provide at all levels.

2) Capacity building of local farming communities and local and national institutions to conserve and manage GIAHS, generate income and add economic value to goods and services of such systems in a sustainable fashion:

- identify ways to mitigate risks of erosion of biodiversity and traditional knowledge, land



degradation and threats posed by globalization processes and skewed policies and incentives;

- strengthen conservation and sustainable use of biodiversity and natural resources, reducing vulnerability to climate change and enhancing sustainable agriculture and rural development and as a result contributing to food security and poverty alleviation;
- enhancing the benefits derived by local populations from conservation and sustainable use of their resources and their ingenious systems and rewarding them through payment for Environmental Services, Eco-labeling, Eco-tourism and other incentive mechanisms and market opportunities.

3) Promote enabling policy, regulatory and incentive environments to support the conservation, evolutionary adaptation and viability of GIAHS:

- assessment of existing policies and incentive mechanisms and identification of modalities to provide support for sustainable agricultural practices;
- promotion of national and international processes leading to improved policies and incentive mechanisms.

A major outcome of the GIAHS initiative is the contribution to the implementation of Convention on Biological Diversity (CBD) Article 10c: “protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements”, specifically within agricultural systems; and Article 8j: “respect, preserve and maintain knowledge, innovations and practices of indigenous communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity”.



Remarkable characteristics of Globally Important Agricultural Heritage systems (GIAHS)

By fostering an ongoing, dynamic conservation of selected agricultural systems and sites that display unique agricultural landscapes around the world, a process will emerge which offers tangible global services, while providing important support to rural communities through enhancing

food security, conservation and sustainable use of biodiversity, and maintenance of cultural identity. The unique traditional farming systems prevalent at the GIAHS sites represent systems that simultaneously exhibit remarkable features of global and local significance:

1 HIGH LEVELS OF BIODIVERSITY THAT PLAYS KEY ROLES IN REGULATING ECOSYSTEM FUNCTIONING AND ALSO IN PROVIDING ECOSYSTEM SERVICES OF LOCAL AND GLOBAL SIGNIFICANCE.

GIAHS systems often reflect rich and globally unique agricultural biodiversity displayed at the field and also at the landscape level forming the basis for food production systems. A salient feature of GIAHS is their high degree of plant diversity in the form of rotations, polycultures and/or agroforestry patterns.

This strategy of minimizing risk by planting several species and varieties of crops stabilizes yields over the long term, promotes diet diversity and maximizes returns even with low levels of technology and limited resources. Genetic diversity provides security to farmers against diseases, pests, droughts and other stresses.

It also improves stability of the cropping systems, enables farmers to exploit different soil types and microclimates and derive multiple nutritional benefits and other uses from genetic variation among the species. At the landscape scale, diversification occurs by integrating multiple production systems.

2 AGROECOSYSTEMS NURTURED BY TRADITIONAL KNOWLEDGE SYSTEMS AND FARMERS INNOVATIONS AND TECHNOLOGIES.

Indigenous peoples living in GIAHS sites often possess a broad knowledge base of the intricacies of local and complex ecological systems. This knowledge about plants,

animals, soils and the general environment has accumulated through a long series of observations transmitted from generation to generation. Indigenous farmers are aware that biological diversity is a crucial factor in generating ecological services, and in the conservation of the resource base and foods on which they depend. Women, in particular, are holders of much more traditional knowledge and thus play a critical role in the conservation and utilization of biodiversity.

3 INGENIOUS SYSTEMS AND TECHNOLOGIES OF BIODIVERSITY, LAND AND WATER RESOURCE MANAGEMENT AND CONSERVATION THAT CAN BE USED TO IMPROVE MANAGEMENT OF MODERN AGRO-ECOSYSTEMS.

By studying traditional systems, scientists can learn more about the dynamics of complex systems, especially about the links between agricultural biodiversity and ecosystem function and thereby contribute to enrichment of ecological theory and derive principles for practical application in the design of modern sustainable farming systems.

For example, in deciphering how intercropping practice work, farmers can take advantage of the ability of cropping systems to reuse their own stored nutrients. This information can be gleaned to improve the ways in which farmers can manage soil fertility. Similarly, there could be much progress in pest management schemes if the biological mechanisms within the complex structure of traditional agroecosystems can be determined, and thus minimize crop losses due to insect pests, diseases and weeds.

4 DIVERSIFIED AGRICULTURAL SYSTEMS THAT CONTRIBUTE TO LOCAL AND NATIONAL FOOD AND LIVELIHOOD SECURITY.

Most small farming systems are productive, efficient and sustainable compared to larger farms despite their low use of chemical inputs. As the only resource-base available for small farmers is their natural resources and their human capital, they do all they can to maintain it. Therefore they diversify their genetic resources, they diversify their production systems and their sources of income, and all this builds resilience.

This contributes to food production, but also to environmental health, to the sustainability of the natural resource-base and thus to the sustainability of livelihoods. Small farms which produce grains, fruits, vegetables, fodder, and animal products in the same field are more productive than large farms if the total output is considered rather than yield from a single crop.

The yield advantages of diversified farming systems can range from 20 percent to 60 percent higher than monocultures. Polycultures usually reduce losses due to weeds,

insects, and diseases and make more efficient use of the available resources of water, light, and nutrients. Furthermore, traditional multiple cropping systems provide as much as 20 percent to 40 percent of the world's food supply.

5 FARMING SYSTEMS THAT EXHIBIT RESILIENCY AND ROBUSTNESS TO COPE WITH DISTURBANCE AND CHANGE (HUMAN AND CLIMATIC-ENVIRONMENTAL) MINIMIZING RISK IN THE MIDST OF VARIABILITY.

Many GIAHS farmers cope and even prepare for climate change, minimizing crop failure through increased use of drought-tolerant local varieties, water harvesting, extensive planting, mixed cropping, agroforestry, wild plant gathering and a series of other traditional farming system techniques. Observations of agricultural performance after extreme climatic events in the last two decades have revealed that resiliency to climate disasters is closely linked to levels of farm biodiversity.

Many indigenous management practices that buffer agroecosystems from climate variation include incorporation of wild and local varieties into the agricultural system and increasing the temporal and spatial diversity of crops both at the field and landscape level. This points out the need to re-evaluate indigenous technology as a key source of information on adaptive capacity centred on the selective, experimental and resilient capabilities of traditional farmers in dealing with climate change and other external changes.

6 SYSTEMS THAT PROVIDE LOCAL, REGIONAL AND GLOBAL ECOSYSTEM SERVICES.

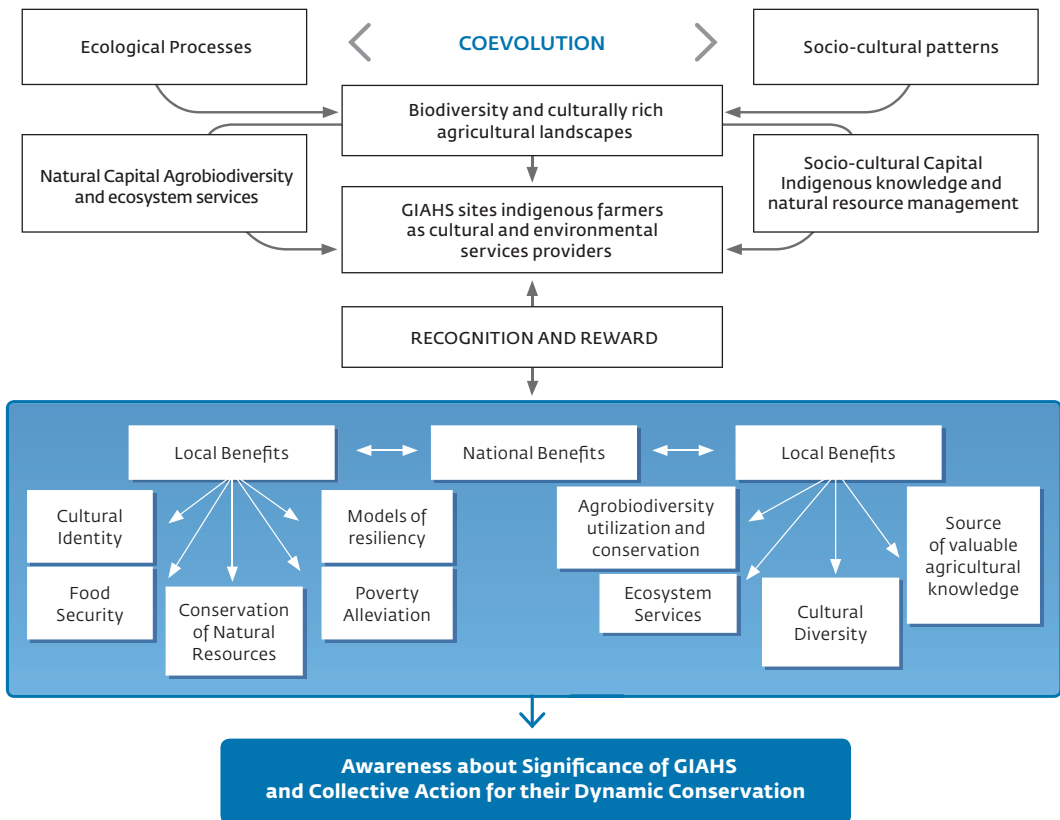
The maintenance of high biodiversity levels at GIAHS sites contributes to agricultural productivity and sustainability through the ecosystem services that biodiversity provides. Agroecosystem function is optimized via complementary interactions that emerge from added species in an agroecosystem, i.e. by mixing specific genotypes of crops for disease resistance, including for example a legume species that increases nitrogen inputs and cycling or by intercropping to support more insect enemies with specific roles in controlling pests.

In many GIAHS sites agroforestry systems are part of a multifunctional working landscape, offering a number of ecosystem services and environmental benefits such as carbon sequestration, biodiversity conservation, soil enrichment, etc. In many regions, the management of diverse agriculture within landscapes provides critical watershed functions, such as maintaining water quality, regulating water flow, recharging underground aquifers, mitigating flood risks, moderating sediment flows, and sustaining freshwater species and ecosystems.

7 SYSTEMS REGULATED BY STRONG CULTURAL VALUES AND COLLECTIVE FORMS OF SOCIAL ORGANIZATION INCLUDING CUSTOMARY INSTITUTIONS FOR AGROECOLOGICAL MANAGEMENT, NORMATIVE ARRANGEMENTS FOR RESOURCE ACCESS AND BENEFIT SHARING, VALUE SYSTEMS, RITUALS, ETC.

The stability and capacity of ecological systems to provide goods and services critically depend upon rural communities having and sustaining diverse and complex forms of social organization (kinship, territoriality, settlement, group membership and identity, gender relations, leadership and political organization), culture (worldviews, languages, values, rights, knowledge, aesthetics), modes of production, labor allocation, and technologies and practices. These reflect adaptation to and management of complex social-ecological systems.

▼ **Figure 2. Local, national and global benefits of GIAHS as the basis for their recognition and dynamic conservation.**



Climate Change and Agricultural Heritage Systems

In the course of human history and civilizations, a number of farming practices and knowledge systems have evolved and adapted to harsh environments, some documented while others not. These are repositories of intergenerational wisdom that exist because of their capacity to deal with change. Agricultural and associated crops, under traditional systems, intensively or lightly managed, are largely buffered against negative events such as environmental perturbations through embedded, rich biodiversity maintained with human care. Perennial tree species, as part of a range of agroforestry systems, have strong stabilizing influences on land use practices, modulating nutrient cycling processes.

The great majority of farmers in Latin America, Africa and Asia are subsistence producers who farm small plots of land, often in marginal areas with harsh environments, utilizing indigenous agricultural techniques. One of the salient features of these traditional farming systems is their high degree of biodiversity. Polycultures are prevalent among subsistence farmers and cover at least 80 percent of the cultivated area of West Africa and Latin America, where more than 40 percent of the cassava, 60 percent of the maize,

and 80 percent of the beans are inter-cropped with other crops. This persistence of millions of hectares under traditional agriculture in the form of raised fields, terraces, polycultures, agroforestry systems, etc., document a successful indigenous agricultural adaptation strategy to difficult environments and offers a tribute to the creativity of rural subsistence producers throughout the developing world. A key challenge has involved the translation of such principles into practical strategies for natural resource management. The ecological constraints on human adaptation in these systems are understood and well documented.

In a world that has abundant resources and can produce sufficient food to feed everybody, if the role of biodiversity can be at the heart of adaptation and mitigation, the extent of hunger will be minimized. It is important to note that three-quarters of those living in extreme poverty, about 900 million people, live in rural areas and depend on agriculture and related activities for their livelihoods.

In most developing countries, the agricultural sector is the main employer, job creator and even export earner. Historically in many parts of the world, agriculture has been the engine that has driven economic growth.



GIAHS worldwide continue to provide their custodians with food and livelihood security, while providing globally important values for climate adaptation and sustainable management of natural resources. These areas generally support high levels of (agricultural) biodiversity.

They are managed through traditional knowledge systems and cultural practices that

promote sustainability, resilience to climate change and social equity, often finely tuned to fragile and challenging environments. In addition to the environmental and social importance of these areas themselves, they are repositories of valuable resources for climate adaptation e.g. genetic resources, traditional knowledge and management systems for natural resources.



Heritage for the Future

Traditional systems of agriculture constitute a cumulative legacy of humankind initiated since the Neolithic of fundamental importance. Modern agriculture constantly threatens the sustainability of this inheritance. Because of their ecological and cultural significance and the wealth and breadth of accumulated knowledge and experience in the management and use of resources that these systems represent, it is imperative that they be considered globally significant resources to be protected and conserved, as well as allowed to evolve. Policy support and actions at international, national

and local levels are needed to allow GIAHS to evolve while providing continued goods and services in their totality and integrity.

Inherent to the concept of GIAHS is an acknowledgement that indigenous knowledge has intrinsic merit, and holds development potentials. Fortunately in many parts of the developing world, there still exists a diversity of local and traditional practices of ecosystem management, including systems of biodiversity management, and soil and water conservation. Many rural peoples, who are resource-poor farmers, are inventively self-



reliant, and continuously experiment, adapt and innovate. The rural communities living in traditional agricultural landscapes and GIAHS sites may hold many of the potential answers to the challenges of agricultural production and natural resources management in an era of climate change. The GIAHS framework acknowledges that there are real opportunities for building on ecosystem and livelihood diversity and investing in local communities and their resources, indigenous knowledge and institutions, to solve hunger and poverty in rural areas, rather than relying on excessive external inputs and often inappropriate and unsustainable technologies from outside.

To sustain and capitalize GIAHS it is necessary to improve understanding of threats that they face and identify ways to mitigate risks of land degradation, and the perverse impacts of

globalization and global change. In this sense, to prevent further degradation of GIAHS, their dynamic nature must first be recognized. Their resilience depends on capacity to adapt to new challenges without losing their biological and cultural wealth, and productive capacity. Trying to conserve GIAHS by “freezing them in time” would surely lead to their degradation and condemn their communities to poverty. The initiative emphasizes that “*GIAHS is not about the past but it is about the future*”, referring to the approach centred on people, human management and knowledge systems. This encompasses their socio-organization, economic and cultural features that underpin the conservation and adaptation processes of agricultural heritage, providing support without compromising their resilience, sustainability and integrity.

Globally Important Agricultural Heritage Systems (GIAHS)



GIAHS pilot systems around the world

The GIAHS initiative has selected pilot systems located in several countries of the developing world. The values of such systems not only reside in the fact that they offer outstanding aesthetic beauty, are key in the maintenance of globally significant agricultural biodiversity, and include resilient ecosystems that harbour valuable cultural inheritance, but also have sustainably provisioned multiple goods and services, food and livelihood security for millions of poor and small farmers, local community members and indigenous peoples, well beyond their borders.

Despite the fact that in most parts of the world, modernity has been characterized by a process of cultural and economic homogenization, in many rural areas specific cultural groups remain linked to a given geographical and social context in which particular forms of traditional agriculture and gastronomic traditions thrive. It is precisely this persistence that makes for the selection of these areas and their rural communities a GIAHS site.

The dynamic conservation of such sites and their cultural identity is the basis a strategy for territorial development and socio-cultural revival. Overcoming poverty is not equivalent to resignation to loss of the cultural richness of rural communities.

On the contrary, the foundation of regional development should be the existing natural and agricultural biodiversity and the socio-cultural context that nurtures it.

CHILOE AGRICULTURE SYSTEM

Chiloé island, Chile

The Archipelago of Chiloé, a group of islands in southern Chile, is a land rich in mythology with native forms of agriculture practiced for hundreds of years based on the cultivation of numerous local varieties of potatoes. Traditionally the indigenous communities and farmers of Chiloé cultivated about 800-1,000 native varieties of potatoes. The varieties that still exist at present are the result of a long domestication through, selection and conservation processes of ancient Chilotes.

The conservation of such rich genetic diversity provides a major social and economic service to the Chilotan people by improving nutrition, welfare and resiliency, as many varieties are resistant to introduced pathogens and droughts which are increasingly affecting the region. Native varieties are highly adapted to the range of ecological conditions found in the region and are of key importance for subsistence production. With more than 60% of the population still living in rural areas, Chilotan



small farmers located in inland as well as coastal valleys are cultivating native and exotic potatoes, giant garlic, wheat, barley and rye. Old apple varieties in small orchards with native vegetation are utilized to feed local races of sheep. In addition many farmers preserve native forest areas from which they derive wood and non-timber products. Others gather from the wild or grow a variety of medicinal plants. Most harvest for subsistence family use but surplus is

sold in local markets in nearby towns or cities. Potatoes, sheep meat and marine resources are the backbone of the food security of the Chilotan population. Rural women have traditionally carried out agrobiodiversity conservation activities in small plots on family vegetable gardens, comprising a key source of knowledge about on-farm seed conservation, cultivation and potato-based gastronomy in their respective communities.



ANDEAN AGRICULTURE SYSTEM

The Cuzco-Puno corridor, Peru

The Andes are a range of mountains including the Puna and Páramos valleys. They are considered among the most heterogeneous environments on the planet. Andean people have domesticated a suite of crops and animals. Of particular importance are the numerous tubers, of which the potato is the most prominent. Generations of Aymara and Quechua have domesticated several hundred varieties by in the valleys of Cusco and Puno, of which more than 400 varieties are still grown today. The maintenance of this wide genetic base is adaptive since it reduces the threat of crop loss due to pests and pathogens specific to particular strains of the crop. Other tubers grown include oca, mashua, ullucu, arracacha, maca, achira and yacón. Farmers also grow some fruit trees, corn and chenopods.

Ascending the Andes mountain range, different climates, plant types and human shaped landscapes composed of patchworks of terraces, irrigation works, crop fields and settlements are found. The impact of the complex Andean environment on human economy has resulted in vertically integrated spatial arrangements of settlements and agricultural systems. The pattern of vertical-

ity derives from climatic and biotic differences related to altitude, geographical location and human influence. The evolution of agrarian technology in the Central Andes has produced extensive knowledge about using the environment sustainably. This knowledge affected the division of the Andean environment into agroclimatic belts by altitude, each characterized by specific field and crop rotation practices, terraces and irrigation systems, and the selection of animals, and crop varieties.

The most important cultural adaptation to these environmental constraints has been the development of farming systems and technologies designed to yield an adequate diet with local resources while avoiding soil erosion. The highlands of Peru contain more than 600,000 hectares of terraces, mostly constructed during prehistoric times. These staircase farms, built up steep mountain slopes with stonewalls, contributed vast amounts of food to the Incas. The farms provided tillable land, controlled erosion and protected crops from frost and freezing. Many were irrigated with water carried at long distances through stone canals. Today, as in the distant past, the major crops grown on these terraces are native tubers such as potatoes, oca and ulluco.



The 350 kilometre transect of the GIAHS pilot site captures environmental heterogeneity notably determined by the mountainous topography. This extends from the southern area of the Peruvian Andes including the sacred city of the Incas, **Machu Picchu** (1900 meters) and the whole Vilcanota River Watershed (4300 meters), crossing to northern part of the Peruvian high plateau and eventually reaching **Lake Titicaca** (3800 meters). In this transect more than 300 native communities maintain most of their ancient traditional agricultural technologies in spite of strong external economic and other influences. Many

cultural and agricultural treasures from the Inca civilization can be found in this GIAHS transect, which has been carefully conserved and improved over the centuries in order to live in high altitudes (from 1000 to 4000 meters above sea level).

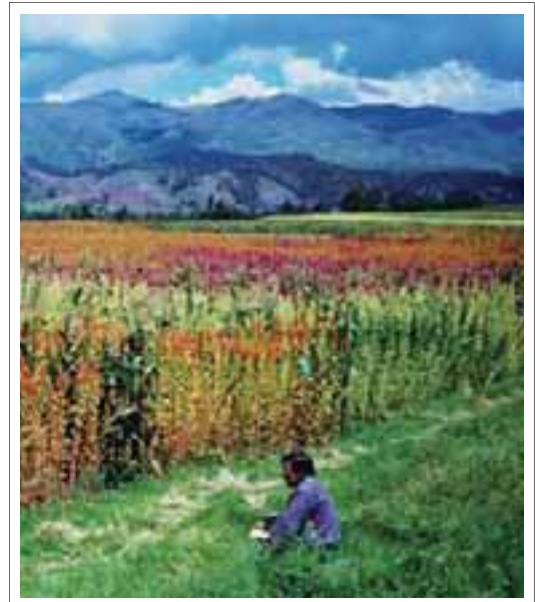
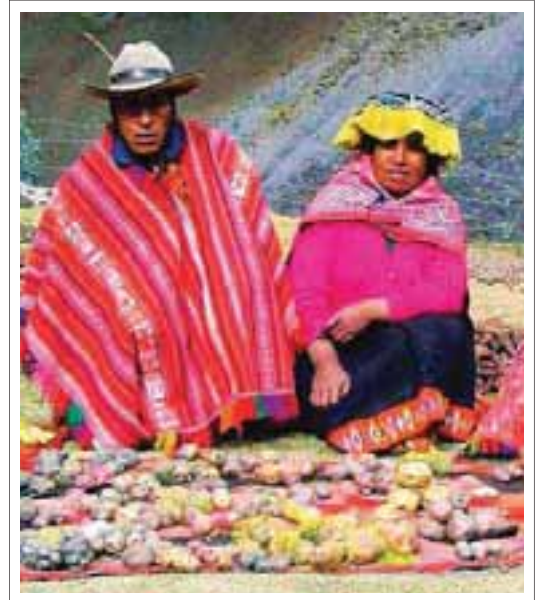
One of the most amazing features of this agriculture heritage is the terracing system used to control land degradation. Terraces allow cultivation on steep slopes and at different altitudes. Andean peasants manage a diversity of crops and crop varieties which have been adapted to different altitudes and are grown in plots in up to different ecological zones to spread risk across the



mountain environment. A plot is seldom dominated by a single crop and even a potato field has up to 10 different varieties. Crops are combined for different purposes. Mashua and potato are grown together as protection against certain diseases. To prevent cattle damage, tarhui (lupine) is planted on the edge of maize fields. Maize, beans and pumpkin complement each other in maintaining soil fertility and maximising use of growing space.

In the high plateaus around Lake Titicaca, farmers used to dig trenches (called “sukakollos” or “waru-waru”) around their raised fields. These trenches were filled with water, modifying or regulating the microclimate and allowing for crop production in the midst of frosts. These ingenious platforms of soil surrounded by ditches filled with water are able to produce bumper crops, despite floods, droughts and the killing frost common at altitudes of nearly 4000 meters. This ingenious system of raised fields emerged on the high plains of the Peruvian Andes about 3,000 years ago.

The combination of raised fields and canals has proven to have important temperature moderation effects, extending the growing season and leading to higher productivity on the Waru-Warus compared to chemically fertilized pampa soils. In the Huatta district, reconstructed raised fields produce an impressive harvest with sustained potato yield of 8 to 14 tons per hectare per year. In Camjata, with the waru-waru system, potato yields can reach up to 13 tons per hectare per year.



IFUGAO RICE TERRACES

Philippines

The ancient Ifugao Rice Terraces (IRT) are the country's only highland mountain rice ecosystem (about 68,000 hectares) featuring the Ifugao ingenuities, which has created a remarkable agricultural organic paddy farming system that has retained its viability over 2000 years. The continued existence and viability of the rice terraces is a demonstration of strong connections between culture and nature, marvellous engineering systems, indigenous technological innovation and flexibility, and the determined spirit of local communities to maximize use of mountainous and steep lands for food production. In 1995, five terrace clusters in the Ifugao province were declared UNESCO World Heritage Sites honouring these spectacular landscapes reflecting the harmony between rural society and the environment.

The rice terraces are managed based on indigenous knowledge. The *Muyong*, a private forest that cap each terrace cluster, is sustained through collective effort and under traditional local practices. The communally managed forestry areas at the apex of the terraces contain

about 264 indigenous plant species, mostly endemic to the region. The terraces form unique clusters of micro-watersheds and have become an integral part of the whole mountain ecology. They serve as a rainwater filtration system and are saturated with irrigation water all year round. The technology, in which cultural activities are harmonized with the rhythm of climate and hydrology management, has enabled farmers to grow rice at over 1000 meters.

IRT paddy farming favours planting traditional rice varieties of high quality for food and rice wine production. Varieties of mudfish, snails, shrimps and frogs - many of them endemic - are associated with the rice paddies. The *Muyong* associated with the rice terrace paddies serve as biodiversity reservoirs (171 tree species, 10 varieties of climbing rattan, 45 medicinal plant species, and 20 plant species used as ethno-pesticides; about 41 bird species, 6 indigenous mammal species, including beneficial species of rats, and 2 endemic species of reptiles) and are fundamental to the agro-ecosystem.



RICE-FISH CULTURE

Qingtian county, China

In Asia fish farming in wet rice fields has a long history. Over time an ecological symbiosis has emerged in these traditional rice-fish agricultural systems. Fish provide fertilizer to rice, regulate micro-climatic conditions, soften the soil, displace water and eat larvae and weeds in the flooded fields; rice provides shade and food for fish. Furthermore, multiple products and ecological services from the rice ecosystems benefit local farmers and the environment.



Fish and rice provide high quality nutrients and an enhanced living standard for farmers. The rice-fish association reduces cost and labor, increases productive efficiency and reduces use of chemical fertilizers, pesticides and herbicides for insect and weed control through agro-biological conservation and on field environmental protection. In Longxian village of Zhejiang Province, this system demonstrates an ingenious approach to generating ecological, economic and social benefits through integrated systems that perform essential ecological functions.

About 20 native rice varieties - many threatened - grow in the rice paddies, interwoven into the landscape with home gardens, livestock, poultry, trees, field hedges, small plots featuring numerous native vegetables and fruits including lotus root, beans, taro, eggplant, Chinese plum (*Prunus simoni*) and mulberry, 6 native breeds of carp, five other species of fish, several amphibians and snails can also be found in the paddies. Seven species of wild vegetables are commonly collected along field borders where 62 forest species thrive with 21 species used as food as well as 53 species for medicinal and herbal purposes.



HANI RICE TERRACES

China

Hani Rice Terraces are located in the south-east part of the Yunnan Province. The Hani are the main minority local group and have lived in the region for over 1300 years. Their rice terraces are distributed along the south slopes of the Ailao Mountains covering an area of about 70,000 hectares. Hani villages are usually located on the mountainsides in a landscape with flourishing forests above and the Honghe River below. Hani Rice Terraces are rich in agricultural biodiversity and associated biodiversity. Rice planted in Hani terraced fields is extremely diverse even though it has been subjected to genetic erosion. Of the original 195 local rice varieties, today there are still about 48 varieties. Local varieties of rice include Hongjiaogu, Shuihongjiaogu, Dabaigu, Maxiang, Mazhagu, Pizagu, Changmaogu, Shangu, Xianggu, Shuihuangnuo, Damaonuo, etc. To conserve rice diversity, Hani people are exchanging seed varieties with surrounding villages. In addition to the diversity of rice in Hani terraced fields, other common types of plants and animals include a large variety of local aquatic flora and fauna such as fish, snail, eel, loach, shrimp, stone mussels and crab as well as duckweed, lotus and other aquatic plants. Wild herbs like water celery, plantain and Houttuynia

are grown on the ridges of terraced fields. Hani communities also raise ducks and culture a variety of fishes including common carp, silver carp, crucian carp and other fish species within the rice terraces and also plant soybeans on the ridges between fields.

The vertical distribution along the mountain slopes of the Forest - Village - Terrace - River landscapes constitutes a unique system of energy and material flows. Part of surface rainfall runoff percolates into the underground water system, while the balance of the runoff and springs flow through the forests, villages and terraces. The flowing water carries nutrients from the forest litter, village sewage and waste, and soil into the layers of horizontal terraced fields. These nutrients and sediment are trapped and filtered in the fields, hence improving soil fertility of the terrace fields. The spatial distribution of the different components of the Hani terrace system performs multiple ecological functions, including soil and water conservation, control of soil erosion, maintenance of system stability and water-purification.

The Hani people also invented two traditional methods of “fertilization of rice fields with hydropower”. The first fertilization method



requires each village to dig a communal manure pond, in which livestock manure is gathered. During spring ploughing, water is released from the large pond and nutrient-rich water washes into the terraced fields. Nutrients are ploughed into the subsoil to provide long-lasting basic fertility.

The second type of fertilization method uses June and July rains, which wash dung and humus from the mountain into ditches and diverts them into terraced fields to fertilize the flowering rice. These traditional methods of soil

fertilization not only save energy and labour in the fertilization process but also make full use of the organic “garbage” in the village and the nutrients carried by water runoff and natural soil erosion. Management of ditches plays a very important role in terraced field irrigation. Water coming down the hills has to go through ditches to reach the whole terrace. The purpose of digging, cleaning and maintaining ditches is to catch flows from mountain forests and spring water seeping from mountains to irrigate terraces. In addition, the ditches also

In the absence of a dedicated global support structure, many of these heritage systems and associated communities are threatened with virtual extinction. With rapid advances in globalization, liberalization of trade and commerce, technological change and revolution in communications, these traditional systems are increasingly being challenged by factors such as: (a) agricultural transformation and loss of traditional agricultural know-how and techniques, (b) lack of payment for non-market goods and services, (c) out migration of farmers due to local economic pressures or opportunities elsewhere, (d) loss of biodiversity and (e) cultural erosion.

The disappearance of cultures, habitats and human-created ecosystems is a serious and immediate threat. There is need to protect and safeguard the unique characteristics of agricultural heritage systems: their importance for human resilience; the value of the conservation of biodiversity, cultural, spiritual and agro-ecological assets in the light of the goods and services provided by traditional systems in diverse local contexts. GIAHS main goal is to design policy strategies conceived in a global context to meet the threats that undermine the sustainability and agro-ecology of traditional agricultural landscapes.

deposit sediments before entering the terrace to avoid continuously elevating the terrace surface due to sediment deposition resulting in declining water-retention capacity. To enable every household reasonable access to water, the Hani invented a unique water allocation method with “water dividing wood”, “water dividing stone” and “watershed distribution”. A wood or stone bar is placed at the junction of water diversion to lower ditches. The wood or stone is carved

with different sizes of water outlets to divide and allocate a specific volume of water flow to lower ditches. The size of the water outlet for each lower ditch is decided according to the irrigation area of the ditch, the water flow in the upper ditch, and the historical order of irrigation priority. This water distribution method not only conserves water, but also ensures irrigation of lower hill paddy, and has set a precedent for irrigation of mountainous regions.

▼ **Table 1. The extent of traditional agriculture in the developing world.**

REGION	NUMBER OF FARMERS	AREA (HECTARES OR %)	CONTRIBUTION TO FOOD SECURITY
<i>Latin America.</i>	<ul style="list-style-type: none"> a. 160 million peasants. b. 50 million indigenous people. 	38% of total land devoted to agriculture, about 60.5 million hectares.	41% of food consumed domestically.
<i>Africa</i>	<ul style="list-style-type: none"> a. 60-80% labor force involved in agriculture. a. 70% of population living in rural areas (about 375 million of Sub-Saharan Africa). 	100-150 million hectares	80% cereals 95% meat
<i>Asia</i>	200 million small scale rice farmers.	<ul style="list-style-type: none"> a. 7.3 million hectares of upland rice. a. 20.5 million hectares of rainfed rice. 	200 million people supported by upland shifting cultivation.

Source: Organic agriculture, environment and food security (FAO 2002).



Small farms and family farming have been and will remain a key component of our efforts to reduce global food insecurity, alleviating poverty and achieving the Millennium Development Goals (MDGs). In the context of increased global urgency for economically viable, socially responsible and environmentally sound solutions, GIAHS can serve as benchmark systems for international and national strategies for sustainable agriculture and rural development. They address the increasing food and livelihood needs of the poor and the sustainability of natural resources in an era of climate change.

WANNIAN TRADITIONAL RICE CULTURE

China

Wannian County is located in the north-east of the Jiangxi Province and the lower reaches of the Lean River. It is under the jurisdiction of Shangrao City in Jiangxi. The Wannian has a long history, a splendid ancient civilization and is believed to be at the origin of rice cultivation. Its wild rice ancestor is found in neighbouring Dongxiang County.

Wannian traditional rice was formerly called “Wuyuanzao” and is now commonly known as “Manggu”, cultivated in Heqiao Village since the North and South Dynasty. Wannian varieties are unique traditional rice varieties as they only thrive in Heqiao Village. The varieties require cold spring water and special soil conditions and climate

found in in this village. This traditional rice is of high nutritional value as it contains more protein than ordinary hybrid rice and is rich in micronutrients and vitamins. Rice culture is intimately related to local people’s daily life, expressed in the cultural diversity of their customs, food and language. As ancient but dynamic tradition, Wannian people have developed a set of experiences in rice seedling preparation and transplanting, field management, harvesting, storage and processing. Traditional rice is resistant to insects and adapted to poor soils, hence farmers do not need to use chemical fertilizers and pesticides. This contributes to environmental quality and biodiversity conservation.

OASIS OF THE MAGHREB

El Oued, Algeria and Gafsa, Tunisia

The oases of the Maghreb region are green islands flourishing in a constraining and harsh environment. They are home to a diversified and highly intensive and productive system, which has been developed over millennia. Sophisticated irrigation infrastructure constitute a crucial element of the oasis systems, supported through traditional local resource-management institutions which ensure a fair water distribution.

Dominated by the date palm, intertwined with trees and crops, these long-standing systems produce a surprising variety of fruits (pomegranates, figs, olives, apricots, peaches, apples, grapes, citrus) and vegetables, cereals, forages, medicinal and aromatic plants. In Algeria there are about 100 date varieties while 50 varieties can be found in Gafsa, Tunisia. The palm groves offer shade and lower the ambient temperature, making it the best place to live in the Sahara and an important place for recreation.

Agricultural products from the oasis provide an important source of nutrition and income for its inhabitants and for many it is their primary or secondary source of livelihood. The systems of production and irrigation and the culture of the oases vary between the different locations in

relation to their environment. There are oases in inland plain and mountainous, as well as in littoral, areas. With their rich diversity these oases systems constitute an agricultural and cultural heritage.

In Algeria, social institutions such as the Aoumma represent the local community and are charged with the oversight, control, and



maintenance of oasis resource systems. The Aoumma derives its legitimacy and authority from customary law and is dependent upon the council of local religious dignitaries - the Halqa of Azzabas - which is also the focus of social life and local norms. Agricultural products from the oasis provide an important source of nutrition and income for its inhabitants and for many it is their source of livelihood. Most of the agricultural products derived from the oasis are for family



consumption and guarantee food security that is high in quality and quantity.

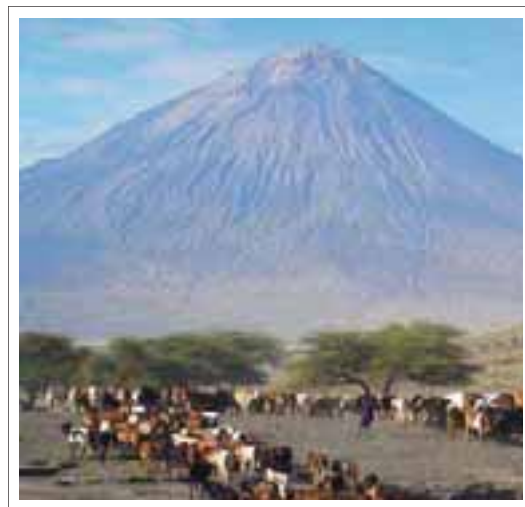
In Tunisia, oasis dwellers are descendents of indigenous Berbers and people from numerous civilizations that have invaded, migrated to and assimilated into the population over millennia. Since the beginning of the extraction of phosphate (at the end of the 19th century) there has been a significant influx of workers and families looking for work in phosphate mines from Libya and Algeria. The backbone of oasis livelihood is the irrigated date palm culture with integration of other crops and livestock. In recent times other economic activities such as tourism and remittances from community emigrants have provided for other sources of income and investment.

The traditional water management system has been largely replaced by: an association of farmers for water management (“Groupement d’Intéret Collectif (GIC)” for water), a co-operative of agricultural services, Omda (responsible for the smallest administrative unit), agricultural engineering services and local farmer unions. As there is no integrated collaborative community approach towards water management, access to the principal natural water sources and disputes between water users are beginning to be a problem. Also, due to the increased demand for drinking water of the city of Gafsa, the irrigation systems are under increased stress.

THE MAASAI PASTORAL SYSTEM

Kenya and Tanzania

Maasai pastoral system in Tanzania occupies northern areas bordering Kenya (from Loliondo to West Kilimanjaro) and extends southward as far as parts of Manyara (Kiteto to Simanjiro) along the Great Rift Valley on semi-arid and arid lands including parts of the Ngorongoro National park and Serengeti Plains. The Maasai live in extended households and manage livestock herds to increase herd size (sheep and goats for market slaughter, and camels and cattle for weddings, rituals and insurance), produce milk (for young children), for wool (sheep) and for hides (goats). It is a pastoral system and culture over 1000 years old and it continues to strike a social and environmental balance in a fragile environment. The Maasai are trying to maintain their unique identity through the maintenance of socio-cultural institutions, which are critical in regulating natural resource uses, maintaining grazing cycles and promoting conservation values. Maasai practices of rotational grazing and other natural resource management practices have contributed to creating the typical East African rangeland landscapes that provide such critical habitat for wildlife. In areas where traditional Maasai pastoralism is practiced, the synergies between their natural resource management practices and the prevalence of wildlife continues. However, this traditional pastoral system is under



pressure, threatened by several factors including recent policy reforms, increase in human and livestock population, socio-economic changes, and climatic changes. The livestock pasture and water resources are diminishing due to shrinkage of grazing areas, successive years of droughts, prolonged dry seasons and increasing stocks. The Engaresero village on the Western shores of Lake Natron has been chosen by the government of Tanzania to exemplify the Maasai pastoral system given its singularity, integrity, high diversity of habitats and biodiversity. The site also has major additional significance because of the presence of Lake Natron and the volcano Oldonyo L'Engai, which have immense ecological, geological and cultural value. The community has demonstrated strong resilience in facing threats to their systems and has maintained associated social and cultural institutions, which ensure its sustainability under prevailing environmental conditions.



Rewarding traditional farmers as providers of ecological and cultural services

Many traditional farmers provide environmental services such as watershed conservation, biodiversity protection and carbon storage. These strongly benefit external stakeholders. GIAHS intends to build momentum and public interest in rewards for environmental services and to develop ways to offer incentives to poor farmers who protect ecosystems of local and global significance. Farmers' and Non-Governmental Organizations, working with external financial support, could play an important role in developing and maintaining programmes to utilize and conserve agricultural biodiversity, e.g. bridging between farmers who provide and beneficiaries who pay for environmental services, or facilitat-

ing the production of 'added value' products that comes from GIAHS farming systems that utilize and conserve unique agricultural biodiversity. In addition, stakeholders outside the agriculture sector - e.g. ecotourists - may be induced to pay for conservation measures that offset the loss of biodiversity in agricultural landscapes to increase farmers' income and livelihood security. As GIAHS sites constitute heritage landscapes of global significance, recognition and rewards for environmental services from beneficiaries within countries and from outside can generate financial and other incentives for environmental service providers to maintain biodiversity-rich agricultural landscapes.

The resiliency of agricultural heritage systems depends on their capacity to adapt to new challenges without losing their biological and cultural wealth, and productive capacity. It does require continuous agro-ecological and social innovation combined with careful transfer of accumulated knowledge and experience across generations. The GIAHS Initiative will not "freeze" agricultural systems in time but instead stimulate "dynamic conservation", emphasizing a balance between conservation, adaptation and socio-economic development. It aims to empower smallholder family farming communities, traditional rural communities, and indigenous peoples and minority or tribal groups to continue to conserve their traditional agricultural systems and create an economic value for the conservation of biodiversity so that nature and people can prosper together.



Opportunities for promoting dynamic conservation of Globally Important Agricultural Heritage Systems

It is imperative that the common world agricultural patrimony is recognized at the national and international level and the values of agricultural heritage systems as cultural, social, environmental and economic assets be assessed properly. Agricultural Heritage Systems satisfy the expectations and demands for food, energy, health, culture and recreation of millions of people at the national level but also provide shared global benefits. Such recognition can open new opportunities for generation of employment and income through what may be called the “cultural economy” (ecotourism, cultural identity products, local gastronomy, and other products pertaining to richness of local cultures and resources).

In many GIAHS sites the eco-cultural patrimony is associated with “poor people”. Public recognition of their knowledge and skills can help in enhancing the rural poor’s identity, self esteem and sense of belonging to the global community. Their cultural resources may also be calculated as economic resources. The challenge is to search for new ways of valuing such assets in order to develop strategies of territorial development based on investments in all rural livelihood assets as well as products and services of specific cultural identity. By obtaining economic benefits from their

“products with cultural identity”, local farmers can sustain their traditions without abandoning rural areas and continue their role as stewards of biodiversity and the environment. Identifying and promoting food diversity, local varieties and other products with cultural identity at GIAHS sites can contribute to the creation of market processes tailored to informed local and other consumers that prefer products identified by origin, cultural identity and quality. In the case of GIAHS sites located in biodiverse areas of global importance, linking cultural capital with natural resources can provide the foundation for territorial development directly involving the small farmers, indigenous peoples and the overall local population rooted in their evolving knowledge systems.

Farmers at GIAHS sites maintain *in situ* crop and animal genetic diversity and are actually net subsidizers of modern agriculture and food consumers worldwide. These custodians of genetic portfolios are not compensated for the potential global benefits that they provide. Certainly, rewarding such ecological and social service providers to continue agrobiodiversity conservation is a major goal of the GIAHS initiative.

In many countries, conservation of the eco-cultural patrimony is still threatened by the

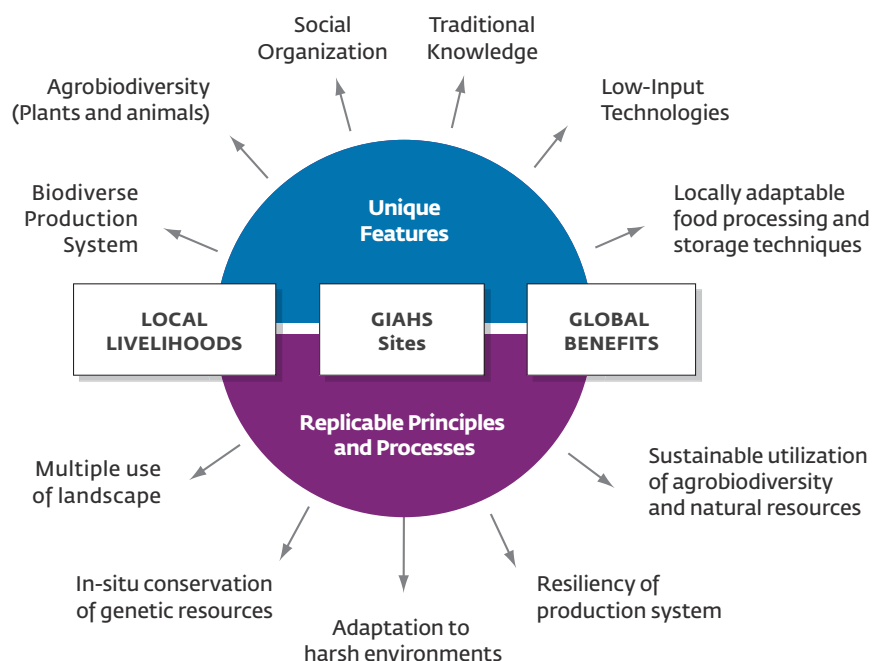
low value attributed to traditional products and skills. Markets need to be developed and improved, although other non-market mechanisms may be available and preferable to enhance income and well-being. Likewise, the tourist industry must aim at creating more awareness of the significance of this patrimony, and support it by consuming local foods, promoting ecotourism of natural areas and traditional agricultural landscapes, donating to local projects that support community projects, and other initiatives. When ecotourism is managed by local people or local businesses committed to the GIAHS concept, projected results should include reduction of poverty, greater conservation of biodiversity and generation of socio-economic benefits for local populations.

Major drivers of traditional agricultural biodiversity loss include land use changes, introduction of new crop varieties, over exploitation of wild resources, over fishing, highly consumptive food practices with considerable waste, and perverse effects of trade liberalization and agricultural subsidies. The consequences of these losses disrupt the lifestyles of the poor farmers who depend upon local ecosystems for their livelihoods especially in terms of food security. Therefore, policies are needed to support dynamic conservation of GIAHS and safeguard it from negative external drivers of change. It is also important to protect the natural and cultural assets of GIAHS sites from industrial development, which often extract labor and cause market

distortion as well. Special attention should be given when introducing modern agricultural varieties and inputs to avoid upsetting the balance of traditional agro-ecosystems.

In addition to conserving local production systems and compensating farmers for their services, one of the goals of the GIAHS initiative is to engage in a process of scaling up agroecologically-based innovations, which incorporate elements of both traditional knowledge and modern agricultural science. The analysis of hundreds of farmer-centred projects around the developing world shows convincingly that under agroecological approaches, crop yields of most poor farmers can be increased several-fold. This is achieved based on internal inputs through reliance on their own labor and know-how and not on external inputs such as the purchase of expensive inputs. GIAHS sites capitalize on processes of diversification and synergies amongst activities. Scaling up such approaches can have a positive impact on the livelihoods of small farming communities in many countries. Success will depend on the use of a variety of agroecological improvements that, in addition to farm diversification, favor better use of local resources, emphasize enhancement of human capital and empower communities through training and consultative, participatory methods. Finally, there has to be greater access to equitable markets, credit and income generating activities with the support of enabling policies local farmers and rural areas.

▼ **Figure 3. Unique features and principles of GIAHS derived from such sites that may be replicated in other farming systems to achieve sustainability and resiliency.**



GIAHS systems represent a continuation of historic traditions and knowledge that have evolved over the centuries. These cultures, settlements, landscapes and habitats have suffered dramatically in the wake of industrial and agricultural revolutions and advances of science, technology, commerce and communications in the 19th and 20th centuries.

The few that still survive as flag bearers of the earlier tradition are worth safeguarding as a part of the protection of the world cultural and natural heritage. Agricultural heritage landscapes are not only important landmarks of historical value but also depend on living and dynamically evolving agricultural communities. These communities are the custodians of an institutional, ecological and cultural heritage which provides a variety of benefits and services at the local, national and global levels.

Conclusions and Way Forward for Sustainable Agriculture and Rural Development

Globally Important Agricultural Heritage Systems are living, evolving system of human communities in an intricate relationship with their territory, cultural or agricultural landscapes or biophysical and wider social environment. The humans and their way of life have continually adapted to the potentials and constraints of the social-ecological environments, and shaped the landscapes into remarkable and aesthetic beauty, accumulated wealth of knowledge systems and culture, and in the perpetuation of the biological diversity of global significance.

Many GIAHS and their unique elements are under threats and facing disappearance due to the penetration of global commodity driven markets that often creates situations in which local producers or communities in GIAHS have to compete with agricultural produce from intensive and often subsidized agriculture in other areas of the world. All of these threats and issues pose the risk of loss of unique and globally significant agricultural biodiversity and associated knowledge, aesthetic beauty, human culture, and thereby threatening the livelihood security and food sovereignty of many rural, traditional and family farming communities.

Moreover, what is not being realized, once these GIAHS unique key elements is lost, the agricultural legacy and associated social-ecological and cultural, local and global benefits will also be lost forever. Therefore, policies are needed to support dynamic conservation of agricultural heritage and safeguard it from the negative external drivers of change. It is likewise important to protect the natural and cultural assets of GIAHS sites from industrial development, which often extract labor and causing market distortion as well. Special attention should be given when introducing modern agricultural varieties and inputs to avoid upsetting the balance of traditional agro-ecosystems.

Success in sustainable agriculture development will depend on the use of a variety of agroecological improvements that in addition to farm diversification, favoring better use of local resources; emphasizing human capital enhancement; empowerment of rural communities and family farmers through training and participatory methods; as well as higher access to equitable markets, credit and income generating activities, and all should be supported by conducive policies.

“A Heritage for the Future”

The Earth is dotted with a myriad of home-grown agricultural systems that are humanity's common heritage. These systems provided essential ecosystem goods and services and food security for millions of local community members and indigenous peoples, well beyond their borders.



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