Conservation and Adaptive Management of Globally Important Agricultural Heritage Systems (GIAHS)

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Abstract: Worldwide specific agricultural systems and landscapes have been created, shaped and maintained by generations of farmers and herders based on diverse natural resources using locally adapted management practices. Building on local knowledge and experience these ingenious agricultural systems reflect the evolution of humankind, the diversity of its knowledge and its profound relationship with nature. These systems have resulted not only in outstanding landscapes maintenance and adaptation of globally significant agricultural biodiversity indigenous knowledge systems and resilient ecosystems, but above all, in the sustained provision of multiple goods and services, food and livelihood security and quality of life. However, many of these systems are facing severe threats from various sources including globalization. In 2002 FAO initiated an international partnership initiative: “conservation and adaptive management of Globally Important Agricultural Heritage Systems (GIAHS)”. The global GIAHS initiative aims to establish the basis for the international recognition, dynamic conservation and sustainable management of such systems, agricultural biodiversity and their associated biodiversity knowledge systems, food and livelihood security, landscapes and cultures.

Key words: Globally Important Agricultural Heritage Systems (GIAHS); dynamic conservation; agricultural biodiversity; indigenous knowledge; FAO/UN

1 Introduction

In many countries, specific agricultural systems and landscapes have been created, shaped and maintained by generations of farmers and herders based on diverse species and their interactions and using locally adapted, distinctive and often ingenious combinations of management practices and techniques. Building on generations of accumulated dynamic knowledge and experience, these ingenious agri-“cultural” systems reflect the evolution of humanity and its profound harmony with nature. They have resulted not only in outstanding aesthetic beauty, maintenance of globally significant agricultural biodiversity, resilient ecosystems and valuable cultural inheritance but, above all, in the sustained provision of multiple goods and services, food and livelihood security for millions of poor and small farmers.

Such agricultural and agro-silvo-pastoral systems can be found, in particular, in highly populated regions or in areas where the population has, for various reasons, had to establish complex and innovative land-use/management practices, for example, due to geographic isolation, fragile ecosystems, political marginalisation, limited natural resources, and/or extreme climatic conditions.

Their ecosystem resilience and robustness has been developed and adapted to cope with change (natural events and social, technological and political context) so as to ensure food and livelihood security and alleviate risk. The dynamic human management strategies and processes that allow the maintenance of biodiversity and essential ecosystem services are characterised by continuous technological and cultural innovation, transfer between generations and exchange with other communities and
ecosystems. The wealth and breadth of accumulated knowledge and experience in the management and use of resources is a globally significant resource that needs to be conserved and allowed to evolve.

2 Globally Important Agricultural Heritage Systems

Globally Important Agricultural Heritage Systems (GIAHS) represent a unique sub-set of agricultural systems, which exemplify customary use of globally significant agricultural biodiversity and merit to be recognised as a heritage of mankind. 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).

Given the above definition of GIAHS, dynamic conservation and nurturing is not only ideal to the systems, land use or landscapes and biodiversity, it is also an integrated idea and approach for looking at the well-being of a community while aiming for sustainable development. GIAHS introduce the need for efforts to promote public understanding and recognition of the agricultural legacy, in which multiple goods and services provided to family farming communities are distinct in many ways. They provide food sovereignty, health and nutrition for many poor, helpless and isolated people, maintenance of globally significant biodiversity and genetic resources for food and agriculture, ecosystem services through functional diversity, products and service diversity, collective and individual knowledge systems and cultural diversity.

3 Agricultural heritage systems' characteristics and examples

GIAHS are selected based on their importance for the provision of local food security, high levels of agrobiodiversity 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. There are hundreds of examples of such agricultural heritage systems and they are home to thousands of minorities, indigenous communities and local populations with a myriad of cultures, languages and social organizations. 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; the Ifugao rice terraces in the Philippines; and many more. These systems also include diverse agricultural features 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 labour. These practices are common in the tropics, e.g. in taro-based or root cropping systems, planted along with other trees, shrubs, vines, or other plants that can thrive in the environment under the canopy of the taller trees (endemic plant varieties from local genetic resources). They 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 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. They 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 that 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 ones.

(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 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 the Bamileke region, Cameroon; 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. Seethampetha 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 require acquired handling skills and extraordinary finesse e.g. Saffron systems in Iran, Afghanistan and Kashmir, India.

(10) Hunting-gathering systems

These systems feature unique agricultural practices such as harvesting of wild rice in Chad and honey gathering by forest dwelling peoples in Central and Eastern Africa.

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

4 The GIAHS initiative and their dynamic conservation

4.1 Socio-ecological landscapes

GIAHS throughout the world testify the inventiveness and ingenuity of people in their use and management of biodiversity, inter-species dynamics, and more importantly, in utilising the physical attributes of the landscape where they live, codified in traditional but evolving knowledge, practices and technologies. Ingenious agro-ecosystems reflect human evolutionary transitions by intimately linking socio-cultural systems with biophysical systems. They use traditional knowledge systems, ‘trial-and-error’ and experiential learning, insights and innovations. Their ingenuity has resulted in well-balanced agro-ecological systems in marginal, extreme or very specific ecologies, which could not otherwise have sustainably supported human life and agrobiodiversity. These systems are organised and managed through highly adapted social and cultural and customary practices and institutions. These agricultural “landsapes” typically evolve in parallel with their associated “lifescapes”. They are characterised by continuous technological and cultural innovations, as well as the adjustment of management practices and use of resources and ecosystems, through their transfer from generation to generation, exchanges with other communities and ecosystems and in response to natural events and to changing social, technological and political contexts.

4.2 Body of traditional knowledge systems

GIAHS is a set of practices, knowledge, institutions, technologies, skills, traditions, beliefs and values proper to a farming community. The traditional and indigenous knowledge systems employed in GIAHSs are the foundation and basis for managing the agroecosystem, including its processes and functions, and to maintain the general ecosystem and landscape integrity. As such, agricultural system have evolved, co-evolved with the human communities, handed down from one generation onto another, refined and continuously fine tuned, primarily as a response to the specific natural environment change where they need to gain their livelihood. Thus, agricultural systems in many parts of the world have led to landscape-scale ecosystem variation, and provided mosaics of micro-habitats, that support associated plant and animal communities, which now largely depend on continued management for their viability. In many regions of the world, especially where natural conditions of climate, soil, accessibility and human presence militate against
intensification, there still persist agro-ecosystems and landscapes that are maintained by traditional knowledge and practices developed by generations of farmers, forest dwellers, and herders.

4.3 High Degree of biodiversity and associated biodiversity

A growing body of scientific evidence demonstrates that indigenous and traditional agricultural systems feature a high degree of plant and genetic resources for food and agriculture. GIAHS systems often reflect rich and globally unique agricultural biodiversity within and between species, but also at ecosystem and landscape level. For instance, tropical agroecosystems composed of agricultural and fallow fields, multi-storey farming practices, complex home gardens, and agroforestry plots commonly contain well over 100 plant species per field. These biodiversity products are used for construction material, firewood, tools, medicines, livestock feed, and more importantly, for human food consumption (Koohafkan and Altieri 2004). This happens through practicing traditional agriculture, such as and multiple-cropping systems which supply food and livelihoods to about 1.4 billion subsistence families and communities. Others outlined that most of the traditional agriculture and agroecosystems are located in centres of crop of diversity, and contain populations of variable biological resources, both domesticated and adapted landraces, as well as wild and weedy relatives of crops. The richness of biodiversity in any form and given condition however, can only be effectively maintained, adapted and conserved with the human management systems that have created it, including indigenous knowledge systems and technologies, specific forms of social organisation, customary or formal law and other cultural practices. Having been founded on ancient agricultural civilizations, GIAHS are linked to important centres of origin and diversity of domesticated plant and animal species, the in situ conservation of which is of economic importance and global value (Altieri and Koohafkan, 2008).

4.4 A natural landscape with aesthetic beauty

GIAHS have evolved in time specific and highly adapted forms of social organisation through which the ecosystems and landscape management takes place, and cultural identity is preserved. These indigenous and traditional agricultural systems have resulted in outstanding landscapes with remarkable aesthetic beauty. Some of these GIAHS landscapes appear to satisfy the objectives of the UNESCO Convention concerning Protection of the World recognised as World Heritage Sites. The Ifugao Rice Terraces of the Philippines are an example of GIAHS and World Heritage Site. This system is an epitome of agricultural legacy which dates back to more than 2000 years ago. The spectacular rice terraces’ landscapes allow protection and conservation of significant and important agricultural biodiversity and associated biodiversity, feature marvellous engineering systems and innovativeness, promote tourism, as well as expressing the conquered and conserved harmony between humankind and the environment.

4.5 Socio-Cultural functions and diversity

GIAHS have other values beyond production of food, fibres, maintenance and conservation of plant and genetic resources for food and agriculture, and other provisioning services. These living and evolving systems and communities have kept their distinct identities intact on the strength of unifying values such as nature, family, community, history, and a sense of belonging to their natural habitats (Koohafkan 2006). What sets apart the agricultural heritage systems from the UNESCO World Heritage Sites is a unique feature of outstanding universal value: the fact that GIAHS are not static or frozen in time or space. They represent a living, dynamic, socio-economic, cultural and institutional mosaic of how man has adapted over the centuries to the demands of dramatic advances in human civilisation, while preserving and conserving to this day a rich heritage of customs, livelihood patterns and landscapes. Their cultural diversity is also a factor which reinforces the heritage characteristics of GIAHS. These systems are bonded by a common thread of distinct identities, language use, ethnicity, aesthetics, and respect for nature and the ecosystem. GIAHS are an agricultural legacy, which only represent important agroecosystems, landscapes or landmarks of historical value but also living and evolving family farming communities, institutions and ecological and cultural heritage.

5 The need for Recognizing Custodians of GIAHS

Small scale traditional family farming communities and rural dwellers are the custodians, guardians and managers of natural resources. They have wealth of knowledge about their crops, soils, farming environment and socio-cultural condition. A great part of the traditional ecological and agricultural knowledge systems that underlie in GIAHS and the ways farmers adapt and cope with the changing environment and socio-economic conditions, has proved essentially crucial to local internal and external assistance for poor farmers in many parts of the developing countries, and in restoring the ecological integrity of watersheds and micro-watersheds and the productive capacities of small holder/traditional family farming communities.

The GIAHS initiative is a timely effort to gather GIAHS around the world and to recognise farmers’ innovative ways and their contribution in natural
resources’ management as well as instilling pride in their own unique farming practices. The GIAHS initiative is being now piloted in eight countries representing several types of agricultural heritage systems, such as: (i) Chiloe agriculture, Chile; (ii) Rice fish agriculture, Hani Rice terraces, Wannian traditional rice Culture System, China; (iii) Andean agriculture, Peru; (iv) Ifugao rice terraces, Philippines; (v) Oases of the Maghreb, North Africa, Algeria and Tunisia; (vi) Maasai agropastoral system, Kenya; and (vii) Tapade agroforestry system, Tanzania.

6 Goals and objectives of the 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 by 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 the 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-labelling, 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 the 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”.

7 The need for dynamic conservation of GIAHS

Dynamic conservation of traditional and unique agricultural systems can only be guaranteed if the food and livelihoods of the custodian communities is secured. However, enhancing rural livelihoods requires an understanding of the factors that interplay in the sustainability of the local practices, traditional agricultural and ecological knowledge systems and appreciating the richness of the diversity that exists between and within the rural communities. The concept of GIAHS is distinct from and more complex than a conventional heritage site or a protected landscape, since GIAHS is a living, evolving system of human communities in an intricate relationship with their territory, cultural or agricultural landscape or biophysical and wider social environment. In the early days of introducing the GIAHS concept and even today, people from all walks of life, e.g. scientists, students, policymakers, general audience, who are not aware of GIAHS, often associate GIAHS with “preservation”, museums, or architectural monuments because of the term “heritage”. To make people grasp an understanding of GIAHS is not easy but as soon as the concept is understood, implementation becomes easy and it stirs local communities’ innovative thinking to benefit from
the dynamic conservation of GIAHS. In most occasions, the concept of dynamic conservation of GIAHS gathers interest and enthusiasm. “GIAHS is not about the past but it is about the future” is a simple slogan, yet very compelling. And the resiliency of the system depends on their capacity to adapt to new challenges without loosing their biological and cultural wealth, and productive capacity. It does require continuous agro-ecological and social innovations combined with careful intergenerational transfer of accumulated knowledge and experience across the generations. Any attempt to try to conserve GIAHS by “freezing them in time” would surely lead to their degradation and condemn their communities to poverty.

8 GIAHS: resiliency and farmers’ innovations
Sustaining rural livelihoods, food security and environmental sustainability is a challenge to humankind. Previous and current approaches to natural resources’ management are always providing us with opportunities and new ideas, such as improving, even if as simple as a basic methodology and practical ways of farming systems and land husbandry. However, with the increasing pressures on the natural resource base and the needs of farmers to cope with their livelihoods, farmers may choose to leave their farms in pursuit of bigger and better opportunities or they may choose practices that may give them immediate benefits but maybe unsustainable. Since the majority of the world’s population is subsisting on agriculture for their livelihoods, a holistic and integrated approach that will promote both sustainability of livelihoods of traditional societies and viability of ecosystems such as GIAHS is needed. Traditional societies, poor as they may be, have the ability to innovate in the face of change, which is an important aspect of resiliency and sustainability. Also, they are the repositories of agricultural and ecological knowledge systems (farming, herding, fishing, hunting and gathering systems). These living and evolving systems and communities hold a merit for recognition as they have kept their distinct identities intact on the strength of unifying values such as nature, family, community, history, and a sense of belonging to their natural habitats.

9 Summary and the way forward
Dynamic conservation of GIAHS is an example of holistic management approach, a shared vision of agricultural, ecological and traditional societal sustainability. Worldwide, work is ongoing to promote recognition of GIAHS and safeguard their continued evolution. The GIAHS Partnership Initiative calls for safeguarding the agricultural legacy and its associated landscapes, agricultural biodiversity and knowledge systems, by mobilising world-wide recognition and support to outstanding traditional and family agriculture. It also seeks to support GIAHS communities and their local institutions by developing enabling and appropriate policy environments conducive to their continued existence and which allow their sustainable evolution and development. Over the last 8 years, piloting dynamic conservation of selected systems has created awareness, interest and enthusiasm from a wide audience of both local and international bodies. Several countries have expressed interest in participating in the Partnership Initiative to promote sustainable agriculture and rural development of unique traditional and family farming systems of developed and non developed countries.

The programme also involves enhancing local, national and global benefits derived through dynamic conservation and economic viability. The programme attempts to address challenges, issues and mitigate threats to the resilience of GIAHS by supporting rural farmers and their communities’ capacities to continue to manage agricultural heritage systems, with the involvement of national governments, scientists and other stakeholders. 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 indigenous and ingenious agricultural systems, threaten the foundation of agricultural “culture” and associated biodiversity. Other challenges and threats needed to address are: erosion of rural values closely linked with out-migration, overexploitation of resources and declining productivity, as well as imports of exotic domesticated species leading to severe genetic erosion and loss of local knowledge systems. In some areas, there are spill over 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 subsidised 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, land degradation, poverty, 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.

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全球重要农业文化遗产（GIAHS）保护与适应性管理

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摘要: 世界各地世代居住的农牧民，以多样化的自然资源为基础，通过因地制宜的生产实践活动，创造、形成并保持着许多独具特色的农业系统和景观。这些在本土知识和传统经验基础上所建立起来的农业文化遗产巧夺天工，充分反映了人类及其文化多样性与自然环境之间深刻关系的演进历程。这些系统不仅维持并适应了具有全球重要意义的农业生物多样性，形成了丰富的本土知识体系，而且更为重要的是，还为人类持续提供了多样化的产品和服务，保障了食物安全和生计安全，提高了人们的生活质量。但是，许多这样的农业生产系统正面临着包括全球化在内的多种影响因素的威胁。2002年，联合国粮农组织发起了一个国际合作计划“全球重要农业文化遗产（GIAHS）保护与适应性管理”。这一全球性倡议旨在建立这些农业文化遗产及其有关的生物多样性、食物与生计安全、景观与文化的保护体系，并在世界范围内得到认可，实现动态保护和可持续管理。

关键词: 全球重要农业文化遗产（GIAHS）; 动态保护; 农业生物多样性; 本土知识; 联合国粮农及农业组织（FAO/UN）