A methodological framework for the dynamic conservation of agricultural heritage systems

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This handbook was prepared by Parviz Koohafkan and Miguel Altieri. It is intended for the various stakeholders to: (i) facilitate understanding of the GIAHS concept, dynamics and its goals; (ii) provide information on multi-stakeholders participatory processes and assessment; (iii) develop the capability to prepare and implement a Dynamic Conservation Plan; and (iii) assess the sustainability of the system. The handbook contains suggestions and tips essential for stimulating discussion of each methodological process.

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Abbreviations and acronyms

CBD	Convention on biological diversity
CBO	Community based organizations
CBPR	Community based participatory research
FAO	Food and Agriculture Organization of the United Nations
FPIC	Free, prior, and informed consent
GIAHS	Globally Important Agricultural Heritage Systems
HYV	High-yielding varieties
IK	Indigenous knowledge
IPM	Integrated pest management
MESMIS	Marco para la Evaluación de Sistemas de Manejo de Recursos Naturales Mediante Indicadores de Sustentabilidad (Framework for the Evaluation of Natural Resource Management Systems Incorporating Sustainability Indicators)
MSP	Multi-stakeholder process
NGO	Non-governmental organization
NRM	Natural resource management
PES	Payments for environmental services
SLA	Sustainable livelihoods framework
TEK	Traditional ecological knowledge
UNESCO	United Nations Educational Scientific and Cultural Organization
WHC	World Heritage Convention
WSSD	World Summit on Sustainable Development

Glossary

Agricultural biodiversity is a broad term that includes all components of biological diversity of relevance to food and agriculture, and all components of biological diversity that constitute the agricultural ecosystem. (COP decision V/5, appendix).

Agricultural ecosystem (or agro-ecosystem) is the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure and processes (COP decision V/5, appendix, Convention on Biodiversity, CBD).

Biological diversity is the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and ecosystems. (Article 2 of the Convention on Biological Diversity, www.cbd.int/convention/)

Capacity building is a process of strengthening or developing human resources, institutions, or organizations. Encompasses the country's human, scientific, technological, organizational, institutional and resource capabilities. A fundamental goal of capacity building is to enhance the ability to evaluate and address the crucial questions related to policy choices and modes of implementation among development options, based on an understanding of environment potentials and limits and of needs perceived by the people of the country concerned. (http://202.73.13.50:55381/agrovocv10i/#Concepts)

Climate change is a long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. It may be a change in the average weather conditions or a change in the distribution of weather events concerning an average, for example, greater or fewer extreme weather events. Climate change may be limited to a specific region, or may occur worldwide. (http://www.wikipedia.org/).

Dynamic conservation is all those actions which are directed towards sustaining otherwise decreasing rates of use, towards sustained yield management, or towards increasing sustained use. (http://202.73.13.50:55381/agrovocv10i/#Concepts).

Ecosystem is a dynamic complex of plant, animal and micro-organism communities and their nonliving environment interacting as a functional unit (Art. 2, Convention on Biological Diversity).

Ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Application of the ecosystem approach will help to reach a balance of the three objectives of the Convention. It is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems. (http://www.cbd.int/ecosystem/)

Ecosystem management is a process that aims to conserve major ecological services and restore natural resources, while meeting the socio-economic, political and cultural needs of current and future generations. The principal objective of ecosystem management is the efficient maintenance, and ethical use of natural resources. Ecosystem management

acknowledges that the interrelation of socio-cultural, economic and ecological systems is paramount to understanding the circumstances that affect environmental goals and outcomes. It is a multifaceted and holistic approach, which requires a significant change in how the natural and human environments are identified. Several approaches to effective ecosystem management engage conservation efforts at both a local or landscape level and involves: adaptive management, natural resource management, strategic management, and command and control management. (http://en.wikipedia.org/wiki/Portal:Agropedia)

Environment indicates the surroundings of an object and all the external or internal factors or conditions supporting or influencing the existence or development of an organism or assemblages of organisms.
(http://202.73.13.50:55381/agrovocv10i/#Concepts)

Financial capital is the money used by entrepreneurs and business to buy what they need to make their products or provide their services or to that sector of the economy based on its operation, i.e. retail, corporate, investment banking, etc.
(http://www.wikipedia.org/)

Food security is a condition that can be reached when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. (http://202.73.13.50:55381/agrovocv10i/#Concepts)

Free, prior and informed consent (FPIC) is acknowledged by several international human rights law instruments. The International Labour Organization Indigenous and Tribal Peoples Convention, 1989 (No. 169) refers to the principle of free and informed consent in the context of relocation of indigenous peoples from their land in its Article 16. Article 7 recognizes indigenous peoples' "right to decide their own priorities for the process of development" and "to exercise control, to the extent possible, over their own economic, social and cultural development." In Articles 2, 6 and 15, the Convention requires that States fully consult with indigenous peoples and ensure their informed participation in the context of development, national institutions and programmes and lands and resources. As a general principle, Article 6 requires that consultation be undertaken in good faith, in a form appropriate to the circumstances and with the objective of achieving consent (E/CN.4/Sub.2/AC.4/2005/WP.1). The underlying principles of free, prior and informed consent can be summarized as follows: (i) information about and consultation on any proposed initiative and its likely impacts; (ii) meaningful participation of indigenous peoples; and, (iii) representative institutions.
(Commission on Human Rights, Sub-Commission on the Promotion and Protection of Human Rights, Working Group on Indigenous Populations, Twenty-second session, 19–13 July 2004).

Genetic resources are the germplasm of plants, animals or other organisms containing useful characters of actual or potential value. In a domesticated species it is the sum of all the genetic combinations produced in the process of evolution.
(http://202.73.13.50:55381/agrovocv10i/#Concepts)

Germplasm is an individual, group of individuals or a clone representing a genotype, variety, species or culture, held in an in situ or ex situ collection.
(http://202.73.13.50:55381/agrovocv10i/#Concepts)

Globalization is the process by which regional economies, societies, and cultures have become integrated through a global network of political ideas through communication, transportation and trade. The term is most closely associated with economic globalization: the integration of national economies into the international economy through trade, foreign direct investment, capital flows, migration, the spread of technology and military presence. However, globalization is usually recognized as being driven by a combination of economic, technological, sociocultural, political and biological factors. The term can refer to the transnational circulation of ideas, languages, or popular culture through acculturation. An aspect of the world which has gone through the process can be said to be globalized. (http://www.wikipedia.org/)

Globally Important Agricultural Heritage Systems: are remarkable land-use systems and landscapes rich in globally significant biological diversity that have evolved from the co-adaptation of a community with its environment and its needs and aspirations for sustainable development. (www.fao.org/nr/giahs/en/)

Human capital is the stock of competences, knowledge and personality attributes embodied in the ability to perform labour to produce economic value. It is the attribute gained by a worker through education and experience. Many early economic theories refer to it simply as workforce, one of three factors of production, and consider it to be a fungible resource – homogeneous and easily interchangeable. Other conceptions of this labour dispense with these assumptions.
(http://www.wikipedia.org/)

Indigenous knowledge is the expression that indicates long-standing traditions and practices of certain regional, indigenous, or local communities. Traditional knowledge encompasses the wisdom, knowledge and teachings of these communities. In many cases, indigenous knowledge has been orally passed down for generations from person to person. Some forms of IK are expressed in stories, legends, folklore, rituals, songs and laws. (http://www.wikipedia.org/).

Indigenous species are particular species native to a particular area; used of a species having originated naturally in a region or environment.
(http://202.73.13.50:55381/agrovocv10i/#Concepts)

Land degradation is a concept in which the value of the biophysical environment is affected by one or more combination of human-induced processes acting upon the land. It is viewed as any change or disturbance to the land perceived to be deleterious or undesirable. Natural hazards are excluded as a cause; however human activities can indirectly affect phenomena such as floods and bush fires.
(http://en.wikipedia.org/wiki/Portal:Agropedia)

Land use is the human use of land. Land use involves the management and modification of natural environment or wilderness into a built environment such as fields, pastures, and settlements. It has been defined as "the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it" (FAO, 1997a; FAO/UNEP, 1999).

Natural capital is the extension of the economic notion of capital (manufactured means of production) to goods and services relating to the natural environment. Natural capital is thus the stock of natural ecosystems that yields a flow of valuable ecosystem goods or services

into the future. For example, a stock of trees or fish provides a flow of new trees or fish, a flow can be indefinitely sustainable. Natural capital may also provide services such as recycling wastes or water catchment and erosion control. Since the flow of services from ecosystems requires that they function as whole systems, the structure and diversity of the system are important components of natural capital. (http://www.wikipedia.org/)

Natural resources are portions of the natural environment, such as air, water, soil, botanical and zoological resources and minerals. Renewable resources can potentially last indefinitely (provided stocks are not overexploited) without reducing the available supply because it is replaced by natural processes (either because it recycles quite rapidly, such as water, or because it is alive and can propagate itself or be propagated, such as organisms and ecosystems). Non-renewable resources (such as coal and oil) may eventually be replaced by natural processes, but this will occur over long periods of geologic time rather than within the timeframe of current civilization. Their consumption necessarily involve their depletion. (http://www.wikipedia.org/)

Physical capital is any manufactured asset that is applied in production, such as machinery, buildings, or vehicles. In economic theory, physical capital is one of the three primary factors of production, also known as inputs in the production function. The others are natural resources (including land) and labour — the stock of competences embodied in the labour force. 'Physical' is used to distinguish physical capital from human capital (a result of investment in the human agent) and financial capital. 'Physical capital' may also refer to fixed capital, any kind of real or physical asset that is not used up in the production of a product, as distinguished from circulating capital. (http://www.wikipedia.org/)

Resilience is (i) in general, the ability to recover from or resist being affected by some shock or disturbance. In ecosystems, it indicates the buffer capacity or the ability of a system to absorb perturbations (Holling et al., 1995). It reflects the capacity of a system to stay or return to its original steady state. This first and traditional definition concentrates on stability near an equilibrium steady-state, where resistance to disturbance and speed of return to the equilibrium are used to measure resilience. (ii) The measure of the amount of change or disruption required to transform a system from being maintained by one set of mutually reinforcing processes and structures to a different set of processes and structures (www.wikipedia.com).

Resilience is also the magnitude of disturbance that can be absorbed before a system changes its structure by changing variables and processes that control behaviour (Holling et al., 1995). This second and more modern definition emphasises conditions far from steady-states, where instabilities can flip a system into another regime of behaviour, i.e. to another stability domain; (iii) Connected to (ii), the capacity for renewal of a social-ecological system in a dynamic environment, adapting to change so as to maintain or modify as appropriate essential functions (e.g. productivity, livelihoods), structure, identity, feedbacks. It is related to knowledge-building and the building of learning capabilities in institutions and organizations. It also means adaptability. (http://en.wikipedia.org/wiki/Portal:Agropedia)

Rural assets are Natural Capital, Social Capital, Human Capital, Physical Capital, and Financial Capital.

Rural development is the management of human development and the orientation of technological and institutional change to improve inclusion, longevity, knowledge and living

standards in rural areas, in the context of equity and sustainability. (http://202.73.13.50:55381/agrovocv10i/#Concepts)

Social capital is a sociological concept, which refers to connections within and between social networks. Though there are a variety of related definitions, which have been described as 'something of a cure-all' for the problems of modern society, they tend to share the core idea that social networks have value. Just as a screwdriver (physical capital) or a college education (human capital) can increase productivity (both individual and collective), so do social contacts affect the productivity of individuals and groups. (http://www.wikipedia.org/)

Socio-economic is every phenomenon pertaining to the combination or interaction of social and economic factors and involves topics such as distributional issues, labour market structure, social and opportunity costs, community dynamics, and decision-making processes. (http://202.73.13.50:55381/agrovocv10i/#Concepts)

Species are groups of animals or plants having common characteristics, able to breed together to produce fertile (capable of reproducing) offspring, and maintaining their 'separateness' from other groups. (http://202.73.13.50:55381/agrovocv10i/#Concepts)

Sustainability is the capacity to endure. In ecology, the word describes how biological systems remain diverse and productive over time. Long-lived and healthy wetlands and forests are examples of sustainable biological systems. For humans, sustainability is the potential for long-term maintenance of well being, which has environmental, economic, and social dimensions. (http://www.wikipedia.org/)

Sustainable agriculture is an agricultural practice that seeks to make use of nature's goods and ecosystem services, while producing an optimal yield in an economically, environmentally, and socially rewarding way, preserving resources for future generations. Making the transition to sustainable agriculture for farmers and agricultural producers is a process that aims to use water, land, nutrients, and other natural resources effectively, or at the rate they are replenished, so that resources are conserved. For example, using water effectively means considering other ecosystem services that water provides (flood mitigation, nutrient cycling, drinking water supply and sanitation). Sustainable agriculture also refers to the management of biodiversity so that biological resources are sustained, for example, maintaining wild relatives of crop species within agricultural landscapes (woodlots and hedgerows) sustains biodiversity; and minimize the impact of agriculture in the wider environment in order to sustain the other ecosystem services, such as, minimizing chemical inputs, especially non-renewable sources, so there is minimal damage to the surrounding ecosystem. (http://www.cbd.int/ibd/2008/sustainable-agriculture/)

Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987, p 43). Sustainable development is often explained as balancing three components: environment, society and the economy. The well-being of each of these three areas depends on the well-being of the others. In other words, it's impossible to have a vibrant healthy environment and society if the economy is very weak. (http://greenwave.cbd.int/resources/sustainable_development)

Traditional knowledge is a cumulative body of knowledge, practice and belief, evolving through adaptive processes and handed down through generations by cultural transmission

(about the relationship of living beings (including humans) with one another in their environment). Also called traditional ecological knowledge (TEK). (http://www.wikipedia.org/)

Introduction

Over the centuries, generations of farmers, forest peoples and herders have developed complex, diverse natural resources and locally adapted agricultural and forestry management systems to create and maintain specific, remarkable landscapes and agricultural systems that provide livelihoods, food security, conservation of natural resources and biodiversity. Building on local knowledge and experience, these ingenious agricultural systems reflect the evolution of humankind, the diversity of knowledge and profound relationship with nature. However, these systems are rapidly shrinking, victims of modernization, technological and economic changes. To address this problem, and the global trends undermining family agriculture and traditional agricultural systems, in 2002, during the World Summit on Sustainable Development (WSSD, Johannesburg, South Africa), the Food and Agriculture Organization of the United Nations (FAO) launched a Global Partnership Initiative on conservation and adaptive management of 'Globally Important Agricultural Heritage Systems', known as The GIAHS Initiative. The overall objective of the partnership is to identify and safeguard Globally Important Agricultural Heritage Systems and their associated landscapes, agricultural biodiversity and knowledge systems by initiating and establishing a long-term programme to support such systems and enhance global, national and local benefits derived from their dynamic conservation, sustainable management and enhanced viability.

What are Globally Important Agricultural Heritage Systems?

GIAHS (web site: www.fao.org.nr/giahs) are defined as remarkable land-use systems and landscapes rich in globally significant biological diversity. These systems have evolved from a community's co-adaptation to its environment and its needs and aspirations for sustainable development. Since its launch in 2002, the number of countries and interested stakeholders have been increasing. The GIAHS Initiative introduces the need to promote public understanding and international recognition of the Globally Important Agricultural Heritage Systems, in which multiple goods and services are provided small-scale farmers, indigenous peoples, traditional and family farming communities are distinct in many ways. The importance of this initiative is highlighted against the background of issues related to food security and nutrition in the face of climate change, adaptation, mitigation, resilience and limited natural resources. Overall, the GIAHS approach recognizes the crucial importance of the well-being of family farming communities while directing activities towards sustainable agriculture and rural development.

The Conference of the Parties to the Convention of the Biological Diversity on its COP10 Meeting adopted the GIAHS Initiative – strengthen its approaches promoting sustainability of agricultural systems and landscapes (Decision X/34. Agricultural biodiversity).

To assist stakeholders, a common understanding is essential of the type of dynamic conservation required for the system and the site including processes and methodologies. The main challenge is the establishment of an enabling environment to initiate joint collaboration between and among traditional family farming communities, indigenous peoples, local and external actors on the importance of GIAHS sites. Involvement and active participation of local communities, indigenous peoples and traditional farmers is necessary, as they are the stewards and guardians of natural resources. On the other hand, external agent's institutional diversity is required. Only by combining the different intellectual capacities, will it be possible to address the complexities of a holistic and dynamic conservation plan.

To overcome these challenges, an action plan should be developed that ensures the empowerment of communities and social sustainability for every GIAHS site proposal. Each plan will be different, because objectives and local circumstances vary, however common steps may be followed at all sites to guide the design of a locally-crafted action plan. It is intended that this handbook will assist GIAHS stakeholders prepare their action plan. Guidelines and tips are suggested for each of the steps related to conservation and adaptive management of Globally Important Agricultural Heritage Systems.

This handbook, then, is organized into Steps or Processes as follows (see Figure 1 for an overview of the process):

I. Establishing the national participatory planning strategy (establishing goals, organizational framework and enhancing capacities)

II. Determining the key features and dynamics of selected GIAHS (factors influencing positively or negatively the performance of GIAHS)

III. Identification of principles, tools and best practices for dynamic conservation of selected GIAHS

IV. Action plan is developed and implemented on demonstration sites

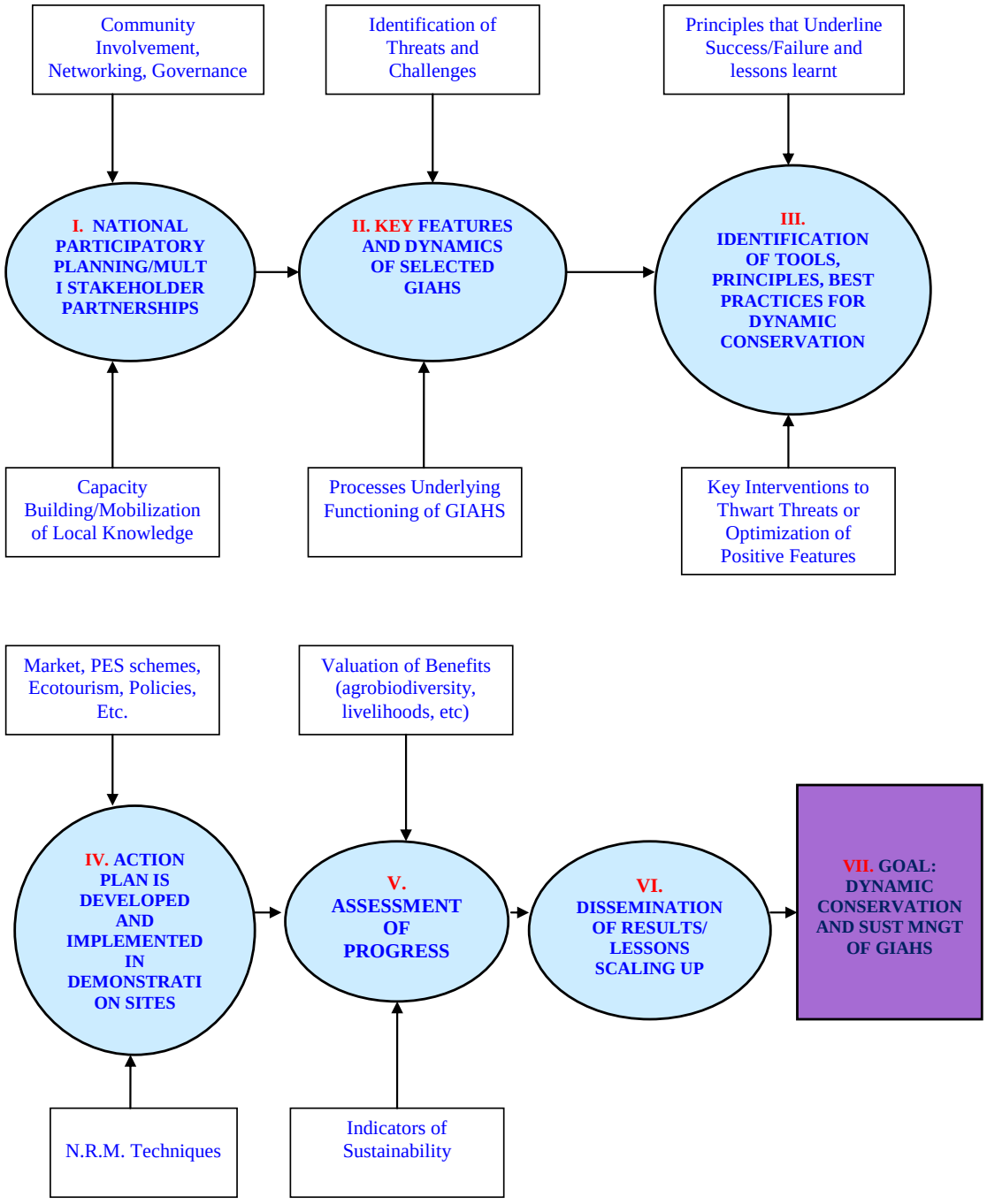
V. Assessment of progress

VI. Dissemination of results and scaling-up of successful initiatives

VII. Achievement of local people's goals and aspirations

The most important step is a genuine investment on the ground applying participatory and bottom-up approaches and recognition of cultures, livelihoods and the rights of local communities.

Figure 1. Overview of the methodological processes.



Methodological framework for dynamic conservation of agricultural heritage systems

I. ESTABLISHING THE NATIONAL PARTICIPATORY PLANNING STRATEGY (ESTABLISHING GOALS, ORGANIZATIONAL FRAMEWORK AND ENHANCING CAPACITIES)

At each site, the greatest challenge facing the implementers of the GIAHS Initiative is to establish an enabling environment conducive to establishing a dialogue between local and indigenous populations and external actors on the local and global importance of the site and the need to revitalize or conserve the system. An essential first step is the collective understanding of the system, landscape and its value and the identification of strategies to achieve the goal of the GIAHS Initiative (Box 1).

Box 1 Identification of GIAHS strategies

GIAHS calls for dynamic conservations, emphasising the balance between conservation, adaptation and socio-economic development.

There are no shortcuts to achieving the goal of developing community-based options to overcome key environmental, social and economic problems faced by local communities. Given the diversity of players at different levels and scales and the skewed power relations, the focus of this process should be on how to best undertake negotiations among the multiple stakeholders, while improving the decision-making power and influence of local communities. A bottom-up local planning process should be conducted following the suggested guidelines.

Stimulating interest and involvement of stakeholders in the GIAHS process at each target site

The dynamic conservation of GIAHS sites involves national actors and multidisciplinary teams as well as policy actions. Actual implementation of the activity frameworks is carried out at the local level. Targeting specific agricultural landscape systems and local communities is essential at this process level. The local people in this agricultural system, will be engaged in a series of activities to conserve and revitalize the selected GIAHS in partnership with governmental and non-governmental organizations.

At the local level, a key prerequisite of any GIAHS site is the involvement of local communities and being sure they understand the GIAHS concept from their own perspective. They may want to know why others are interested in conserving their agricultural heritage. Among other questions, they may ask: What benefits will we derive from this conservation? In this way they actively participate in deciding upon actions to be implemented in collaboration with other interested stakeholders.

See Box 2 for discussion topics.

Box 2. Topics for discussion and presentation should include:

I. *Discuss natural resource management and socio-economic problems and potentials of the specific GIAHS.*
II. *Identify, analyse and prioritize problems and needs for the dynamic conservation of GIAHS, as well as identify forces that threaten the stability and functioning of existing systems.*
III. *Identify positive features of existing systems (diversity of local varieties, ingenious soil conservation practices, etc.) that need to be optimized and scaled-up.*
IV. *Identify and harmonize initiatives/interventions to respond to such problems and/or to optimize successful features of target systems.*
V. *Discuss climate change/variability coping mechanisms.*
VI. *Agree on and plan activities for the dynamic conservation of a target GIAHS.*
VII. *Raise awareness and catalyze national processes to harness conducive policy, regulatory and incentive-filled environments for GIAHS.*

Actions to be undertaken by GIAHS teams to promote community participation

1. *Recognize and highlight community assets and strengths such as the views of community members as advisers and experts.*
2. *Provide real service to communities by addressing the community's needs.*
3. *Build and maintain respectful, trusting relationships within/across the community. In particular, develop relationships with leaders in the community.*
4. *Include communities in the planning stage and implementation.*
5. *Welcome new participants into the discussion.*
6. *Acknowledge and make use of existing community institutional structures (e.g. powerful community-based organizations (CBO) and grass-roots groups).*

At each GIAHS site, communities should define their own view of development, the other actors should facilitate the process of bringing the vision to achievement of the objectives. To facilitate participation, and encourage people to take responsibility for their own development, a collectively defined (in terms of composition, tasks and responsibilities) GIAHS coordinating team should be formed in each country to address several key questions:

- How to organize the stakeholders for GIAHS at various levels (provincial, watershed, community or field levels) for collective action?
- Where to draw the geophysical and socio-economic boundaries for collective action?
- Who to include in the collective action process?
- How will decisions be made and responsibilities assigned?
- Which approaches and technologies should be applied given local conditions?
- Which technologies will be excluded?

These questions may be answered through dialogue and exchange of ideas between different groups to enhance understanding of the local setting and project implications. The

stakeholders should be stimulated to think about local development problems, challenges and possible solutions, while supporting awareness-building efforts and inspiring involvement in the project. At the local level, the local coordinating team will need to initiate a process to:

- Identify ways to strengthen the capacities of farmers and other actors for the adaptive management of GIAHS sites.
- Identify forms of decentralized governance and co-management agreement setting criteria for decision-making and rules and regulations for responsible actions inherent in the GIAHS process.
- Define codes of conduct and ethical framework regulating the involvement of various stakeholders and establish equitable benefit-sharing mechanisms.

Box 3. Basic principles for establishing a transparent GIAHS process

- *The community must be respected and should always have ultimate control: this requires creating an environment for farmers to reach agreements and build an inter-learning process.*
- *Government and non-governmental organization (NGO) officials should learn to support community empowerment. A common space should be defined to identify common goals and ensure the interests of the various stakeholders remain transparent.*
- *Collaboration should occur around a shared vision and around a clear understanding of the added value of such collaboration.*
- *Experts should facilitate the process by learning to integrate scientific innovation with traditional wisdom, translating such synthesis into practical innovations.*
- *Interdependence, not dependency, is essential for a just and sustainable process.*
- *Equity can only be realized when projects impact those in greatest need while realizing the global benefits of the GIAHS process.*
- *Holistic action, at the local level, leads communities to solve priority problems and create awareness of the underlying causes as well as the understanding of new potentials.*
- *Iterative action leads to sequential learning and continued collective adjustment.*
- *Sustainability should translate into community shared benefits that will last, and into concrete support from more society members as they become aware of the global benefits of GIAHS.*

Who are the stakeholders involved in this process?

Various stakeholders will be involved in the GIAHS implementation process at different levels. This institutional diversity is required because each type of organization has a unique set of technical capacities and only through combining these capacities is it possible to address the complexities of the GIAHS process (see Box 4). These institutions include:

At the local level:

- Farmers, who are the main resource-users, their participation is the foundation of a successful programme.
- Farmers' organizations are important actors in on-farm conservation, where they exist to represent farmers' interests.
- Customary institutions provide legitimate decision-making structures and perform regulatory functions based on customary law.
- Community-based organizations (CBOs) provide local support to a conservation initiative by representing and mobilizing local communities outside of farmers. The capacity of CBOs can be strengthened to implement activities related to public awareness, market networks and holding information on various matters.

At the regional/national level

- Non-governmental organizations (NGOs) help represent local, regional or national interests. Their objectives and abilities vary greatly. Some are almost technical organizations, while others act as advocates for community rights or environmental conservation.
- National research institutes may be private, government-controlled or public, and may be focused on conservation or development.
- Government ministries may include National Ministries or Departments of Agriculture or Ministries of the Environment and can make important contributions to an on-farm conservation team, by contributing technical guidelines and operational support.
- International institutes can provide scientific and methodological guidance and policy support to local efforts. They may be of value as global bodies that can identify and coordinate various initiatives.
- Local governments and political will at the local level is of utmost importance to spearhead processes and mobilize human and material resources.

Box 4. Actions to empower local organizations to fulfill their roles

- *Organize 'community spirit – labour', the entire community participates in increasing production or conducting conservation activities.*
- *Mobilize materials to ensure increased production and conservation.*
- *Assist needy groups to gain better or new access to productive resources.*
- *Provide social infrastructure at the village level and improve social cohesion.*
- *Influence local governments and policies affecting local groups.*
- *Provide links between farmers and research-development organizations.*
- *Improve community access to information and technology.*
- *Provide a framework for cooperative action and governance.*

II. DETERMINING THE KEY FEATURES AND DYNAMICS OF SELECTED GIAHS (FACTORS INFLUENCING POSITIVELY OR NEGATIVELY THE PERFORMANCE OF GIAHS)

This Process identifies the drivers of change in farming systems, threats and the processes underlying the functioning of the GIAHS. The outcome of this process is to provide information by:

- Identifying forces, drivers of change in farming systems, trends and factors that threat the stability of GIAHS (global commodity driven markets, inadequate policies, introduction of high-yield varieties or modern inputs, poor rural services, etc.).

- Identifying processes of systems degradation (loss of biodiversity, erosion of traditional knowledge, land degradation, water and soil pollution, proliferation of unsustainable agricultural practices, etc.) and their causes/symptoms.

- Assessing fundamental processes underlying the functioning of GIAHS systems (ecosystem resilience, human devised natural resource management (NRM) strategies, balanced environmental interactions, agro-ecosystem synergies, dynamic links between livelihoods and agro-biodiversity, etc.).

- Determining traditional knowledge systems, forms of social organization and networks, cultural assets linked to satisfying human needs, subsistence and food security strategies, income generation, and socio-economic factors that affect livelihoods at local levels.

The drivers of change in farming systems

The objectives of the GIAHS Initiative is to document and foster the viability and permanence of particularly remarkable farming systems. As a result of their positive affects they benefit the environment and society at large. The GIAHS approach identifies the positive roles these systems perform, the benefits accrued not only to the developing

countries agriculture, but globally, through the various environmental, social, economic and cultural benefits provided to society at large. However, the GIAHS Initiative's primary purpose is to ensure the permanence of these systems' existence. This requires a diagnosis that concretely identifies specific threats and opportunities for the sustainability of the system. This includes the type of producers, commodities, resources and specific actions required for the markets in the GIAHS framework. Activities should encourage 'dynamic conservation' of the system and its remarkable attributes and contributions to society. This diagnosis should identify the blend of market and public-based actions suitable to the enhancement of the sustainability of the system. Actions should stimulate valuation and payment for the environmental, social and cultural services provided by the system to the custodians, stewards and dwellers in the area and to society as a whole.

Identifying threats to the existence and dynamic conservation of agricultural heritage systems

In any community or economic system, there may be several sources of unsustainability (see Box 5 for examples of signals of unsustainability sources or threats), such as the limited size of a resource, inadequate supply of inputs, high production demand, different forms of contamination such as pollution, etc. Some may be controlled within the system, while others are subject to outside pressures, over which local communities have little control.

GIAHS sites face great challenges in adapting to rapid environmental and socio-economic changes in the context of weak agricultural and environmental policies, climate variability and economic and cultural pressures. Globalization is exacerbating pressures on small-scale and traditional farming systems because of the promotion of monoculture specialising in exports. The penetration of global commodity-driven markets into remote areas often creates situations in which local producers in GIAHS must compete with agricultural producers from intensive (and often subsidised) agricultures in other parts of the world. Among these pressures are inadequate policies inducing subsidised external inputs, falling farm prices for staples and cash crops, often directly transforming overall economic viability and biodiversity, the basis of traditional systems, thus limiting the capabilities of local populations to meet their food security needs and livelihood requirements.

Often the impacts of these forces include: (i) the adoption of unsustainable practices and erosion of traditional knowledge; (ii) overexploitation of resources and declining productivity and land degradation; and (iii) importation of exotic domesticated species; leading to severe genetic erosion, as well as to social disintegration and cultural erosion of rural communities and populations. This leads to the reduced capacity of this land to support livelihoods or to deliver and sustain global goods and local benefits.

Box 5 Examples of threat signals

- *market incentives and economic policy environments that focus exclusively on short-term economic goals;*
- *low community involvement/empowerment in resource management decision-making processes despite decentralization processes;*
- *inadequate attention to local knowledge, indigenous technologies and practices, and inadequate valuation of GIAHS and associated biodiversity by research, development and rural services and policy frameworks;*
- *insufficient support to the conservation and sustainable use of significant agricultural biodiversity within and between species and at agro-ecosystem level;*
- *lack of structures supporting incentives, benefit-sharing mechanisms and marketing expertise, to ensure that adequate value is placed upon local cultivars and races, local produce and the ecosystem services provided by such systems, and that benefits are accrued by producers and their communities;*
- *inappropriate policy and legal environments, particularly in the areas of land tenure and access to resource legislation, as well as non-implementation of ground policies supportive of GIAHS and/or a lack of enforcement of laws that protect common property and traditional livelihood systems and their communities;*
- *de-legitimization of local, customary institutions for the management of natural resources, particularly the normative frameworks for access, use and benefit sharing of natural resources. Such trends occur in the context of land reform, and individuation of common property systems and policies that promote national legal, institutional and cultural homogeneity.*

In many countries, current and past policies have not supported agricultural practices and technologies supporting environmental, social or economic considerations.

Common examples include:

- Economic incentives and subsides for pesticides and fertilizers that tend to perpetuate agrochemical dependency even when economic returns and environmental impacts are negative.
- Subsidies or policy prescriptions for planting certain uniform varieties, along with requirements to use associated inputs, that reduce biodiversity and create vulnerability to pests and diseases, also reinforcing chemical dependence.
- Extension programmes and agricultural policies that encourage monocultures of crops that may be poorly adapted to local conditions.
- Land tenure policies that undermine small-scale farmers' security of ownership and consequently discourage investments in sustainable practices.
- Trade and marketing policies that promote investments in crops unsuitable for production by poorer farmers, or that create inequitable market opportunities.
- Price support policies that affect the unsustainable use of inputs and/or choice of crops.
- Incentive policies, such as granting land rights for deforestation and agricultural that result in the clearing of land unsuited to sustained production; and

- Economic and trade policies favouring export-oriented agricultural development and neglecting food security considerations.

Many of these policies have inherent biases that tend to aggravate economic inequities as well as to induce adverse ecological impacts, particularly over the long term. Such results have been seen in both northern and southern countries.

Besides the previously cited weak policies, other constraints to the implementation of sustainable agricultural initiatives, include those listed in Box 6.

Box 6. Key constraints to the implementation of sustainable agriculture initiatives

Macro-economic policies and institutions:

- *pesticide incentives and subsidies;*
- *export orientation and mono-cultural focus of conventional policies; and*
- *lack of incentives for institutional partnerships.*

Pressures from agrochemical companies:

- *political and economic power yielded against integrated pest management (IPM); and*
- *advertising and sales practices.*

Funding/donor issues and sustainability questions:

- *lack of funding, especially long-term support;*
- *lack of recognition of IPM or sustainable agriculture benefits; and*
- *need for reducing dependency on donors and for developing local support.*

Lack of information and outreach of innovative alternative methods.

Weak internal capacities of the institutions involved:

- *institutional rigidities among some collaborators;*
- *lack of experience with agro-ecology and participatory methods;*
- *social and health concerns sometimes neglected; and*
- *lack of communication and cooperation skills (among some groups).*

III. IDENTIFICATION OF PRINCIPLES, TOOLS AND BEST PRACTICES FOR DYNAMIC CONSERVATION OF SELECTED GIAHS

This particular Process is to identify the principles, tools and best practices for dynamic conservation. The following paragraphs underscore the basic elements of agricultural heritage systems, and should be considered in the preparation of an action plan.

Understanding the dynamics and systemization of traditional knowledge systems on GIAHS sites

Local stakeholders' participation is fundamental to the GIAHS developmental framework, as adaptation and innovation at local levels are typically facilitated by a learning-by-doing approach, based on experiential knowledge and generation-to-generation sharing, rather than knowledge gained in structured, scientific research. National institutions implementing the GIAHS activities will require a framework that summarizes the range of strategies, socio-cultural processes and associated belief systems that foster adaptive management of natural resources of each site.

Traditional agro-ecosystems, and associated genetic diversity prevalent on GIAHS sites, are the result of a complex co-evolutionary process between natural and social systems leading to ingenious strategies of ecosystem appropriation. The indigenous knowledge system behind the adaptation and modification of the agricultural environment is often very detailed.

Ethnobotanies are the most commonly documented folk taxonomies and many indigenous groups recognize hundreds of plant species. Soil types, degrees of soil fertility, and land-use categories are also identified in detail by farmers. Traditional agriculture is location-specific, evolving over time in a particular habitat and culture, and this is why it tends to be sustainable. Transfers of specific technologies, to other places and contexts may fail if soils, tools and social organization are different. This is why GIAHS implementers should not focus on specific technologies, but rather on the principles used by traditional agriculturists to meet the environmental requirements of their agro-ecosystems.

Two dimensions of traditional knowledge are relevant:

- traditional management practices based on ecological knowledge; and
- social mechanisms (rituals, folklore, ceremonies), social organization, customary law and decision-making that support those management practices.

Traditional resource management practices inherent to GIAHS, and the knowledge of ecosystem processes upon which they are based, are often embedded in elaborate social institutions. A major task is to identify and assess the traditional knowledge framework and resource management practices used by individuals and communities at the target sites, illustrating their value as a basis for the dynamic conservation efforts. Most farmers have an intimate knowledge of the ecological forces surrounding them. However, their experience is limited to a relatively small geographical and cultural setting. Such intimate local experiences, cannot be matched by the generalised knowledge of the ecologists, yet sophisticated training of the ecologists cannot be matched by the experiential knowledge of local farmers, although ecologists may be unable to appreciate the rich texture of the detailed knowledge of local farmers.

This is why a 'dialogue of wisdoms' is necessary between ecologists, development specialists and traditional farmers. This is an essential prerequisite to the development of a truly ecological agriculture, in which the people who own the knowledge are part of the planning process. Local skills can be mobilized, applying participatory development approaches, combining local farmer knowledge with that of external agents in the diffusion of appropriate farming techniques. Integrated studies using agro-ecological and ethno-ecological methodologies that, when combined, can determine the myriad factors

conditioning the way farmers perceive their environment and subsequently its modification, have later translated this information into adaptive management schemes.

In the context of GIAHS dynamic conservation, the protection and revitalization of traditional ecological knowledge (Box 7) is important for a variety of social, cultural and environmental reasons:

Box 7. The experimental nature of traditional knowledge

The strength of rural people's knowledge (especially Traditional Ecological Knowledge – TEK) is that it is based not only on acute observation but also on experimental learning. The experimental approach is apparent in the selection of seed varieties for specific environments. It is also implicit in the testing of new cultivation methods to overcome particular biological or socio-economic constraints. Many researchers consider this knowledge a powerful resource that must be mobilized using participatory development approaches, that combine local farmers' knowledge and skills with those of external agents in the design and diffusion of appropriate farming techniques. In general, TEK differs from scientific ecological knowledge in a number of ways.

TEK:
- *is mainly qualitative and experiential;*
- *has an intuitive component;*
- *is holistic;*
- *is spiritually based on a distinct cosmology;*
- *incorporates local ethic and social values;*
- *is based on empirical observations and accumulation of facts by trial and error;*
- *is based on data generated by resource users themselves; and*
- *is based on long-term data series in one location.*

Furthermore:

- TEK offers opportunities for biological and ecological insights to develop new scientific knowledge.
- Most of the TEK is relevant to contemporary natural resource management. Rules of thumb developed by ancient resource managers and enforced by social and cultural means are, in many instances, superior to Western scientific precepts.
- Specifically, where the local community jointly manages protected landscapes, the use of traditional knowledge for conservation education is likely to be very effective.
- The use of TEK can assist development institutions and agencies in providing more realistic evaluations of the environment, natural resources and production systems. Involvement of local resource management enhances chances of success of development plans; and
- The time-tested, in-depth knowledge of traditional farmers and local communities is an essential part of any impact assessment programme.

TEK is also desirable because it:

- draws on local resources. People are less dependent on outside agricultural supplies that may be costly, scarce and irregularly available;
- provides effective alternatives to Western know-how. It gives local people and agricultural extension workers extra options when designing projects. Instead of

searching only among Western technologies for feasible solutions, they can choose from the range of indigenous knowledge or combine indigenous and Western technologies; and

- indigenous technologies and practices are often cheaper than Western. They rely on locally available materials and often require little or no cash outlay.

Given the importance and desirability of Traditional Ecological Knowledge, many significant contributions emerge from the use of such knowledge as described in Box 8.

Box 8. Contributions emerging from the correct organization and use of traditional ecological knowledge results in the provision of:

- *best-farmer practices for dissemination to other farmers and areas;*
- *detailed local knowledge on productive resources and environment (soils, rainfall conditions, etc.);*
- *locally adapted varieties;*
- *criteria for technology development (local goals and priorities, gender preferences, etc.);*
- *a basis for testing new technologies and their 'rightness-of-fit' to local systems and circumstances; and*
- *leads for identifying opportunities for technology development; and*
- *time-tested, in-depth knowledge of the local area as an essential part of any impact assessment.*

Enhancing and adopting policy instruments to support GIAHS goals

Beyond amendment of existing policies that adversely affect agro-ecological development. Additional policies may be required to create economic incentives for local and national institutions to facilitate the adoption of sustainable practices and technologies. Without appropriate policy support, initiatives may remain localized. A major future challenge will be the promotion of institutional and policy changes to realize the potential of alternative approaches. Areas needing enhancement of policies could include:

- increasing public investments and support to agro-ecological practices and related methods;
- improvement of infrastructure and credit facilities for poor and marginal areas;
- appropriate equitable market opportunities including access to fair market and market information to small-scale farmers and family farmers;
- security of tenure and progressive decentralization processes;
- change of attitude and philosophy of decision-makers, scientists and others towards acknowledgment and promotion of different alternatives;
- institutional strategies to encourage equitable partnerships with local NGOs/CBOs and farmers;

- replacing the top-down transfer of technology models with participatory technology development and farmer-centered research and extension; and
- focussing on the role of gender (women and youth) in natural resources management and development goals.

Improving market environment in GIAHS sites

The need to improve market conditions

GIAHS stakeholders should focus attention on markets and environments to create a variety of incentives in favour of, or against, investments in sustainable agriculture. Efforts to affect these incentives will be more successful if they relate to the 'pull' of farmers' needs rather than to the 'push' of technology. Market prices should accordingly reflect real scarcity relations and not be altered by interventions of the state or non-governmental organizations (NGOs). There is ample evidence that offering subsidies for inputs seldom leads to lasting adoption of agro-ecological practices. Providing free inputs has proved to be a costly and unsustainable policy that benefits only few farmers, usually not the poorest.

Subsidized demonstration plots are generally less convincing to farmers than experiments conducted on their own fields with investments in their own resources. Similarly, financial support systems, based on farmers' own savings, are far more sustainable than entirely subsidized credit systems. Some interventions that may be suitable for study and application in the target community, to improve market condition, could include:

- establishing ways and means to eliminate unnecessary input subsidies, particularly agrochemicals;
- improving the efficiency of input-delivery and output-marketing systems and reducing the transaction costs involved in market exchange, through public and private investments in services and through provision of infrastructure;
- introducing payments for environmental services (PES);
- enhancing farmers' capacity to be more competitive, for example by establishing farmers' commercial cooperatives, market information services, fairs for direct marketing, institutional markets, etc.;
- enhancing farmers' creativity to boost their capacity for improved marketing strategy and opportunities, such as the creation of added value in agricultural production and marketing through investment in agro-processing, certification of organically grown produce, farmers' markets, etc.; and
- supporting diversification of factor and commodity markets to give farmers better access to non-farm and off-farm income opportunities that may enable them to intensify/diversify their farming systems.

The need to promote alternative markets and trade on GIAHS sites

The main idea behind Alternative and/or Fair Trade is to help family farmers in developing countries gain direct access to international markets, as well as to develop the business capacity required to compete in the global marketplace. By learning how to market their own harvests, participating farmers are able to establish their own businesses and receive a fair price for their products. This alternative trade builds on producers' skills and enables

communities to play an active part in their own development without dependency on foreign aid, while at the same time satisfying international consumer market demand.

The fundamental characteristic of alternative trade is that an equitable partnership based on mutual respect is created between producers and importers, shops, labelling organizations, and consumers from developing countries. Alternative trade 'humanizes' the trade process, making the producer–consumer chain as short as possible so that consumers become aware of the culture, identity and conditions in which producers live. Because of their cultural and ecological features, products from GIAHS sites should be highly appealing to consumers in the North. The key challenge is to develop partnerships between GIAHS farmers and marketing-consumer groups guided by specific criteria. The GIAHS stakeholders should explore this alternative with the ministry or organizations having the appropriate institutional mandate and capacity.

Natural resources management (ecosystem approach and ecosystem services)

Ecosystems are multi-dimensional interacting systems that develop structures and function through interactions between biodiversity, the abiotic environment (i.e. climate and nutrients) and human activities. Ecosystems provide humans with many services and resources vital to our survival (see Box 9, for examples of ecosystem functions). Food security and human well-being are inextricably linked to the ability of the production system and the ecosystem, of which it is part, to withstand or recover from shock or disturbance. The concept of resilience is vital in this context. Resilient social-ecological systems can sustain development in a manner that does not lead to loss of future options. Resilient systems provide capacity for renewal and innovation in the face of rapid transformation and crisis.

An ecosystem management approach focuses on sustaining dynamic ecological functions and productivity of ecosystems by protecting habitats and their biodiversity to maintain the services and resources humans derive from ecosystems. Ecosystem management usually involves three processes:

- assessment of the occurrence and distribution pattern of biodiversity and the physical structure of the ecosystem;
- monitoring of ecological changes in biodiversity at different scales representing habitats, ecosystems, watersheds and landscapes; and
- management of natural resources and biodiversity at the landscape level to enhance ecosystem services and productive qualities while preserving ecosystem stability and resiliency.

In this context any natural resource management unit is considered an ecosystem. This may be described partially by the summation of biodiversity profiles for the defined sampling units and related biodiversity data collected by a taxon-based inventory. The first step in ecosystem management is the assemblage, analysis and synthesis of existing data on landform, soil, land-cover, landscapes, land-use pattern, biodiversity and classification of the vegetation in the ecosystem (resource management) unit (recommended activity). The integrated body of ecosystem data layers provides a scientific basis for the inventory of biodiversity and ecosystem profiles to create the structure of specific ecosystems. After ecological classification, data is used to design strategies for sustainable management of the landscape sites under study and provide a sampling of the plot design.

Work at GIAHS sites requires information on site-specific biodiversity and community structure and functions in the agro-ecosystems. This information provides the baseline database on the distribution of component species in different layers of the ecosystem, particularly those playing key ecological functions such as biological control agents, recyclers, etc.

Documenting the biodiversity of an agro-ecosystem over an entire season, and at varying trophic levels, often shows the resilience or redundancy of such systems, with several species being able to serve similar ecosystem functions. In agriculture, biodiversity can be crucial to the internal regulation of sustainable functions that are present in a natural ecosystem, but have been lost as a result of agricultural simplifications present in monocultures and use of broad-spectrum pesticides. A critical challenge on GIAHS sites is the identification of currently present key agro-biodiversity species and those that are lacking, but are important to sustainable agricultural systems. The importance of biodiversity and associated biodiversity on GIAHS sites is explained in the next section.

Box 9. Examples of ecosystem functions

Ecosystem functions	*Examples*
• Regulation of temperature, precipitation, and other biologically mediated climatic processes at global or local levels	• Greenhouse gas regulation, DMS production affecting cloud formation
• Damping and integrity of ecosystem's response to environmental fluctuations	• Storm protection, flood control, drought recovery and other aspects of habitat response to environmental variability mainly controlled by vegetation structure
• Regulation of hydrological flows	• Provisioning of water for agricultural (such as irrigation) or industrial (such as milling) processes or transportation
• Storage and retention of water	• Provisioning of water through watersheds, reservoirs and aquifers
• Retention of soil within an ecosystem	• Prevention of loss of soil by wind, runoff, or other removal processes, storage of stilt in lakes and wetlands.
• Storage, internal cycling, processing and acquisition of nutrients	• Nitrogen fixation, N,P, and other elemental or nutrient cycles
• Recovery of mobile nutrients and removal or breakdown of excess or xenic nutrients and compounds	• Waste treatment, pollution control, and detoxification
• Habitat for resident and transient wildlife populations	• Nurseries, habitat for migratory species, regional habitats for locally harvested species, or over-wintering grounds
• That portion of gross primary production extractable as food	• Production of fish, game, crops, nuts, fruits by hunting, gathering, subsistence farming or fishing
• Gross primary production extractable as raw materials	• Production of lumber, fuel or fodder
• Source of unique biological materials and products	• Medicine, products for science materials, genes resistant to plant pathogens and crop pests, ornamental species (pets and horticultural varieties of plants)

• Providing opportunities for recreational activities • Providing opportunities for non-commercial uses	• Eco-tourism, sport fishing, and other outdoor recreational activities • Aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems

Agricultural biodiversity of global significance and unique to GIAHS sites

The biodiversity that underpins agricultural systems, includes cropping, animal husbandry, forestry, swidden agriculture, fisheries, hunting, gathering and combinations, and spans a continuum from simple use of wild species, for sustenance or to increase yields from desired species, to the creation and intensive management of genetically modified organisms. Within this spectrum, 'agricultural biodiversity' represents that group of organisms that has been domesticated, maintained and adapted in a process of co-evolution with human management systems.

Note: The Convention on Biodiversity (CBD) states that agricultural biological diversity is "...a broad term that includes all components of biological diversity of relevance to food and agriculture, and all components of biological diversity that constitute the agro-ecosystem: the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure and processes..." (decision V/5).

Thus, landraces and wild animal and plant species are the essential source of genetic variability for responding to biotic and abiotic stress through genetic adaptation. Agricultural biodiversity, in any form, can only be effectively maintained and adapted using human management systems that have created it, including knowledge systems and technologies, specific forms of social organization, customary or formal law and other cultural practices. Agricultural practices worldwide have led to landscape-scale ecosystem variation, and provided mosaics of micro-habitats, that support associated plant and animal communities, that largely depend on continued management for their viability. In many regions, especially where natural conditions of climate, soil, accessibility and human presence hinder intensification, there are agro-ecosystems and landscapes that are maintained by traditional practices developed by generations of farmers and herders.

Agricultural biodiversity of global significance is part of a unique subset of GIAHS, and shares the following main characteristics:

- domestication, maintenance and adaptation of the agricultural biodiversity of global significance;
- holistical management of agricultural biodiversity of global significance, which includes: (i) integration at the level of inter and intra-species dynamics; (ii) integration of different scales – genes, species, ecosystem and landscape; (iii) integration of the sustainable management of biotic and non-biotic natural resources (land and water); (iv) integration of biodiversity and ecosystem characteristics and human needs, aspirations, cultural views and preferences; and (v) adaptive management;
- agricultural biodiversity of global significance has co-evolved with these systems over centuries, even millennia

For this reason, on most GIAHS sites, in situ conservation of local crop genetic resources, and the environments in which they occur, should be part of the main objectives (Box 10). Maintenance of traditional agro-ecosystems is the only sensible strategy to conserve and sustain in situ repositories of crop germplasm. Any attempt at in situ crop genetic

conservation must maintain the agro-ecosystem productivity in which it occurs. Likewise, the conservation of traditional agro-ecosystems cannot be achieved in isolation or without being maintained by local people's socio-cultural organizations. Ultimately, if biodiversity conservation is to succeed among small-scale farmers, the process must be linked to rural development efforts that give equal importance to local resource conservation, food self-sufficiency and links to the market.

Box 10. Objectives of in situ conservation of agricultural biodiversity and associated biodiversity:

- *conservation of the processes of evolution and adaptation of local crops and varieties to their environments;*
- *conservation of diversity at the level of ecosystem, species and genetics;*
- *encouraging farmers to continue cultivation and management of a diverse set of populations in agro-ecosystems where crops have evolved;*
- *maintenance of, or increasing farmers' access to, control and access to crop genetic resources; and*
- *improvement of farmers' livelihoods through socio-economic development*

Tracking tool and monitoring of agricultural and associated biodiversity

For a given site, as indicated in Step II, the conservation and sustainable use of agricultural biodiversity (and associated biodiversity) of global significane harboured in GIAHS should have a baseline information and a regular assessment and monitoring must be conducted. The in situ conservation cannot be achieved outside dynamic farming systems and local human cultures in which these resources were developed. The initiative does not intend to freeze agricultural systems in time, but rather calls for "dynamic conservation", emphasizing a balance between conservation, adaptation and socio-economic development. It implements activities aimed to empower smallholder family farming communities, indigenous peoples and minorities/tribal groups to conserve their traditional agricultural (best) practices and to create an economic stake in the conservation of biodiversity so that nature and people can prosper together. "Agricultural systems" embodies different land husbandry management practices in agriculture and forestry. To monitor this, some examples of indicators but not limited to, must be filled up regularly.

Tracking tool and monitoring of agricultural biodiversity and associated biodiversity: some indicators

Project Duration (EOD/NTE)	Foreseen at:		
	Project Start	Mid Term	Project Closure
(1) Extent (in hectares) of the landscapes/ seascapes where the project will directly contribute to biodiversity conservation or sustainable use of its components			

(2) Production sectors and/or ecosystem services directly targeted (include baseline statistics) - Agriculture (plants and animals) - Fisheries - Forestry - Tourism			
(3) Areas (in hectares) under sustainable management of: - Agriculture (plants/crops/animals) - Forestry - Fisheries			
(4) Number of agricultural biodiversity and associated biodiversity in each sector			
(5) Capacity Building/Improved livelihoods: - Number of farmer/ targeted beneficiaries - Number of small scale farmer communities/indigenous/tribal communities - Number of farmers practicing sustainable agricultural practices - Number of farmers adopting sustainable agricultural practices			
(6) Agricultural practices/GIAHS - Number of farming systems, practices exist at each agroecosystems - Number of GIAHS identified in accordance with the established criteria (in addition to project sites) - Hectares of GIAHS under management that is consistent with GIAHS criteria incorporates biodiversity considerations			

Relevant Policy: mainstreaming of the GIAHS concept

Sector* Statement: Please answer YES or NO for each sector that is a focus of the project.	**Agriculture**	**Fisheries**	**Forestry**	**Tourism**	**Environment**	**Culture**
GIAHS for conservation and sustainable use Biodiversity are considered/ mentioned in sector policy (level: municipal, provincial, national)						
GIAHS for conservation and sustainable use Biodiversity are considered/ mentioned in sector policy through specific legislation (level: municipal, provincial, national)						
Regulations are in place to implement the legislation (level: municipal, provincial, national)						
The regulations are under implementation (level: municipal, provincial, national)						
The implementation of regulations is						

enforced (level: municipal, provincial, national)						
Enforcement of regulations is monitored (level: municipal, provincial, national)						

(*if more thane, additional columns/rows can be added)

Implementing agro-ecological interventions

Implementing agro-ecological concepts are highly recommended, to promote natural processes and biological interactions. These natural processes and biological interactions optimize synergies and allow diversification of crops grown on farms using their own soil fertility, crop protection and productivity. By assembling crops, animals, trees, soil and other factors in spatial and temporally diversified schemes, key processes (energy flow, nutrient cycling, water balance, pest regulation, etc.) can be optimized (see Box 11, for examples of crop diversification). Such processes are crucial in determining the sustainability of agricultural systems.

Agro-ecology takes advantage of natural processes and beneficial on-farm interactions to reduce off-farm input use and improve the efficiency of farming systems. Agro-ecological intervention and related technologies emphasize or enhance the functional biodiversity of agro-ecosystems and conservation of existing on-farm resources. Promoted technologies such as cover crops, green manures, intercropping, agroforestry and crop-livestock mixtures are multifunctional as their adoption usually means favourable changes in various components of the farming systems at the same time. Most of these technologies may function as an 'ecological turntable' by activating and influencing components of the agro-ecosystem and processes such as:

- recycling of biomass and balancing nutrient flow and availability;
- securing favourable soil conditions for plant growth, through enhanced organic matter and soil biotic activity;
- minimizing loss of solar radiation, air, water and nutrients through microclimate management, water harvesting and soil cover;
- enhancing species and genetic diversification of the agro-ecosystem in time and space; and
- enhancing beneficial biological interactions and synergisms among agro-biodiversity components resulting in the promotion of key ecological processes and services.

There are many promising technological options related to sustainable agriculture (see Box 12 for tenets of sustainable agriculture). Farmers may improve their agriculture production by:

- making better, more efficient use of nonrenewable inputs, such as precision-farming, low-dose sprays and slow-release fertilizers;
- focussing on better use of available natural resources, such as water harvesting, better irrigation management, rotational grazing, or no-till agriculture;
- intensifying a single subcomponent of farm operations, while leaving the rest alone, such as double-dug beds, digging a fish pond or adding vegetables to rice bunds;

- diversifying and strengthening the agro-ecosystem by adding regenerative components such as combining agroforestry and livestock, using legumes as cover crops or raising fish in rice paddies; and
- adopting innovations to increase profitability for the farm operator, while producing other benefits, such as cleaner water, beautiful landscapes and building natural, human, physical, financial and social capital.

Agro-ecological principles may be applied using various techniques and strategies. Each will affect productivity, stability and resilience within the farm system in different ways, depending on local opportunities, resource constraints and, in most cases, the market. Agro-ecological design attempts to integrate biotic and abiotic components, so that overall biological efficiency is improved, biodiversity is conserved, and agro-ecosystem productivity and its self-sustaining capacity are maintained. The strategy exploits the complementarities and synergies resulting from the various combinations of crops, trees and animals in spatial and temporal arrangements. The ultimate goal is to knit together agro-ecosystems within a landscape unit, with each system mimicking, in the best way possible, the structure and functions of natural ecosystems.

Box 11. Agro-ecologically based strategies to diversify agro-ecosystems

- *Crop rotations – incorporate temporal diversity into cropping systems, providing crop nutrients and breaking the life cycles of several insect pests, diseases, and weed life cycles.*
- *Polycultures – are complex cropping systems in which two or more crop species are planted within sufficient spatial proximity to result in competition or complementation, thus enhancing yields.*
- *Agroforestry – is an agricultural system where trees are grown together with annual crops and/or animals, resulting in enhanced complementary relations between components and increasing multiple use of the agro-ecosystem.*
- *Cover crops – use pure or mixed stands of legumes or other annual plant species under fruit trees to improve soil fertility, enhance biological control of pests, and modify the orchard microclimate.*
- *Animal integration in agro-ecosystems aids in the achievement of high biomass output and optimal recycling.*
- *All the above diversified forms of agro-ecosystems share the following features. They:*
- • *maintain vegetative cover as an effective soil and water conservation measure with no-till practices, mulch farming, and the use of cover crops and other appropriate methods;*
- • *provide a regular supply of organic matter through the addition of organic matter (manure, compost, and promotion of soil biotic activity);*
- • *enhance nutrient recycling mechanisms with livestock systems based on legumes, etc.; and*
- • *promote pest regulation through enhanced activity of biological-control agents achieved by introducing and/or conserving natural enemies and antagonists*.

Valorization of culture related to natural resources management

Solutions for the future have roots in the past. Local responses to climate change, the livelihoods of poor rural communities – men, women, youth and future generations, can be sustained and improved by nurturing the agri-cultural knowledge systems of traditional small-scale and family farmers and their management of agricultural biodiversity and associated biodiversity for food security. A number of related activities should be part of the broader agenda for conservation of the agricultural heritage.

Preparing and defining an action plan[1]

The Dynamic Conservation Plan should be developed for every GIAHS site following Multi-Stakeholder Processes (MSPs) and applying the principles of free, prior, and informed consent (FPIC) procedures and guidelines (if applicable). This process requires the involvement of various stakeholders to ensure inclusion of their viewpoints, knowledge and values (the team may go back to check Process I).

Note: The dynamic conservation action plan is developed applying a participatory process and implemented according to human rights principles, i.e. participation, accountability, non-discrimination and attention to vulnerable groups (small-scale farmers, women and youths), transparency, human dignity, empowerment and rule of law. It is suggested that the action plan should provide space for adopting new lessons learned and experiences in implementing the dynamic conservation plan.

Note: The underlying principles of free, prior and informed consent can be summarised as follows: (i) information about and consultation on any proposed initiative and its likely impacts; (ii) meaningful participation of indigenous peoples; and, (iii) representative institutions (Reference: Commission on Human Rights, Sub-Commission on the Promotion and Protection of Human Rights, Working Group on Indigenous Populations, Twenty-second session, 19–13 July 2004).

Although each plan may differ, as objectives and local circumstances vary, some common steps may be followed at all sites to guide the design of a locally-crafted action plan. Based on the above discussions, the team should prepare and define the action plan. A suggested template for the action plan is provided in Annex 1, after the summary of the processes. The action plan can be in any format or in any order, as long as it contains the basic elements of an action plan (see Box 13 for the main ingredients of a collective action plan). The following checklist will guide the stakeholders in deciding and agreeing on the framework of actions and priorities:

- Establish the common goals and a shared vision of the GIAHS dynamic conservation plan. Why is it important to create a GIAHS site in the region?
- Identify and analyse problems affecting sites and underlying causes: poverty, environmental degradation, socio-economic marginalization, etc.
- Identify the affected community groups and other concerned stakeholders.
- Develop local collaboration and partnerships for collective action.
- Establish transparent and democratic decision making mechanisms;
- Identify opportunities for change such as possibilities of new NRM strategies, new fair market opportunities, existence of political will, and other prospects of relevance to GIAHS.

1 See Appendix 1 for the summary of the suggested Methodological Process.

- Evaluate threats challenging the stability of GIAHS sites.
- Appraise alternatives to deal with problems and threats and choose the best options, some of which may already exist and are successfully used by local farmers.
- Define how alternatives will be put into practice at individual farm or watershed or landscape level. At times, this may require the diffusion of existing innovations among farmers, or the promotion of new NRM-sustainable agriculture initiatives, at the local or regional level.
- Define and implement new strategies to reduce the risk of external institutions, markets, policies and ordinances, and enhancing enforcement of new policies that foster GIAHS goals.
- Identify and set sustainability indicators for monitoring based on benchmarks.
- There is no fixed solution, an action plan presents an opportunity for learning-by-doing, from time to time it should adapt to socio-environmental conditions.

A key message for those involved in the process of preparing or implementing a dynamic conservation plan for GIAHS is the identification of systems that exhibit agro-ecological properties to conserve and revitalise (if necessary) with new designs or technologies and without any harmful effects to the environment. The goal is to promote systems that are productive and conserve resources, but are also socially equitable and economically viable.

Box 13. Main ingredients of a collective action plan

- *Participatory action-research. Initial exercises in participatory appraisal and subsequent exercises in participatory evaluation can play a major role in this connection. Furthermore, starting from specific needs expressed in participatory planning exercises, and using both local knowledge and technical innovations, relevant 'conservation by use' measures can be identified and validated.*
- *Promotion of environmental awareness. People's awareness and understanding of environmental problems affecting GIAHS can be raised through special communication and education activities. As women play an important role in certain conservation activities (conservation and sustainable use of biodiversity, land tilling, collection of fuelwood and water, cattle grazing, etc.), special attention should be paid to developing education and communication initiatives specifically targeting women as well as youth.*

- *The development of ownership, partnerships between and among communities and institutions. The project could establish links among grassroots organizations and conservation agencies to facilitate collaborative management of the overall watershed. Forums for discussion and negotiation should be promoted and incentive schemes should be developed or made accessible for conservation activities.*
- *Enhancement of rural livelihoods. What is more important is that the action plan should contribute to enhancement of livelihood security and well-being of the custodians and stewards of GIAHS.*

IV. ACTION PLAN IS DEVELOPED AND IMPLEMENTED IN DEMONSTRATION SITES

GIAHS dynamic conservation plan

The process of dynamic conservation of GIAHS is complex. People inhabiting the selected sites will lead the conservation assisted by external institutions facilitating a participatory and action-oriented approach. Researchers and other rural development practitioners will need to translate general ecological principles and natural resource management concepts into practical advice that is directly relevant to the needs and circumstances of family farmers and smallholders. This implies a clear understanding of the relationship between biodiversity and agro-ecosystem functions, so that the appropriate biodiversity conservation plan is identified to maintain genetic diversity and agro-ecosystem productivity.

Natural resource management activities will transcend the field level to encompass soil and water conservation strategies at the watershed or landscape level. Development of sustainable agricultural technologies must bring to bear local knowledge and skills. Particular emphasis must be given to involving farmers directly in the process of technological innovation and dissemination. The focus should be on strengthening local action and problem-solving capacities. Organizing local people around the goals of GIAHS can provide an impetus to additional learning and organization, thus improving the prospects for community empowerment and development of self-reliance. Methodologies oriented to monitoring improvements in livelihood indicators and farm sustainability are crucially

important. Policies and equitable market opportunities should be enhanced, enforced and developed to generate a meaningful impact on farmers' income. The GIAHS team should be aware of the key elements or features of the GIAHS approach provided in Box 14.

Box 14. Key elements of the GIAHS approach

- Promote traditional, family and community-driven agricultural and indigenous knowledge systems.
- Provide best-farmer practices for dissemination to other farmers and areas.
- Provide criteria for technology development (local goals and priorities, gender preferences, etc.).
- Provide leads for identifying alternative opportunities for technology development.
- Apply the principles of agro-ecology for pests, soils and crop management (effective use of available local resources, diversification of farming components, use of multiple purpose technologies) using farmer-developed and adapted technologies.
- Apply social and participatory processes leading to group action and empowerment of farmers and communities.
- Promote partnerships between institutions.
- Create people-centered process for learning and communication and build human capital (empowerment) through training-learning programmes.
- Promote access and control of production resources such as seeds, water, land and technology.

V. ASSESSMENT OF PROGRESS

This Process monitors conservation activities, estimates impacts and costs, assesses the project direction, whether the objectives have been delivered or achieved, and whether the interventions have had the desired impacts. The GIAHS stakeholders should assess the impacts, evaluate the benefits and sustainability.

Assessing the impacts and evaluating the benefits

Assessment of the impacts of GIAHS on the local livelihoods through the sustainable livelihoods framework

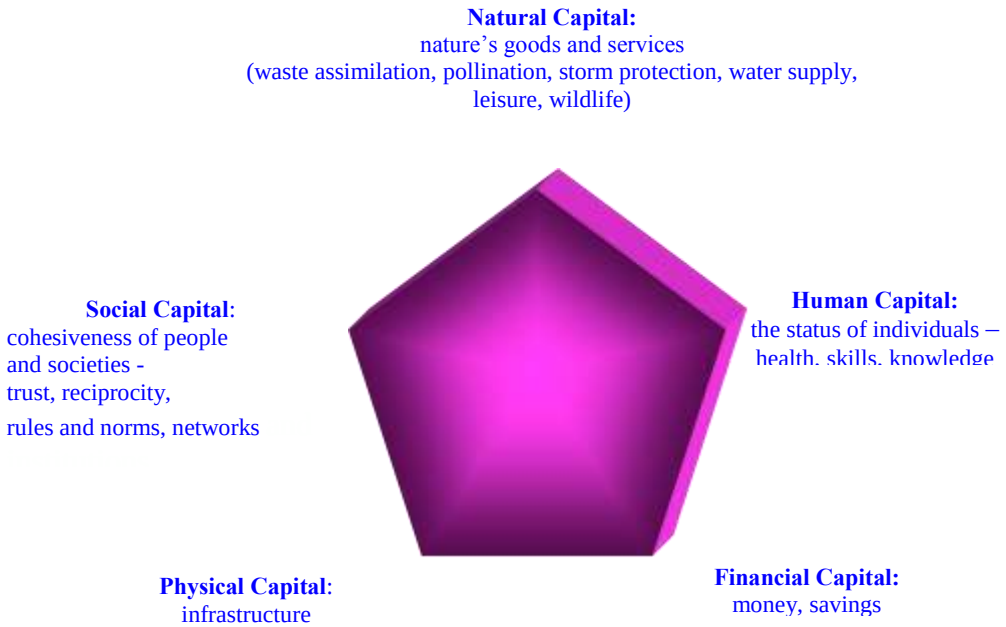
The GIAHS Initiative adopts the sustainable livelihoods framework (SLA) as an approach to understanding the main factors affecting people's livelihoods, and the typical relationships between these factors. It can be used in planning new development activities and in assessing the contribution that existing activities make to livelihoods. In particular, the framework:

- provides a checklist of important issues and outlines the way these factors are linked to each other;
- focusses attention on the core influences and processes; and
- emphasizes the multiple interactions between the various factors affecting livelihoods.

The framework is centred on people. It does not work in a linear fashion and does not attempt to present a model of reality. The framework (Figure 1a) is to help the various stakeholders who have different viewpoints engage in structured and coherent debate on the many factors (shocks, trends, etc.) that affect livelihoods (expressed as five types of capital: financial (F), human (H), natural (N), social (S) and physical (P), their relative importance and how they interact. The five capital assets are defined in the context of farmers' livelihoods and it is the stakeholders' collective assets that will determine their well-being. The challenge is to identify the entry points to transform structures and processes to support their livelihoods.

Factors affecting the decision to conserve GIAHS are related to the resources available to the local community at each site. Within the SRL framework, resources available to a specific community can be divided into five different capital assets (Figure 1b). Based on these assets, a list can be drawn up of what is available in the community. By definition, land use implies human decision-making regarding how the land and resources will be managed and the types of activities that will occur on the land. From an economic perspective, land-use decisions depend fundamentally on the perceived returns from using the land in different ways. Environmental, social, institutional and human behaviour also influence land-use decisions and the strength of such factors can be shaped by internal and external forces that in turn influence the direction, the positive or negative tendencies of any of the capital assets.

Figure 2a. Rural systems' five assets (livelihoods, communities, economies).



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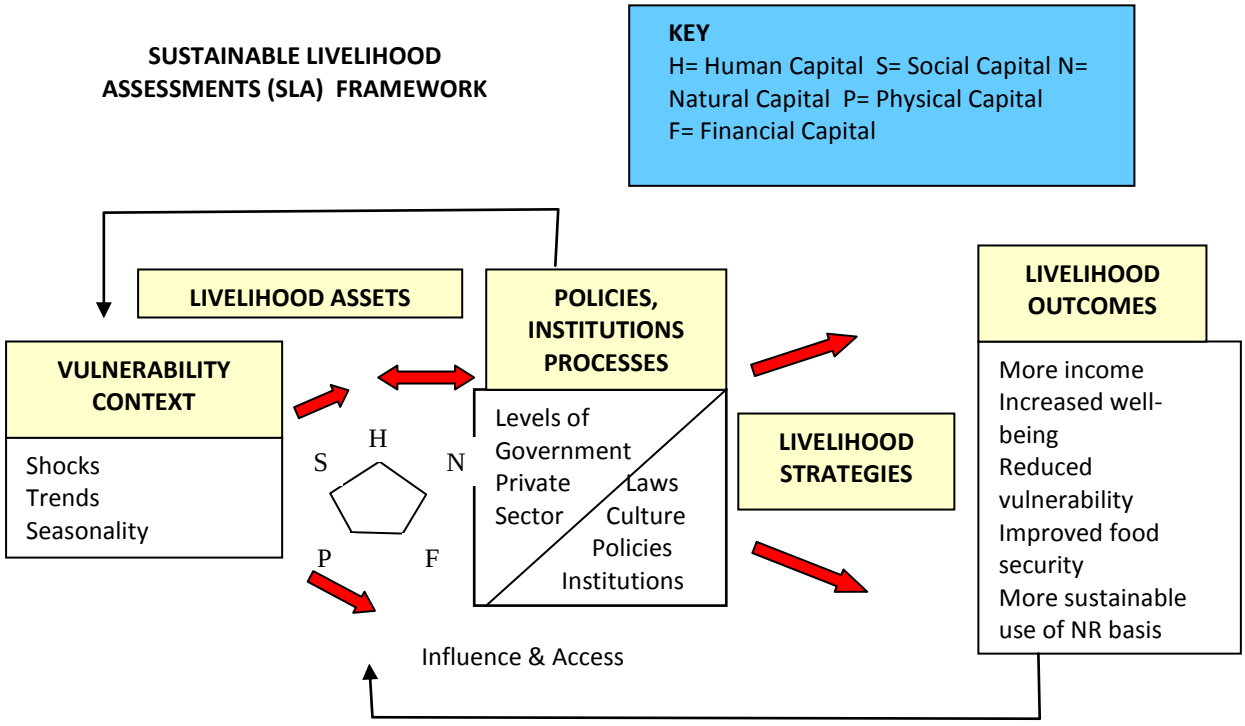
Once the local groups, who are in-charge of the dynamic conservation of agricultural heritage system, have applied the framework, analysed the factors affecting their livelihoods and taken action to achieve improvements, the major outcomes of the strategy should include:

- higher income-generating capacity – more money coming into the household;
- increased well being – including self–esteem, sense of control and inclusion, health status, access to social services, etc.;
- reduced vulnerability – provision of cushions against risk and uncertainties;
- improved food security – at the household and community level, including access to productive resources and appropriate technologies; and
- a sustainable use of natural resources – benefits derived from prudent use and conservation of soil, water, genetic resources, etc.

Figure 2b: Illustration of the attributes of the SLA Capital Assets



Determining and assigning sustainability indicators

How can the sustainability of a GIAHS initiative be evaluated? How does a given strategy impact the overall sustainability of the system in place? What is the appropriate approach to explore its economic, environmental and social dimensions? What do we mean (and how do we quantify?) health and sustainability in ecological and economic terms? What is the degree of substitutability between natural and human capital? What (or where) are the

thresholds or irreversible degradation for natural resources? These are some of the unavoidable questions faced by GIAHS teams involved in the GIAHS process which indicate the need to:

- develop a preliminary set of indicators of sustainability;
- develop a model for identifying and using indicators to assess ecosystem conditions (ecological, economic, social and cultural); and
- make recommendations for the use of indicators at multiple scales, e.g. field, regional and national.

While indicators can be used for a wide variety of purposes, the GIAHS teams can focus efforts primarily on the use of indicators for the planning of dynamic conservation efforts and during natural resource assessments.

Sustainability indicators at the farm level

One of the challenges that farmers, as well as extension workers face, is to know when an agro-ecosystem is healthy, or better yet, to know how healthy the system is after the conversion to agro-ecological management has been initiated. Various researchers working on sustainable agriculture have designed a set of sustainability indicators to assess the condition of particular agro-ecosystems. Unfortunately, only a few of the proposed methods are farmer-friendly. Indicators are important for the sustainable use and management of environmental resources. They give valuable information about the present status of the resources being measured, the rate and direction of change; they highlight priority actions to be taken and can assist in guiding policy formulation. Indicators can facilitate access to key information by different groups of users and, in so doing, transform information into action (see Box 15 for additional reasons on why these indicators are useful).

Box 15 Why are indicators useful?

- *They enable planners to assess ecosystem conditions.*
- *They integrate ecological, social, and economic elements at multiple scales.*
- *They facilitate the integration of multiple objectives within the planning process.*

A few practical methodologies offer a set of proposed indicators comprising observation or measurements made at the farm level, to assess soil fertility and conservation and the health, strength and productivity of crop plants. In other words, the proposed indicators are used to check the pulse of the agro-ecosystem.

A major challenge for the GIAHS implementers will be to devise a practical methodology to rapidly assess the sustainability of exiting systems with simple indicators. Proposed indicators should be:

- easy to use by farmers;
- precise and easy to interpret;
- practical enough to facilitate making new management decisions;

- sensitive enough to reflect environmental changes and the effects of management practices on soil and crops;
- capable of integrating physical, chemical and biological properties of the soil; and
- relate to ecosystem processes, for example the relationship between plant diversity and pest population stability and/or disease incidence.

Much remains to be learned about indicators of ecosystem conditions. The state-of-the-art is generally not very advanced. Some attributes of ecosystem conditions can be:

- **directly measured** (i.e. soil organic matter, soil temperature, crop yield, deer density);
- **statistically estimated** (i.e. national crop yields, timber volume, deer populations, conversion of wetlands), or
- **predicted by models** (i.e. soil erosion rates, rate of change in timber volume, global warming, watershed runoff).

However, many attributes of ecosystem conditions, and indeed most ecosystem processes, are more difficult to describe (i.e. carrying capacity, energy transport and balance, habitat quality, niche breadth, population recruitment, biodiversity, watershed viability, soil quality) thus indicating the need to identify the **direct measures** of ecosystem conditions.

Most farmers possess their own indicators to estimate soil quality or the health condition of their crops. For example, some farmers are able to identify weeds that grow only on acidic soils or on non-fertile soils. For others, the presence of earthworms is a sign of a fertile soil, and the colour of the plant's leaves reflects the nutritional status of the soil. In any zone, it is possible to compile a long list of local indicators used by farmers. The problem with many indicators is that they are site-specific and may vary according to the knowledge of the farmers or the conditions of each farm. This makes it difficult to make comparisons between farms when the analysis is based on results derived from different indicators utilized by farmers in diverse ways.

In order to overcome this limitation, qualitative indicators relevant to farmers and the biophysical conditions of the area should be selected. Once such indicators are defined and selected, the procedure to measure sustainability should be the same and independent of the various situations in different farms of the studied region. S*ustainability* is defined then, as a group of agro-ecological requisites that must be satisfied by any farm, independently of its management, economic level, landscape position and other variants. Since the measurements made will be based on the same indicators, the results are comparable in such a way that it is possible to follow the evolution of the same agro-ecosystem along a timeline, or make comparisons between farms along various transitional stages. Most importantly, once the indicators are applied, each farmer can visualize the conditions of his/her farm, perceiving, which soil or plant attribute is doing *well or not* compared to a pre-established threshold. When the methodology is applied to various farms simultaneously, then it is possible to visualize which farms exhibit low or high values of sustainability. This is useful for farmers as it allows them to understand why some farms perform ecologically better than others while being able to think about what management modifications need to be done to improve farms exhibiting lower productivity.

VI. DISSEMINATION OF RESULTS AND SCALING-UP OF SUCCESSFUL INITIATIVES

This process is dedicated to assessment and documentation of best practices (or successful initiatives that aim to:

- disseminate positive lessons learned within and outside the local community reaching different areas and stakeholders;
- disseminate and adopt agro-ecological principles over substantial areas by large numbers of farmers and technical staff;
- achieve a significant increase in the knowledge and management of agro-ecological principles and technologies between farmers of varied socio-economic and biophysical conditions, and between institutional actors; and
- participatory research and development and farmer-to-farmer networking.Participatory research and development and farmer to farmer networking.

The GIAHS stakeholders are particularly invited to pay attention to participatory research and farmer-to-farmer networking.

At GIAHS sites, community-based organizations or farmers' associations should play a direct role in the design and conduction of research activities by:

- bringing community members into the study as partners, not just subjects;
- using the knowledge of the community to understand problems and to design activities and interventions to improve the environment;
- connecting community members directly with how the research is done and what comes out of it; and
- providing immediate benefits from the results of the research to the community that participated in the study.

In this process community members become more involved in spreading the word about the research and promoting the use of research findings. This involvement can help improve the quality of life in the community by putting new knowledge in the hands of those who need to make changes. An important strategy for the diffusion of agro-ecological innovation is the creation of a farmer-based horizontal methodology for learning and technology transfer. Experiences of this nature, such as the "campesino a campesino" movement in Central America (see Box 16 for basic principles of farmer-to-farmer led agriculture) has shown that experimenting on small, local scales and then widely sharing knowledge, creativity, experience and wisdom among farmers has led to massive validation and diffusion of agro-ecological technologies.

Box 16 Basic principles used in farmer-to-farmer led agricultural experimentation and experience sharing

- *Start small, grow slowly*
- *Small-scale experimentation to overcome limiting factors and stabilize ecological functions*
- *Multiplier effect*
- *Limit the introduction of technology*
- *Teach others*
- *Reduction, substitution, redesign: three-phase conversion to sustainability*

By focusing on overcoming factors that limit production and by strengthening the weak ecological functions in the agro-ecosystem, farmers first reduce and substitute external with internal inputs. To the extent possible, farmers gradually eliminate inputs altogether by redesigning the farm system to rely primarily on ecosystem functions. Protection of the environment then becomes crucial to the productive function of the farm. Watershed hydrology, habitat and biodiversity become key considerations for on-farm soil and water conservation and pest management, thus linking farmers' collective watershed management to their individual farm management.

During these participatory research and technology development projects, farmers learn from each other by sharing wisdom, creativity and knowledge, not just information and techniques. Rather than simply transferring technologies, farmers primarily 'make culture' –- sharing that leads to action therefore building a culture of sustainable agriculture. Technology transfer is just one component of this cultural matrix. Some of the motivation felt by GIAHS farmers for developing sustainable farming systems should arise from their sense of making a contribution to the well-being of their region and its communities. This subjective, but powerful motivational force can be nurtured through cross-visits, farmers' gatherings and the inclusion of farmer-promoters in workshops held by national and international agencies for agricultural development.

This combined approach of developing pools of local expertise and widely sharing experiences can accomplish three important tasks in the development of sustainable agriculture:

- It can generate and adapt locally-based alternatives that are easily incorporated into the ecology of each particular area, increasing agro-ecological diversity and resilience.
- It can spread simple, adaptable technologies at low cost to thousands of farmers and can improve the capacity to innovate.
- It can develop farmers' social and agro-ecological capabilities.

VII. ACHIEVEMENT OF GOALS AND ASPIRATIONS OF THE LOCAL PEOPLE

Achieving the goals and aspirations of the local people is at the heart of the GIAHS Dynamic Conservation Plan. The ultimate goal is to dynamically conserve the unique features and

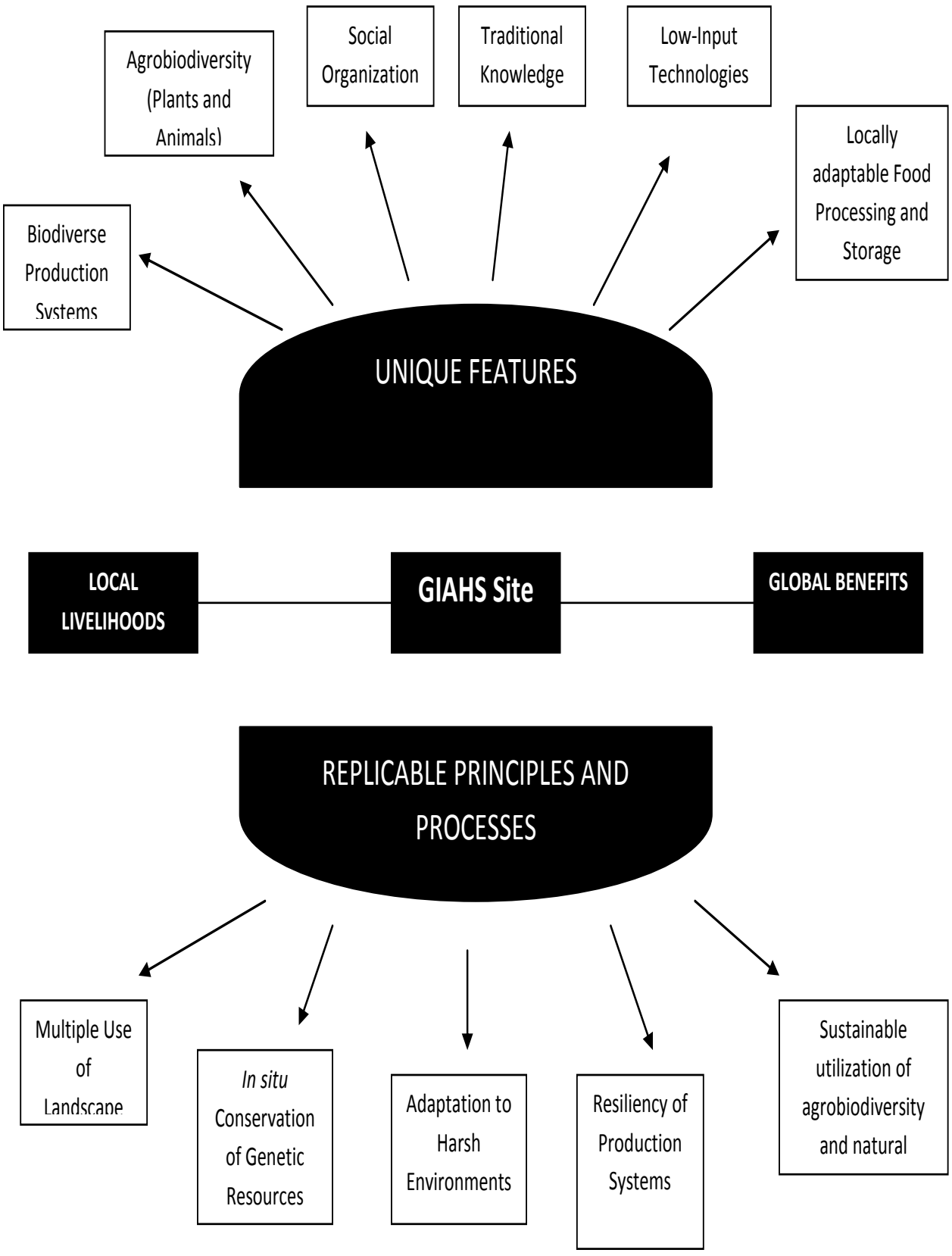
principles of GIAHS, and replicate these in other farming systems to achieve sustainability and resilience (refer to Figure 2).

A summary of the criteria for determining a successful GIAHS Dynamic Conservation Plan is provided in Box 17.

Box17.

Criteria for determining a successful GIAHS Dynamic Conservation Plan	
Process Criteria	*Broadly shared vision* *Diverse, inclusive participation* *Participation of local inhabitants and local government* *Broad alliances* *Open, accessible and transparent process* *Clear, written plan* *Consensus-based decision making* *Decisions regarded as just and equitable*
Environmental outcome Criteria level	*Improved environmental quality at field/watershed* *Improved water quality* *Soil and water resources conserved* *Biological diversity conserved* *Agroecological land management practices adopted*
Socioeconomic outcome criteria	*Relationships strengthened* *Cultural identity reinforced* *Traditional knowledge preserved and used* *Increased trust*

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.



Summary

The handbook provides a brief rationale of the FAO GIAHS Initiative, the concept and the need to protect, conserve and promote sustainability of the functions and services of GIAHS. The need to pay attention to the local stakeholders (and gather all relevant groups) is discussed as a basic step to begin the process. The processes of preparing a Dynamic Conservation Plan may seem tedious and laborious. However, laborious as it may seem, commitment of stakeholders at the local and national levels can only be met by reaching out. The handbook illustrates a multi-stakeholder participatory processes and bottom-up approach. Each of the processes are provided with topics, either as questions or ideas, to stimulate discussions about assessment of the physical and socio-economic environment, functions and services of the system, sustainable agriculture, intervention needs, etc. as well as to provide the tools for evaluating livelihoods and sustainability. The handbook emphasizes the need to gather organizations having a stake in conservation and to join forces to come up with an integrated/holistic approach to management of GIAHS – A Dynamic Conservation Plan that emphasizes "a balance between conservation, adaptation and socio-economic development".

The handbook also illustrates the SLA framework, as an approach to understanding the main factors affecting the livelihoods of people and the interactions between and among these factors. These factors may be used as an entry point into intervention strategies. The MESMIS Framework (Framework for the Evaluation of Natural Resource Management Systems Incorporating Sustainability Indicators) has been cited as a tool to evaluate sustainability.

In summary, the methodological framework is expected to produce a Dynamic Conservation Plan that can be implemented, evaluated, upscaled/replicated. A plan has the following attributes. It:

- uses a multi-participatory process (MSP) in its development;
- creates and promotes environmental consciousness and awareness on the problems affecting peoples' livelihoods and the need to sustain natural resources capacity;
- develops and establishes ownership, partnerships between and among institutions having a stake in conservation of the system;
- conserves and sustains the functions and services of the system; and
- the most important outcome should be the enhancement of the livelihood security and well-being of the small-scale farmers, indigenous peoples and traditional family communities.

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APPENDIX 1A

Summary of the GIAHS methodological framework

I. Establishing the national participatory planning strategy (establishing goals, organizational framework and enhancing capacities)

In this process, the following points should be met:

- encouragement of stakeholders and target communities interestand involvement;
- identification of the stakeholders involved in the process;
- formation of multi-stakeholder teams and key partners;
- creation of networking strategies;
- definition of governance and co-management agreements;
- setting of decision-making criteria;
- definition of codes of conduct/ethical framework and benefit sharing;
- mobilization of local knowledge and skills;
- understanding and knowledge of the local population, their strengths, weaknesses and potential;
- listing of the existing national/regional initiatives; and
- linking and mobilizing local/national expertise.

II. Determining the key features and dynamics of selected GIAHS (factors influencing positively or negatively the performance of GIAHS)

After identification of the stakeholders, the second step in the process will involve a detailed collaboration and work with local stakeholders. This process is important; as it will be the basis of the action plan. Outputs in this process shall include but are not limited to the following:

- identification of the driving forces, trends and factors that threaten the stability of GIAHS (global commodity driven markets, inadequate policies, introduction of high-yielding varieties (HYVs)/modern inputs, poor rural services, etc.);
- identification of the processes of GIAHS degradation (loss of biodiversity, erosion of traditional knowledge, land degradation, water pollution, adoption of unsustainable practices, etc.) –causes/symptoms;
- assessment of the fundamental processes underlying the functioning of GIAHS systems (ecosystem resilience, human devised NRM strategies, balanced environmental interactions, agro-ecosystem synergies, dynamic links between livelihoods and agro-biodiversity, etc.);
- determination of local skills and knowledge systems, forms of social organization and networks, cultural assets linked to satisfying human needs, subsistence and food security strategies, income generation, etc.

IV. IDENTIFICATION OF PRINCIPLES, TOOLS AND BEST PRACTICES FOR DYNAMIC CONSERVATION OF SELECTED GIAHS

This particular Process is to identify the principles, tools and best practices to conserve the unique features and elements of GIAHS. The Dynamic Conservation Plan will be developed during this process. Activities include:

- understanding the dynamics of agri-cultural heritage;
- systematization of knowledge systems;
- policy and market needs assessment;
- defining mitigating interventions that optimize positive features;
- determining factors and processes that explain success or failure;
- prioritizing actions/solutions, sequence of activities, resources needed, timing and duration, partners involved-availability and responsibility;
- identifying practices that foster sustainability, win-win options or alternatives; and the
- formulation of the Dynamic Conservation Plan for GIAHS.

V. Action plan is developed and implemented on demonstration sites

This Process is the implementation of the Dynamic Conservation Plan. The GIAHS Approach should be observed in this process as learning by doing. GIAHS approach is as follows:

- promotion of traditional, family and community driven agricultural and indigenous knowledge systems;
- provision of best-farmer practices for dissemination to other farmers and areas;
- provision of criteria for technology development (local goals and priorities, gender preferences, etc.);
- provision of leads for identifying alternative opportunities for technology development;
- application of the principles of agro-ecology for pests, soils and crop management (effective use of available local resources, diversification of farming components, use of multiple purpose technologies);
- focussing on farmer developed and adapted technologies;
- promotion of participation and empowerment of farmers and communities and social and participatory processes leading to group action;
- promotion of partnerships between institutions;
- promotion of a people-centered process for learning and communication and human capital building (empowerment) through training-learning programmes; and
- promotion of access and control of production resources: seeds, water, land and technology.

V. ASSESSMENT OF PROGRESS

This Process aims to monitor conservation activities, estimating impacts and costs, assessment whether the project is on the right track, whether the objectives have been delivered or achieved, and whether the interventions have had the desired impacts. This Process will use the SLA Framework, designing of Sustainability Indicators and evaluation of the system through the MESMIS framework. Activities should include but are not limited to:

- evaluating if proposed interventions are profitable for the farmers;
- evaluating economic benefits: measuring the value of the GIAHS land-use systems;
- evaluating conservation of biodiversity, ecosystem services and livelihood systems in which biodiversity is embedded;
- estimating added economic value and generation of income;
- assessing the progress of institutional and legal mechanisms;
- identifying the social impacts of proposed changes on women, elderly, children, minority groups and the poor;
- estimating the formation of social capital and evaluating the level of empowerment;
- assessing environmental impacts (soil, water, biodiversity impacts);
- developing and applying local indicators of agro-ecosystem sustainability at field or landscape level; and
- identifying weak points and determining new interventions to enhance sustainability.

VI. DISSEMINATION OF RESULTS AND SCALING-UP OF SUCCESSFUL INITIATIVES

These initiatives include but are not limited to:

- dissemination of positive lessons learned within and outside the local community reaching different areas and stakeholders;
- dissemination and adoption of agro-ecological principles over substantial areas by large numbers of farmers and technical staff;
- achievement of a significant increase in the knowledge and management of agro-ecological principles and technologies between farmers of varied socio-economic and biophysical conditions, and between institutional actors;
- promotion of cross-visits between and among farmers;
- enhancement of participatory research and development; and
- promotion of farmer-to-farmer networking.

VII. Achievement of goals and aspirations of the local people

Achieving the goals and aspirations of the local people is at the heart of the GIAHS Dynamic Conservation Plan. The ultimate goal is to dynamically conserve the unique features and

principles of GIAHS, and replicate these in other farming systems to achieve sustainability and resiliency.

Appendix 1b

Annotated outline of the Dynamic Conservation Plan

1. Background, problem, overall vision
2. General project framework
3. National level project framework
4. Local level project framework
5. Community level project framework

For each level, describe:

a. Strategy
b. Links with other levels (services expected from and output for other levels)
c. Logframe (outcomes, outputs, activities, assumptions)
d. Organization and management
    i. Main stakeholders
    ii. Co-operation structure
    iii. Financial management
e. Monitoring and learning for adaptive management

Annexes

SYSTEM'S DESCRIPTION (BASED ON GIAHS CRITERIA: SERVICES AND FUNCTIONS)

WORKPLAN (WORK PROGRAMME, BENCHMARKS AND TIME FRAME, BUDGET BREAKDOWN AND SOURCE)

INDICATIVE PROJECT AREA MAP

Other relevant information

Appendix 2

Helping communities conserve their Traditional ecological knowledge TEK[2]

Despite limited documentation, people have managed to transmit knowledge efficiently from generation-to-generation, conserving wisdom for centuries. Social and technical skills are shared and used throughout communities, and in the process, passed to children. There is no patent recipe for conserving indigenous knowledge (IK) but education, communication, and application can help.

Here are a few suggestions on how to help communities protect their IK.

- To raise awareness in the community about the value of their IK

Record and share IK success stories using songs, drawings, puppet plays, story-telling, dramas, videos, and other traditional or modern means of communication.

- To demonstrate the usefulness of IK

Establish model farms, agricultural demonstration plots, handicraft enterprises, herbal gardens, and other indigenous technologies that can show people the value of their IK.

- To help community members record and document their local practices

Circulate the results of IK recording efforts in a newsletter, book, video, and other traditional or modern means of communication. Likewise, encourage indigenous forms of record keeping.

- To increase availability of IK

Involve local people in protecting their IK, for instance, help set up a farmer-managed local germplasm bank.

- To promote revival of traditions and selected local practices

Encourage the reintroduction of indigenous knowledge systems into the education curriculum to encourage establishment or strengthening of indigenous organizations. This will motivate community members to place a higher value on local culture and practices.

Using indigenous knowledge in development

Usually development projects start with the identification of problems and with discussions on how these problems might be solved. For example, if soil erosion is a problem, conservation measures will be needed. If farmers need money for farm inputs, a credit programme might be the answer.

Can such projects and others use IK? There are four basic steps:

To determine whether relevant IK exists

Working together, community members and development workers record and briefly document all IK available in the community relating to the identified problem, what has been done in the past and what is being presently done to solve the problem. If time and financial constraints prevent a thorough recording and documentation, they should think of methods that allow for a quick assessment of at least some IK, for example brainstorming sessions with key informants. If no relevant local IK exists, it might be necessary to test,

2 http://www.panasia.org.sg/iirr/ikmanual/ik.htm#helping

adapt, and promote appropriate knowledge from outside. This outside knowledge could be Western knowledge, IK from other places, or a blend of both.

To evaluate the effectiveness and sustainability of IK

If relevant IK exists, local people and development workers can discuss together and screen their findings, looking for IK useful to the project.

From a development viewpoint, not all IK is equally useful. Some might be ineffective, and some might even be harmful. There is a need to be selective. When evaluating the effectiveness of IK, it is important to understand the reasons behind a particular practice or belief. For example, why does farmer X build a stone wall in this particular place and not further down the slope like he has been taught at university? One might find that if the wall was built in a different place, it might be washed away by heavy rains. Thus IK can make sense even if it contradicts the teachings of outside specialists. If the IK is indeed effective and sustainable, it can be promoted without further modification. For example:

- Making effective cooking devices more widely known
- Promoting local remedies that work
- Employing local healers

To test if IK can be improved

Often, IK is effective but can be improved. For instance, a traditional cropping system might be made more productive by incorporating a new grass species or an improved crop variety. Slight modifications to a traditional stove design might make it more fuel-efficient yet retain other desirable features.

These improvements can be made in various ways:

- Through formal research in laboratories and experimental farms
- With on-farm research managed by scientists (as is common in farming systems research)
- Through farmer-managed, participatory technology development give guidance on this)

The outside knowledge could be both Western knowledge and/or IK from other places.

In some cases, IK cannot be improved or adapted satisfactorily. Adaptations of a local cropping system, for instance, might prove consistently inferior in all respects to an introduced pattern. In such instances, it might be best to adapt and promote the introduced pattern.

Appendix 3

The MESMIS Framework[3]

MESMIS is defined as Marco para la Evaluación de Sistemas de Manejo de Recursos Naturales Mediante Indicadores de Sustentabilidad" or in English, the Framework for the Evaluation of Natural Resource Management Systems Incorporating Sustainability Indicators.

The MESMIS Approach is a systemic, participatory, interdisciplinary and flexible framework for sustainability evaluation. The MESMIS framework is originated from Mexico, developed by a multi-institutional team and validated through its application to more than 20 case studies in Mexico and Latin America. The MESMIS operative structure is a six step cycle. The first three steps are devoted to the characterisation of the systems, the identification of critical points and the selection of specific indicators for the environmental, social and economic dimensions of sustainability. In the last three steps, the information obtained by means of the indicators is integrated through mixed (qualitative and quantitative) techniques and multi-criteria analysis, so as to obtain a value judgement about the resource management systems and to provide suggestions and insights aimed at improving their socio-environmental profile. The MESMIS framework attempts to generate a cyclic process which, by effectively integrating the evaluation into the decision making process, improves the likelihood of success in the design of alternatives and the implementation of development projects.

The following paragraphs summarise the MESMIS approach:

- MESMIS evaluates the status, condition and trends of ecological, economic and social resources; and
- enables planners, advisors, researchers as well as land managers to evaluate the effects of management actions in order to: make corrections in the implementation of plans or goals; and to increase the knowledge of how systems respond to management changes

In addition to the previously stated, the framework is a methodological tool that:

- Assists in evaluating the sustainability of natural resource management systems (NRMS), with an emphasis on small-scale farmers within the local context (from the level of the farm to the village).
- Improves the likelihood of success for any proposed alternative NRMS as well as for already existing NRMS being evaluated. MESMIS attempts to generate a process of analysis and feedback, which would avoid a simple ranking of management systems in terms of a sustainability index or scale.
- Seeks an integral understanding of the opportunities and constraints for the sustainability of NRMS that are forged by the intersection of environmental processes and socio-economic conditions.
- Evaluates the comparative sustainability of management systems, either by comparing one or more alternative systems with a system of reference, or by observing changes in the properties of a particular system over a period of time.

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3 For detailed information, refer to: http://ate.oikos.unam.mx/gira/mesmisingles.htm

- Promotes an evaluation process that is systemic, participatory, multidisciplinary, and flexible, which can adapt to different levels of data availability and local technical and financial resources.
- Comprises a tool for development, in which the experience of applying the methodology will improve the very model on which it is based. In this sense, it should be understood that MESMIS functions as a method for organizing a discourse on how to make the concept of sustainability operational in the field.
- Evaluates sustainability in a manner that is participatory. The evaluation team should also include both external personnel involved in the project, and should emphasize group dynamics, promoting continuous feedback from the evaluating team.

MESMIS relies on the following premises:

1. The concept of sustainability is defined by five general attributes of natural resource management systems: (a) productivity; (b) stability, reliability and resilience; (c) adaptability; (d) equity; and (e) self-reliance (self-empowerment).
2. Sustainability evaluations are only valid for:
    a. a specific management system in a given geographic location;
    b. a previously determined spatial scale (parcel, production unit, community);
    c. a previously determined time period.
3. The evaluation of sustainability is a participatory process which necessitates an evaluation team with an interdisciplinary perspective. The evaluation team should include external evaluators and internal participants (farmers, technicians, community representatives, and others involved).
4. Sustainability can not be measured per se, but rather through the comparison of two or more systems. The comparison can be made cross-sectionally (e.g. by simultaneously comparing an alternative system with a reference system), or longitudinally (e.g. by analysing the evolution of a system over time).
5. The evaluation of sustainability is a cyclic process whose central objective is to improve the management system as well as the methodology used.

The MESMIS framework proposes the evaluation of sustainability as a cyclic process consisting of six principal steps:

Step 1: Characterize the management system that defines the NRMS to be evaluated, its spatial and temporal characteristics and the socio-environmental context of the evaluation.

Step 2: Determine the critical points affecting system sustainability.

Step 3: Select strategic indicators by first defining diagnostic criteria and then deriving strategic indicators.

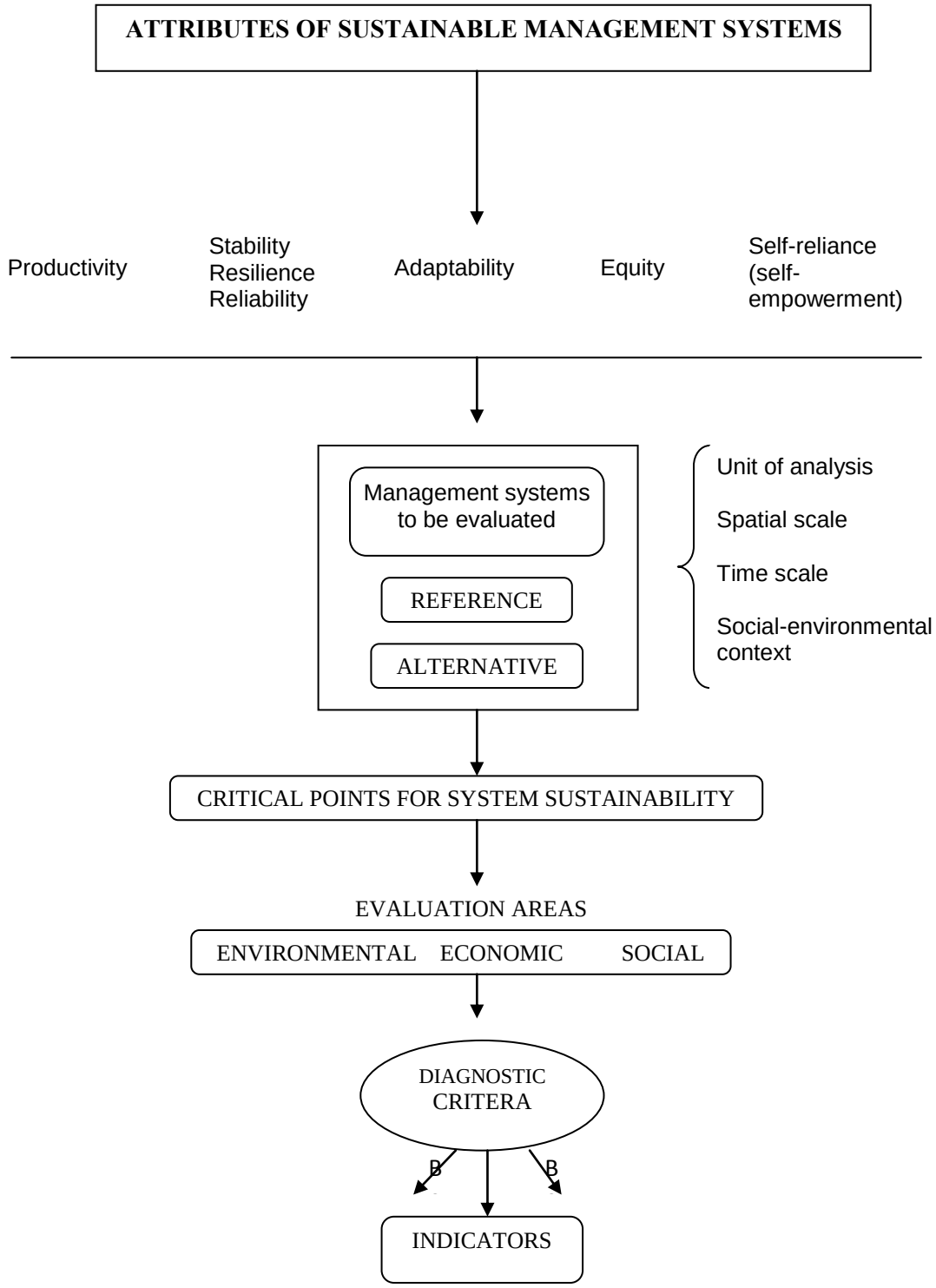
Step 4: Measure and monitor indicators, which include designing appropriate analytic tools and methods for collecting data.

Step 5: Present and integrate results: After comparing the management systems being evaluated in terms of sustainability, the main positive and negative aspects of each system must be discussed and analyzed.

Step 6: Propose conclusions and recommendations which synthesize the analysis and suggest specific strategies to fortify system sustainability as well as to improve the evaluation process itself.

By using community established optimal values as indicators, such as independence from external inputs, grain yield, food self-sufficiency, diversity of species, system adoptability, etc. an amoeba type diagram can be used to show, how far the objectives have been reached for each indicator by giving the percentage of the actual value (measured in the field) with respect to the ideal/optimal value defined by the community. This enables a simple yet comprehensive comparison between the advantages and limitations of the two systems being evaluated and compared.

Figure A1. Overview of MESMIS structure, showing the relationship between attributes, diagnostic criteria and indicators (Source: Speelman et al., 2007).



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