

Farming with nature

Editorial

As human beings, we exist as part of a web of life that includes plants, animals and microorganisms, as well as the physical environment. This “web” is constantly changing and adapting, but we need to ensure that it stays more or less in balance. An important factor in this balance is the diversity of life or “bio-diversity” (see box).

Biodiversity refers to the variability of all organisms, including their genetic diversity and the diversity of eco-systems in which they live. Diversity is important for two main reasons - to maintain healthy, balanced ecosystems in the wide range of environmental conditions present on earth at many different scales, and to provide resilience to change.

A range of organisms help to maintain healthy ecosystems through the processes of which they are a part. Together, these processes contribute to the “ecosystem services”, which continue to enable life on earth. For example, the protection and maintenance of productive soil and water resources through processes, such as, maintenance of water quality, reduction of runoff, improved water infiltration, and maintenance of soil fertility through organic matter decomposition and erosion control. Plants and animals also contribute to carbon sequestration, pollination, dispersal of seeds and the provision of habitats for all the organisms that help maintain healthy ecosystems. On a global scale, a diversity of ecosystems is important to regulate climate and the water cycle, and to provide resilience to global climatic change.

Ecosystem services like clean water, fresh air and fertile soils are usually taken for granted and regarded as “free” resources: we do not pay any attention to them as long as they continue to function. However, when they start breaking down, we are faced with serious problems. Short-term economic goals, increasing emphasis on ownership of land and decreasing responsibility for community and global resources result in the degradation of those resources. And yet, ecosystem degradation on a wider scale means less water for people, crops and livestock; lower crop, livestock and tree production; and greater risk of natural disasters.

For rural people, managing biodiversity has always been a central part of their livelihood strategies. Biodiversity contributes in different ways to agriculture and rural livelihoods - either directly, by providing food, medicines, timber, fuel, fodder, organic fertilizer, or cash income - or indirectly by providing ecosystem services such as biological pest control, pollination or organic matter decomposition. However, some organisms such as weeds, parasites, pests or invasive species can also reduce agricultural production or negatively affect ecosystem services. Wild relatives of domesticated crop and animal species are also important resources for the genetic improvement of domestic species. Wild species that are not directly important to agriculture can sometimes cause problems for farmers. However, these species can be important for the balance of the wider ecosystem.

Biodiversity provides an important safety net, helping farmers to cope with the risks posed by pests and diseases, as well as environmental and social changes. It also forms a part of cultural identity. In a world where more and more geographical barriers are being broken, not only plants and animals, but also humans are subject to increasing pressure from outside their usual ecosystem. It is becoming more and more important to

Biological diversity or Biodiversity refers to the variety, distribution and abundance of the different plants, animals and microorganisms, the genetic diversity they contain and the ecological functions and processes they perform at local, regional or landscape levels.

An **Ecosystem** is a system of living organisms (e.g. plants, animals, and microorganisms) together with their physical environment and the interacting processes between them. Ecosystems do not have fixed boundaries in time or space, since their components can change rapidly or slowly, depending on many different environmental factors.

A **Habitat** refers to the specific environmental conditions required for a particular species to thrive.

maintain the cultural identities that have developed together with a particular environment.

For over two decades, ILEIA has considered “Farming with nature” to mean farming in a way that builds on natural processes, maintains a healthy environment and supports livelihoods at the local level. This issue of *LEISA Magazine* takes one step further: it looks at the contribution farming can make to the sustainability of life on earth on a broader scale and the importance of wild biodiversity for the maintenance of the healthy landscapes and watersheds we all need to survive.

Biodiversity or agricultural development?

Agricultural development has in most cases been pursued without considering its effect on biodiversity. Likewise, efforts to conserve biodiversity and protect watersheds and other key ecosystem services have typically relied on the establishment of protected areas that officially exclude agriculture. This segregation of “farming” and “environmental conservation” is no longer viable in many parts of the world. At least half the world’s temperate, sub-tropical and tropical forest ecosystems are dominated by crop and pasture production, mostly in low productivity systems. Most of the over 1,00,000 areas that have been set aside to preserve wildlife and ecosystems contain significant amounts of land used for agriculture, while many more are islands in a sea of farms, pastures and production forests that are managed in ways that are incompatible with the long-term survival of species and ecosystems.

In addition, pressure on agricultural land is increasing. Global demand for food and fiber is expected to grow by at least 50 percent in the next few decades, and much more in low-income developing countries. Nearly 40 percent of the earth’s total land area is already used for agriculture, and there is very little land left that is considered potentially suitable for agricultural production. To make matters worse, productivity is declining substantially on many agricultural lands and each year, some 5 to 10 million hectares of cropland is taken out of production because of soil erosion, nutrient depletion, salinization and water logging.

Conserving biodiversity in agricultural landscapes

LEISA farming practices contribute to the maintenance of ecosystem services on a local scale. In addition, small-scale farms are, in general, more biodiverse than larger farms, as they are often more ecologically and intensively managed. However, to effectively conserve wild biodiversity in agriculture-dominated ecosystems, we need to move beyond farm level and consider the effects of management practices on both humans and wildlife, on a landscape scale. A “landscape” is a mosaic of land uses, with a particular pattern of topography, vegetation, land use and settlement, usually

kilometers-wide. Ecosystems must be managed as a whole with protected areas as reservoirs of wild biodiversity within a “matrix” of land that is managed to protect its habitat value, while also providing food and income to people.

Over half of the world’s most species-rich areas contain large human populations whose livelihoods depend on farming, forestry, herding or fisheries, many plagued by chronic poverty and hunger. In these areas, the potential for conflict between demands for food, ecosystem services and rural livelihoods reaches a peak. Managing landscapes for both agricultural production and biodiversity conservation is therefore, particularly important in and around protected areas of high biodiversity value. It is also of paramount importance in biologically degraded landscapes, where ecosystem services essential for sustainable agriculture and local livelihoods need urgent rehabilitation.

Managing entire ecosystems or entire landscapes with the goals to feed people and protect wild biodiversity, can provide a long-term approach to securing the livelihoods of local people — and be a cost-effective approach to biodiversity conservation.

There are two interrelated approaches to achieving these goals. The first is to maintain healthy and diverse agricultural production systems that produce the goods we need, while, still maintaining important ecosystem services — for example, through LEISA practices. The second, is to leave space and habitats for wildlife in “unused” areas of the farm and surrounding areas. This is important for the wildlife itself and the balance of wider ecosystems, but it can also benefit farmers by providing habitats for beneficial organisms, such as, pollinators and other beneficial insects.

Maintaining ecologically healthy agricultural production systems

Healthy agricultural systems support ecosystem functions and contribute positively to the health of the surrounding environment. High degree of biodiversity creates barriers against any pest epidemics. Some living organisms may be host to certain insects or diseases and a complex mix of naturally occurring organisms will do away any chances of widespread loss to the farmers. The CPR centered mountain farming system is a fine example of achieving functional diversity through combining complementary plant and animal species in synergetic interactions, injecting sustainability into the agroecosystems (Vir Singh, p. 10).

The agro-forestry system is another way to conserve biodiversity. The homestead gardens of Kerala are mimics of the mini-forests created by farmers (Nisha Aravind, p. 21). Homesteads constituting multitier canopy integrating livestock ensure optimum utilisation of natural resources, besides protecting biodiversity.

Conventional agricultural development and intensification has contributed to the decline of biodiversity in agricultural production systems. These agroecosystems have been dramatically simplified in order to bring them under full human control - by clearing native vegetation; modifying hydrological systems and water sources; by radically simplifying the types of vegetative cover; and by replacing natural processes with chemical inputs. To make agricultural production systems more “friendly” to biodiversity, change of management practices is required, in order to work with nature as far as possible, instead of attempting to simply control it. This includes a reduction in the use of chemical inputs, changes in the management of vegetation, soil and water resources, recycling farm outputs, and an increase in the

diversity of domestic species grown on the farm, particularly perennial crops, grasses and trees, whose production does not require repeated cultivation. Reducing the use of chemical inputs can help improve farmland habitats for wildlife. This can also be very important for productivity. For example, important pollinators like bees, for example, are very susceptible to chemical pesticides. Article on *Suman Sangam* (Kulkarni, p. 35) depicts how a conscious effort towards conserving biodiversity will pay rich dividends, both to humans, as well as, environment.

Yet another way of maintaining the ecological balance is by means of recycling resources between natural areas and farmlands. Natural areas, even if they are unsuitable for regular use, can provide an important “resource bank” for surrounding communities. In the Eastern part of India, in Assam, the State departments have been helping communities in productively utilising the water weed – water hyacinth, thus also enabling protection of the “*Deepor Beel*”, the largest lake in Assam. Farming communities have been using the water hyacinth, the unwanted weed, converting it as vermicompost and soil mulch. (Mohan, p. 20). In the United States, a similar strategy is used by the Malpai Borderlands Group on ranchlands —although in this case the land is owned not by the communities but by a benevolent rancher (p.7).

Leaving space for wild species

Protecting and restoring wildlife habitats across the landscape can be achieved through linking protected natural areas by using “in-between” spaces to provide corridors and networks. Non-cultivated areas on and off farms can be used effectively, for example, by allowing natural vegetation to grow along riverbanks, irrigation canals and natural waterways; on uncultivated strips between crop fields; on roadsides; or as windbreaks or live fences. Other areas such as forests, woodlots and parks can also harbour significant biodiversity, if they are managed appropriately.

Communities are often willing to protect these areas when they have a say in their development and management, and where they are designed to provide local benefits, as well as, broader conservation goals. Practical examples of farmers and herders or ranchers deliberately making space for wild biodiversity are not yet commonplace, but do exist. Imhoff and Baumgartner

Barking deer (Muntiacus muntjak) strolling over a recently sown potato field in Kanglung, East Bhutan.





Skylark

(p.7) present a number of examples from the United States where farmers are using organic methods, while at the same time developing habitat networks for wildlife throughout farming landscapes. In Zimbabwe, holistic resource management approaches are regenerating grazing areas while also allowing for the presence of wildlife (Neely and Butterfield, p. 24).

Farming communities as stewards of biodiversity

It is often necessary to combine many different elements of land use and management to achieve healthy ecosystems at a landscape scale. This

requires action by farmers, communities and broader land use initiatives. The Talamanca Initiative in Costa Rica, for example, is helping farmers to maintain a very biodiverse farming system based on ecological production methods and diverse products (Lynch, p.14). In this way, the farmers are helping to preserve the Mesoamerican Biological Corridor which links many smaller reserves with the *Amistad* park, thereby linking wide network of habitats in this extremely biodiversity-rich area. Ecotourism has now become an important source of additional income for the farmers.

There are also other examples from around the world where local communities play a critical role in conserving biodiversity. A recent review found that forest communities conserve over 400 million hectares – more than the total land area of “public” protected areas. In Indonesia, displaced farmers have revitalized a farmer’s organisation and are now working together with the Department of Forestry to gain their livelihoods from the forest in an environmentally friendly way – and at the same time acting as guardians of the forest.

New management practices and technologies may sometimes be needed to develop systems that enhance both production and conservation, particularly in more intensively managed farming systems. But in many cases, the source of good solutions lies embedded in traditional knowledge and technologies. Traditional practices like, use of *Panchagavya* is not only economical but also highly environment friendly (Reddy, p.29). Vayals in Kerala describe how a traditional practice of classifying paddy farms helps in conserving biodiversity (Girigan et al, p. 27). Haq *et al.* (p. 17) describe a story from Bangladesh that shows how an adaptation of the traditional practice of cultivating on floating beds has helped a community to deal with an environmental change. Traditional practices have also proven to be a rich source of modern innovation in pastoral systems, as illustrated in Zimbabwe (Neely and Butterfield, p.24), in agroforest systems (Nisha Aravind, p.21), and in mountainous regions (Ahmad *et al.*, p.12, Vir Singh p.10)

Thinking long term

Realistically, landscape management that successfully combines the goals of biodiversity conservation and agricultural production will require the support of many

different stakeholders. Integrated approaches to participatory landscape planning and stakeholder negotiation can provide a good foundation for this work. Yet, a range of incentives for agricultural development still work against the small-scale farmer and promote agrochemical-based intensification and the destruction of biodiversity and ecosystem functions. Change on a global scale will not be possible without major changes in policy, trade and economic systems. Here, organizations like Ecoagriculture Partners may be able to play a significant role by facilitating dialogue and collaboration among farmer and community organizations, conservation organizations, agricultural researchers, the food industry, municipalities and public agencies, to help coordinate their efforts and to mobilize policy reform.

Much can be also done at local level to improve the synergy between people’s livelihoods and maintaining healthy ecosystems that include wildlife. Where people have lived for centuries, they have usually developed a successful system for living with the environment, in a sustainable way. This is becoming increasingly rare, as people everywhere are subject to migration and many different kinds of upheavals. In many cases there is a need to rebuild livelihood security, social capital and an understanding of the importance of maintaining the environment in the long term.

Farmers and rural communities can become leaders in environmental stewardship and demonstrate their continuing central role in national development. It is important to strengthen the capacity of farming communities to play this role, by re-orienting conservation, technical assistance, research and other institutions to support them. Education and trading programmes need to explicitly link production and biodiversity perspectives, objectives and strategies. Farming communities need to be actively involved in designing and championing national conservation policies. They can advocate for a more enabling policy environment for small-scale, ecologically-based farming – a policy environment that rewards and enables farming communities to be effective environmental stewards at the same time as meeting their own needs, in a way that maintains the health of the wider ecosystem.

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