



The Evolving Landscape of **Agricultural Biodiversity** Conservation

Community-based Biodiversity Management (CBM):

A landscape approach to the conservation of agricultural biodiversity cultivated on fifteen years of experiences in Begnas, Nepal





Photo: Mahesh Shrestha/LI-BIRD

It takes a landscape perspective to see the intrinsic link that agricultural biodiversity forms between people, food and the environment. Agricultural biodiversity comprises crop varieties and livestock breeds; fodder, tree, fish and other harvested wild species; and non-harvested species that provide ecosystem functions (e.g. soil biota, pollinators and pest predators). It also includes the diversity of agricultural, pastoral, forest and aquatic ecosystems shaped by human activity over millennia. With accelerating land use change, conservation of agricultural biodiversity increasingly depends on the empowerment of local communities to restore and sustainably manage heterogeneous landscape mosaics and to harness synergies of conservation and livelihood for greater resilience.

A LANDSCAPE APPROACH TO AGRICULTURAL BIODIVERSITY MANAGEMENT

Community-based Biodiversity Management (CBM) is an emerging landscape approach to agricultural biodiversity conservation. CBM seeks to encourage the custodianship of land and agricultural biodiversity as a means for improving livelihoods of local communities. Local Initiatives for Biodiversity, Research and Development (LI-BIRD), in collaboration with national and international research organizations, has been developing CBM through participatory action research projects in 15 districts in Nepal. One compelling example of CBM is

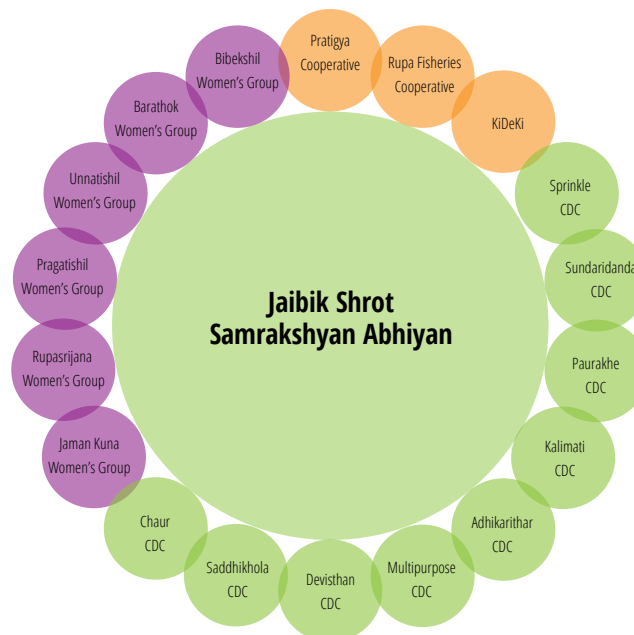
the restoration of the Rupa lake watershed in Begnas, in the Lekhnath Municipality in Kaski district of Nepal. The Begnas landscape lies in a Himalayan valley, with the elevation ranging from 600 to around 1,400 metres above sea level. It comprises a mosaic of Rupa and Begnas lakes, wetlands, forests, rice terraces, agroforestry gardens and grazing areas. Affirming a common vision and their commitment to conservation, the local communities and the Lekhnath Municipality have declared the landscape as a pilot for an *Agrobiodiversity Conservation Area*.

Local community network

CBM is embodied by a local farmers' umbrella organization called the *Jaibik Shrot Samarachyan Abhiyan* (Bio-Resources Conservation Movement or *Jaibik Shrot* for short), which brings together three cooperatives, nine community development committees and six women's groups. Activities of *Jaibik Shrot* cover over 30 km² of the Rupa lake watershed and are expanding into neighbouring areas. The responsibility of the umbrella organization spans a wide range of conservation, restoration and livelihood activities.

The three cooperatives and associated groups fulfill complementary roles. The Pratigya Cooperative conserves and markets traditional crops and herbal medicine. The Rupa Cooperative runs a successful fishery enterprise and uses the profits for watershed restoration. While, the KiDeKi (Farmer to Farmer) organization gives trainings on goat rearing, beekeeping and organic farming and supplies beehives and saplings of fodder and medicinal plants.

The three cooperatives represent and provide a voice for the diverse needs and interests of the local communities. The representative structure and track record gives them local legitimacy while undertaking collaborations with research agencies and governmental and civil society organizations.



Jaibik Shrot is an umbrella organization that coordinates and monitors agricultural biodiversity conservation; knowledge documentation and sharing; and farmer capacity building with its members across the Rupa lake watershed.

Photo: Sajal Sthapit/LI-BIRD



Watershed management: from conflict to cooperation

Jaibik Shrot, through the leadership of Rupa Cooperative, played a crucial role in the restoration of the Rupa lake and the revival of the fishery through integrated watershed management. Only a decade ago, the lake was covered with water chestnut, which threatened biodiversity and livelihoods. The deterioration of the lake was the result of siltation and pollution caused by deforestation, open grazing and use of fertilizers and pesticides in the upstream areas.

The cooperative purposively introduced an herbivorous fish, grass carp (*Ctenopharyngodon idella*), to control water chestnut and imposed a ban on fishing of indigenous sahar fish (*Tor* spp.) during spawning season. Because sahar fish swims upstream to spawn, the upstream farming communities retaliated against the fishing ban claiming equal rights to harvest this high-value fish.

This impasse paved a way for collaboration when the Rupa Cooperative opened membership to the upstream communities at a reduced fee, earning them dividends from the lake fishery and engaging them in all decision making. In addition, 25% of the fishery profits are invested in the upstream areas namely in scholarships for pupils and reforestation activities. Tree planting is carried out by 18 Community Forest Groups that manage the use of forest resource through common rules and activities.

This benefit-sharing scheme provided leverage for conservation. It encouraged the enforcement of fishing regulations, transition to organic agriculture, and reforestation, all of which have helped reduce soil erosion and lake sedimentation. Over the years, the cooperative has grown from 35 to 746 members.

Members of the Pratigya Cooperative at Chaur monitor the diversity of cereals, vegetables and medicinal plants and market traditional rice and taro products.

Land use diversification

Jaibik Shrot has created incentives for land use diversification, which contributed to lake restoration. It created a revolving fund that farmers can access to investment in income generating activities. In return for no collateral and low interest loan, each recipient is assigned a conservation task. For example, each farmer who takes a loan for goat rearing is required to plant 25 saplings of medicinal plants and fodder trees such as *raikhaniyo* (*Ficus semicordata* var. *montana*) and *nimaro* (*Ficus auriculata*) provided by the KiDeKi organization. Likewise, in return for a loan for beekeeping, the farmer is required to plant 25 saplings of bee forage plants such as *kalki* (*Callistemon citrinus*).

Farmers are not allowed to leave their land fallow in winter and are instead required to plant *tori* (*Brassica campestris* var. *toria*)-an important nectar source for bees and other pollinators. The use of goat manure has reduced the need for artificial fertilizers, while apiculture has discouraged the use of pesticides thereby contributing to the transition to organic agriculture and subsequently reduced water pollution in the lake.

Soil erosion was tackled through reforestation, funded by the profits from the fishery, and the planting of fodder and fruit trees and perennial grasses such as *amriso* (*Thysanolaena maxima*) and *napier* (*Pennisetum purpureum*).

Annual field monitoring conducted by *Jaibik Shrot* in 2012 showed that 3295 out of the 5060 saplings of fodder, medicinal plants and fruit trees distributed since 2008 have survived. The growing network of restored forests, fodder trees, fruit orchards and agroforestry gardens has increased the structural complexity of the landscape and enhanced ecosystem functions, including soil erosion control and water recharge.



Photo: Top: LI-BIRD Photo Bank, Bottom: Mahesh Shrestha/LI-BIRD



Conservation of agricultural biodiversity and wild species

Each of the 15 groups affiliated with *Jaibik Shrot* is entrusted with specific conservation responsibility including documentation of local knowledge on genetic resources through Community Biodiversity Registers (CBRs). The CBRs contain information on more than 440 species and crop varieties, including 111 wild medicinal or non-timber species and 92 wild food and timber species.

The KiDeKi organization is responsible for the CBRs of non-timber forest species and the Pratigya Cooperative CBRs on the diversity of cereals, vegetables and medicinal plants. It employs an elaborate system for landrace conservation, in which the cultivation of rare landraces is assigned to specific farmers.

The biodiversity of the Rupa lake and its wetland is monitored by the Rupa Cooperative. The cooperative sets aside protected areas for wild rice (*Oryza rufipogon*), white lotus (*Nelumbo nucifera*), indigenous fish and migratory birds.

Various other groups in the landscape perform or contribute to the conservation activities. For example, the *Sundaridanda* group conserves and raises awareness of 34 wild orchid species in a small botanical garden. General awareness and support for biodiversity conservation has significantly increased over the years as illustrated by the populations of wild rice and white lotus, which are now left undisturbed even outside the protected areas.

Top: Areas in the Rupa lake have been set aside as habitat for white lotus, which are managed by the Jaman Kuna Women's Group. Bottom: The Rupa lake and its wetlands harbor 24 species of fish, 30 species of birds and 11 species of mammals (Kafle and Regmi 2008. Birds of Rupa Lake. LI-BIRD. available at: bit.ly/1jVtFmU)

Seed exchange

As in many heterogeneous landscapes, the crops and varieties in the Begnas landscape vary along altitudinal gradients. Paddy rice is grown in the lowlands; while upland rice, millets and maize are grown on rainfed fields at higher elevations. However, perennial and fruit crops are increasingly popular due to their high market value, low labour requirement and greater tolerance to elevated temperatures and drought.

Farmers commonly save and exchange seeds with their neighbors and relatives. *Jaibik Shrot* has expanded the seed exchange network, which now plays a key role in the dynamic management of diversity as illustrated by the reintroduction of local rice variety called *Anadi*. A decade ago *Anadi* was on the verge of extinction with only 15 kg of seeds available in the entire village. That 15 kg of seeds were widely distributed and the current annual production of *Anadi* rice is about 30 tons. Other examples of reintroduction of rare varieties through landscape-wide seed exchange network include the ongoing revival of aromatic sponge gourd (*Basaune ghiraunla*), *Madale* cucumber and *Panchmukhe* taro.

Seed exchange also increases access to new varieties such as those developed by the Participatory Plant Breeding (PPB) group that focuses on the improvement of local varieties through crossing with exotic varieties and selection. In 2012, the PPB group distributed 300 kg of rice variety called *Biramphool-3*, which is a cross between local low-yielding aromatic variety *Biramphool* and a commercial high-yielding aromatic variety *Himali*. The cross has increased the productivity of *Biramphool*, while maintaining its adaptability to local conditions.

Top: Promotion of honey bees has been effective in getting farmers to convert to organic practices and plant more flowering plants.

Bottom: *Jaibik Shrot* uses participatory four cell analysis to monitor the population status of local varieties and make seed exchange plans.



Photo: Top: Mahesh Shrestha/LI-BIRD, Bottom: LI-BIRD Photo Bank



COMMUNITY-BASED BIODIVERSITY MANAGEMENT AS A LANDSCAPE APPROACH

The experiences from Begnas show that on farm conservation of agricultural biodiversity depends on integrated landscape management to restore and maintain the processes of land, ecosystem and biodiversity regeneration. In Begnas, this was achieved by a landscape-wide adoption of sustainable practices to reverse soil erosion and increase productivity through mutually reinforcing activities of reforestation, diversification, apiculture, agroforestry and organic crop production. Lake restoration and land use diversification have supported the conservation of crop genetic diversity including landraces and crop wild relatives, whose habitats are now protected.

The main feature of CBM is a strong network of local groups guided by an umbrella organization that provides strategic and technical guidance; builds collaborative partnerships with

Main characteristics of the landscape approach

- Network of local groups and cooperatives
- Integrated watershed management
- Land use diversity
- Community-protected areas
- Exchange of seeds, skills and knowledge
- Equitable sharing of resources, opportunities and benefits

other stakeholders; oversees conservation at the watershed or jurisdictional scale; and reinforces cooperation across the landscape. Such an organization needs to have: i) knowledge and skills to manage agricultural biodiversity, ii) rules and regulations to govern the process, and iii) strategies and vision to improve livelihoods and incomes.

Through this network, CBM connects individual households to run a collective saving and credit scheme, and provides a forum to access information, learn, plan and implement activities related to agricultural biodiversity management and livelihood improvement. Such an umbrella organization becomes the locus for collaborative decision-making and action driven by common cause and management objectives defined by local communities.

Four Principles of CBM

- **Empower local communities to take leadership in planning and decision making**
- **Build on local innovations, practices and resources**
- **Diversify biodiversity-based livelihood options**
- **Provide a platform for social learning and collective action**

The Rupa lake provides important habitat for wetland and migratory birds.

Photo: Krishna Lamsal/LI-BIRD

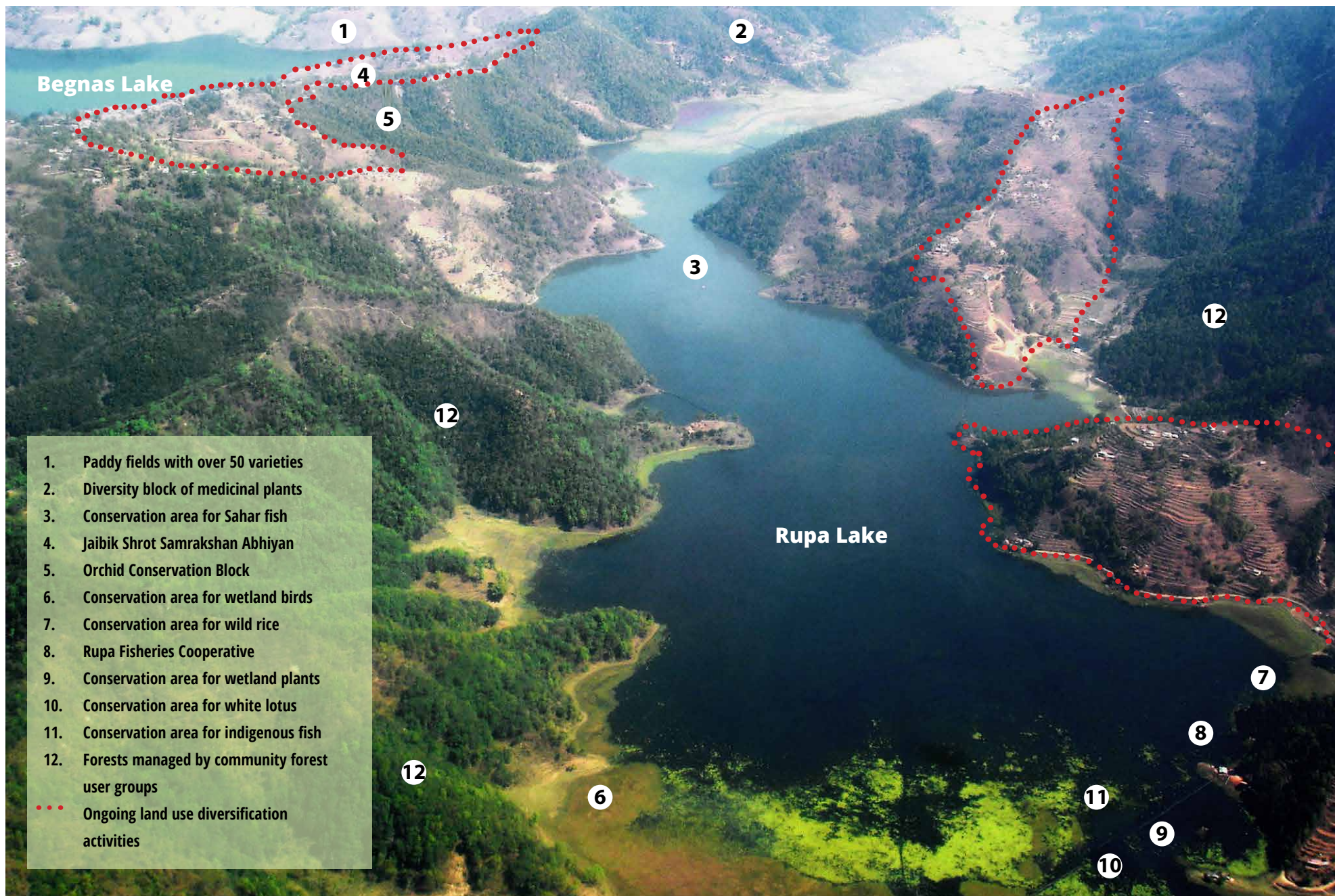


CBM places a strong emphasis on the sustainable use of agricultural biodiversity through on farm conservation. It involves the identification, conservation, management, distribution, exchange and value addition of local crop varieties, medicinal plants, fodder species and, in some cases, crop wild relatives. Various methodological tools and practices, such as four cell analysis, diversity fair, diversity block, diversity kit, community seed bank, community biodiversity register and participatory plant breeding, are employed depending on context and community.

The revival of Rupa watershed was a long but rewarding process. The landscape perspectives helped shed light on the ecological interconnectedness of cultivated and “wild” areas. Only through integrated management and collective action of farmers and fishers, the benefits of biodiversity-based livelihoods were accomplished. The support of CARE, LI-BIRD and other organisation was crucial. However, it is the commitment of the people of Begnas that reinvented once degrading and impoverished land into a lush and productive mosaic of forests, wetlands, agroforestry gardens and crop fields. We thank them and hope that they will continue to inspire similar activities around the world.

For more information

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Conservation and restoration activities in the Rupa watershed.

Photo: LI-BIRD Photo Bank

This publication was prepared by Sajal Sthapit* and Dunja Mijatovic**, with support from Indra Paudel* and Sandesh Neupane*. The case documented is result of over three decades of work of CARE-Nepal, LI-BIRD, Nepal Agriculture Research Council, Bioversity International and their various projects in the Begnas landscape.

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