Chapter 11

Conservation Strategies for Species/Populations Occurring Outside Protected Areas

More than 90 per cent of the terrestrial surface of the earth is not covered by any form of protected area category. If this situation does not change, there will be severe loss of biological wealth in the next few decades (Halladay and Gilmour, 1995).

Aims and purpose

Given that national parks and other conservation areas cover only 12 to 13 per cent of the earth's surface in total, it is clear that these areas alone will not ensure the survival of species and ecological communities, even without the impacts of accelerated global change. It is crucial, therefore, that lands outside national reserve networks be managed in ways that allow as much biodiversity as possible to be maintained. The *in situ* conservation of species outside protected areas, where the majority of them occur, is a seriously neglected aspect of biodiversity conservation and in the face of global change it must demand much further attention from governments and conservation agencies. This approach is also known as *off-reserve management* (Hale and Lamb, 1997).

This approach should also be seen within the context of integrating protected areas within wider landscapes, seascapes and natural resource policies (Ervin et al, 2010), one of the benefits being to achieve additional conservation benefits outside of protected areas (Box 11.1).

Other reasons for paying more attention to the conservation of resources in land outside protected areas are given by Torquebiau and Taylor (2009):

- Farming and land management practices strongly influence available natural resources and biodiversity.

Box 11.1 Achieving additional conservation benefits outside of protected areas

A significant proportion of biodiversity is located outside of protected areas – working with other interest groups and sectors across the wider land/seascape matrix can significantly improve biodiversity conservation, even without protected status being achieved. For example, ecologically friendly practices can be pursued in agriculture and extractive industries, while actors involved in agroforestry and sustainable tourism can adjust their practices so they are more compatible with biodiversity conservation. Regeneration and reforestation schemes can also help, potentially with funding from initiatives such as the Clean Development Mechanism of the Kyoto Protocol.

Source: Ervin et al, 2010

- Agricultural (or useful) biodiversity – the plants and animals domesticated or used by man, together with associated ecosystems, land-use systems, wild species and indigenous practices – is the foundation of sound farming practices and is under threat from large-scale 'industrial' agriculture. This also applies to natural forest biodiversity, including the extraction of non-timber forest products, and exotic plantation (or industrial forestry).
- There is strong evidence that biodiversity can contribute to improved development, although there is continuing debate about the relations between conservation, food security and poverty reduction.

It follows logically that many CWR will be numbered among the species that grow outside protected areas, and for these, off-reserve management can be an important strategy. We need to address what actions may be proposed so that many areas that are currently not protected, but house target species, will be maintained in a manner that ensures their conservation at the ecosystem or landscape level by positive management policies or the prevention of certain forms of activity. In addition, it may be possible to take actions through various forms of agreement with landowners to ensure such areas outside formal protection, whether on public or private land, can provide a sufficient degree of protection to target species and ensure the maintenance of viable populations.

Several authors have noted that many CWR occur in disturbed, pre-climax plant communities such as roadsides, field margins and orchards, which tend not to be included in protected areas (Jain, 1975; Maxted et al, 1997; Maxted and Kell, 2009). For example, Al-Atawneh et al (2008) observed that in the Wadi Sair Reserve in Palestine, the wild pear species, *Pyrus syriaca* Boiss., is only found as scattered trees, never as continuous populations, and the largest populations are found near the borders of fields and in areas not grazed as they receive some protection by being surrounded by fruit tree orchards. Conservation of this species must take place primarily outside of the existing protected areas, supplemented by *ex situ* measures. CWR may also occur as weeds in agricultural,

horticultural and silvicultural agroecosystems, and as Maxted and Kell (2009) note, they are often associated with traditional cultural practices or with marginal environments. The abandonment of such traditional agricultural systems will place many weedy CWR at risk.

In view of the scale of the problem and the large numbers of CWR for which formal protection is unlikely to be achieved, we need to invest heavily in a range of actions outside of, and complementary to, the formal protected area system in order to afford some degree of protection to CWR species and their habitats. Many of these actions depend on engaging private landowners in the conservation process. A wide range of indirect means exist through agreements, such as conservation easements, to reduce the level of exploitation of areas or to contain threats. These agreements include:

- conservation easements, including covenants, trusts, partnerships, with or without financial or tax incentives;
- incentive-based schemes, including agro-environmental schemes;
- local conservation strategies;
- public and private collaboration for conservation;
- special cases such as conservation in vegetation fragments and micro-reserves;
- habitat conservation planning (HCP) and mitigation banking.

Conservation easements

Conservation easements are legal agreements that allow landowners to voluntarily restrict or limit the kinds of development that may occur on their land (TNC 2003, 2008; Merenlender et al, 2004). Generally, conservation easements are voluntary agreements between landowners and another party, usually a private local or national conservation organization, for the preservation and protection of land in its natural, scenic, historic, agricultural, forested or open space condition. They may be negotiated in conjunction with an international conservation organization such as the United States Nature Conservancy (see below) and may be acquired through purchasing from the landowner, given as a gift or inherited. Title to the land remains with the owner who may receive tax benefits, depending on the country and national or regional legislation.

Easements can serve as a means of helping protect biodiversity in cases where purchase of the land is not possible or even as an interim measure while purchase is being negotiated. The agreements are legally binding and can afford long-term protection. The restrictions of the easement, once agreed, are perpetual and apply to all future owners of the land. They are detailed in a legal document recorded in the local land records; the easement becomes a part of the chain of title on the property.

Easements can be used to conserve land that is of biologically significant value while, at the same time, the landowner can continue to own and use the

property. An example is the Grassland Reserve Program administered by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and USDA Farm Service Agency (FSA) in cooperation with the USDA Forest Service. It is a voluntary programme that helps landowners and operators restore and protect grassland, including rangeland and pastureland, and certain other lands, while maintaining the areas as grazing lands. The effectiveness of buying easements as a conservation strategy is reviewed by Armsworth and Sanchirico (2008).

In the US, The Nature Conservancy (TNC), one of the world's leading conservation charities, has been a major player in conservation easements, which it regards as one of the most powerful, effective tools available for the permanent conservation of private lands in the US. TNC has negotiated easements in 20 states[1] in the US and has been granted easements on roughly 30,000 acres in Latin America (see Box 11.2), the Caribbean and Canada.

TNC has adopted a broad approach to easements, to protect land and water, directly or indirectly, as habitats for plant and animal biodiversity. It notes that easements can be designed to:

- protect natural habitat from destruction by conversion to other uses such as subdivision and development;
- protect open space of varying kinds from development or other disturbance;
- protect natural habitat from destruction by intensive agriculture;
- conserve forests through limitations on forest management and development;
- preserve agriculture and grazing lands from subdivision and development;
- protect water resources by limiting disturbance of lands in the watershed;
- provide for public use and access, such as through trail easements.[2]

Box 11.2 TNC role in conservation easement at Cuatro Ciénegas, Mexico

In 2000, The Nature Conservancy (TNC) and its Mexican partner organization, Pronatura Noreste, A.C., purchased the 7000-acre Rancho Pozas Azules (Ranch of the Blue Pools), situated in a 200,000-acre valley in the northern state of Coahuila. The area contains 77 endemic species found nowhere else in the world. The purchase was one of the largest private land purchases for conservation purposes in Mexico. Pronatura holds the title to the property and is responsible for its management as a nature preserve. As part of the transaction, Pronatura accepted a conservation easement over the 200-acre parcel that the seller retained. The easement was the first in north-eastern Mexico. TNC is helping Pronatura expand the reserve by purchasing Rancho Pasta de Garza, a 2964-acre private ranch located to the north of the reserve. More than 300 of the valley's 883 plant species are also found here.

Source: See http://www.nature.org/wherewework/northamerica/states/texas/files/chihuahuan_desert_1008_lowres.pdf

Off-reserve management

Various types of off-reserve management are practised, such as in production forests, agricultural landscapes and urban landscapes, roadsides and transport corridors.

Conservation easements and forestry

Conservation easements can be an effective tool for maintaining working forests, preserving environmental values and protecting communities from excessive development pressure according to the Society of American Foresters (2007), which supports easements as one tool for ensuring sustainable forest management. But, as they observe, easements are not appropriate for all forest lands and should only be entered into with full understanding of their consequences. 'Selling or donating conservation easements may allow landowners who are committed to sustainable management to resist pressure to sell their property to developers. Similarly, in the face of pressure to withdraw working forests from active management, conservation easements offer a way to provide adequate environmental and open-space benefits while allowing continued timber harvesting.' In the US, conservation easements are negotiated and run by federal agencies, state natural resources agencies, and nearly 1700 local, regional and national land trusts. An overview of current efforts and summaries of the various programmes involved are given in a recent report (US Endowment for Forestry and Communities, 2008).

Forest genetic conservation outside protected areas

The maintenance of genetic resources outside protected areas has been carried out traditionally in forestry, albeit neither consistently, nor in all cases consciously, as an act of conservation (Palmberg-Lerche, 1993, pers. comm. to V. Heywood). Kanowski (2001) points out that the conservation of many rare and threatened species continues to depend on the management of production forests or on private land outside the protected area system, highlighting the need to adopt forest conservation strategies that extend beyond protected areas if biodiversity conservation goals are to be achieved.

> *The broader vision for* in situ *forest conservation recognizes that achieving and sustaining forest conservation also requires the integration of social and economic goals into conservation planning processes. It therefore recognizes the development of more collaborative participatory modes of conservation planning and management as essential to achieving and sustaining forest conservation goals. New forms of partnership between many of the actors with interests in forests, which recognize the diversity of their roles and contributions, are especially important in delivering conservation outcomes* (Kanowski, 2001).

Box 11.3 Conservation fields for forest genetic resources in Indonesia

In Indonesia, to promote *in situ* conservation of forest tree genetic resources in areas where concessions have been granted, the National Committee on Genetic Resources works together with the Association of Forest Concessionaires to design conservation fields within concession areas. It was agreed that around 200ha of forests should be left uncut in each concession area. In this way, there is a remnant of original forest in each locality, which will serve as a reference for future studies, as well as a place where seeds of native trees can be collected.

Source: Sastrapradja, 2001

It is estimated that approximately 90 per cent of the global forest area lies outside of public protected areas and a World Bank study notes that while existing parks and protected areas are the cornerstones of biodiversity conservation, they are insufficient on their own to ensure the continued existence of a vast proportion of tropical forest biodiversity. Promoting more biodiversity-sensitive management of ecosystems outside protected areas, especially of those known to contain target species, needs to be given high priority. This is especially applicable to forests that are already subject to some form of management such as for timber production.

As Kanowksi (2001) indicates, off-reserve management can make a significant contribution to regional biodiversity conservation, provided appropriate management systems and processes are in place, and may contribute to the conservation of those values that cannot be fully protected in conservation reserves and existing protected areas, largely because of land-tenure and land-use patterns.

The setting aside of areas within forestry concessions as a means of conserving original forest and providing a seed source is another approach that has been adopted, for example in Indonesia (Box 11.3).

Conservation of CWR in traditional agroecosystems

CWR are frequently found in disturbed, pre-climax plant communities such as roadsides, field margins or orchards and often occur in traditionally managed agroecosystems and agroforestry systems or in marginal environments. Their conservation in such areas is incidental and not a result of deliberate policy. As such, their conservation is far from secure, especially when traditional cultivation systems are abandoned in favour of more modern agricultural practices. But as Maxted and Kell (2009) note, these areas often contain large thriving populations of CWR and can act as important corridors for CWR gene flow and dispersal and as reservoirs to bolster genetic reserve populations. We need to consider whether any effective steps can be taken to enhance or reinforce such incidental conservation of CWR, such as the creation of micro-reserves as described below.

Set-aside schemes

The majority of wild species have, of course, managed to survive, at least up to now, outside protected areas, but the chances of their long-term survival in the face of global change and worldwide habitat loss and fragmentation will be enhanced if the areas in which they occur are managed or *set aside* for some non-conservation purpose that does not cause harm to their ecosystems.

Examples include land that is set aside for military use, airport protection zones and grounds of public and private institutions such as hospitals, universities and commercial companies. Some of the side effects of war may also be beneficial for conservation, including demilitarized zones or 'no-man's lands', some of which can be very rich in biodiversity. Such survival is subject to the prevailing dynamics of the system and may not result in a sufficiently broad or representative sample of the species being maintained. Nonetheless, in a broad biodiversity conservation context it is valuable and, although it cannot be regarded as fully effective *in situ* species conservation, it is probably as much as can be expected for the majority of CWR, given the large numbers involved and the lack of massive investment in this area.

In Europe, set-aside is a term that was applied to land that farmers were not permitted to use for any agricultural purpose. Although introduced by the European Economic Community in 1988 as part of a set of measures to prevent overproduction, it was soon realized that this practice often had beneficial effects on the biodiversity of the land concerned. Some farmers chose to set aside those areas that would provide the most benefit to wildlife. In some cases, for example, farmers converted the land taken out of production to woodland. The scheme was abolished in 2008.

Agricultural conservation easements are designed to keep land available for farming and prevent its use for building or other urban influences but are of little value for CWR conservation.

Public and private collaboration for conservation

As González-Montagut (2003) observes, 'limited funds, and the requirement for counterpart funds, leave no room for competition between institutions interested in financing protected areas'. Synergies between the public and private sectors need to be developed. Various models of private–public cooperation for conservation of biodiversity have been adopted by different countries. An action plan for private protected areas is described in Langholz and Krug (2004) (see also Box 11.4).

In Costa Rica, the Legislative Assembly approved a law in 1992 that allows the legal designation of private wildlife reserves. Under this legislation, private wildlife refuges consist of informally protected private nature reserves that qualify for designation as government-approved and officially recognized wildlife refuges. Under this programme, landowners must develop and adhere to a government-approved management plan specifying restrictions on land and resource use. In return, refuge owners receive three incentives:

Box 11.4 Private protected areas: An emerging issue

Privately owned protected areas continue their quiet proliferation throughout much of the world. Despite this expansion, little is known about them. Preliminary evidence suggests that private parks number in the thousands and protect several million hectares of biologically important habitat. They serve as increasingly important components of national conservation strategies. In a time when many governments are slowing the rate at which they establish new protected areas, the private conservation sector continues its rapid growth. Conservationists desperately need to examine this trend closely, assessing its overall scope and direction, and determining ways to maximize its strengths while minimizing its weaknesses.

Source: Langholz and Krug, 2003

1 an exemption from property taxes for land declared as a refuge;
2 access to technical assistance for managing the protected area; and
3 assistance in the event of a squatter invasion.

Voluntary and legal, covenants, trusts and partnerships, with or without financial or tax incentives or payment for management and associated costs

Incentive-based schemes

Incentive-based schemes whereby landowners or tenants are offered payments in return for helping conserve or protect areas such as native forests and other vegetation, watersheds or wetlands or ecosystem services have been introduced by a number of countries. Examples are the CapeNature Stewardship Programme in the Western Cape province of South Africa (Box 11.5), the Conservation Partners Programme in New South Wales, Australia, the BushTender scheme in Victoria, Australia (see Box 11.6), the Grain-for-Green Programme in China (SFAB, 2000; Gee, 2006; Liu and Wu, 2010) for converting steep cultivated land to grassland and forest, and the informally protected wildlife reserves in Costa Rica approved by Costa Rica's Legislative Assembly in 1992 (Langholz et al, 2000). In Catalonia, Spain, the Xarxa de Custòdia del Territori, a network for land stewardship, was established in 2003. It is a not-for-profit organization working to foster land stewardship as a conservation strategy for the natural, cultural and landscape resources and values of the region and its environment. The network comprises over 150 associations, foundations, city councils, enterprises and persons working in land stewardship. It works with networks within Europe, such as the Réseau de Coopération Eurorégionale pour la Gestion Conservatoire, and with Latin America.

In recent years, the concept of payment schemes for environmental services (PES) has received considerable attention in various Latin American countries as

Box 11.5 The CapeNature Stewardship Programme, South Africa

The vision of the stewardship programme is threefold:

- to ensure that privately owned areas with high biodiversity value receive secure conservation status and are linked to a network of other conservation areas in the landscape;
- to ensure that landowners who commit their property to a stewardship option will enjoy tangible benefits for their conservation actions;
- to expand biodiversity conservation by encouraging commitment to, and implementation of, good biodiversity management practices on privately owned land, in such a way that the private landowner becomes an empowered decision-maker.

The three stewardship options that the CapeNature Conservation Stewardship Programme are promoting include:

1 Contract nature reserves – legally recognized contracts or servitudes on private land to protect biodiversity in the long term.
2 Biodiversity agreements – negotiated legal agreements between the conservation agency and a landowner for conserving biodiversity in the medium term.
3 Conservation areas – flexible options with no defined period of commitment (includes conservancies).

Source: Langholz et al, 2000

an innovative tool for the financing of sustainable management of land and water resources (FAO/FLD/IPGRI, 2004).

Some of these schemes have been viewed with suspicion, largely on the grounds that they allow foreigners to buy up huge tracts of land as in the case of the Conservation Land Trust (CLT) of Douglas Tompkins or the Conservación Patagónica (CP) of Kris Tompkins, through which large areas of forest land were acquired for conservation purposes. Clearly, governments need to maintain strict vigilance of such schemes, but it is widely agreed that they have so far proved beneficial. A review of biodiversity offsets is given by Bayon (2008).

Habitat conservation plans and endangered species mitigation

In an attempt to resolve conflicts that had arisen regarding the conservation of endangered species on private lands, the United States Fish and Wildlife Service has been promoting the use of 'habitat conservation plans', whereby the 'take' of some individuals of endangered species or adverse modification of part of their habitat is allowed in exchange for an undertaking to minimize and mitigate the loss of such habitat to the 'maximum extent practicable' (Bonnie, 1999). The

Box 11.6 Conservation outside protected areas in Australia

Roadside Conservation Committee, Western Australia

Established by the Western Australia government in 1985, its terms of reference are to coordinate and promote the conservation and effective management of rail and roadside vegetation for the benefit of the environment and the people of Western Australia. Roadsides often contain remnant native vegetation that has an important role in the conservation of native flora, particularly the case with rare flora, as in some cases it is their only remaining habitat. It publishes a series of guidelines on topics such as assessing the conservation values of roadsides, designating and managing flora roads and managing and harvesting native flowers, seeds and timber from roadsides. For further information see:
http://www.dec.wa.gov.au/management-and-protection/off-reserve-conservation/roadside-conservation-committee.html.

The BushTender scheme

The BushTender scheme aims to conserve areas of remnant vegetation on private land by using an auction-based process to allocate biodiversity contracts. Officials receive the bids from potential suppliers and the assessed biodiversity importance of each site, so they can calculate which of those bids offer best value for money in terms of the greatest biodiversity value for least cost per hectare. It pays private landowners to enter into contracts to undertake management to improve the quality or area of native vegetation on their land. Landowners identify what management activities they will undertake, prepare a management plan and submit a bid indicating what payment they would seek from the government (of Victoria State). The trials have been oversubscribed and they seem to afford appreciable conservation benefits. For a critical evaluation see:
http://een.anu.edu.au/wsprgpap/papers/stoneha1.pdf.

Western Australia Remnant Vegetation Protection Scheme

This scheme provides assistance to landholders to fence remnant vegetation. Landholders apply for a subsidy, which is assessed on the basis of nature conservation value. Funding is tied to entry to a 30-year contract deed for the protection and management of the native vegetation. Funding assistance was originally set at AU$600 (US$497) per kilometre of fencing materials, that is about 50 per cent of the cost of materials. Assistance has now been raised to AU$900 (US$746) per kilometre with another increase to AU$1200 (US$995) being considered. This is equivalent to 100 per cent of material costs. Under the scheme, over 1094 projects have been funded with in excess of 38,000ha of remnant vegetation being fenced at a cost of approximately AU$2.25 (US$1.87) million.
See http://www.myoung.net.au/water/publications/motivating_people.pdf.

Land for Wildlife, State of Victoria

Land for Wildlife is a voluntary, non-binding scheme that allows landholders to register their properties if areas within the property are actively managed for nature conservation. Participation in the scheme is voluntary and a landholder can remove their property from the register at any time. The programme provides recognition of conservation effort, a network of other interested landholders and extension support and management advice. Over 3500 properties are registered with Land for Wildlife, making it the most successful programme, in terms of participation, in Australia.

Off-reserve conservation of natural grasslands

A range of mechanisms is available to help protect natural temperate grassland remnants located outside of conservation reserves. These include memoranda of understanding (MOU), regional plans, joint management agreements, voluntary conservation agreements, local environment plans and other planning mechanisms such as designation as public land categories where permitted activities are compatible with conservation of the grassland values. For further information, see: Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory, http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=14.

underlying principle is that some individuals of an endangered species or parts of their habitat may be expendable over the short term so long as enough protection is provided to ensure the long-term recovery of the species. This is known as endangered species mitigation and had proved highly controversial (Wilhere, 2009). Bonnie (1999) has suggested the adoption of 'mitigation banking' for wetlands whereby landowners would be allowed to seek 'a permit to destroy endangered species habitat and mitigate the loss by buying mitigation credits from other private landowners who restore and/or protect important habitats'.

Community/participatory conservation areas

In a review of protected areas and people, Kothari (2008) observes that two changes have been revolutionizing protected area policy and management in an increasing number of countries: first, the increased participation of local communities and others in what were once solely government-managed protected areas, transforming them into collaboratively managed protected areas (CMPAs); and second, the increasing recognition of indigenous and community conserved areas (ICCAs), many different kinds of which occur across the world but have so far remained outside the scope of formal conservation policies and programmes. According to a recent report on the role of indigenous people in biodiversity conservation, traditional indigenous territories encompass up to 22 per cent of the world's land surface and coincide with areas that hold 80 per cent of the planet's biodiversity (Sobrevila, 2008).

Collaboratively managed protected areas (CMPAs)

There is already extensive literature on collaborative management and its benefits (Kothari, 2006a). A good example of this is the Venezuela–Expanding Partnerships for the National Parks System Project, the objective of which is to implement a co-management model that guarantees the sustainable management of the Canaima National Park through an alliance between indigenous peoples, private sector institutions and government agencies. Another is the Kaa-Iya del Gran Chaco National Park, Bolivia's largest protected area with an area of 3,440,000 ha, is managed collaboratively by the Capitania de Alto y Bajo Isoso indigenous people's organization, the Wildlife Conservation Society (WCS) and the Bolivian National Park Service (SERNAP). The park is the only national protected area in the Americas created as the result of an initiative by an indigenous organization. Further examples can be found in a range of both developed and developing countries such as Canada, Indonesia, France, the Philippines and South Africa.

Indigenous and community conserved areas (ICCAs)

A considerable part of the world's biological diversity is located in territories whose ownership, control and use is in the hands of indigenous and local communities, including nomadic peoples. Despite this, conservation policies have often largely ignored the fact that these people and communities conserve many of these sites, actively or passively, through traditional and modern ways. This is partly due to lack of knowledge, and partly to the suspicion that such methods of conservation are not sufficiently effective. Some conservationists would argue that effective conservation needs a new approach whereby on-the-ground agencies, both government and local, set the broad agenda for research and decide how to implement the results (Smith et al, 2009) – in other words, 'let the locals lead' (see Chapter 5).

The term *indigenous and community conserved* areas (ICCAs) is applied to such areas (Kothari, 2006a) defined as 'natural and modified ecosystems, containing significant biodiversity values, ecological services, and cultural values, voluntarily conserved by indigenous and local communities, through customary laws or other effective means' (Pathak et al, 2004). They are extremely diverse in terms of their governance institutions, their management objectives, and ecological and cultural impacts. They can range from a tiny forest patch of less than a hectare, as in the case of sacred sites or forests, to several million hectares, as in the case of indigenous protected areas in some South American countries.

There is also an increase in the number of indigenous protected areas and reserves that are incorporated into the official protected area system. According to Kothari (2008), indigenous reserves account for one-fifth of the Amazon forests and have been shown to be effective against illegal logging, mining and other threats impacting forests outside these reserves. These include reserves that have been integrated into national protected area systems, such as the 68,000ha Alto Fragua–Indiwasi National Park of Colombia. The government of Madagascar has

Box 11.7 The key benefits of ICCAs

ICCAs are critical from an ecological and social perspective in many ways. They often (though not always):

- help conserve critical ecosystems and threatened species;
- maintain essential ecosystem functions, including water security and gene pools;
- sustain the cultural and economic survival of tens of millions of people, not only in countries of the tropics but also industrialized nations;
- provide corridors and linkages for animal and gene movement, including often between two or more officially protected areas (as illustrated by examples from Southern Africa, North America and South America);
- synergize links between agricultural biodiversity and wildlife, providing larger land/waterscape-level integration;
- offer crucial lessons for participatory governance, useful even in government-managed protected areas;
- offer lessons in integrating customary and statutory laws, and formal and non-formal institutions, for more effective conservation;
- build on and validate sophisticated ecological knowledge systems, elements of which have wider positive use;
- aid in community resistance to destructive development, saving territories and habitats from mining, dams, logging, tourism, overfishing and so on;
- help communities in empowering themselves, especially to reclaim or secure territories, tenure and rights to or control over resources;
- aid communities to better define their territories, e.g. through mapping, such as in Central America (see Solis et al, 2006);
- help create a greater sense of community identity and cohesiveness, and also a renewed vitality and sense of pride in local cultures, including among the youth who are otherwise alienated from these by modern influences;
- create conditions for other developmental inputs to flow into the community;
- lead to greater equity within a community and between the community and outside agencies;
- conserve biodiversity at relatively low financial cost (though often high labour inputs), with costs of management often covered as part of normal livelihood or cultural activities, through existing systems and structures; and
- provide examples of relatively simple administration and decision-making structures, avoiding complex bureaucracies.

Source: Kothari, 2006b

also diversified its types of protected area governance as part of its commitment to triple the area under protection.[3]

Areas conserved by communities are characterized by being voluntarily established and their management in the hands of the communities; in turn, the local

Box 11.8 An example of local co-management and its impact on CWR in Madagascar

The tapia forest is a type of forest that is only found on the western slopes of the Madagascar high plateaux (at around 1000m in height). It is home to the tapia, *Uapaca bojeri* (Euphorbiaceae), and several species of the endemic family Sarcolaenaceae. Economic activities in the region are based on agriculture. In addition, local populations collect a certain number of resources from the forest, such as tapia fruits for local use and marketing, dead tapia trees for firewood, wild mushrooms and tubers of two species of yam (*D. hexagona* and *D. heteropoda*) for food supplementation. The tapia forest also hosts the wild silkworm species *Boroceras madagascariensis* which is used in the weaving of much appreciated wild silk. Thus, the tapia forest is of essential role in the local communities' economy.

Gestion Locale Sécurisée (GELOSE) contracts for the transfer of management of the tapia forest were signed by several communities in the rural municipality of Arivonimamo (about 50–90km west of the capital Antananarivo). Among the clauses of the contracts, local communities obtained exclusive rights to the exploitation of the transferred forests and the legal right to protect their forests and resources from predators, mainly people who were not members of the community. They also were required to set up *Uapaca* nurseries and proceed with reforestation. Fire protection was also built around the transferred ecosystem because the region undergoes annual bushfires that contribute to the reduction of forest lands.

The communities benefited from several training sessions from the technical departments on topics such as identifying donors and asking for small project funding, silkworm raising and silk weaving. The communities also expressed interest in the cultivation of *D. alata* (cultivated species), received training and have started to set up yam fields.

Management transfer has been shown to contribute significantly to an increase in the income of the local community. As one of the consequences observed, the pressure on wild yams was reduced.

This approach has, however, some shortcomings; one of the most important being the failure, in some cases, to respect the agreements. Also, the sanctions for non-compliance to be applied by the community itself based on what is called 'fihavanan' (roughly translated as based mainly on friendly and family relationships), are not always effectively implemented, with the result that the management transfers sometimes fail.

communities have the obligation to conserve and sustainably use the resources of the areas based on their traditional knowledge, practices and customary laws. The main benefits of ICCAs are listed in Box 11.7.

An example is the Parque de la Papa (Potato Park), Peru, an Indigenous Biocultural Heritage Area (Área de Patrimonio Biocultural Indígena: APBCI).[4] In 2002, the six Quechuan agrarian communities, known as Chawaytiré, Sacaca, Kuyo Grande, Pampallaqta, Paru Paru and Amaru, declared some 10,000ha of their lands the *Parque de la Papa*, which was soon followed by an agreement with

the International Potato Centre (CIP) in Lima, Peru that allowed the repatriation of some 420 varieties of potatoes previously collected by CIP for the purposes of plant breeding (see also Box 5.6). The Potato Park focuses on protecting and preserving the critical role and interdependence of the indigenous biocultural heritage (IBCH) for the maintenance of local rights and livelihoods and the conservation and sustainable use of agrobiodiversity.

In Madagascar, a system of secured local management of natural resources, known as GELOSE (Gestion Locale Sécurisée) was introduced in 1996. It is a legal framework for introducing the sharing of responsibility over natural resource management among users and the transfer of rights from central government to the local community. GELOSE allows communities to define their own goals and develop regulations for resource use and management in the form of by-laws, provided they are consistent with national policy (Antona et al, 2004). An example of GELOSE relating to CWR is given in Box 11.8.

Off-site agreements and species recovery

Off-site agreements can be negotiated as part of a recovery strategy for endangered species – see Box 11.9 for an Australian example.

Special cases

Conservation in vegetation fragments

Fragmentation of vegetation is a widespread phenomenon (Saunders et al, 1987) and, in the temperate world, most habitats are small fragments or remnants of previously much larger and more continuous ecosystems. This is now becoming more common in tropical areas, largely as a result of deforestation, which poses problems for the design of protected areas for CWR, especially in increasingly non-steady-state environments as a result of global change. Vegetation fragments also include a wide variety of specialized habitats that may be important for conservation. These include field boundaries such as hedgerows, hedge banks, lines of trees, stone walls, ditches and stream banks, which may play a role in maintaining habitat mosaics and providing connectivity as well as housing rare or scarce species (Marshall and Moonen, 1998). Road verges and unmowed power-line strips (Russell et al, 2005) may play a similar role. The questions needing to be addressed are: How far can species and populations survive in vegetation remnants? Is conservation of vegetation fragments worthwhile? What action is possible? One approach is to accept the facts of the situation and try and establish small-scale reserves, as in the case of the micro-reserves created in Spain and other parts of Europe discussed below. Small reserves are inherently unstable and difficult to maintain and manage but may be judged worthwhile, at least in the short term, especially for CWR of high importance. For a discussion of these issues see Heywood (1999).

Box 11.9 Example of off-site negotiations for recovery of endangered species in Australia

The National Multi-species Recovery Plan for the Cycads negotiates conservation agreements to secure significant known populations of cycads on freehold and leasehold property. It is desirable that the populations of cycads are secured with perpetual arrangements that ensure continued appropriate management in the long term. For cycads, a conservation agreement between the landholders and the Queensland Parks and Wildlife Service (QPWS) is an appropriate model for significant populations not currently existing in national park, state forest or conservation reserves. These voluntary agreements are negotiated with landholders to create a nature refuge over part or all of a property and are attached to the land title. They allow for production and land management activities compatible with conservation of the values of the land such as sustainable grazing but generally prohibit further destruction or removal of individuals. QPWS extension officers undertake property assessments, negotiate the conservation agreement and provide follow-up advice and assistance with management of the nature refuge.

Nature refuge landholders may be eligible for Queensland government incentives. In addition, lessees of state land may be entitled to benefits under proposed changes under the Land Act (1994) and may be advantaged in seeking grants for conservation works such as fencing through natural resource management funding bodies. A conservation agreement will provide access to volunteer groups to assist with conservation work, for example fencing on grazing properties where cycads are a threat to stock.

Where significant populations occur on private land, some controlled harvesting of cycad seeds and foliage for commercial sale by the landowner may provide a significant incentive for entering into a conservation agreement and providing on-ground management of populations.

Source: Queensland Herbarium, 2007 – National Multi-species Recovery Plan for the Cycads

Conservation fields

A German project called '100 Fields for Biodiversity' aims at establishing a nationwide network of conservation fields for wild arable plant species. The project is financially supported by the Deutsche Bundestiftung für Umwelt (DBU)[5] and seeks to counter the ongoing loss of species by implementing a network of conservation fields. In these fields, the areas are managed without using herbicides and in tune with the growth preferences of the wild arable plants. It is hoped that the conservation fields will act as future centres for potential recolonization of rare species.[6]

Micro-reserves

Small-scale reserves, frequently referred to as *micro-reserves*, have been established in various parts of the world to afford protection to threatened species,

Box 11.10 Spanish plant micro-reserves

A network of plant micro-reserves (PMR) was pioneered in Spain by Emilio Laguna of the environment agency (Conselleria de Medio Ambiente) of the regional government of Valencia, Spain and the first one was established in 1997. By the end of 2008, the Valencian community held 273 officially protected plant micro-reserves that house populations of more than 1625 species of vascular plants. Of these, 1288 populations of 527 species are targeted for long-term monitoring. The sites are protected by orders of the environment agency. The management plan designates a few priority plants in each PMR, which are targeted for conservation actions (census, management projects, population reinforcement if required, etc). Only two actions are designated for all the PMRs: census of priority species and the collection of their seeds to be transferred to the germplasm bank of the botanic garden at the University of Valencia. More than 1050 populations, belonging to 450 taxa, have been targeted for census and seed collection; however, both actions are still at the starting point for most PMR, so their implementation represents an important challenge for the coming years.

Source: Laguna, 2004 and http://microreserve.blogspot.com/

usually in fragmented vegetation (Saunders et al, 1991; Turner and Corlett, 1996; Heywood, 1999). In the last 10 to 15 years, a great deal of interest has been generated by the network of plant micro-reserves established in the Valencia region in Spain (see Box 11.10). Micro-reserves in Spain are small-scale protected areas, usually less than one or two hectares as in the Valencian examples, but up to 200ha in other regions. They often maintain a high concentration of endemic, rare or threatened species. Micro-reserves may be considered as an option in areas where the vegetation has been subjected to fragmentation and the species populations within these areas are similarly reduced or fragmented. Because of the small area occupied by micro-reserves and their frequent simplicity in legal and management terms, it may be possible for them to be established in great number and to complement the larger, more conventional protected areas. On the other hand, their long-term viability remains in question, especially in the light of global change.

Micro-reserves have also been established in others parts of Spain such as Castilla y León, Castilla-La Mancha, Murcia and Menorca. The model is being introduced with modifications in some other European countries. A pilot network of micro-reserves in Western Crete was set up under the European Union LIFE Nature 2004 Programme. One of the species targeted was *Phoenix theophrasti*, a wild relative of the date palm, at Preveli beach.[7]

An innovative use of micro-reserves is being developed for Lima beans (*Phaseolus lunatus*) in the Central Valley of Costa Rica. Because of their patchy and fragmented distribution, the usually small population size and other factors, two types of micro-reserve were designed (Meurrens et al, 2001; Baudoin et al, 2008), either in original sites of the existing natural populations (provided these

sites are sufficiently protected from any human disturbance) or in artificially established micro-conservation reserves for synthetic populations created from seeds of four nearby populations collected in their sites of origin.

Need for monitoring

As with CWR populations within protected areas, routine monitoring of various elements or activities at the sites of various forms of off-site conservation is necessary to see how far the site management is actually maintaining the target CWR populations. This may cover:

- evaluation of compliance with the management plan and implementation mechanisms;
- evaluation of the biological performance of the management plan;
- determining whether the management objectives remain appropriate;
- resource monitoring;
- monitoring plant and animal population counts;
- undertaking phenology studies;
- monitoring human activities such as wild-harvesting; and
- monitoring the spread of invasive species and the effectiveness of the actions to counter-control them.

Off-site conservation in the GEF/UNEP CWR Project countries

Armenia: Conservation of CWR outside protected areas[8]

According to current legislation in Armenia, plants growing in forests, pastures, hay meadows and other lands of special importance are afforded some degree of *in situ* conservation in that their use is subject to regulation. Exploitation of the plant resources on these lands must be conducted in a way that allows natural regeneration to take place.

The rare and endangered plants listed in the Red Data Book of Armenia are a special case. According to a recent study, about 70 per cent of plants in the Red Data Book are CWR. As stipulated by the Law on Flora, landowners must make provisions to ensure conservation of the rare and endangered (Red-listed) species growing on their lands. Any activity that can lead to the decline in the number of these species or deteriorate the habitats is prohibited.

The policy framework regulating conservation and use of wild plants (including CWR) outside protected areas is far from ideal in Armenia. Neither is it adequately enforced. Certain reforms took place during the last decade to improve the regulatory framework: in particular, the Law on Flora (1999), Land Codex (2002), Forest Codex (2005) and other legal acts arising from these have been adopted. These norms are, however, mainly limited to the wild plants

growing on the state-owned lands. It is up to the landowners to decide the fate of the plants growing on private lands. One possible solution to ensure conservation of plants on private lands would be adoption of incentive schemes, but this is not possible during the present stage of economic development in the country. It can be inferred, therefore, that the populations of CWR occurring on private lands are more threatened. At present, however, the conservation status of plants on these lands is relatively satisfactory in that private lands are abandoned in many rural areas of Armenia since their exploitation would require significant investment such as expensive fertilizers and equipment. The same is true for highland rural areas and villages located close to the state border. Agricultural activities are limited on these lands, as the younger generation leaves the villages for the cities. Wild plants, especially CWR (among them many weedy species), thrive on the abandoned lands.

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Notes

1. Conservation easements across the US: http://www.nature.org/aboutus/howwework/conservationmethods/privatelands/conservationeasements/about/art15087.html
2. Conservation easements at The Nature Conservancy: http://www.nature.org/aboutus/howwework/conservationmethods/privatelands/conservationeasements/about/tncandeasements.html
3. http://news.mongabay.com/2006/0117-madagascar.html
4. http://www.parquedelapapa.org/
5. www.dbu.de
6. www.schutzaecker.de
7. CRETAPLANT: A Pilot Network of Plant Micro-Reserves in Western Crete: http://cretaplant.biol.uoa.gr/docs/A5_Interim_Report.pdf (accessed 24 September 2009).
8. Contributed by Siranush Muradyan.

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