



CHAPTER 25

MANAGING RESOURCE USE AND DEVELOPMENT

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Convention on
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TITLE PAGE PHOTO

Forest produce from community conserved forest, Chittagong Hill Tracts, Bangladesh

Source: Ashish Kothari

Introduction

Resource use and development activities of various kinds are commonplace in and around protected areas. These have various impacts on conservation values, are related in diverse ways to the lives and livelihoods of local peoples and other sections of society, and are being dealt with in varying ways in protected area governance and management. This chapter provides a broad sweep of the experience with resource use and development within and adjacent to protected areas.

The first major section of the chapter deals with resource use. It is generally recognised that sustainable use of ecosystems and biological resources can play an important role in the management and conservation of protected areas. There are, however, complex issues of the scale and kind of use, and the kinds and fragility of ecosystems and wildlife populations where such use is taking place. Conventional approaches of separating people and protected areas, or in other ways restricting resource use, have begun to give way to more inclusive approaches. This chapter contributes to an understanding of how sustainable use models contain ingredients such as common values, defined roles, rights and responsibilities, conflict-resolution mechanisms, and other measures that are essential for equitable governance and effective management of protected areas. The general approach is that protected area management is as much a matter of managing human use and recognising people's links with the rest of nature as it is a matter of the intrinsic features of natural systems. A set of processes that connects resource use and development, integrated conservation and development projects (ICDPs), is also addressed.

The second major section deals with development and infrastructure projects and processes in and around protected areas. One aspect of this is projects that are carried out for the protected area itself; this is dealt with in Chapter 24. The second aspect is those carried out for other purposes, such as meeting the needs and aspirations of populations within or outside the protected area, or of people further away, including extractive and other industries, infrastructure, power generation, and so on. These can often have negative impacts on the conservation values of protected areas, and therefore need to be dealt with through appropriate legal, social and managerial responses.

Resource use in and around protected areas

Across the world, protected areas have, for the most part, been traditionally inhabited or used by humans. Resident, mobile or seasonal uses of lands, waters and wild species within such areas are both age-old and widespread. Comprehensive assessments at a global level are not available, but extrapolations based on indicative studies from various regions and countries cited below suggest that a very large proportion, if not a majority, of protected areas are likely to be inhabited and/or under resource use by people.

Available figures from a few regions or countries suggest that the number of people who currently use resources within protected areas is at least several tens of millions. A global analysis of the situation at the end of the 1990s found that around 70 per cent of the more than 30 000 (then) sites on the United Nations' list of protected areas permitted some local use of natural resources (Pretty 2002). In India, 69 per cent of about 250 protected areas surveyed in the late 1980s were inhabited, and 64 per cent had community rights, leases or concessions inside them; there are between three and four million people living within protected areas, and several million more in adjacent areas who use the resources within them (Kothari et al. 1989). The situation is unlikely to have changed significantly since then. At least five protected areas reported a population of more than 100 000 people living within them. Almost 90 per cent of the 1984 national parks declared until 1991 in South America were found to be inhabited or under resource use (Amend and Amend 1995). A substantial number of protected areas in Europe also contain human populations.

If one includes the 'new' governance types of protected areas (see Chapter 7) that are not necessarily part of the formal system, such as Indigenous Peoples' and Community Conserved Territories and Areas (ICCAs) and Private Protected Areas (PPAs), there is an even greater share of areas that are inhabited or used, and the number of people involved increases several-fold. No comprehensive figures exist, however, for these types of protected areas.

Types of resource use and their importance for local populations

Human occupation of protected areas and use of the resources in them range from permanent to seasonal settlements, from sedentary agriculture to shifting cultivation, and from resident to seasonal and nomadic



Women are particularly dependent on resource uses related to protected areas

Source: Ashish Kothari

pastoralism. Types of uses range from some timber felling to the collection of non-timber forest products (NTFPs), from fishing to harvesting myriad aquatic produce, and from occasional to frequent hunting (see Case Study 25.1 and Chapter 6). Use has been and is for domestic or localised purposes, for recreation by visitors to the area, for education, research and teaching or for commercial purposes involving local or far-flung trade. It could be based on lifestyles and occupations that are thousands of years old, as in hunter-gatherers, or very new, as in recent settlers and tourists.

Across the world, indigenous peoples or local communities used lands, water and resources long before protected areas were declared over their territories and often prior to the formation of the nation-state (see Chapters 2 and 7). An understanding and appreciation of these prior uses (many surviving into current times) are the basis for recent trends in more inclusionary conservation policies. There are, however, also many contexts in which occupation or resource use has been established subsequent to the establishment of the protected area, often out of economic compulsion (such as landless people clearing forest for cultivation), or as part of sociopolitical movements to occupy territory.

Resource uses in protected areas can be extremely important in sustaining livelihoods and in maintaining cultural connections to land and nature. Subsistence or domestic use is often supplemented with various forms of commercial use. In many marine protected areas

(MPAs), for instance, fisher communities catch aquatic produce both for self-consumption and for sale, while the sale of timber, NTFPs, fodder and other products is common in terrestrial ecosystems. Other commercial uses include tourism (see Chapter 23), and commercial recreational hunting. Apart from livelihoods, these uses can be important for the local or regional economy, for generating revenue for the protected area, and for generating support of local people. Forms of local resource use are also often a critical component of maintaining species diversity through various forms of ecological disturbance—for example, it is widely documented how pastoralists' grazing practices, including the traditional use of fire, enhance species diversity in many East African landscapes as well as other parts of the world (Western and Gichohi 1993).

The *IUCN Policy Statement on Sustainable Use of Wild Living Resources* (IUCN 2000) recognises that use is fundamental to the economies, cultures and wellbeing of people, and highlights that sustainable use is an important conservation tool because it provides people with incentives for conservation.

Resource use and IUCN categories of protected areas

Types of protected area vary widely in terms of what level of use of wild resources they allow; while Category Ia (Strict Nature Reserve) generally precludes resource extraction and use, such use at some level is probably compatible with all other categories (Dudley 2008). For example, Category Ib (Wilderness Area) is defined as including the objective of enabling indigenous people to follow traditional lifestyles, including using resources in ways compatible with conservation objectives. They are also promoted for their tourism values, particularly ecotourism. Likewise, Category II protected areas (National Park) may aim to take into account the needs of indigenous and local people in terms of sustainable resource use for subsistence purposes. Category IV (Habitat/Species Management Area) will sometimes rely on traditional patterns of resource use (for example, grazing) to maintain the desired conservation values, whereas maintaining the patterns of interaction between humans and the landscape/seascape through traditional practices is among the major aims of Category V (Protected Landscape/Seascape). Finally, sustainable use is the focus of Category VI protected areas (Protected Area with Sustainable Use of Natural Resources). Such areas now cover 32 per cent of the global area of assigned IUCN protected area categories (the single largest), and are shown to have similar levels of naturalness or human influence as Category II (National Park) areas (Bertzky et al. 2012).

Case Study 25.1 Example of resource use within protected areas in Pakistan

In Pakistan, protected areas provide goods and services to a large number of people (*Pakistan Forest Act 1927*; *Pakistan Wildlife Act 1974*; Jan 1992). Forest protected areas (initially declared for sustaining forest resources, but more recently also oriented towards wildlife conservation) are divided into state-owned and private/community-owned categories: according to Jan (1992), 66 per cent are state forest while 34 per cent are owned by the local communities or privately. Certain use rights and privileges are included in both categories. Designated protected forests (state-owned) allow some rights and concessions including grazing, grass cutting and collection of dry wood, unless these are prohibited by the Government.

Guzara (subsistence) forests (privately/communally owned) were set aside to meet the bona fide needs of local communities, especially in Malakand and Hazara areas of Pakistan. In these forests, customary rights-holders are entitled to 60–80 per cent of proceeds from timber harvesting (carried out by the Forest Department), to cut green trees (through permits) and gather NTFPs. Both customary rights-holders and other residents within an 8-kilometre radius are allowed to collect dry wood and graze animals. For most of the protected areas, buffer zones are created primarily for providing products of use or value (cash crops) to local people.

Attitudes towards resource use in protected areas

A history of exclusion: The Yellowstone model

In many parts of the world, the establishment of formal protected areas has followed the ‘Yellowstone model’, established in 1872 with the declaration of the Yellowstone National Park in the United States. This paradigm was generally protectionist and exclusionary, with the central underlying beliefs that human use is necessarily or inherently detrimental to conservation objectives, and that the state apparatus is the most effective governance approach to achieve conservation objectives (Neumann 1988; Kothari et al. 1995; Adams 2004). The approach in Yellowstone itself and many other protected areas has since evolved. Yet the exclusionary approach remains prevalent in many parts of the world, and moves to reconstitute customary rights where they were previously taken away are rare.

Government-managed protected areas have often been established without consultation with the communities living or using the resources within them. Wildlife and resource tenure are typically legally vested in the state, resulting in the deterioration of customary tenure systems and even expulsion of local residents or user communities from their ancestral areas—Native Americans from Yosemite and other national parks, the Maasai from the now-iconic reserves like Serengeti in Tanzania, the Batwa (‘Pygmies’) from Bwindi in Uganda, the Karen from reserves in Thailand, several forest-dwelling communities from tiger reserves in India, the Basarwa (‘Bushmen’) of Botswana from Central Kalahari Game Reserve (from areas they had occupied for 30 000 years), and others (Spence 1999; West et al. 2006; Dowie 2009; Lasgorceix and Kothari 2009). This only added to the dispossession and disempowerment of communities for the purposes of colonisation and industrialisation.

In some regions, however, such as Europe and parts of the Amazon Basin, existing resource use and local populations were integrated from the beginning into the vision and management of protected areas, examples of which appear later in this chapter.

Early game laws in South Africa and East Africa were largely aimed at colonial settlers whose actions were leading to the depletion of large mammals (for example, by ivory traders, trophy and sport hunters), or to clearing areas of wildlife for agricultural settlements (Anderson and Grove 1987). Initial protected areas in East Africa maintained local communities’ customary land rights and resource use (Nelson et al. 2007). During the first half of the 20th century, protected area policies shifted towards a more exclusionary stance, discouraging local communities’ residence and resource uses. Major debates took place in the period before and after independence in East Africa, for example, around the residency of pastoralists in key wildlife reserves such as Amboseli National Park in Kenya and Serengeti National Park in Tanzania (Neumann 1998). This shift towards exclusion was often driven more by externally introduced notions of the need for ‘pristine and inviolate wilderness’ rather than any empirical analysis of local communities’ positive or negative impacts on conservation (Homewood and Rodgers 1991; Neumann 1998), though, as acknowledged below, this does not mean that communities have always been in harmony with their natural surrounds.

In several countries, where local resource use privileges have been maintained within state-protected areas, it is typically more as exceptions to the general rule, in particular with reference to areas broadly under IUCN Categories I, II and IV. Again, the history of the Serengeti in Tanzania is instructive. When the Maasai communities were evicted and Serengeti National Park gazetted as an exclusionary protected area in 1959, it was based on a compromise with those

communities, excluding the Ngorongoro highlands and adjacent portion of the Serengeti Plains from the park and including them in the new multi-use Ngorongoro Conservation Area (NCA) (Homewood and Rodgers 1991). The NCA was explicitly—and, in East Africa, quite uniquely—established as a state-run conservation area with the mandate to balance wildlife conservation and local economic development. Maasai customary rights to residence and resource uses, mainly through traditional pastoralist livestock grazing, are explicitly built into the NCA charter and management system.

In South Africa, the Makuleke community was awarded approximately 20 000 hectares of land within Kruger National Park in 1998, through the post-Apartheid land-claims process and related negotiations with the national park authority (Reid 2001). This claim was, however, only recognised on the basis that conservation land use would not be permitted to change, and that the Makuleke would lease their land back as a contractual national park to South Africa National Parks. Protected area managers in many parts of Africa remain generally resistant to incorporating local use or co-management into major protected areas, particularly national parks (Steenkamp and Uhr 2000).

In the Indian subcontinent, there is a long history of conservation and protection in a wide diversity of ways, both by communities and by rulers. In more modern times, however, it is the Yellowstone model that has been uniformly adopted for the declaration of formal protected areas (Saberwal et al. 2001). Biodiversity is often concentrated in areas where poverty (in the conventional sense of the word) tends to be pervasive and where the reach of government development programs is often limited (Pandey and Wells 1997). The setting up of a protected area in such situations often results in disruption of resource use by the community. Anywhere between 100 000 and 600 000 people have been physically evicted in India, and many hundreds of thousands more have been deprived of their livelihood resources (Wani and Kothari 2007; Lasgorceix and Kothari 2009).

Latin America has a more mixed history. In Costa Rica, Chile and Argentina, protected areas were established relatively early in their history, mostly under the concept of 'national parks', where land is mostly owned by the state (though in cases like Costa Rica, the Government still owes the original landowners the payment for expropriation of a little less than half the land now included in protected areas) (Programa Estado de la Nación 2006). In Mexico, only a small percentage of land in protected areas is owned by the Federal Government, with a high percentage under community or private

property regimes, meaning the protected area system has to permanently negotiate with the landowners for their protection (Bezaury-Creel and Carbonell 2009).

Moving from an exclusionary approach

The latter part of the 20th century witnessed a re-examination of some of these approaches to biodiversity conservation. Conservation planning has often employed 'top-down' and centrally planned approaches that pay little attention to the needs or aspirations of local communities (Hunter and Heywood 2011). These 'command-and-control' strategies often perpetuated the poverty, inequality and power structures that hindered the realisation of biodiversity conservation and sustainable wellbeing goals in the first place. Local and indigenous communities in biodiversity-rich countries have been closely linked to their natural environments for millennia and have intimate knowledge of habitats and their wild plant and animal species—a relationship that has often been disrupted by conventional conservation approaches (UN 2009). For example, the territorial maritime zone in Costa Rica has excluded small-scale fishers and coastal communities from access to land and resources on which they depend (Fonseca 2009). Increasingly, it is recognised as neither politically feasible nor ethically justifiable to deny local communities the use of natural resources without providing them with alternative means of livelihood, or to manage protected areas without their empowerment and support (McNeely et al. 1990; Wells et al. 1992; WRI et al. 1992). Regulated resource use can also provide revenue flows for protected area management in some instances.

The growth of common property scholarship since the late 1980s, and recent studies, have highlighted the ability of local people to sustainably and effectively manage natural resources and ecosystems (Berkes 1989; Ostrom 1990; Hayes 2006; Porter-Bolland et al. 2011; Nelson and Chomitz 2011). By no means is this universal, and there is also evidence of unsustainability in several situations (Terborgh 2004), including extinctions caused by ancient peoples, but it is a widespread enough phenomenon to require greater attention than that paid by conventional conservation policies. A particularly important factor is the ability of communities to make and enforce the rules that govern resource use, which highlights the need to devolve clear rights to local resource users in and around protected areas (Chhatre and Agrawal 2009). These scientific findings have increasingly built legitimacy for more community-based forms of protected area governance and management, and highlighted that in many situations multiple-use protected areas or indigenous lands may actually be as or more effective as conservation instruments as strict

Category I or II protected areas, especially when there are comparable pressures (Nelson and Chomitz 2011). This is not to say that indigenous peoples and local communities are in all situations and cases conservation oriented; many are subject to external and internal influences that affect their traditional or customary ways, and there are also multiple pulls and pressures for younger generations to adopt unsustainable lifestyles. All other factors remaining equal, though, it appears that participatory, rights-based approaches need to be increasingly adapted for effective conservation.

Due to these multifaceted dynamics, strict exclusion of resource use, where necessary and beneficial in situations of such use being inherently detrimental to local species or ecosystems (such situations are dealt with later in this chapter), can also at times have perverse and detrimental impacts. These include: alienating local communities from conservation efforts, removing any incentive to cooperate with protected area managers and regulation; losing the conservation and management benefits of traditional knowledge and resource management practices; worsening illegal use; shifting resource use to other areas, with intensified impacts; increasing illegal use by ‘outsiders’ through removing the rights and presence of traditional custodians; upsetting complex food webs with unintended consequences on target conservation species; and removing options for much-needed sustainable financing of protected areas. Removal of domestic sheep from the proposed Patagonia National Park is one factor that inadvertently could lead to a decline of the species this move is meant to protect, the Huemul deer (*Hippocamelus bisulcus*) (Wittmer et al. 2013); a ban on buffalo grazing in India’s iconic Keolodeo (Bharatpur) National Park is believed to have led to habitat changes detrimental to the conservation of the endangered Siberian crane (Vijayan 1991); and the ban on forest fires in a tiger reserve in southern India is documented to have led to negative ecological impacts that indigenous people could have foreseen (see Case Study 8.1 on fire and the Soliga tribe).

Changing paradigms: Greater inclusion and new models for protected area management

Increasingly, the mission of government-protected areas has expanded from biodiversity conservation to incorporating considerations of improving human welfare. The result is a shift in favour of protected areas allowing local sustainable resource use (Naughton-Treves et al. 2005), or recreational, research, education or commercial forms of resource use that benefit local people and communities. Although protected areas are designated or meant primarily for biodiversity

conservation, increasingly, they are also seen as drivers and providers of social and economic benefits (Brandon et al. 1998).

Community participation is now typically regarded as fundamental to the attainment of the economic, political, social and environmental objectives that underpin conservation, while exclusionary conservation is questioned on social, institutional and sustainability grounds (Saberwal et al. 2001). There is increasing recognition of the rights and claims of indigenous peoples and local communities to their traditionally held lands and resources, and recognition of the negative impacts the establishment of protected areas has often had on these (West et al. 2006). Global surveys and comparative case study analyses have highlighted that conservation professionals and managers now regard participation as one of the most important success factors for management (Stoll-Kleemann and Welp 2008), although participation does not necessarily always translate into economic benefits for local people (Galvin and Haller 2008).

Others refer to this shift as the move away from the ‘preservation approach’—trying to isolate and maintain biodiversity in protected areas by excluding indigenous and local communities—towards a more biocultural (the inextricable links between nature and culture) approach, allowing human activity as part of the process and thereby rendering a much more successful conservation strategy (Hunter and Heywood 2011) (see also Chapters 4 and 23). Maintaining or enabling various forms of resource use in protected areas will often form part of these approaches. For example, the Niassa National Reserve in northern Mozambique is the largest (42 000 square kilometres) in the country’s wildlife protected area system, with about 80 per cent of the elephants in Mozambique, and it incorporates customary local use, residence and coexistence, having a resident population of around 35 000 people (Wikipedia 2014; Niassa Carnivore Project 2013).

Community-based natural resource management (CBNRM), one of the more common inclusive models to emerge, represents a shift from a centralised to more devolved approaches. CBNRM is basically a catch-all term denoting a wide range of practices whereby local collective institutions or groups of people, organised formally or informally, manage and utilise their lands, resources and common property. This may or may not involve a protected area. A recent review of the impact of CBNRM approaches in Africa has highlighted some notable ecological, economic and institutional achievements (Roe et al. 2009). As many reviews during the past two decades have noted, however, CBNRM is ultimately contingent on the devolution of authority

and tenure over land and resources to the local level, often hindered by political-economic barriers (Gibson 1999; Nelson 2010; de Beer 2013).

Integrated conservation and development project (ICDP) is a subset of these more inclusive approaches, linking biodiversity conservation, often in or around protected areas, with local social and economic development (Wells et al. 1999). ICDPs usually target both the protected area (by strengthening management) and local communities (by providing incentives, such as rural development opportunities, to reduce the pressure of activities damaging to natural habitats and resources). ICDPs often started as small NGO-led initiatives but really took off when international donors embraced the concept of linking conservation to poverty alleviation. Today many protected areas are engaged in ICDP models that range in size and scope from site-based efforts to major programs that attempt to integrate conservation with regional development (for example, see Cadman et al. 2010). They offer an almost irresistible cocktail of perceived benefits—biodiversity conservation, increased local community participation, more equitable sharing of benefits and economic development for the rural poor. Some have achieved remarkable and inspiring successes, but many ICDPs have failed to meet either their conservation or their development objectives (Brandon et al. 1998; Hackel 1999; Oates 1999; Wells et al. 1999; McShane and Wells 2004; Alers et al. 2007).

This mixed experience with ICDPs is illustrated in the case of India. At some sites, ecodevelopment committees have empowered villagers with information and avenues of participation, created youth and women's groups, enabled villagers to access additional livelihood opportunities and development resources through local government (*panchayat*) schemes, freed tribal communities and other poor villagers from moneylenders, and greatly increased cooperation between communities and forestry officers. At Periyar Tiger Reserve, cinnamon bark collectors were encouraged to abandon their poaching activities and instead use their forest knowledge to guide tourists. Although their income from tourism was less than from illicit activity, they were no longer in conflict with the Forest Department or in debt to moneylenders to cover fines, and their social standing within the community was enhanced (Periyar Tiger Reserve 2012). At many other sites, however, these gains have not materialised; nationally, the ongoing ecodevelopment scheme has been characterised by serious conceptual weaknesses, inadequate or no monitoring of impacts, no independent assessments, and no sharing of decision-making power with local communities (Das 2007; Shahabuddin 2010; see also Case Study 25.2). At Periyar itself, an independent study suggests that benefits to local communities may be less than officially claimed (Gubbi et al. 2008).

Major weaknesses common to many ICDP interventions are unrealistic and often conflicting objectives, failure to correctly identify the source of threats and target interventions accordingly, poor monitoring so that it is difficult to effectively link improved conservation to project activities, and lack of long-term support to continue to build capacity and sustain gains beyond the project's lifetime (Alers et al. 2007). Others include failure to identify and promote indigenous/local traditions, knowledge, practices and world views that aid conservation, since much of the time local people are seen as 'pressures' on the ecosystem and wildlife, and failure to meaningfully share decision-making power.

Promoting new livelihood opportunities is just one way to benefit local communities; other strategies may be more effective in encouraging long-term support for changing behaviours, including employment opportunities through tourism ventures (see Chapter 23) or in the protected area itself providing labour or clearance of invasive alien species. Elsewhere protected areas have attempted to address the issues of equity and sustainability through microfinance or long-term financing mechanisms to provide resources for development activities—for example, in a number of protected areas in Peru (PROFONANPE 2012).

It is critical to monitor all ICDP activities against the objectives of reducing threats and conserving biodiversity. In some places there will be a clear link between improved protection and conservation—for example, increasing fish stocks in marine protected areas or development activities and habitat protection. Elsewhere the linkages may be less clear. When monitoring focuses more on numbers of beneficiaries than on biodiversity outcomes and reduction of threats, it is increasingly difficult to understand when, and where, interventions are effective for conservation. Unless the linkages between project activities and conservation goals are clear to, and endorsed by, local stakeholders, offering new livelihood opportunities is unlikely to lead to conservation benefits. Participatory monitoring by community members can be a useful supplement to monitoring by government protected area staff and research institutes (Margoulis and Salafsky 2001; Danielsen et al. 2005).

Sustainable resource use is often a key objective and pillar of protected areas and other conservation sites governed by non-governmental actors, including ICCAs and PPAs (see Chapter 7). It is the basis, for instance, of thousands of community forests in South Asia, hundreds of locally managed marine areas in the South Pacific, South-East Asia and some African countries, vast territories of mobile peoples in Central Asia and the Horn of Africa, and many other ICCAs (Borrini-Feyerabend et al. 2010; Bassi and Tache 2011; Kothari et al. 2012; Naqizadeh

Case Study 25.2 Ecodevelopment in Great Himalayan National Park, India

In the 1990s, ICDP approaches were introduced at various locations in India, including the Great Himalayan National Park (GHNP). The program here started with a World Bank-aided Forestry Research Education and Extension Project (FREEP) in 1994, which had an additional sub-project, Conservation of Biodiversity (CoB) (Pandey and Wells 1997). On project completion, the park managers initiated livelihood-based programs in the buffer area aimed at setting up alternative community-based systems of natural resource management and resolving human-animal conflicts through a participatory mode of management (Tandon 2002; Pandey 2008).

Women belonging to the poorest households, most dependent on the park's resources, have been organised through capacity-building programs into Women's Savings and Credit Groups (WSCGs) in the buffer zone. Nearly 1000 women in 95 WSCGs have been provided with alternative income-generating activities: vermicomposting, apricot-oil production, hemp products, ecotourism, street theatre and wage labour. Mechanisms are being developed so that the WSCGs strengthen the village council (*panchayat*) and become sustainable.

The ecodevelopment approach in the GHNP has also received criticism from researchers and activists. There was no democratic process to determine whether a national park, which by law requires removal of all human uses, was the appropriate conservation category to apply here; no consideration of an integrated conservation and livelihoods approach; and inadequacy of compensation

compared with the loss of livelihoods from stoppage of activities like herb collection (Baviskar 2003; Chhatre and Saberwal 2006). Also, while people's traditional uses have been stopped, the park has been subjected to highly damaging hydro-electricity development. The process at GHNP thus mirrors the contradictions of the conventional protected area approach prevalent in India (Saberwal et al. 2001).



Village in the buffer zone of Great Himalayan National Park, India

Source: Sanjeeva Pandey

et al. 2012; see also Chapters 7, 20 and 21). It is also a key motivation for PPAs such as those conserving large mammals (and associated wildlife) in several African countries (see elsewhere in this chapter).

Recognising the role of sustainable use in conservation

There is increasing recognition that sustainable resource use may often be quite compatible with and contribute to conservation objectives. Traditional human uses have been in some cases part of shaping the landscape or seascape in ways that conservationists consider important, or they may provide incentives for protection and conservation efforts, or generate much-needed revenue to finance protected areas. In some cases, harvesting can actually increase density of the resource—for example, in the Western Australian desert, sand monitor lizards are most abundant where hunting is most intense due to the patch-burning techniques used by Aboriginal hunters (Bird et al. 2013), though it is not clear what the overall biodiversity impacts are.

In Guatemala, the sustainable harvest and trade of small palms (for floristic use in developed countries) have allowed local communities to generate

important income while providing incentives for them to maintain the resource, thus conserving the forest. In the Maya Biosphere Reserve, Guatemala's most important protected landscape, sustainable use concessions underpin an array of private and community-based management practices, leading to more effective conservation (Radachowsky et al. 2012). At Ostional National Wildlife Reserve, Costa Rica, tens of thousands of leatherback turtles arrive almost simultaneously to nest each year. Local communities are allowed to harvest a percentage of the 'early' laid eggs, many of which would have been destroyed by later arrivals. This approach has built enormous local community support for conservation and virtually eliminated the illegal poaching of eggs locally, while the turtle population continues to rise (Campbell et al. 2007). In Brazil, the traditional harvesting of brazil nuts from the Amazon forests for economic returns has resulted in strong protection of these forests by the harvesters against loggers and ranchers (Amazon Conservation Association 2013).

In Central Europe, the Morava River floodplains are semi-natural ecosystems that are now fully dependent on human management. A large area of the floodplains (almost 5000 hectares) in Slovakia has been included

in the Landscape Protected Area of Záhorie. The most suitable form of management to maintain biodiversity values is hay production. This prevents meadows being overgrown by vegetation and spreading invasive species, and keeps suitable biotopes for endangered flora (for example, orchids) and fauna (for example, butterflies). Monitoring has confirmed that biodiversity is significantly higher on meadows regularly managed than on those that are not (Rybanič et al. 1999). Maintaining this use therefore benefits both biodiversity conservation and local socioeconomic development. Another example highlighting the compatibility of conservation and resource use is Lonjsko Polje Nature Park, located on the Sava River floodplains in Croatia. This park is a unique example of an organically evolved landscape maintaining traditional land uses, with a preserved medieval system of pasturing on commons land that was typical for the whole of Central Europe until the second half of the 19th century (Gugić 2009). This traditional animal husbandry system is run with indigenous breeds of horse, pig, cattle and goose.

In Ireland, the unique local geology and climate of the Burren (a karst landscape in north-west County Clare, much of which is designated as a special area for conservation) has not only given rise to unique landscapes, but also contributed to the development of a distinct form of transhumance referred to as 'winterage'—a traditional grazing practice that has moulded its cultural and natural heritage (Parr et al. 2010). Over the past 40 years, socioeconomic factors have contributed to significant changes in agriculture with detrimental impacts on biodiversity. This trend has recently been reversed through the concept of 'farming for conservation', which has revitalised interest in farming on winterages, playing a pivotal role in restoring the landscape and its biodiversity. BurrenLIFE is the first major 'farming for conservation' project in Ireland as well as marking the first working partnership between the National Parks and Wildlife Service, the Agriculture and Food Development Authority and the Burren branch of the Irish Farmers' Association (BurrenLIFE 2014).

In eastern and southern Africa, protected areas (with their globally exceptional wildlife populations and viewing conditions) not only serve conservation purposes, but also generate revenues and jobs through tourism. These revenues in turn fund conservation efforts and create incentives locally and nationally for investments in wildlife management (Spenceley 2008; Child 2004).



Mobile peoples on migration through their ICCA, Iran

Source: CENESTA

The satoyama and satoumi landscapes and seascapes of Japan, known for highly productive resource use, are increasingly being recognised as examples of sustainable use contributing to conservation (Bélair et al. 2010; UNU-IAS OUIK 2011).

General principles and approaches for resource use in protected areas

Rights to use and governance

Who holds rights to access and extract resources from a protected area (terrestrial or marine) and who has the right to be involved in management are important and sometimes controversial issues (see Chapter 7). Rights may arise out of indigenous, customary or traditional tenure and practices, or may be developed through policy and legislation. They may be communally or individually held, and may be permanently assigned or transferable by purchase. Management rights specify who is to be involved in protected area management decision-making; they may be held by governments, by indigenous peoples and local communities, or by some combination of the two (co-management). Use rights specify who may have access to a protected area or a resource (access rights) and how much activity (for example, the number of harvesters or fishing days) or extraction (for example, the volume of fuel wood or tonnes of catch) is allowed (withdrawal rights) (Charles and Wilson 2009). Appropriate and equitable recognition of these resource use rights are increasingly viewed as critical in achieving effective sustainable resource use management (Charles and Wilson 2009; Charles 2011).

An ongoing process of restitution or recognition of rights is that of India's *Scheduled Tribes and Other Traditional Forest Dwellers' (Recognition of Forest Rights) Act 2006*. Under this law, individual and community rights to forest lands and resources that have traditionally existed but have not been recognised since colonial times can be recognised and recorded. Included in this are the right and powers to govern forests. Since 2008 when the law came into force, these have been recognised over more than 6000 square kilometres of forest land (including a couple of government protected areas), and in several instances communities are making plans for how best to conserve and sustainably use them, as well as exclude what they consider to be destructive 'developmental' and logging activities (Vasundhara and Kalpavriksh 2012; Desor 2013).

Traditional and indigenous knowledge

Effective resource management needs to be based on good information, which may be either embedded in indigenous and traditional science or knowledge systems and cultural practices where they are still prevalent or derived by Western scientific methods, and ideally a combination of these (Posey 1999; Failing et al. 2007; Tebtebba Foundation 2008; Parrotta and Trosper 2012). Indigenous/traditional and local knowledge can be of central importance in, for example, mapping habitat and resource use areas, establishing workable and socially acceptable resource use zones, strategies focused on landscape restoration, increasing resilience of ecosystems and better adapting to climate change (see Case Study 25.3). This is particularly important in marine protected areas, for example, where local resource users tend to have deep knowledge of resource distribution, abundance and environmental conditions, in a context where resources are mobile and monitoring is difficult (Drew 2005). In Eastport, on Newfoundland island in Canada, the knowledge of local community fishers of potential juvenile lobster-rearing habitat formed the basis of decision-making about where to close areas to lobster fishing, to enhance egg production and increase recruitment (Charles and Wilson 2009). Such an approach is typical of many ICCAs, and provides lessons for government-managed and private or formal protected areas (see Chapter 7).

Sustainable and equitable use

Managing use to achieve sustainability and equity is a critical priority for maintaining biodiversity values. The IUCN *Policy Statement on Sustainable Use of Wild Living*

Resources (IUCN 2000) recognises that sustainable use is an important conservation tool because it provides people with incentives for conservation in the form of social, cultural and economic benefits. This is most relevant to protected areas. It also highlights the importance of adaptive management, the biological limitations of species and ecosystems, governance structures, whether users have a formal or informal stake in the resources they are using and the removal of perverse incentives. The importance of clear and secure tenure over land and resources as a basis for motivating local users to achieve sustainable use has also been clearly demonstrated through an IUCN-led process of regional analyses and global case studies (Oglethorpe 1999).

Under the Convention on Biological Diversity (CBD), principles for achieving sustainable use (one of the convention's three main objectives) have been elaborated in the Addis Ababa Principles and Guidelines (CBD 2004). These principles and associated documents provide an important framework for managing the use of resources in protected areas.

As with sustainability, socioeconomic equity is a crucial component of resource use. For instance, incorporating gender aspects into thinking, strategy and management of all forms of protected areas is critical, else women's access to and use of resources risks marginalisation (FAO 2012; Harper et al. 2013). Within fisheries, the importance of women in particular in the pre and post-harvest sectors should be recognised. Women in fishing communities often lack access to fish, and may be denied a role in decision-making due to existing cultural norms, as well as facing broader problems of lack of credit and transport services and undervaluation of their work. Similarly, inequities in access to resources, such as those between different ethnic groups, classes, castes and other social divisions, could seriously hamper the sustainable use of resources, and need to be dealt with sensitively.

Management of resource use in protected areas: Approaches and examples

Management of resource use in protected areas needs to be highly context-sensitive and responsive to the form of use involved, the characteristics of the resource and the socioeconomic context. In this section, some of the main types of use are discussed, drawing on examples from a wide variety of regions.

Case Study 25.3 Protecting the Sangha-Sangha ancestral fishing grounds, Central African Republic

The Sangha-Sangha is a fishing community in the buffer zone of the Dzanga-Ndoki National Park, Central African Republic. Due to its outstanding biodiversity values, the area was inscribed as the Trinational de la Sangha World Heritage site jointly with bordering parks in Cameroon and Congo in 2012. Together with the Baka hunter-gatherers, the Sangha-Sangha are the first inhabitants of this region. Over time, they have developed an intimate, synergistic relationship with their territory, which has defined their values, shaped their social organisation, and generated sophisticated environmental knowledge and management systems. An example of this is an interconnected system of channels and flood zones the Sangha-Sangha ancestors created along the River Sangha, which allows fish to retreat and breed.

Since the incursion of logging companies in the 1980s and 1990s, new settlers have practised unsustainable fishing techniques including poison. In response, in 2008

the Sangha-Sangha created the Association pour le Développement Sangha-Sangha (ADSS), with the aim of reinstalling local governance and customary practices. In 2012, ADSS initiated a dialogue with the national park management and other local authorities, and received a municipal decree that prohibited the use of toxic substances of industrial origin and non-conventional equipment for fishing, assigned exclusive fishing rights to specific families or clans recognised by the traditional authorities and declared that non-compliance with these provisions could result in criminal proceedings. Trespassing into the ancestral Sangha-Sangha territories and unsustainable fishing methods have been rendered criminal offences. ADSS has since undertaken activities to promote sustainable resource use, and encourage the transmission of ecological knowledge and cultural techniques, especially among youth.

— Ernesto Noriega and Tatjana Puschkarsky



Sangha-Sangha community members at a wetland

Source: José Martial Betoulet

Harvesting wild plant products (local use and trade)

Protected forests, wetlands, grasslands and marine environments are the source of a wide range of non-timber forest products (NTFPs), defined as all biological material other than industrial round wood and resulting products that are harvested from within and on the edges of natural, manipulated or disturbed forests (Chamberlain et al. 2004). While the term can include both plant and animal products, this section focuses primarily on plant products,

with animal products discussed in the following section. NTFPs are of major economic and livelihood value. For example, Schippmann et al. (2006) estimate that up to 70 000 species of higher plants (about 20 per cent of the estimated global flora) are used as medicine worldwide, of which around 3000 are traded internationally. Further, it has been estimated that for 80 per cent of the world's population, plants are the major available form of medicine (Kamboj 2000; Parrotta and Trosper 2012). In India alone, about 275 million people depend on NTFPs,

using more than 10 000 species of plants and animals for food, fuel, fodder, medicine, housing, implements, and cultural uses (TPCG and Kalpavriksh 2005). The global value of NTFPs in 2005 totalled US\$16.839 billion (FAO 2010). This includes extensive and widespread use in and around protected areas.

NTFP harvesters are increasingly becoming involved in commercial ventures driven by national and global market demand, with traditional management structures breaking down, threatening the sustainability of the resource base. For example, the alternative health industry in Europe, North America, Australia and New Zealand uses a wide variety of herbal medicines, and has adopted many of the practices of Ayurvedic, Buddhist and Chinese traditional medicines so that the industry has become a fast-growing multibillion-dollar industry. Harvesting wild medicinal plants has thus become an organised commercial venture in many places, where agents employ local people to do the harvesting (Battharai et al. 2003). This is also a concern with other wildlife products, such as ivory, with a significant recent rise in poaching to meet the demand from newly enriched consumers in Asia (CITES 2013).

Plant biodiversity hotspots typically occur in low Human Development Index (HDI) countries, in the tropics, where the pressure to increase economic and human development can be high. In many protected areas, managers are given the responsibility to determine if long-term plant harvesting, grazing or other such uses have beneficial, detrimental or neutral implications for achieving management objectives; in others, it is a responsibility taken by the user communities or civil society organisations. In some, there are well-established and scientifically rigorous systems for measuring, monitoring, evaluation and reporting on activities (see Chapter 28). It is also necessary to determine at what level the activity is sustainable and to establish limits, which is best done by or with the participation of local user communities. For example, harvesting grass from a wetland area may be beneficial to bird habitat, but increasing or decreasing the harvest or changing the way in which it is carried out may make the activity detrimental. Where possible, ongoing monitoring of environmental and social conditions to assess the impact of such activities is desirable. A number of co-managed protected areas and ICCAs across the world are employing monitoring methods, ranging from traditional indicators and baselines often based on centuries of observation, to modern, often more quantified ones (Case Study 25.4).

Measures to avoid overharvesting are being incorporated into new tools for evaluating the sustainability of the collection of medicinal and other wild-harvested plants,

such as the FairWild Standard, and others to assess both the ecological and the social aspects (FairWild 2009; Kathe et al. 2010; Kathe 2011; Unnikrishnan and Suneetha 2012). Species management plans are also a mechanism to monitor and prevent overharvesting (Case Studies 25.4 and 25.5). International policy efforts around the sustainable use of plant resources include the *Guidelines on the Conservation of Medicinal Plants* (currently under revision) of the World Health Organisation (WHO) and others, and the Global Strategy for Plant Conservation under the CBD (Unnikrishnan and Suneetha 2012). Negotiating with communities to stop practices that are damaging the protected area may be needed in the case of government-managed protected areas. In the case of ICCAs, such negotiations are usually carried out internally by community members and could involve dealing with both internal and external pressures (Case Study 25.3). Novel approaches to safeguarding and conserving medicinal plants include the establishment of medicinal plant conservation areas (MPCAs) and medicinal plant conservation parks (MPCPs) in India (Unnikrishnan and Suneetha 2012). Until 2012, 112 MPCAs had been established across 13 Indian States. Other strategies include limiting resource extraction to certain areas, allowing only specific people to collect the resource, establishing quotas based on a sustainable yield and doing plantations of coveted species outside the protected area.

Hunting and fishing

A number of forms of hunting and fishing take place in some protected areas, legally and illegally, both for subsistence and for commercial purposes. Wild game has long been important for rural communities, and many protected areas permit limited subsistence hunting and fishing. Bushmeat is a term commonly used to describe meat gained from hunting wild animals, mostly in forest environments in countries where domestic livestock is not common. It is now an important subsistence and commercial activity in Africa and to a lesser extent in South America and Asia. It meets the majority of human needs for protein and fat in some areas, such as the Congo Basin. With little requirement for a capital outlay to engage in it, young men in poor communities can participate easily, and decentralised trade means a large proportion of the value of the goods goes to the primary producer (the hunter) (Nasi et al. 2008, 2011; van Vliet et al. 2012; Schulte-Herbrüggen et al. 2013).

In Africa, 42 mammalian species of global conservation concern are involved in the bushmeat trade, including chimpanzees, elephants and gorillas (CITES 2000;

Case Study 25.4 Dealing with overharvesting through negotiation and community action in Uganda and India

Kibale National Park in Uganda (IUCN category not set) illustrates the success of a negotiation approach. The park is surrounded by 27 parishes in which approximately 120 000 people live. The boundary communities extract more than 20 products from the park to meet some of their subsistence, commercial, cultural and medicinal needs. While prohibition was the first management strategy attempted, it was found that law enforcement was becoming very time-consuming and expensive for park managers. It was found that most illegal activity was coming from the boundary communities. With the aid of the Kibale Semuliki Conservation and Development Project, collaborative resource management agreements were negotiated with local boundary communities, setting agreed limits on who could harvest in the park and what products could be taken. It took two years to identify, negotiate and sign the first agreements, then six months on average for the following agreements. The success of the collaborative agreements was greater where assistance was given to develop alternatives to harvesting park resources. Community/park relations improved, a

significant drop in illegal activity was noted and community members became involved in reporting illegal activity (Chhetri et al. 2003).

Mendha-Lekha village in India, with a community-conserved forest of nearly 2000 hectares, has led a number of assertive movements to regain community forest rights and stop a paper mill from depleting the local bamboo habitat. After obtaining legal title under the Forest Rights Act 2006, it has reinforced its customary rules and regulations, and updated them to include sustainable harvesting of bamboo (which previously the state Forest Department had control over). Now the village is earning substantial revenue from this and the money is deposited in the account of the village, and is being used to generate livelihoods for the village through activities related to forest development, designating wildlife habitats and other activities. The village is now able to provide fair wages and timely loans not only to the residents but also to other villagers who would like to work in the village (as long as they follow local rules) (Pathak Broome and Dash 2012).

Case Study 25.5 Species management plan for *Cinnamomum capparucoronae*

Cinnamomum capparucoronae is a highly threatened endemic medicinal species in Sri Lanka. The Kanneliya-Dediyagala-Nakiyadeniya (KDN) Biosphere Reserve in southern Sri Lanka hosts substantial populations, known locally as '*Kapuru Kurundu*'. There are 78 villages surrounding the reserve; 50 per cent of the households live below the poverty line and depend on the forest for timber and NTFPs. *Cinnamomum capparucoronae* is locally used to cure bronchitis, rheumatism, snakebites, fractures and tooth ache, among many other ailments. Eugenol is an important chemical ingredient extracted from the plant.

In an attempt to prevent overharvesting of this important endemic species, the KDN forest reserve was selected to develop and implement a species management plan. The objective is to maintain the population of *Kapuru Kurundu* through monitoring the density changes from 2009 to

2019 in two macro-plots within KDN reserve. The plan is implemented by the Forest Department with the assistance of local communities and researchers from the University of Ruhuna and other agencies. The broader economic and cultural needs of communities living on the periphery of the reserve have also been taken into account by the Forest Department in the Reserve Management Plan, to which the species management plan is linked.

Sources: Sathurusinghe et al. (2010); Hunter and Heywood (2011)

Redmond et al. 2006). Weak governance structures at the local level and poor industrial practices make regulation and management of the trade difficult.

Market forces can create value for wildlife and provide incentives for private or community conservation, and also drive overexploitation of populations. In Cuc Phuong National Park, Vietnam, illegal hunting has reduced populations of large mammals and conflicts with local human populations hamper effective management (Compton and Le 1998; McNeely

1998). Many aquatic protected areas face problems of overfishing caused by incursion from neighbouring communities or by the illegal presence of larger-scale operations. On the Great Barrier Reef in Australia, large-scale prawn trawling, both licensed and illegal, has halved populations of some species; for every tonne of prawns caught, 6–10 tonnes of other marine life was killed. The Australian Government's research body, the Commonwealth Scientific and Industrial Research

Organisation (CSIRO), identified 50 illegal operators in the 362 400 square kilometre area (Australian Committee for IUCN 1999; Zinn and Vidal 1999).

Where such activities have been prohibited or curtailed, sometimes compensation has been offered for the loss of revenue (particularly if the use was legal). This is the case with medicinal plant harvesting in the Indian Himalaya (see Case Study 25.2). This is also often done in the case of ICCAs, where a collective decision to stop some resource-use activity, or change land use, is compensated through new livelihood opportunities like community-based tourism or provision of land elsewhere. In the community-protected wetland of Mangalajodi, in India, a community decision inspired by a civil society organisation to stop hunting of waterfowl was followed up by an ecotourism venture that has employed some of the erstwhile hunters (Kothari 2010). In such instances, however, the compensatory measures may not match the scale of the loss.

Where well managed, hunting can be sustainable and contribute to protected area management and conservation (Case Study 25.6), and it is increasingly recognised that confronting the bushmeat problem, as in Africa, requires establishing legally regulated sustainable use of wild meat resources (Nasi et al. 2008). In some cases, this has been achieved through agreements with local communities and/or by making wildlife management the responsibility of the local communities. In many of the relatively new ICCAs, a mix of traditional and new restrictions may be adopted (see Chapter 7). In the State of Nagaland in India, for instance, several dozen villages have declared seasonal prohibitions on hunting, and/or designated forest areas where hunting is totally prohibited (Kothari and Pathak 2005). Private protected areas may involve sustainable hunting to raise revenue—for example, the commercially operated Campbell Private Game Reserve in South Africa provides hunting experiences resembling those of the Bushmen of the Kalahari, within sustainable limits (Campbell Private Game Reserve 2004, cited in Lockwood et al. 2006).

Tourist or 'trophy' hunting with substantial fees occurs in many forms of protected area across sub-Saharan Africa, southern Africa and Tanzania in particular. The bulk of these trophy-hunting activities take place on private lands and some communal lands, with some carried out in state-managed protected areas. In Tanzania, about half of all hunting concessions are located in state protected areas called game reserves, where no people reside, as well as game controlled areas (GCAs), where human residence and use have recently been prohibited under the *Wildlife Conservation Act 2009*. This provision of the 2009 Act is extremely problematic, as GCAs were, prior to 2009, not

exclusive protected areas, and nationwide are home to between 500 000 and one million people. In 2013 there was a major conflict over the Loliondo GCA, following a government proposal that 1500 square kilometres of former community lands would become an exclusive GCA or 'wildlife corridor' (Ngoitiko and Nelson 2013). Such struggles over wildlife conservation, commercial uses such as hunting, and local land and resource rights have been debated in Tanzania for 50 years. Hunting in game reserves is based on division of these protected areas into 'blocks' or concession areas, and an annual quota for each block is granted by the Ministry of Natural Resources and Tourism. Hunting provides an important economic justification for retaining this land as wildlife habitat, although considerable weaknesses with respect to hunting governance and regulation, including corruption, are evident (Leader-Williams et al. 2009; Nelson et al. 2013).

In Namibia, under the communal conservancy model, communities generate revenue through photographic and hunting tourism, sales of live game and 'game cropping' for meat and skins. This approach has dramatically increased the social and economic value of wildlife for people, changing attitudes and leading to large-scale changes in land use from degraded pastoral land to wildlife conservation, with rebounding populations of species such as elephant and black and white rhino (Naidoo et al. 2011; Nelson et al. 2013).

Trophy hunting of big game in Pakistan has emerged as a conservation approach that helps enhance local livelihoods (Frisina 2000; Frisina and Tareen 2009). Markhor, urial and ibex are a few major wildlife species found in different parts of Pakistan that have an international market for trophy hunting. Populations of these and other species have, however, been on the decline since colonial times, due to large-scale hunting and habitat loss. The idea of organised, legal trophy hunting as a means of reversing this decline was first developed by the Agha Khan Rural Support Programme, WWF-Pakistan and the Society for Torghar Conservation Protection. Markhor hunting started in 1997 when the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) approved a quota. Regulated by national and provincial wildlife departments under law, 80 per cent of the proceeds from trophy hunting are returned to the local communities. Community elders through a traditional *jirga* (meeting of elders) impose a ban on any commercial activity or illegal hunting in their areas, and set rules for equitable distribution of the proceeds. With substantial income for collective benefits, local attitudes have become increasingly positive about conservation. There were

Case Study 25.6 Management of hunting in state-owned protected areas, northern Finland

In northern Finland, including regions of Lapland, Kainuu and parts of Northern Ostrobothnia, hunting is allowed for local residents in most national parks and other protected nature reserves if it does not threaten conservation or recreational objectives. In northern Finland, there are about 50 000 people with such rights. Hunting is also allowed for non-residents, with a licence, in most of the other protected nature reserves. Hunting is banned in strict nature reserves.

The regulations for hunting are described in the decree or law of each nature reserve. Restrictions can be temporal or territorial, and species-specific. Management plans are prepared with the participation of local stakeholders. All game species have national or regional hunting seasons outside the breeding or vulnerable periods. If a population becomes threatened, the hunting season is restricted through a decree by the Ministry of Agriculture and Forestry.

The main stakeholders with traditional use rights include reindeer herders represented by herding associations and their national federation (their area in northernmost Finland covers one-third of the country), and Sámi people who

have their traditional homeland areas here. More than 90 per cent of this area is state owned and administered by Metsähallitus, the Finnish national protected area agency. The Sámi people have long traditions in reindeer herding and trapping of willow grouse (*Lagopus lagopus*). Game management associations represent the interests of resident hunters.

The results of wildlife censuses demonstrate natural fluctuations and long-term stability in the game populations in northern Finland. Based on this, the game management system can be considered ecologically sustainable. The bigger challenges relate to social sustainability, affecting the volunteer work on which depend the wildlife triangle censuses and control measures of invasive predators, the raccoon dog (*Nyctereutes procyonoides*) and American mink (*Neovison vison*).

— Mikko Rautiainen

an estimated 200 urials (*Ovis arientalis*) and less than 100 markhors (*Capra falconeri*) in the Torghar area of Balochistan when the *jirga* resolved to try this approach; by 2005, the markhor population increased to 2540 and that of the urial to 3145 (Arshad and Khalid 2008).

In the United States, management of hunting—regardless of categorisation as sport, recreational, trophy or subsistence—is generally the domain of the individual States, all of which have publicly funded agencies tasked with this responsibility (Bolen and Robinson 2003; United States Fish & Wildlife Service 2014). Federally recognised Native American tribes manage hunting separately from the State governments, and most have their own management agencies.

Agriculture

Both subsistence and market-oriented agriculture are widely practised in certain types of protected areas, especially (but not only) IUCN Category V (Amend et al. 2008). Crop–livestock systems are frequently supplemented by resources from natural ecosystems. Nearby forests and wetlands are used for a number of purposes including collection of leaf litter, pest control products, medicines, food, fodder and fuel.

Shifting cultivation, or swidden, is widely practised as a form of subsistence farming across the world, particularly in parts of Asia, Africa, the Pacific Islands and Central and South America (Heywood 1999; Cairns 2014). Typically under low population densities, and when practised by traditional swiddeners, shifting cultivation

has minimal long-term impact on a tropical forest. Such a system is generally viewed as sustainable where the period the land lies fallow is between seven and 20 years (Shriar 1999). Several factors, including entry of market forces and increase in local populations, have in many places reduced the sustainability of swidden.

In some government protected areas, zoning defines areas where agriculture is permitted. In the National Park of American Samoa, the US National Park Service (NPS) has leased the land and marine environment in the park for 50 years from several villages, who wanted to protect the forest. The NPS manages the land and reefs within the park but the villagers reserve the right to traditional use, including subsistence agriculture, while clearing and cultivation are prohibited in primary and mature secondary forest (Graves 2004; NPS 2014). In Spain, at the La Garrotxa Volcanic Zone Natural Park in Catalonia, the park authorities actually encourage the revival of traditional horticultural practices as these are linked to the conservation of many elements of nature (Bassols Isamat et al. 2011).

Several ICCAs provide exemplary instances of such interactions—shaped as they are by the dynamic interaction of people and nature over time, and rich in agricultural biodiversity as well as wildlife and cultural and spiritual values. They can be seen as biocultural systems whose resilience is dependent on community practices. Many also contain important genetic reservoirs of the wild relatives of domesticated crops and livestock (Brown and Kothari 2011; van Oudenhoven et

al. 2011). In Oaxaca, Mexico, 126 sites of community conservation spread over 375 500 hectares incorporate agroforestry and agroecology systems, such as *milpas* and shade coffee plantations, making these areas important reservoirs of wildlife and agro-biodiversity. In the el Parque de la Papa (Potato Park) near Pisac, Peru, six indigenous Quechua communities are conserving their landscape for optimising ecologically sustainable, biologically diverse farming and pastoralism (Argumedo 2008).

Livestock grazing and pastoralism

Studies have found that certain levels of grazing are sustainable, but also they can be essential to maintain certain highly diverse grasslands, with the removal of people and livestock leading to decreases in biodiversity in the protected area (Infield 2003; Parr et al. 2010; Nelson 2012). In Africa and western Asia, nomadic pastoralists grazed cattle in some areas on a sustainable basis for centuries. Where traditional cultures were based on herding livestock, the systems they established over long periods have often shaped the landscape, with their use of it becoming integral to maintaining ecological processes and biodiversity (Farvar 2003; Borrini Feyerabend et al. 2004; see also references under the 'Agriculture' section above). In Europe, much of the biodiversity in protected areas has co-developed with traditional pastoral practices (Case Study 25.7).

Even where livestock grazing is not part of a long-established biocultural landscape, it can sometimes be useful in meeting protected area management objectives. For instance, in Costa Rica, grazing has been used in the restoration of the dry tropical forest ecosystem of the Guanacaste National Park for seed dispersal, exotic grass control and generating local support (Evans 1999). In the Palo Verde Refuge, also in Costa Rica, livestock grazing has supported the conservation of a particular wetland (Vaughan et al. 1996).

Decisions on grazing livestock in protected areas, however, must be made very much on a case-by-case basis. In Australia, extensive research has shown that livestock grazing causes significant damage to alpine and subalpine native vegetation, soils and waterways in Kosciuszko National Park and the Alpine National Park (Williams 1990; Wahren et al. 1994). In some protected areas, pressures to increase agricultural production have led to overgrazing, but rather than prohibition, participatory measures have been developed to minimise the damage (Case Study 25.7). In many ICCAs (see Chapter 7)—for instance, community forests in



Markhor (*Capra falconeri*) at Torgarh Community Conserved Area, Balochistan, Pakistan

Source: Tahir Rasheed

South Asia—communities voluntarily regulate grazing through a temporary or seasonal stoppage of all grazing activity, allowing degraded landscapes to regenerate.

Coastal and marine resource use

Coastal ecosystems in marine protected areas (MPAs) often have significant resource use, for both subsistence and commercial purposes (Spalding et al. 2013). Harvests include edible resources such as finfish, shellfish, marine mammals and seaweeds; resources for construction such as mangrove poles, coral blocks, sand and lime; resources for ornamental use such as shells, pearls and coral; for scientific use, which includes a wide array of species; for industrial use, such as giant clams and species yielding pharmaceuticals; and for mariculture such as mussels and oysters. Increasingly, ecotourism and education are important components of the use of the marine environment.

The safeguarding of sustainable fisheries is in many cases a primary objective of the designation of the MPA. The community-based Eastport MPA on the island of Newfoundland in Canada was motivated by the local community's long historical reliance on fisheries, after the collapse of groundfish stocks and catch declines in lobster fisheries, as a means to safeguard lobster stocks (Charles and Wilson 2009). Likewise, part of the motivation for communities in establishing and managing the now extensive locally managed marine areas (LMMAs) network in the South Pacific is to ensure the sustainable flow of fisheries benefits from these areas (Govan 2009).

Case Study 25.7 Sustainable grazing in Retezat National Park, Romania

The Retezat National Park is Romania's oldest national park. It protects a unique corner of the Carpathian Mountains, and contains a rich plant assemblage and viable populations of various large mammals. In 1979 the park was designated as a biosphere reserve.

Traditional grazing is still practised; over 20 per cent of the alpine areas are pastures owned and used by local villagers. The villagers' rights to these pastures date back to a governmental agreement of 1922; but over the years local control over the grazing in this area has diminished and the area has been overgrazed, altering the natural diversity and richness of the alpine pastures. The challenge for the park management authority has been to encourage local people to go back to sustainable levels of grazing.

The Romanian Biodiversity Conservation Management Project has funded projects that promote sustainable grazing on the alpine pastures. A grants committee has

been established, which includes representatives from all the communities with ownership rights or other stakes in the park. Training is provided to local people to enhance their capacities for project writing and fundraising activities.

Since 2001, local authorities have assisted in the development of protocols and joint programs that establish rules for grazing activities, including inside the central zone of the park, and protect the grazing rights of local animal owners. As a result, the level of grazing activities in the alpine meadows has decreased since 2002. An appraisal in 2013 was appreciative of these management efforts and recommended continuation of the park's European Diploma of Protected Areas.

Sources: Adapted from Wieting (2004); Galland (2013)



Grazing introduced as a management measure in Linnansaari National Park, Finland

Source: Ashish Kothari

As with use of terrestrial resources, indigenous and traditional societies had regulations in place through customary law to protect against overuse of marine resources. For example, in Korea, diving is traditionally done by women. They self-regulated by agreeing that they would not use scuba equipment even if available, so that all they could take was what they could gather by holding their breath and diving in the traditional way. They collect octopus, abalone, sea urchins, sea slugs, sea cucumber and seaweed and have been selling their produce since the 1970s (Onishi 2005; Pfeiffer 2009).

In Costa Rica, after two years of the recognition of the Tárcoles Marine Responsible Fishing Area and the studies presented by fishers to the state institutions, a sustainable use permit for three months of shrimp

collection has been given to local fishing communities (Madrigal Cordero and Solís Rivera 2012). In such places, self-regulated systems are still operating effectively, but often changes in land use and tenure have disrupted practices that have been in place for millennia. In Nosy Atafana Marine Park, north-east Madagascar, part of the UN Educational, Scientific and Cultural Organisation (UNESCO) Biosphere Reserve of Mananara-Nord, an agreement between the reserve authorities and local communities specifies permitted and prohibited activities relating to octopus, sea cucumber and other fauna (IUCN 2004).

In many parts of the world, however, MPAs continue to be managed in exclusionary ways, leading to stoppage or restrictions on even those traditional uses that are not detrimental to biodiversity, or in other ways dispossessing local communities—one of the results of which is increasing hostility towards the MPAs. Where a consultative and negotiated process is able to demonstrate that no-take zones can help increase fish populations outside them, there is greater chance of people accepting a range of strategies including strict exclusion from some areas or for a certain period—for instance, at the Seaflower Biosphere Reserve in Colombia (Friedlander et al. 2003). In some cases, local communities have organised to regain rights lost earlier, such as the Tárcoles in Costa Rica mentioned above, and then evolve their own sustainable use strategies.

The case of St Lucia (Case Study 25.8) illustrates the often rocky path to agreement and sustainable use of resources in a government declared area, while that of Coron Island (Case Study 25.9) demonstrates how indigenous people can organise against outside unsustainable uses to conserve their ICCAs.

Case Study 25.8 Soufriere Marine Management Area, St Lucia

The Soufriere Marine Management Area in St Lucia is a multiple-use area including no-take marine reserves, fishing priority zones and other use zones. Prior to its establishment in 1994, there were numerous ongoing conflicts between the local traditional fishers, tourists, day visitors and yachters cruising the West Indies. Visiting divers cut holes in fish traps to release reef fish; yachtsmen anchored in sandy bays, interfering with local fishing for coastal pelagic fish; and access to the beach and sea had been restricted by tourist facilities. The reef fish populations were under threat from illegal spearfishing and pot fishing, and anchors were damaging the reef (Salm et al. 2000).

In 1992 the Department of Fisheries and the Caribbean Natural Resources Institute initiated negotiation, conflict resolution and participatory planning. Mapping of all uses was undertaken, and a preliminary agreement was arrived at for zoning 11 kilometres of coastline. Implementation of this was successful, however, only for two to three years, after which it broke down due to violations by some

parties, the agreement not having any legal backing. After a full institutional review, a new management regime was developed based on a clear agreed mission, transparent management structure and strong legal basis (Salm et al. 2000; Geoghegan and Renard 2002).

In 2005, the Soufriere Marine Management Area celebrated its tenth anniversary. A study prior to that showed that commercial fish biomass in the marine reserve had a fourfold increase and there was a threefold increase in the fishing zone. The area had become financially self-sufficient, thanks to diving and yacht mooring fees. Institutional capacity increased in all stakeholder groups and tourism was bringing benefits to the local community (Gell and Roberts 2002). Challenges continue to arise, but there is a commitment from all the stakeholders to deal with them.

Global changes and resource use

Projected climate change impacts on protected areas in many parts of the world will force a rethink of their role in biodiversity conservation and sustainable use (Hunter and Heywood 2011; see also Chapter 17). The political boundaries of protected areas are fixed but the biological landscape is not. Significant rethinking in the design of such areas will be necessary, which has major implications for protected area management (Schliep et al. 2008).

Global change is expected to drive the number of environmental refugees to increase by around 200 million by the middle of this century (Myers 1997). The impacts of this on the conservation and use of biodiversity could be significant in that these people will migrate into territories not able to support or feed them without large-scale disruption. It will also lead to increased incidents of conflict between resource users. By their very nature, displaced people rely heavily on their surrounding environment for food, fuel wood and other subsistence needs, often leading to forest and other resource degradation or loss (Hunter and Heywood 2011).

Achieving conservation and sustainable use of resources in these contexts will require a paradigm shift in how we approach protected area management, design and connectivity, and will necessitate more effective partnerships between protected area administrations, forestry and agricultural departments working through traditional agro-ecosystems and indigenous and social movements (Perfecto et al. 2009; Padulosi et al. 2011).



Tárcoles Marine Responsible Fishing Area, Costa Rica

Source: CoopeSolidar RL

Case Study 25.9 Countering external threats at Coron Island, the Philippines

Often community struggles to maintain or revive sustainable use have been embedded in or led to wider political struggles for rights and control; this is especially the case of many ICCAs. The Tagbanwa people of the Philippines inhabit the stunningly beautiful limestone island of Coron for which they have established stringent use regulations (Ferrari and de Vera 2003) (see title page photo, Chapter 8). The forest resources are to be used for domestic purposes only. All the freshwater lakes but one are sacred. Entry to those lakes is strictly forbidden for all except religious and cultural purposes. The only lake accessible for highly regulated tourism is Lake Kayangan.

Until recently, the Tagbanwas' territorial rights were not legally recognised, leading to encroachment by migrant fishers, tourism operators, politicians seeking land deals and government agencies. This led to impoverishment of marine ecosystems and resources. In the mid 1980s, the islanders organised themselves into the Tagbanwas Foundation of Coron Island (TFCI), lobbying to regain

management control over their natural resources. They first applied for a Community Forest Stewardship Agreement (CFSA), which was granted in 1990 over the 7748 hectares of Coron Island and a neighbouring island, Delian, but not over the marine areas. The Tagbanwa continued their struggle and, in 1998, were granted a Certificate of Ancestral Domain Claim for 22 284 hectares of land and marine waters. Finally, in 2001, after having produced a high-quality map and an Ancestral Land Management Plan, they managed to obtain a Certificate of Ancestral Domain Title (CADT), which grants collective rights to land.

Development and protected areas

Large-scale projects that are part of national or subnational economic growth and development strategies can often be within or adjacent to a protected area. They include mining and other forms of extraction, hydro-electricity and irrigation projects, roads and highways, ports, sports and tourism facilities, communication and power transmission lines, urban expansion, and others. Many of these present serious threats to ecosystems and species, and to human populations, within protected areas.

There are few national or regional assessments of the level and kinds of threats that development poses to protected areas. The national survey of protected areas in India (Kothari et al. 1989) found that 62 per cent of the 293 protected areas surveyed had one or more of the following within them: roads, railway tracks, mining, dams, canals, industry or transmission lines. A recent study by the Indian NGO Kalpavriksh found that between 1998 and 2009, nearly 300 projects that required diversion of lands within protected areas came to the Central Government's National Board for Wildlife for approval; while many remained pending a decision, of those disposed of, most were cleared and few rejected (Menon et al. 2010). Interestingly, almost all mining proposals were approved, which is hard to understand given that mining is extremely damaging.

One of the most discussed issues in regard to the infrastructure development affecting protected areas in Central Europe is the building of motorways and highways. Motorways and highways very often cross habitats or important migration corridors of protected

species such as brown bears (*Ursus arctos*), Eurasian lynx (*Lynx lynx*), wild cats and wolves (*Canis lupus*). Find'o et al. (2007) found the majority of bear–vehicle collisions happened during the period when bears require high levels of nutritious food, from mid July until hibernation in November–December, when they cover big areas criss-crossed by roads. The result is that many bear–vehicle collisions are happening within and outside protected areas. This is a serious problem globally, though there have been recent advances in the design of overpasses and underpasses that enable freer movement of wildlife from one side to the other (see, for example, Locke 2010).

In Latin America, during most of the past century, deforestation was due to expansion in farming. In recent years, however, greater deforestation has taken place mainly due to corporate agencies and their activities. With the rise in intensity of consumption patterns due to globalisation, there has been increased pressure on protected areas for biofuel and soybean production, energy (geothermal and hydro-electricity), mining and oil. Many countries are currently facing enormous threats from governments trying to degazette, downsize or downgrade areas (WWF 2014). For example, soybean production in Argentina, Paraguay and Brazil, and more recently in Bolivia, has encroached on many hundreds of thousands of hectares of protected areas. Palm-oil plantations for biofuel production are likely to be the biggest cause of land-use changes in tropical Asia, including within government protected areas and on many indigenous and community lands that could constitute ICCAs (Campbell et al. 2008).



Skeena River, Gixtsan Indigenous Territory, Canada

Source: Francois Depey

ICCAs and other areas crucial for conservation are threatened elsewhere too. In Chile, a legal battle including at the Inter American Court for Human Rights has been going on between the Government and the Mapuche-Pehuenche indigenous groups due to the construction of several hydro-electricity dams in the BioBio River (OLCA 2014). In Brazil, the construction of the Belo Monte Dam will have devastating consequences in an area of more than 1500 square kilometres of rainforest and will result in the forced displacement of between 20 000 and 40 000 people (Washington Post 2013). The need for 'clean energy' (itself a misnomer, given that large reservoirs have serious ecological and climate change impacts) has been placed well above the need for conservation and the rights of communities. The Skeena watershed in British Columbia, Canada, which is home to several indigenous groups and contains significant wildlife, is under threat from proposed oil and gas pipelines, mines, commercial fisheries, forestry and powerlines (Skeena Watershed Conservation Coalition 2014; SkeenaWild Conservation Trust 2014).

In the ecozone of India's Great Himalayan National Park (see Case Study 25.2), there are substantial ecological changes caused or threatened by mega-hydro-electricity projects such as the Parvati Hydel Project (Chhatre and Saberwal 2006). More than 1000 hectares of prime forest land within the protected area was diverted for hydro-electricity development, and several more big and small such projects on various streams adjacent to the park are further restricting the home ranges of different species. This is ironic considering the less-intrusive activities of villagers within the adjacent GHNP were stopped in the name of conservation (see Case Study 25.2).



Resistance against proposed pipeline through Skeena indigenous territories

Source: Leah Macknak

ICCAs, PPAs and other conservation initiatives that do not have formal protected area status, or official recognition, face even greater threats from development and infrastructure projects (Borrini-Feyerabend et al. 2010; Kothari et al. 2012). At least in the case of formal protected areas, most countries have some legal or policy mechanisms that can be used to regulate such developments, but this is not the case for unrecognised conservation sites and initiatives.

Due to the large size of eastern and southern Africa's protected area network, and the scale of the region's economic development needs and aspirations, most protected area management agencies have frameworks for carrying out general management plans that rationalise the development of infrastructure such as roads, water, staff facilities, tourism facilities and services, as well as planning for conservation and landscape management. These frameworks, often described in national wildlife or protected area legislation, also tend to define requirements for environmental and social impact assessments (ESIAs) to be carried out when planning infrastructure developments in protected areas. ESIA requirements and procedures are in turn a central feature of environmental management acts, which, for example, were adopted in Kenya, Uganda and Tanzania during the 1990s and have gradually been implemented, to varying degrees, across the region (see Chapter 24).

The nature of ESIA processes and findings, and the legally actionable nature of environmental legislation in terms of holding state decision-makers accountable for environmental regulatory decisions and impacts, plays a major role in debates around infrastructure development

in major regional protected areas. The most notable among these in recent years has been the proposal by the Tanzanian Government to build a highway across the northern part of Serengeti National Park in order to link different urban areas in that part of the country. Biologists have raised concerns that such a highway could lead to substantial increases in mortality in the annual north–south wildebeest migration between the Serengeti Plains and the Maasai Mara National Reserve to the north in Kenya (Dobson et al. 2010; Norwegian University of Science and Technology 2013). A number of compromise designs for a road to link Lake Victoria's large human populations to urban centres to the east have been proposed, and additional ESIA studies commissioned, and the ultimate design of this road remained unclear in 2014. A similar though more spatially limited debate took place in Kenya 2010s around a new Nairobi ring-road that would have encroached on the boundaries of Nairobi National Park, which lies adjacent to the nation's capital city. This road was recently successfully challenged in court and its ultimate design and construction are now uncertain (Koross 2013).

In southern Tanzania, a major new uranium mine has been developed on land that was recently excised from the Selous Game Reserve (Tairo 2014). The Selous reserve is a World Heritage property, where mining is not permitted, so the excision first had to be approved by the UNESCO World Heritage Committee. Such processes, however, raise the spectre of degazettement of other protected areas, even those with such a high level of international recognition, when there are competing commercial or infrastructure interests that come into play (see Case Study 25.2).

In a global context, there is little balance between development and conservation. More generally, the global context of economic growth, the rise in consumption levels, economic and financial globalisation, climate change and other such factors is having a serious impact on various ecosystems. The Millennium Ecosystem Assessment, focusing on the ecosystem changes that have taken place on a global scale in the past 50 years, predicts that the harmful consequences of the degradation that has set in on Earth may become worse in the next 50 years (MEA 2005). Numerous editions of the *Global Biodiversity Outlook* (CBD 2010) have given similar warnings.

The long-term sustainability of protected areas and conservation efforts will depend on the establishment of effective institutional mechanisms and interventions to better address the real causes of biodiversity loss. Protected area authorities usually have responsibility

only for management within the reserves, yet most threats emanate from outside the protected area boundaries. This requires protected area managers to work with other agencies and the private sector to ensure that considerations of park integrity and conservation are integrated with local and regional planning. In some cases, a single agency may have responsibility for both protected area management and sectoral development planning—for example, in Madagascar, the National Association of Management of Protected Areas (Association National de Gestion des Aires Protégées: ANGAP) has responsibility for both tourism and protected areas but this is the exception, rather than the rule. Local governments can be valuable partners to ensure that development planning complements protected area goals. Ensuring such cooperation requires not only good personal relationships, but also strong support and coordination at the state/provincial level and between ministries at the national level. Local governments are more likely to support conservation where they recognise the benefits that protected areas provide either in fuelling local economic growth (for example, tourism in many countries) or in maintaining crucial ecosystem functions like water supplies (for example, Chingaza National Park in Colombia, the water source for the capital, Bogotá; see Natural National Parks of Colombia 2008).

One of the few attempts at dealing with this systematically and at a global level is the IUCN's advocacy to safeguard certain categories of protected areas. For instance, at the second IUCN World Conservation Congress (in Amman, Jordan, in 2000), members adopted Recommendation 2.82 (protection and conservation of biological diversity of protected areas from the negative impacts of mining and exploration), which: 1) calls on state members of the IUCN to prohibit mining exploration and extraction in Category I–IV protected areas; 2) recommends strict controls over such activities in Category V and VI protected areas; 3) urges strict standards governing changes to protected area boundaries to accommodate mining activities; and 4) recommends environmental impact assessments to ensure that mining activities outside protected areas do not negatively impact on them.

While this has not been widely accepted, the IUCN and UNESCO did manage to persuade the International Council of Mining and Metals (ICMM) to a voluntary moratorium on mining in World Heritage sites in 2003 (ICMM 2003). But this leaves out many protected areas that are just as important for conservation; the moratorium is only voluntary and liable to violation in several countries where environmental governance is weak; the ICMM

does not include many mining companies; and, possibly most importantly, protected areas that are not formally recognised (like most ICCAs and PPAs, as pointed out above and in Chapter 7) receive no protection from it. Mining critics allege that the agreement is mere 'greenwashing', with the industry paying little or no cost but gaining credibility. In addition, some governments are often willing to excise land from protected area boundaries to enable such activities (such as the example of Selous given above). New developments in oil exploration, including fracking, threaten to further damage natural ecosystems in many parts of the world.

Conclusion

A few concluding remarks are in order for both the aspects dealt with in this chapter: resource uses, and development projects.

Resource use can contribute in a number of ways to achieving conservation objectives, in ecological terms (for example, where biodiversity values are maintained by use), economic terms (for example, where allowing sustainable use generates revenue for park management) and in social terms (for example, where allowing local sustainable use builds or maintains local support and 'buy-in' for conservation). Conservation policy and practice need to be flexible to accommodate existing resource use by local communities, especially those crucial for survival and livelihoods, where they are or can be made compatible with conservation objectives (assuming these objectives have been set in democratic ways, using the best available knowledge and the 'good governance' principles and practices outlined in Chapter 7). This tends to often happen in the natural course of events in the case of ICCAs, and to some extent in co-managed protected areas, but may need special attention in many government-managed protected areas.

Where such resource use can in no situation be compatible with conservation objectives, action has been taken in many instances to place restrictions, and simultaneous provision or facilitation of alternatives (for example, in Kibale National Park; see Case Study 25.4). However, these alternatives may not always adequately compensate the losses (as in the case of the Great Himalayan National Park; Case Study 25.2), or may not be culturally appropriate and economically feasible. Such shortcomings are a key lesson from the ICDP initiatives in various parts of the world (as discussed above), and need to be specially considered in protected area management planning.



Mining inside Sariska Tiger Reserve, India

Source: Ashish Kothari

It is important to realise that every situation is unique; exactly what works to make resource use sustainable at one site may not work at another. Some commonalities between sites and situations can be drawn out, and lessons learnt that can be taken across sites, but for every site and situation, fresh assessment, study and monitoring based on local and external knowledge are necessary. Inter and intra-community conflicts, especially related to land tenure and holding, access to resources and distribution of the benefits of such uses, need to be resolved for the effective participation of the whole community in conservation.

Security of tenure, territorial rights, resource rights, the right to participate in decision-making and concomitant responsibilities towards conservation and fellow people are increasingly considered crucial for the involvement of local populations in all kinds of protected area governance types, as well as for the sake of clarity of roles and responsibilities of government agencies in the case of government-managed protected areas (see Chapter 7).

Effective resource management needs to be based on good information, which may be either embedded in indigenous and traditional science, knowledge and cultural practices or derived by modern scientific methods. Indigenous/traditional and local knowledge can be of central importance in mapping habitat and resource use areas and establishing workable and socially acceptable resource use zones.

It is important to incorporate strategies to deal with various kinds of social and economic lack of privilege, including gender inequities, ethnic biases and

inequalities, elite capture of benefits, and other factors that could distort the equitable distribution of decision-making powers and capacities, and of conservation benefits.

Lessons can be learnt across various governance types—for example, many ICCAs have worked out adaptive modes and institutional processes of figuring out levels and kinds of resource use that do not endanger the relevant ecosystems and species, from which government and others can learn. Many government-managed protected areas have evolved robust systems of management planning, from which ICCAs could learn. At national and subnational levels, platforms for such sharing and learning need to be created.

Ongoing and potential global factors, such as climate change, are likely to alter the situation of resource use within and around protected areas. Considerable resilience and flexibility, connectivity across large landscapes and seascapes, and collaboration amongst various rights-holders and stakeholders will be needed to adapt to such changes.

Development and infrastructure projects and processes that have an impact on protected areas and other conservation sites need to go through knowledge-based and democratic processes of screening and decision-making, in which the protected area authorities and local populations should have a central voice. Ideally, national policies should designate sites that are crucial for ecological and biodiversity conservation purposes as no go areas to large-scale activities that will have detrimental impacts; this should apply also to the ‘catchment’ or ‘impact area’ outside the protected area where such activities could have an impact on the protected area.

While such measures, or more global efforts such as the IUCN’s advocacy for certain categories of protected areas to be off-limits for mining, are steps towards limiting the adverse impacts of development on protected areas, there is also increasing focus on the need to reorient the framework of development itself. Without this, widespread ecological damage by extractive industry, infrastructure and other such ‘development’ processes that are inherent to a model that places economic growth above all else will continue to undermine both biodiversity and communities, especially those most dependent on the natural environment. One strand of such reorientation is taking the pathway of ‘sustainable development’, in which environmental impacts are integrated more centrally into development planning, and the economy moves towards greener processes, technologies, accounting and other such measures. This is the thrust of the outcome declaration from the Rio+20

Conference on Sustainable Development (UNCSD 2012), and of the ongoing negotiations for a post-2015 agenda to replace the Millennium Development Goals (Sustainable Development Knowledge Platform 2014). Another strand holds that this will be inadequate since development remains dependent on economic growth, which is impossible to sustain in a world with ecological limits. It therefore calls for a fundamental shift in direction towards non-growth-based strategies and indicators of human wellbeing that are in sync with nature’s limits, and more attuned to directly achieving security of basic needs (water, food, shelter, sanitation, clothing, learning, health, social relations, and so on) for all (Rijnhout et al. 2014). This volume is not the place to go into these issues in detail, but protected area managers, rights-holders, stakeholders and all those interested in conservation will need to engage themselves in one way or another with this larger context of developmental and wellbeing pathways.

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