PART II

Chapter 5

Protected areas

Brazil has massively expanded its network of protected areas. This chapter presents progress in extending the terrestrial and marine areas under environmental protection. It examines achievements and challenges related to the management of protected areas, including in terms of financial sustainability. The chapter describes the role of protected areas in improving the quality of life of traditional communities. Finally, it discusses the opportunities of opening protected areas to the public for tourism, recreation and environmental education, and for sustainable forest management.

1. Categories, extension and benefits of protected areas

1.1. *The National System of Protected Areas*

Protected areas have a long history in Brazil and are a cornerstone of its biodiversity policy. In 2000, in an effort to improve effectiveness of protected areas and to better preserve its tropical rainforests, Brazil established the National System of Protected Areas (SNUC), or conservation units, as such areas are known in the country.[1] SNUC integrated the heterogeneous landscape of protected areas, including those established by federal, state and municipal governments as well as those proposed by private actors (individuals, companies, non-government organisations), into one national system. It provided a common definition of protected areas and a framework for co-ordinated management and implementation at different levels of government. It also introduced the National Register of Protected Areas (CNUC) in 2006 as the official national database to consolidate information about protected areas at all levels of government.

SNUC defined 12 management categories (consolidating several existing categories and creating some new ones) in two broad groups: i) strict protection areas, with the primary objective of biodiversity conservation and forbidding direct use or consumption of natural resources; and ii) sustainable use areas, primarily aiming at conservation but permitting human settlements and various uses of natural resources in accordance with a sustainable management plan. Table 5.1 provides an overview of the objectives and activities allowed for each category. About two-thirds of the area under protection lies within sustainable use categories (Figure 5.1). This results from several factors, including the higher political and social acceptability of sustainable use areas, as they impose fewer restrictions on land and resource use; respect of traditional communities' rights and civil society movements in defence of these rights; and the government objective of stimulating sustainable timber logging in national forests (Veríssimo et al., 2011). The Brazilian example of extractive reserves has contributed to shaping the international classification of protected areas (Table 5.1).

The 2000 SNUC Law was the result of 12 years of parliamentary debate. It provided a sound legal basis for the establishment and management of protected areas and thus laid the groundwork for the remarkable expansion of the number and coverage of protected areas.[2]

1.2. *Extension and coverage of protected areas*

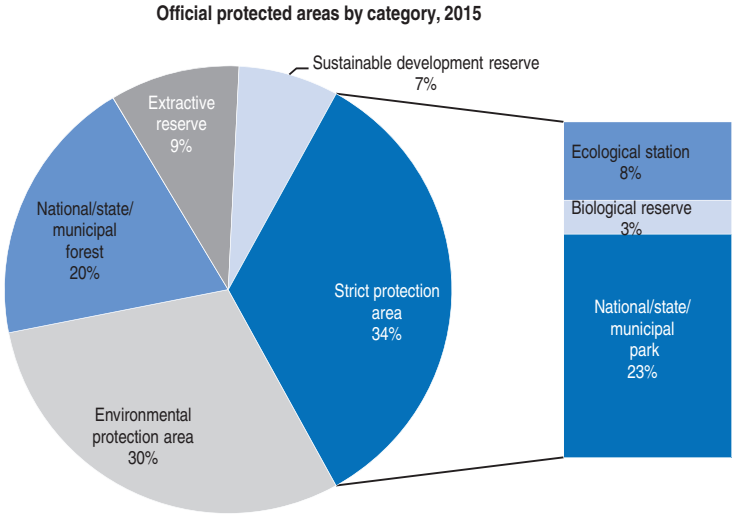
In the last decade, Brazil has become one of the world's top contributors to increasing the land area under environmental protection, as foreseen by the UN Convention on Biological Diversity (CDB) Strategic Plan 2002-10. Between 2003 and 2008, it accounted for more than 70% of the world's new terrestrial area placed under protection (Jenkins and Joppa, 2009). This period coincides with the first implementation stages of the Action Plan for Prevention and Control of Deforestation in Amazônia Legal, or PPCDAm (Chapter 4), and of the Amazon Region Protected Areas (ARPA) programme (Box 5.1).

Table 5.1. **Categories of protected areas under SNUC**

Brazilian management category	Land ownership	Main goal	Main features	International management category	Area (km^2)
			Strict protection areas		
Ecological Station	Public	Nature preservation and scientific research	Θ Scientific research ⊗ Public visitation Θ Education and environmental interpretation	Ia – Strict Nature Reserve	Federal: 74 691 State: 47 513 Municipal: 9
Biological Reserve	Public	Strict preservation of biota and other natural features	Θ Scientific research ⊗ Public visitation Θ Education and environmental interpretation	Ia – Strict Nature Reserve	Federal: 39 034 State: 13 449 Municipal: 48
National/State/ Municipal Park	Public	Preservation of natural sites with ecological relevance or beautiful scenery	Θ Public visitation Θ Scientific research Θ Education and environmental interpretation	II – National Park	Federal: 252 978 State: 94 889 Municipal: 221
Natural Monument	Public or private	Preservation of rare natural sites, with unique or beautiful scenery	Θ Scientific research Θ Public visitation Θ Education and environmental interpretation	III – Natural Monument or Feature	Federal: 443 State: 892 Municipal: 73
Wildlife Refuge Area	Public or private	Protection of the natural environment to ensure conditions for the existence or breeding of local flora and fauna species	Θ Scientific research Θ Public visitation Θ Education and environmental interpretation	III – Natural Monument or Feature	Federal: 2 017 State: 1 729 Municipal: 22
			Sustainable use areas		
Environmental Protection Area	Public or private	Protection of areas that are important to life quality and well-being of humans through biodiversity protection	(Vast areas; no buffer zone) ✓ Public visitation ✓ Scientific research	V – Protected Landscape/ Seascape	Federal: 100 101 State: 334 898 Municipal: 25 922
Area of Relevant Ecological Interest	Public or private	Maintenance of natural ecosystems with local or regional importance	(Small areas) ✓ Public visitation ✓ Scientific research	Mostly considered as IV – Habitat/Species Management Area	Federal: 447 State: 443 Municipal: 32
National/State/ Municipal Forest	Public or private	Multiple use of forest resources and scientific research, with emphasis on methods for sustainable use of native forests	✓ Permanence of traditional communities that already lived there when the protected area was created ✓ Public visitation ✓ Scientific research	VI – Protected Areas with Sustainable Use of Natural Resources (allowing local/ traditional communities in the Brazilian case)	Federal: 163 913 State: 136 053 Municipal: 0
Extractive Reserve	Public	Protection of areas inhabited by traditional populations living on extraction of natural resources, ensuring the sustainable use of the protected area	✓ Natural resource extraction by traditional populations living on the land ✓ Public visitation ✓ Scientific research ⊗ Exploitation of mineral resources ⊗ Hunting (neither amateur nor professional) Θ Commercial exploitation of timber	VI – Protected Areas with Sustainable Use of Natural Resources (with local/ traditional communities co-management in the Brazilian case)	Federal: 124 362 State: 20 208 Municipal: 0
Sustainable Development Reserve	Public	Protection of areas inhabited by traditional populations practising sustainable resources exploitation and use	✓ Public visitation ✓ Scientific research ✓ Sustainable natural resources exploitation ✓ Substitution of vegetation by cultivable species	VI – Protected Areas with Sustainable Use of Natural Resources (allowing local/ traditional communities co-management in the Brazilian case)	Federal: 1 026 State: 110 090 Municipal: 176
Fauna Reserve	Public	Technical and scientific research about sustainable economic management of wildlife resources	Θ Public visitation ✓ Scientific research ⊗ Hunting (neither amateur nor professional)	IV – Habitat/Species Management Area	Federal: 0 State: 0 Municipal: 0
Private Natural Heritage Reserves	Private	Conservation of biodiversity	(no buffer zone) ✓ Public visitation ✓ Scientific research	IV – Habitat/Species Management Area	Federal: 4 832 State: 686 Municipal: 0

Notes:
✓ Activities allowed/encouraged as far as compatible with management plan
Θ Activities allowed with restrictions established by management plans or in special circumstances
⊗ Prohibited activities
Public visitation includes tourism, recreation and environmental education.
Source: IUCN (2008), *Guidelines for Applying Protected Area Management Categories*; MMA (2015), "Areas protegidas", *www.mma.gov.br/areas-protegidas*; MMA (2015), "Cadastro Nacional de Unidades de Conservação" (accessed February 2015); WCMC-UNEP and IUCN (2015), "World Database on Protected Areas", *www.protectedplanet.net*.

Figure 5.1. **Strict protection categories cover about one-third of protected areas**



Note: Excluding natural monuments, wildlife refuge areas, areas of relevant ecological interest, fauna reserves and private natural heritage reserves, which together accounts for 0.7% of total officially protected area.
Source: MMA (2015), Cadastro Nacional de Unidades de Conservação.

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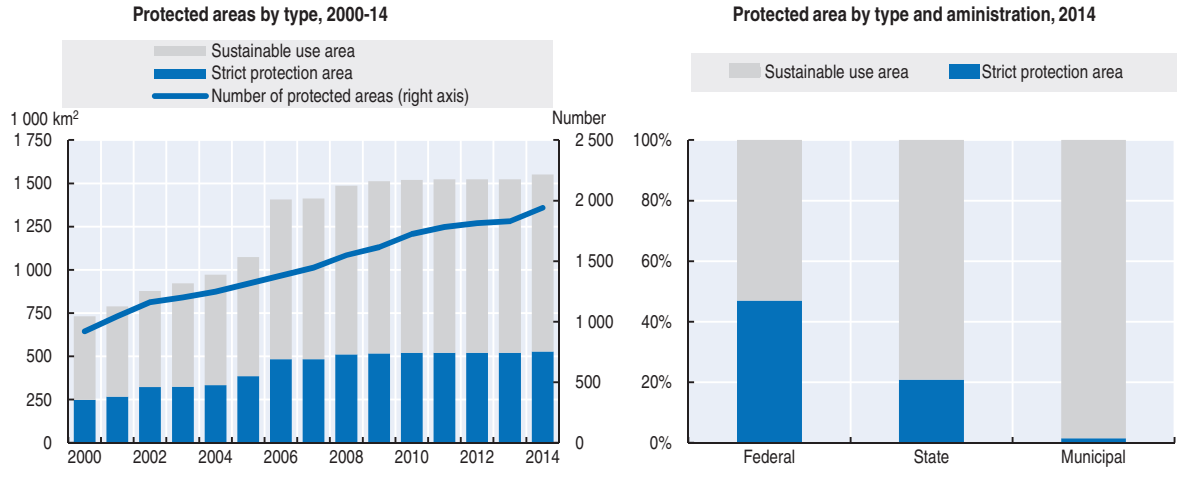
Between 2000 and 2014, the number and extension of protected areas within SNUC more than doubled. As of early 2015, 1 940 protected areas covered a surface of more than 1.5 million km^2, almost three times the size of France, or 17.2% of Brazil's terrestrial and inland water areas and 1.5% of coastal and marine areas, including the exclusive economic zone (Figure 5.2). Therefore, Brazil achieved the 2020 Aichi target of protecting at least 17% of terrestrial and inland water areas well ahead of time.[3] The expansion of protected areas has levelled off since 2010, though their number has continued to increase. This reflects the recent focus on smaller-scale initiatives, as well as the partial elimination of some protected areas from SNUC (degazetting).

Figure 5.2. **The land area under nature protection has more than doubled**



Source: MMA (2015), Cadastro Nacional de Unidades de Conservação.

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Box 5.1. **The Amazon Region Protected Areas programme**

ARPA is one of the largest tropical forest conservation programmes in the world. ARPA was created with the goal of expanding and strengthening SNUC in the Amazon by establishing 600 000 km^2 of protected area. The programme is result-oriented and has four major components: establishment; management and consolidation; financial sustainability; and co-ordination, management and monitoring. It is co-ordinated by the Ministry of the Environment (MMA) and managed by the Brazilian Biodiversity Fund (Funbio; Box 5.7). It is funded by resources from the Global Environment Facility (GEF), the German Federal Ministry for Economic Co-operation and Development via the German Development Bank (KfW), WWF and the Brazilian Amazon Fund (Chapter 4).

ARPA was launched in 2002 and designed to be implemented in three phases. The first (2003-10) aimed to establish 180 000 km^2 of new protected area in the Amazon and to start the consolidation progress in 70 000 km^2. Both targets had been exceeded by 2010. The programme invested USD 83 million over the first phase, half of which was used for operating costs.

The second phase (2010-15) aimed at establishing additional 135 000 km^2 and consolidating 320 000 km^2 of protected areas. It also aimed at raising USD 70 million for the Protected Areas Fund (FAP, established under the first phase). Expenditure during the second phase (excluding disbursements under the FAP) reached USD 115 million.

The third phase focuses on ensuring the long-term financial sustainability of the programme. The ARPA for Life initiative was launched in May 2014 (in parallel with implementation of the second phase) to facilitate the transition from a donation-based system to a system financed by the federal and state budgets and environmental compensation (Section 4.4).[a] To achieve this, the share of government budget allocated to ARPA should gradually grow over a period of 25 years, while several partners would contribute USD 250 million to a transition fund (the ARPA for Life Fund).[b]

a) Funbio and the WWF estimated the financial need for the ARPA programme over 2011-20 at BRL 800 million, including both investment and operational costs. Revenue for the same period was estimated at BRL 530 million, for a financial gap of BRL 270 million (Funbio, 2012).

b) The German Ministry for Co-operation and Development, the Inter-American Development Bank, Funbio, the Gordon and Betty Moore Foundation, WWF-Brasil, WWF-US and the GEF.

Source: Funbio (2012), *Quanto custa o Programa Áreas Protegidas da Amazônia? Uma modelagem financeira para as Unidades de Conservação do Arpa*; MMA (2015), *Fifth National Report to the Convention on Biological Diversity*.

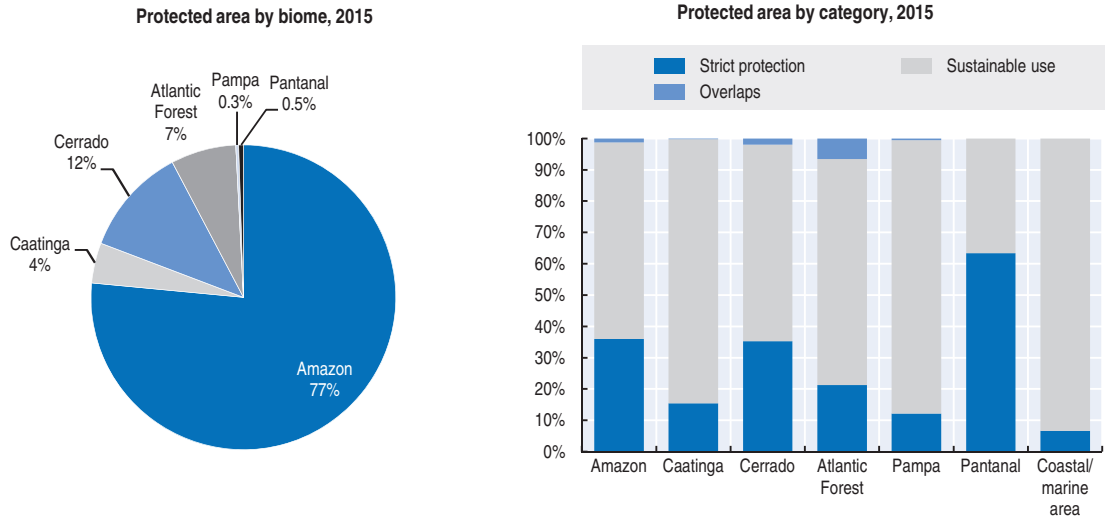
Federal and state protected areas account for 98% of total area under protection. About 40% of protected areas are Private Natural Heritage Reserves, which however cover less than 1% of the total area under SNUC. Municipal protected areas are often within cities and hence significantly smaller in size. Federal protected areas are roughly balanced with respect to strict protection and sustainable use areas, while subnational governments have primarily established sustainable use areas (Figure 5.2). Municipalities and many states use protected areas primarily as land management instruments.

The SNUC protected areas are complemented by several other land use or land management types that aim at, or contribute to, environmental conservation. These include indigenous lands (referred to as *latu sensu* protected areas) and *quilombola* lands (Box 5.2), as well as the so-called Areas of Permanent Preservation (APPs) and Legal Reserves (RLs) that landholders are required to preserve under the 2012 Forest Code (Law for the Protection of Native Vegetation). APPs and RLs are estimated to cover 12% and 30% of the national territory, respectively (MMA, 2010), corresponding to more than twice the

SNUC area. However, many private lands have not respected these quotas (Chapter 4). Brazil is also home to several World Heritage natural sites and 12 internationally recognised wetlands under the Ramsar Convention that are designated protected areas and cover over 65 000 km^2. The government aspires to obtain the designation of additional 10 Ramsar sites by 2017 (MMA, 2015a).

Brazil's terrestrial area is typically divided into six large ecosystems or biomes:[4] Amazon, Atlantic Forest, Caatinga, Cerrado, Pampa and Pantanal (Box 4.1). Sustainable use areas dominate in all biomes except the Pantanal (Figure 5.3). The coverage of protected areas across biomes varies widely. Over three-quarters of the SNUC area is in the Amazon biome, accounting for nearly 27% of this region's surface area, including its vast freshwater bodies (Figure 5.3 and Table 5.2). This reflects the use of protected areas as a primary policy tool to fight deforestation in the region. The SNUC coverage in the other biomes is smaller and more fragmented, ranging from 9% in the Atlantic Forest to about 3% in the Pampa biome (Table 5.2). Despite progress across biomes, Brazil did not meet its ambitious target of protecting 10% of land area within each biome, and 30% of the Amazon, by 2010.

Figure 5.3. **Most protected areas are in the Amazon**



Source: MMA (2015), Cadastro Nacional de Unidades de Conservação (website).

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In 2013, Brazil set a new national target of protecting 30% of the Amazon, 17% of other terrestrial biomes, and 10% of coastal and marine areas; these targets expanded the definition of protected areas, beyond areas covered under the SNUC Law, to also include indigenous lands, APPs and RLs so as to better account for the various conservation efforts in the country.[5] When indigenous lands are taken into account, half the Amazon territory is within protected areas, far above the target (Table 5.2).

Marine protected areas covered only 1.5% of Brazil's total coastal and marine area in 2015. Marine protected areas have long been used for conserving biodiversity and protecting essential marine habitats. About 70% of mangroves are within protected areas (MMA, 2015a). More recently, marine protected areas have been recognised as a fishery management tool and used to reduce conflicts between traditional fishing communities

Table 5.2. **Protected areas and indigenous lands by biome, 2015**

	% of total biome area						% of terrestrial and inland water area	% of coastal/ marine area
	Amazon	Caatinga	Cerrado	Atlantic Forest	Pampa	Pantanal		
2020 target[a]	**30**	**17**	**17**	**17**	**17**	**17**	**17**	**10**
2010 target[b]	**30**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
SNUC protected areas[c]	26.6	7.6	8.2	9.0	2.7	4.6	17.2	1.5
Strict protection	9.6	1.2	2.9	1.9	0.3	2.9	5.8	0.1
Sustainable use	16.7	6.4	5.2	6.5	2.4	1.7	11.0	1.4
Indigenous lands	23.6	0.4	4.5	0.6	0.0	1.8	12.9	-
Total[d]	**50.2**	**8.0**	**12.7**	**9.6**	**2.7**	**6.4**	**30.1**	**1.5**

a) Includes protected areas under SNUC, indigenous land and protected area on private lands as required by the new Forest Code (APPs and RLs).
b) The 2010 targets include only protected areas that are part of SNUC.
c) The total SNUC area excludes overlaps between strict protection and sustainable use area, i.e. may be lower than the sum of the two groups of categories.
d) Total excludes RLs and APPs.
Source: Based on MMA (2015), *Cadastro Nacional de Unidades de Conservação* (accessed February 2015); MMA (2010), *Fourth National Report to the Convention on Biological Diversity*.

Box 5.2. **Indigenous lands**

About 13% of Brazil's territory is protected by designation of about 600 indigenous lands,[a] most of which are located in the Amazon. They are home to 230 indigenous peoples. Indigenous lands are not part of SNUC, as their primary objectives relate to cultural and social factors; however, they are recognised as effectively contributing to nature conservation and are therefore considered protected areas under the CBD and were included in Brazil's 2006 National Protected Areas Plan (Section 4.2). Indigenous lands tend to be well preserved, given indigenous communities' long-standing tradition of sustainable use of natural resources. For example, deforestation rates in these territories are among the lowest in the country: in 2014, only 1% of the total deforestation in the Amazon was within these areas. Indigenous lands are also integrated into "landscape mosaics" (Box 5.6). The Constitution also grants rights to *quilombola* people to collectively own the lands they have occupied since colonial times.[b]

Progress in the legislation on indigenous lands has helped address social issues associated with the management of protected areas (Irving, 2010). The 2007 National Policy for the Sustainable Development of Traditional Peoples and Communities and the 2012 National Policy on Territorial and Environmental Management of Indigenous Lands aim at promoting sustainable use of natural resources in indigenous lands, as well as defending the traditional knowledge of the communities involved. They have helped strengthen the relationships between environmental NGOs, the government and organisations working with indigenous peoples. Several other such initiatives are under way, some of which are supported by the National Environment Fund (Chapter 2) and international organisations. Co-ordination between programmes and involved institutions is weak, however (Irving, 2010). Conflicts about land use rights over indigenous lands can still arise, including with loggers, farmers and miners (Funai, 2015).

a) According to the Brazilian Constitution, the "lands traditionally occupied by indigenous peoples are those on which they live on a permanent basis, those used for their productive activities, those indispensable to the preservation of the environmental resources necessary for their well-being and for their physical and cultural reproduction, according to their uses, customs and traditions. The lands traditionally occupied by indigenous peoples are intended for their permanent possession and they shall have the exclusive usufruct of the riches of the soil, the rivers and the lakes existing therein".
b) *Quilombolas* are traditional groups or communities of African origin.

and fishing companies (OECD-FAO, 2015; also see Chapter 4). This is shown by the growth of marine sustainable use areas, where only traditional fishing activities are permitted. The Sectoral Plan for Sea Resources expects to increase the total marine protected areas to 4% of Brazil's territorial waters and exclusive economic zone by 2015. The government is sealing up efforts to bring this share to 5% by 2020. The Marine and Coastal Protected Areas project, supported by the Global Environment Facility, will contribute to this goal.

The WWF and ICMBio (2012) noted that federal protected areas do not adequately represent the totality of Brazilian ecosystems, nor do they sufficiently protect species against extreme population reduction or extinction, particularly in the Pampa biome (MMA, 2010). Federal protected areas cover nearly 60% of threatened flora and fauna species (Chapter 4). While Brazil needs to keep a tight focus on the Amazon biome, future efforts will need to concentrate on marine areas and the other terrestrial biomes, notably Cerrado and Caatinga, where protection through land-use zoning is low and the most future deforestation is expected (Soares-Filho et al., 2014; also see Chapter 4). The ecosystem representation of conservation may appear more balanced once the set-aside areas, as required under the Forest Code, are implemented and monitored.

1.3. Environmental and economic benefits of protected areas

The rapid expansion of protected area coverage in the Amazon biome has been primarily the result of an integrated and co-ordinated strategy to combat deforestation and illegal land grabbing, based upon the PPCDAm and the ARPA programme. It has also been driven by a desire to recognise traditional and local community rights. Since the mid-2000s, more than 500 000 km^2 of federal and state-level protected areas have been created in the Amazon, including along the so-called "deforestation arc" (comprising the eastern and southern edges of the forests in the states of Rondônia, Mato Grosso and Pará) and in areas expecting road infrastructure development. This was essential in slowing the advance of deforestation for land speculation purposes, which often occurs along new road as a consequence of easier access to the forest (CEPAL et al., 2011).

As Figure 5.4 shows, the establishment of protected areas greatly contributed to the decline of deforestation levels in the Amazon biome in the second half of the 2000s, together with the other measures discussed in Chapter 4. Between 2008 and 2012, nearly 95% of the deforestation in the region occurred outside protected areas. Deforestation is over four times less likely to occur in protected areas than outside these areas (TCU, 2013). This has also helped curb greenhouse gas (GHG) emissions; in 1996-2006, protected areas in the Amazon biome alone absorbed nearly 2 tonnes of CO_2 per hectare (TCU, 2013).

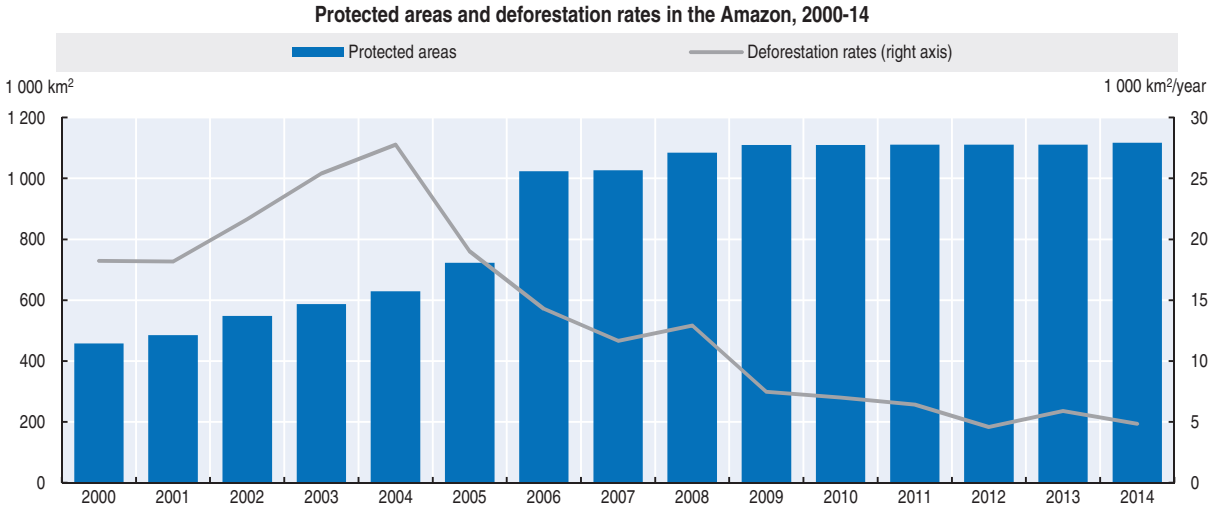
Protected areas contribute significantly to the provision and conservation of water resources and generate various economic benefits in terms of tourism, commercialisation of forest and biodiversity products and generation of tax revenue (Box 5.3). There is also evidence that marine protected areas have helped protect fish stocks (MMA, 2015a).

2. Institutional framework for protected areas

Government institutions

The national system of protected areas involves institutions at federal, state and municipal level. The MMA co-ordinates SNUC, while executing agencies at each level are responsible for implementation, including the proposal and establishment of new protected areas and their operation and management. The Chico Mendes Institute for

Figure 5.4. **Expanding protected areas has greatly helped reduce deforestation in the Amazon**



Note: Deforestation rates refer to the Amazônia Legal, which encompasses the Amazonian forest (about 4.1 million km²) and transitional vegetation (1 million km²).
Source: INPE (2015), "Projeto PRODES: Monitoramento da floresta Amazônia Brasileira por satélite"; MMA (2015), Cadastro Nacional de Unidades de Conservaçao.

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Box 5.3. **The economic value of Brazilian protected areas**

Medeiros and Young (2011) estimated that sustainable timber logging in the Amazon protected areas generated value of between BRL 1.2 billion and BRL 2.2 billion annually. The extraction of non-timber forest products such as rubber and Brazil nuts (in extractive reserves) was estimated to generate between BRL 16 million and BRL 39 million annually. Investment to enhance productive capacity of workers in these reserves would significantly increase annual gains; certification could add value to the final products.

The economic gains from tourism in national parks estimated at some BRL 1.6 billion per year, and revenue from all federal and state protected areas may reach BRL 2.2 billion in 2016, when Brazil hosts the Olympic Games. However, many protected areas are not yet accessible enough to allow a significant flow of tourists; there is still significant room to enhance tourism potential (Section 5.1).

Brazil's protected areas system is estimated to have prevented the release of about 2.8 billion tonnes of carbon into the atmosphere, which in monetary terms would correspond to nearly BRL 96 billion. In addition, it greatly contributes to the provision and conservation of water resources. About 80% of hydropower comes from sources located within or downstream of federal protected areas; 9% of drinking water is directly captured in protected areas and 26% is collected in downstream sources; and 4% of the water used in agriculture and irrigation is taken from sources within or downstream of protected areas.

Source: Medeiros, R. and C. Young (2011), *Contribuição das unidades de conservação brasileiras para a economia nacional: Relatório Final.*

Biodiversity Conservation (ICMBio) is the executing agency for federal protected areas. It was established in 2007 as the result of the division of the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) into two agencies: one maintaining the IBAMA name and the principal functions of licensing, monitoring and enforcement; and ICMBio overseeing the establishment, management and monitoring of

federal protected areas within SNUC.[6] The rationale for this change was to reinforce governance of the increasing number of federal protected areas and separate their preservation and management from compliance monitoring.

As federal protected areas are scattered through a vast territory, 11 ICMBio regional offices were set up to improve communication and co-ordination between the federal authority, the relevant subnational governments and local stakeholders. State and municipal protected areas are administered by the respective environment institutions, often with the support of ICMBio, non-government organisations (NGOs) and international development co-operation providers.

The establishment of an agency overseeing all aspects of federal protected areas is common to many federal countries, such as Canada and Colombia (OECD-ECLAC, 2014). In Brazil, it has helped improve the transparency and effectiveness of SNUC (Veríssimo et al., 2011). The large number of protected areas at all levels of government poses a challenge to effective co-ordination and co-operation among institutions. The Federal Court of Accounts (TCU) evaluated the governance and effectiveness of protected areas in the Amazon biome. It found that co-ordination was often insufficient, resulting in a duplication of efforts and reduced efficiency. The report found that about 70% of protected area managers believed co-operation among themselves, government bodies and NGOs was weak (TCU, 2013).

Non-government organisations

Many NGOs perform a complementary role in establishing and managing protected areas, and in supporting local communities living in and near them. In light of SNUC's constrained financial and human resources (Sections 4.3 and 4.4), NGOs can support activities such as developing technical studies and management plans, implementing management actions and promoting social participation.

NGOs are also involved in biodiversity and forest monitoring in protected areas. For example, SOS Mata Atlântica supported monitoring vegetation cover in the Atlantic Forest biome, Imazon runs a deforestation and forest degradation monitoring system in the Amazon, and the Instituto Socioambiental implemented a monitoring programme in Amazon protected areas and indigenous lands.

3. The establishment of protected areas

As in all countries, in Brazil the majority of lands that are or may be included in protected areas are inhabited. In addition, some areas may be important for potential infrastructure development (chiefly roads and hydropower plants) and other economic activities, such as agriculture and mining. Competition among environmental, social and economic interests is generally stronger in cities, as urban protected areas are likely to be on high-value land that can be used for urban expansion (Box 5.4). For protected areas to be established and managed effectively, consideration must be given to all these conflicting interests so as to avoid environmental, social and economic losses.

In acknowledging this need, the SNUC Law requires public consultation with local communities and stakeholders to be conducted prior to the establishment of protected areas at all levels of government (biological reserves and ecological stations are exempt). This is one of the main areas of progress represented by SNUC. In addition, the establishment of a federal protected area requires prior consultation of the ministries responsible for potentially affected sectors (e.g. mines, power plants, transport infrastructure, agriculture),

Box 5.4. **Urban protected areas in Brazil**

Protected areas in or at the edge of urban areas often provide high-value ecosystem services, such as drinking water, to nearby cities (e.g. São Paulo, Rio de Janeiro and Salvador) and opportunities for recreation and environmental education. They thus help improve the well-being of urban dwellers and build urban constituencies for nature conservation. Their establishment and operation entail specific complexities, however. Protecting urban areas involves several often conflicting interests; the areas are often potential sites for residential, commercial, industrial and government buildings and urban infrastructure such as roads and landfills.

In Brazil, urban protected areas are mostly managed by municipal governments, but there are examples of state-managed urban protected areas (e.g. in Belo Horizonte and São Paulo). Only a few urban protected areas are under federal jurisdiction, but they are among the largest (e.g. Tijuca National Park and Brasília National Park).

Tijuca National Park in Rio de Janeiro covers some 40 km^2 and is managed by ICMBio, in collaboration with the municipal and state governments. The collaboration was established in the late 1990s to meet urban interests related to transport and recreation and to respond to increasing pressures from urban expansion, especially from neighbouring *favelas*. In 2011, 28 national, state and municipal protected areas were consolidated to form the Carioca Protected Areas Mosaic. Tijuca National Park is an example of how strong inter-institutional co-operation can help regenerate large areas of degraded Atlantic forest.

Cantareira State Park, part of the São Paulo green belt, meets almost half the water demand of the urban area. In response to pressure from urban sprawl in the Cantareira mountains, in 2009 the state government launched a process aimed at nearly quadrupling the area under state protection. This required the purchase, transfer or expropriation of private land in seven municipalities. To this end, the state government co-operated closely with landowners and municipalities, surveying the perimeter of the proposed protected areas so as to tailor their boundaries to existing ecological, economic and political situations. Various kinds of protected area status were applied to allow compatible land uses to continue. This co-operation among different government levels, local communities and private landowners was a success. The protected areas were established in 2010.

Source: Trzyna (2014), *Urban Protected Areas: Profiles and best practice guidelines*.

as well as state governments. As in other countries, this process can take several years. While it is an important way to reduce the potential for conflict, bringing the various conflicting interests to consensus can be challenging and has sometimes prevented proposed protected areas from being established.

Some categories of SNUC protected areas, including national parks, are of exclusive public domain (Table 5.1). Establishing such a protected area requires private lands within its boundaries to be expropriated and the owners compensated. Traditional communities may reside in public sustainable development reserves and extractive reserves. While traditional communities do not own the land, which can only be bequeathed, they have the right to live on it and use its resources on the basis of management contracts and plans agreed with the responsible authorities (Section 5.3). In practice, activities and natural resource uses are allowed on 88% of the total SNUC area, including some strict protection areas; in the remaining areas the government seeks to enforce full restriction of the direct use of natural resources (Gurgel et al., 2009). Private ownership is permitted in some

protected area categories if land use is compatible with the category's objectives (Table 5.1); there are also private natural heritage reserves, which are recognised as part of SNUC upon request of the landowner.

Some SNUC implementing regulations and actions were approved and undertaken with considerable delay, notably with respect to land expropriation and compensation, but also regarding permitted activities in sustainable use areas. Regulatory uncertainty has been reduced, but conflict over land ownership and use remains. The establishment of protected areas has sometimes been received with resentment, with some local authorities, landowners and communities fearing (sometimes rightly) to be dispossessed of their land or expectations of future ownership. For example, establishment of the Mata Escura Biological Reserve in 2003, as environmental compensation for a hydroelectric plant, sparked conflicts with the local *quilombola* community. The conflict was resolved only in 2012 with an agreement between the community and ICMBio that allowed the community to remain in the protected area under certain conditions (Vilela, 2013). Pontões Capixabas National Park, established in 2002, included nearly 400 farms within its boundaries; ultimately, in 2008, it had to be reclassified as a natural monument, where private property is allowed.

While redefining boundaries and reclassifying protected areas may in some cases allow for more effective and equitable management, the process also reveals how economic interests compete for land currently under environmental protection (Mascia et al., 2014.). In 2014, four protected areas were degazetted on grounds of national strategic interests such as the construction of hydroelectric plants. Some states have approved more flexible rules that make degazetting easier.

The establishment of sustainable use areas is generally less difficult because restrictions on resource use are less severe. Traditional communities have increasingly requested the establishment of this type of protected area, which can provide a means of improving living conditions and getting access to public services and social benefits (Section 5.3). In 2014, over 50 new extractive reserve proposals were filed by traditional fishermen alone (Prates, 2014).

The expropriation and compensation of private property for exclusively public protected areas are challenging, especially because of insufficient financial resources to compensate landowners and, to a lesser extent, unclear land tenure. In 2011, 20% of the Amazon area was supposedly public land, which facilitates the establishment of protected areas, while only 4% was covered by valid private property titles (Figure 4.4). About 70% of federal protected areas, or 7% of the surface area under federal protection, includes land on which there are private property claims, mostly in the Amazon, Cerrado and Atlantic Forest biomes (TCU, 2013; Veríssimo et al., 2011). TCU (2013) estimated that BRL 7.1 billion was needed to resolve this situation; the federal budget allocated about BRL 70 million per year in 2009-12 for this purpose. At that pace, it would take more than a century to complete the process. The resolution of problems related to territorial consolidation and land tenure sometimes exceeds the capacity and responsibility of environment authorities (TCU, 2013).

The Terra Legal Programme, launched in 2009 with the aim of regularising the occupation of federal public land in the Amazon (Box 4.3), is expected to lead to the establishment of new protected areas with clear land tenure. The programme helps clarify ownership and user rights of public lands among federal and state agencies. About 50 000 km^2 of federal public land was assigned to the MMA for the creation of protected

areas. One protected area was created in 2014 (the Maues Ecological Station) and a group of new areas totalling more than 35 000 km^2 is being created along the Trans-Amazonia Highway in southern Amazonas state, a recent deforestation hotspot.

The new Forest Code introduced a land offset mechanism that could help consolidate public protected areas. It allows landholders that are not compliant with forest set-aside requirements to make up for this deficit by buying private property within official protected areas on behalf of the government. For this mechanism to operate, the Rural Environmental Cadastre will have to be fully implemented (Chapter 4).

In addition to these efforts, Brazil could consider alternative ways to increase the amount of land under environmental protection, including extending the network of private protected areas, which now account for a negligible share of the SNUC surface. Encouraging contractual agreements with landowners can be a cost-effective way of ensuring biodiversity conservation and sustainable use. In South Africa, for example, the Stewardship Programme between the government and landowners is estimated to cost only about one-tenth what it would cost to purchase land outright (OECD, 2013). Beyond cost savings, such approaches allow protected areas to be expanded in a way that considers the rights and interests of landowners.

4. The management of protected areas

4.1. *Management committees and plans*

The SNUC Law requires the creation of management committees, whose main function is to facilitate the active involvement of local communities and stakeholders in decisions concerning protected areas. These committees play decision or advisory roles, depending on the management category. They are composed of government officials and representatives of civil society and the private sector. As of 2013, out of the 320 federal protected areas (excluding private reserves), 253 had committees established and 25 were in the process of establishing them (ICMBio, 2014).

Some factors can limit effective social participation, including inadequate training for managers and committee members, insufficient involvement of potential stakeholders and lack of financial resources (Mendonça et al., 2014). In addition, most management committees have not yet defined their operating rules, so there is still a risk of exacerbating conflicts among committee members (Veríssimo et al., 2011).

The protected area management plan is the main planning and day-to-day management instrument. It should take account of the protected area's objectives and its physical and socio-economic features, as well as the zoning and regulations that guide natural resource use in the area. The existence of a management plan is a condition for public use activities (such as tourism and environmental education), as well as for sustainable logging and local community resource use. The SNUC Law requires the development of management plans within five years of the establishment of a protected area, and it mandates nature protection and basic management to guarantee the area's integrity until the plan is developed. Management plans may be complemented by other instruments: some sustainable use areas, for example, have a "plan of utilisation" as the first phase of the management plan, allowing signage and land regularisation to be carried out.

Due to limited resources and capacity, many protected areas still lack a management plan after the five-year deadline. In 2012, only 94 of the then 247 federal and state protected

areas in the Amazon biome had an approved management plan; 40 federal protected areas had been managed without a management plan for more than 10 years (TCU, 2013). This pattern also holds in other biomes; only in the Atlantic Forest biome did more than half of federal protected areas have an approved management plan in 2013. The lack of a management plan implies that management is limited to monitoring and research, hence impeding socio-economic development, as the example described in Box 5.5 shows.

Box 5.5. **No management plan, no tourism: The case of Anavilhanas National Park**

Anavilhanas is one of the most extensive freshwater archipelagos in the world. It contains more than 400 islands, hundreds of rivers and lakes and, during the dry season, white sand beaches. In the early 1980s, an ecological station was established to strictly protect the area and allow access only for scientific purposes. In recognition of the area's tourism potential, the protected area was reclassified as a national park in 2008. The management plan, however, had been adopted to meet the objectives of an ecological station and has not yet been revised. In 2012, ICMBio issued temporary permission for tourism activities in the park under certain conditions. However, in 2014, expanding demand for tourism activities and constrained management capacity at the site led ICMBio to restrict the park management from allowing access to visitors, maintaining that, without a valid management plan, tourism could have an unacceptable impact on biodiversity.

Efforts to develop and approve management plans have intensified in recent years, but the gaps remain large (Veríssimo et al., 2011). Existing management plans are often based on sound scientific information and analysis, yet tend to lack management tools and practical applicability, resulting in a generally low level of implementation. In 2012, half the management plans of Amazonian federal and state protected areas were being applied very little, if at all, according to the TCU (2013). Other studies pointed to even lower levels of implementation (Semeia, 2012b). Developing a management plan tends to be costly and time-consuming. The lack of implementation highlights the need to develop management objectives and approaches that suit the specific protected area, so as to ensure that each plan is applicable in practice (Kinouchi, 2014). Management plans should include financial analysis and be periodically reviewed, and adjusted where they prove ineffective. There is also a need for better-trained protected area managers and for promotion of co-operation and exchange of experience and best practices among them.

4.2. Integrated management of multiple protected areas

The SNUC Law also introduced instruments for managing protected areas at landscape scale, allowing connections among and within ecosystems to be maintained or increased. It recognises ecological corridors as territorial management instruments to maintain ecological processes,[7] and introduces the possibility of integrating multiple protected areas into a "mosaic" if they occur in proximity or overlap.

Mosaics aim to facilitate co-ordination among mangers and local populations of the participating protected areas so as to find shared solutions to common issues such as land and resource use in border zones, access to the protected areas, enforcement, monitoring and evaluation of management plans, scientific research and allocation of resources

(MMA, 2010). As of 2014, the MMA had approved 14 mosaics; Box 5.6 describes an example. However, their implementation is challenging; many protected areas in Brazil are still managed as individual administrative units.

Box 5.6. **Managing protected areas at landscape scale: The Lower Rio Negro Mosaic**

The Lower Rio Negro Mosaic in Amazonas state covers more than 70 000 km^2 and encompasses 11 protected areas (three federal, seven state and one municipal) in five municipalities. The area includes dozens of riverine and indigenous villages that live off small-scale agriculture and extractive activities. Officially recognised in December 2010, the mosaic aims to improve the management of its participating protected areas by adopting a shared and participatory management model.

The mosaic has a common management committee, chaired by the manager of a participating national park, and a joint management plan in addition to the individual management plans of the areas involved. This structure allows park managers to share expertise, infrastructure and equipment and better engage with communities residing in border areas. For example, the personnel of a given protected area focus not only on issues related to that area, but also assume thematic responsibilities across the entire mosaic. The mosaic structure helps address environmental and socio-economic challenges, many of which are common to all protected areas, and facilitates the resolution of conflicts arising in border areas. Such conflicts are often linked to the monitoring and control of natural resource use.

In two of the mosaic's national parks (Anavilhanas and Jaú), for example, members of local communities residing nearby conduct traditional activities within the parks – such as turtle fishing, sand collection and logging – that are not permitted under national park regulations. While these are mostly carried out for community consumption as traditional activities, product sales to commercial companies are increasing; turtle trafficking, for example, has become a major challenge in the region. Enforcement of park regulations has caused many families to move to the neighbouring extractive reserve, where natural resource use is permitted.

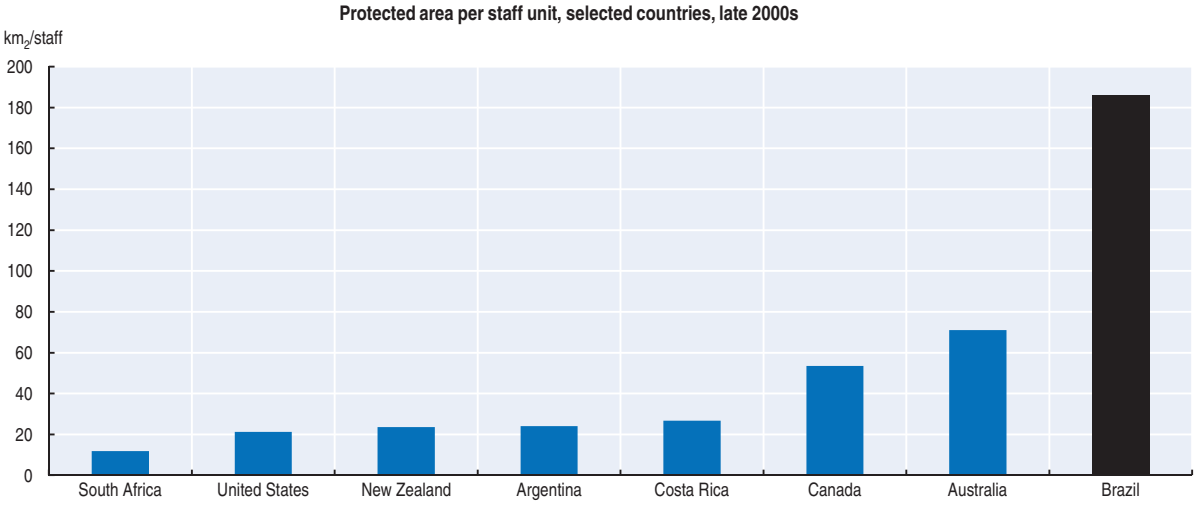
The 2006 National Protected Areas Plan also attempted to integrate the various types of protected areas, those covered and not covered by SNUC (e.g. indigenous lands), into one holistic landscape planning process that would take account of the contribution of protected areas to poverty eradication and social inclusion. This plan probably has too many potentially conflicting objectives and has not been fully implemented. The heterogeneous characteristics and needs of the areas made it difficult for the responsible government agencies to reach consensus.

4.3. Human resources

Managing the vast territory covered by SNUC requires numerous well-trained staff. There is evidence that human resources are insufficient, however. According to ICMBio (2014), 1 079 civil servants were directly involved in the management of federal protected areas as of August 2014. This means, on average, one public servant per 700 km^2 of federal protected areas. In 2010, 305 people were employed in state-level protected areas in the Amazon region, but with large variations across states. In the state of Amazonas, for

example, there was only one employee per 5 900 km^2 (Veríssimo et al., 2011). Medeiros and Young (2011) estimated that, in the late 2000s, staff density was among the lowest in the world. According to their analysis, an employee in a Brazilian protected area managed, on average, roughly 200 km^2, compared to less than 20 km^2 in South Africa (Figure 5.5).

Figure 5.5. **Each protected-area staff member in Brazil manages a much larger area than in other countries**



Source: Medeiros, R. and C. Young (2011), *Contribuição das unidades de conservação brasileiras para a economia nacional: Relatório final.*

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Lack of human resources is a key reason for the insufficient implementation of many activities, especially those related to surveillance, conflict management, promotion and control of public use, and biodiversity monitoring. Estimates suggest that at least 19 000 additional workers are needed overall – 13 000 of them for field activities – in federal and state protected areas (MMA, 2009). At ICMBio alone there is a workforce deficit of 7 000 people, including employees, firefighters and volunteers, though new hiring processes have helped reduce the gap at the federal level in recent years. According to the TCU (2013), in 2012 one-quarter of federal and state protected areas in the Amazon region had no staff; only three protected areas reported that the number of staff was sufficient.

Staff turnover poses additional challenges to effective management. Attracting staff for the long term has proved difficult in some areas, notably remote parts of the Amazon, where working and living conditions (e.g. health, education, housing, transport) are demanding. Satisfactory working conditions are rare, given the generally weak infrastructure, resources and capacity. The lack of staff in protected areas has also been associated with Brazil's strict employment regulations and the red tape involved in hiring in the public sector.

While generally highly motivated and committed, many managers and staff are life scientists and are not trained for day-to-day management challenges, particularly those related to public use of protected areas (e.g. visitation for tourism, recreation and environmental education, and forest concessions), and the conflicts that arise among or with local stakeholders. This lack of capacity also results in poor quality projects, inability

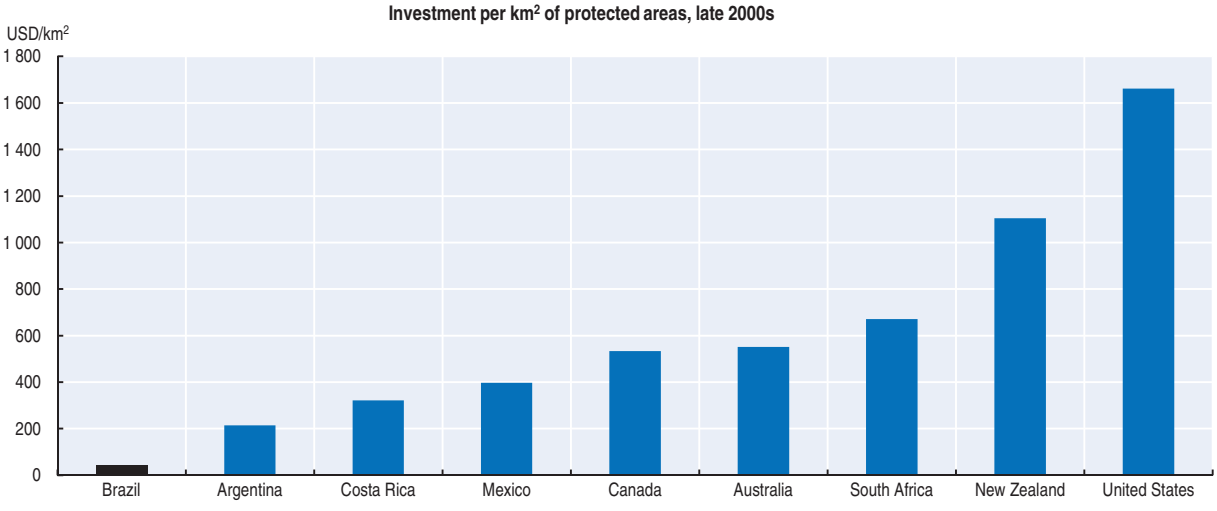
to attract financial resources and difficulty in efficiently spending what funds are allocated. Efforts are being made to reduce this knowledge deficit, including through the NGOs WWF and Institute for Ecological Research (IPE), which provide training to managers of ARPA-associated protected areas, and through ICMBio's internal capacity-building facility, ACADEBio.

4.4. *Financial resources*

The SNUC Law requires allocation of sufficient financial resources to protected areas to ensure that they are effectively managed and meet their goals. However, the expansion of protected areas has not been followed by a commensurate increase in resources. A 2012 survey among managers of protected areas revealed that 60% did not have sufficient resources to carry out their activities (Semeia, 2013).

While the exact amount of funding available for SNUC is not clear, several studies indicate a considerable financial gap for effective management of the huge area under protection – a situation common in much of Latin America (Bovarnick et al., 2010). The MMA (2009) calculated that maintaining federal protected areas in "satisfactory operational conditions" would require a budget increase of BRL 540 million; at the state level, the financial gap was BRL 360 million. In addition, an estimated BRL 610 million in investment would be needed to adequately consolidate federal protected areas (e.g. to put in place the necessary infrastructure), along with some BRL 1.2 billion for state protected areas (Funbio, 2009). Brazil invests much less in maintaining its protected areas than other countries, including Latin American countries and emerging economies (Figure 5.6). The lack of financial resources heavily constrains protected area managers from adequately meeting objectives and from hiring the staff necessary to manage the areas (Section 4.3).

Figure 5.6. **Investment in protected areas is lower than in other countries**



Source: Medeiros, R. and C. Young (2011), *Contribuição das unidades de conservação brasileiras para a economia nacional: Relatório final.*

StatLink http://dx.doi.org/10.1787/888933279819

Resources for protected area management originate from a variety of sources, the most significant one being the federal budget. The volume of public resources allocated to SNUC is not systematically tracked. The last assessment of financial resources available to

federal protected areas was conducted in 2009 by the MMA and the Ministry of Planning and Budget.[8] It indicated that 85% of federal protected areas' resources came from budget allocations to ICMBio, 10% from budget allocations to other environmental institutions[9] and 5% from non-budgetary sources (MMA, 2009). Other sources include relatively limited amount of environmental compensation, national and international donations and revenue from tourism and sustainable forestry (Sections 5.1 and 5.2).

Overall, the operation of SNUC heavily relies on public budgets, mainly federal. This is true in many Latin American countries, although Brazil exhibits one of the highest levels of reliance on government budget outlays, which makes funding vulnerable to external factors and political negotiations (Bovarnick et al., 2010). Brazil should develop an integrated financial strategy to guarantee more efficient and effective use of resources for protected areas and for biodiversity policy more generally, and further explore alternative funding sources. These may include payments for ecosystem services (e.g. water supply and carbon sequestration); revenue from access fees to protected areas, branding and sale of merchandise; and part of the revenue from royalties, from financial compensation paid by hydropower plant and mine operators and from benefits generated from access to genetic resources (Chapter 4).

Brazil could helpfully extend the use of concessions for tourism services and sustainable forest management and, more generally, better engage the business sector in providing infrastructure and services in protected areas. It could also extend the use of public-private partnerships (PPPs) for partial or full management of protected areas, including environmental conservation. This would allow the public authorities to shift their attention from direct management to oversight of protected areas, which is less resource intensive, although it would require different staff capacities and skills. While a number of concessions for tourism activities are in place, the first example of a full management contract was concluded in 2015 (Box 5.7).

Box 5.7. **The Lund Route: Brazil's first public-private partnership for protected area management**

In 2012, the government of Minas Gerais state, in partnership with the NGO Semeia,[a] launched Brazil's first PPP for protected area management. It is for the Peter Lund Route, a hiking trail covering 24 km^2 in three protected areas north of the Belo Horizonte metropolitan area. The PPP is aimed at increasing tourism while improving the effectiveness of conservation.

The 30-year concession contract makes the concessionaire responsible for all conservation activities, including fire control, species control and scientific research. The government's role is limited to monitoring and supervising the concessionaire's performance, using defined indicators.

The proposed PPP model was open to public consultation for 60 days, and various workshops and discussions were held. The bidding process was submitted for public consultation in November 2013; by March 2015 the concession contract had been signed.

a) Semeia is a non-profit organisation that supports the development and implementation of new management models for Brazil's protected areas. It aims to encourage dialogue among government, private sector and civil society actors and to promote the creation of PPPs to manage protected areas.

Source: Semeia (2013), *Semeia Annual Report 2013*.

Budgetary allocations

The budget available to the federal SNUC system decreased by roughly 35% in real terms over 2000-08 (MMA, 2009) despite the significant expansion of the system (Section 1). In a welcomed development, the budget of ICMBio, the main source of SNUC finance, grew by 57% between 2008 and 2014, reaching BRL 783 million (Chapter 2). Resources are largely used to cover staff and running costs, with investment accounting for between 2% and 11% (Funbio, 2014a). There is no consolidated data about subnational budget and expenditure for protected areas.

Environmental compensation

Environmental compensation is the main private contribution to protected area finance. It involves obligatory payments by project developers in the framework of the environmental licensing of installations and infrastructure that could cause environmental degradation or pollution (Chapter 2). At the federal level the compensation can reach 0.5% of the total project costs, depending on the severity of project impact. The SNUC Law provides for resources from environmental compensation to be fully allocated to protected areas, with priority given to strict protection areas. IBAMA defines environmental compensation fees and decides which protected areas should benefit from collected resources. Payments can be made directly in the form of products or services benefitting the protected area or indirectly to a fund managed either by ICMBio or by third parties.[10] The level of execution is, however, very low. In 2008-14, only 8% of available compensation funds were actually spent. Legal uncertainty related to the compensation process is a major bottleneck for more efficient use of these resources; another is the lack of suitable projects in which the resources can be invested (Funbio, 2014a).

Ecological ICMS

Brazil pioneered the use of fiscal transfers as an incentive for biodiversity conservation in protected areas.[11] About half the states redistribute a share of the revenue from the state-level value added tax (ICMS) on the basis of environmental criteria under a mechanism called Ecological ICMS (or ICMS-E). By far the main parameter is the extension (and type) of protected areas and indigenous lands, followed by the presence of municipal waste collection services, public watersheds, and wastewater treatment (IBGE, 2014). Generally, more weight is given to strict protection areas. A similar mechanism, based on the redistribution of income-related federal taxes to the states based on protected areas, has been under discussion in Congress for years.

The ICMS-E was established to compensate municipalities for the opportunity cost of maintaining part of their territory under nature protection, as the use of protected areas for economic activities that can generate tax revenue is restricted. For some municipalities with high protected area coverage, the revenue from ICMS-E amounts to a significant share of the municipal budget.[12] It is possible, though not necessary, to use the ICMS-E revenue to finance expenditure in protected areas or for environmental purposes more generally.

The mechanism has helped increase the number and size of protected areas in Brazil, although its impact on biodiversity conservation is not very clear (May et al., 2012). Empirical studies show that there has been an increase in protected area coverage since the introduction of the ICMS-E in a number of states, although other factors may have contributed. Several municipalities have established large environmental protection areas

(APAs) with loose land-use restrictions (Table 5.1), the only goal being to increase their revenue (Ring et al., 2011). APAs cover 98% of municipal protected areas, with generally low effectiveness for biodiversity protection.

Only the state of Paraná, which introduced the system in the early 1990s, makes the revenue transfers conditional on quality indicators of the status of protected areas and buffer zones and on municipal resources dedicated to conservation actions. This approach is potentially more effective in encouraging good protected area management, but entails additional cost, including for periodic inspections. Overall, the degree of success in expanding protected area coverage appears correlated with technical and institutional capacity at the state and municipal levels (Peters, 2012).

International sources and fundraising partnerships

Brazil has managed to establish fundraising partnerships with bilateral and multilateral development co-operation organisations to finance activities related to protected areas. International finance contributes a minor share of the total budget available to SNUC (8% of the federal protected area budget in 2008), but has helped leverage domestic resources and improve resource use effectiveness by addressing some of the most pressing bottlenecks. However, funding from international partners is likely to gradually decline in the years to come.

The ARPA programme and its Protected Area Fund (Box 5.1) are the most important extra-budgetary source of finance for federal, state and municipal protected areas in the Amazon. Funbio was mandated by the MMA to carry out the financial management of the programme (Box 5.8), which receives large international donations (Germany is the largest donor). The Amazon Fund also helps finance the ARPA programme and other activities to control deforestation, including in protected areas (Chapter 4).

Box 5.8. **Brazilian Biodiversity Fund**

The Brazilian Biodiversity Fund (Funbio) was founded in 1996 as a private non-profit organisation to invest in biodiversity conservation in Brazil. It was created upon the initiative of the MMA and GEF to complement direct government efforts, the rationale being that a private institution would be less vulnerable to changes in government and able to attract more private finance. Funbio's main activity is the support of Brazilian protected areas. The volume and scope of support expanded massively in 2003 with the launch of the ARPA programme. By 2014, about one out of five public protected areas in Brazil received support from Funbio, either directly (e.g. management plans, infrastructure work, procurement of equipment, training of management councils, resolution of land tenure issues) or indirectly (research projects, species monitoring and management, capacity building for park managers, environmental education).

Since its creation, Funbio has mobilised about USD 500 million. Resources originate largely from bilateral and multilateral institutions (the GEF being a major supporter), the Amazon Fund and, to a lesser extent, private donations. Funbio has developed interesting financing schemes to increase private resources, such as the Adopt a Park programme, under which private companies can provide finance for infrastructure and facilities within a selected park. It has also launched mechanisms designed to receive resources from environmental fines and compensation, and manages Brazil's debt-for-swap agreements.

Source: Funbio (2014b), *Funbio and Protected Areas: 2014*.

Donations and private sector engagement

With the exception of some international donations, private voluntary donations to SNUC are limited. This situation has been attributed to the lack of tax incentives for donations and a limited culture of environmental philanthropy (Funbio, 2014b). Involving local businesses and entrepreneurs has generally proven challenging and possibilities for partnership schemes are limited. For example, there are few possibilities for donors to associate their brand with an area or service within protected areas. Nonetheless, specific donation initiatives have been successful in raising additional resources; in Funbio's Adopt a Park programme, for example, the energy companies OGX and MPX committed to support the national parks of Fernando de Noronha and Lençois Maranhenses with more than BRL 4 million each over 2012-18 (Funbio, 2014b).

There are a few examples of private companies financing infrastructure and other investment in protected areas, including companies that donated to the ARPA programme (including Natura, O Boticário and Anglo American). The majority-government-owned companies Petrobras (oil) and Vale (mining) have sponsored several biodiversity conservation initiatives, including in protected areas. For instance, Petrobras supports the Tamar project for the conservation of marine turtles, many nesting in marine protected areas such as Fernando de Noronha National Park. Vale finances the management of more than 12 000 km^2 of local protected areas in the Atlantic Forest, Amazon and Cerrado biomes (de Bulhões Mossri, 2012).

4.5. Assessment of management and biodiversity conservation effectiveness

Management effectiveness

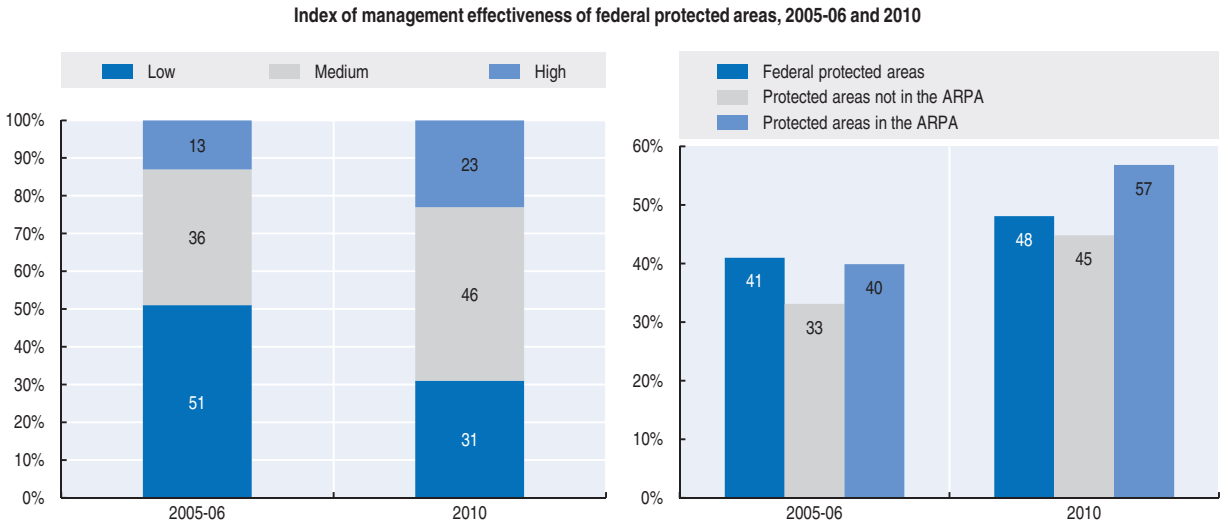
Following the remarkable expansion of protected areas over the 2000s, Brazil now faces the challenge of effectively managing these areas. The management of many protected areas struggles to meet objectives, a problem that, as previous sections have shown, is linked to limited human and financial resources.

An assessment of federal protected areas by WWF and ICMBio (2012) found that about 30% of federal protected areas operated at low management effectiveness levels in 2010; this, however, was a significant improvement from the previous assessment in 2006, when the share was above 50% (Figure 5.7).[13] Improvements were made particularly with respect to planning, available human resources and infrastructure. Management effectiveness improved mainly in extractive reserves, ecological stations and national forests, as well as in protected areas in the Amazon and Cerrado biomes.

Areas supported by the ARPA programme (Box 5.1) showed a higher effectiveness level than the other federal protected areas (Figure 5.7). The better performance was directly linked to the result-based approach of the programme, the considerable financial resources invested in ARPA areas and the fact that both federal and state governments are required to contribute human resources for managing these areas (WWF and ICMBio, 2012). The need to be accountable to international donors may also have played a role.

Despite this improvement, the overall management performance is unsatisfactory. A more recent assessment of federal and state-level protected areas in the Amazon biome found that only 4% had a degree of implementation and management that was sufficient to fulfil the objectives set for these areas (TCU, 2013). While the available financial resources have increased in recent years, the capacity to spend these resources has worsened. This reflects inadequate management skills and substantial red tape. The low level of management effectiveness is of concern, notably in light of overall increasing pressures on

Figure 5.7. **Management effectiveness is low in many protected areas**



Notes: Index of management effectiveness of protected area according to the Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) methodology. The overall effectiveness performance (based on context, planning, inputs, process and outcomes assessment) is expressed as a percentage of the maximum effectiveness that could be achieved. The intervals <40%; 40% -60%; and >60% define the respective classes of low, medium and high effectiveness of management.
Source: WWF and ICMBIO (2012), *Avaliação comparada das aplicações do método Rappam nas unidades de conservação federais, nos ciclos 2005-06 e 2010.*

StatLink http://dx.doi.org/10.1787/888933279827

protected areas from infrastructure development, hunting, resource extraction and invasive species (WWF and ICMBio, 2012). Overall, the weak management performance results in untapped economic, social and environmental potential of protected areas, especially in terms of public use (tourism, recreation and education), sustainable forest management and other income opportunities for traditional communities (Section 5).

While much progress has been made in registering the protected areas in the CNUC, notably with respect to federal and state protected areas, the information provided is usually limited to very basic data (mainly legal information and spatial data), with little on management and activities. As of early 2014, only 40% of the registered areas had provided statistics on the number of staff and visitors (Semeia, 2014). When fully implemented, the CNUC could be an important source of information for evaluating effectiveness of protected areas (Prates and Sousa, 2014).

Socio-environmental effectiveness

Monitoring and assessing management effectiveness require understanding of biodiversity trends in protected areas and of changes in the socio-economic conditions of the affected local communities. Most protected areas, however, do not systematically conduct such monitoring. Two-thirds of managers in federal and state protected areas in the Amazon biome have not monitored biodiversity for years, mainly due to insufficient infrastructure, equipment and access (TCU, 2013). More than half the managers of Amazonian extractive reserves and sustainable development reserves have reported that they lack the tools to monitor the results of social and environmental development activities.

ICMBio maintains an electronic system (SISBio) to provide researchers with permits to collect biological material in federal protected areas and to gather the information generated from research. It has monitored coral reefs in marine protected areas since 2002.

Monitoring results suggest that fish stocks and species diversity are higher in areas where fishing is not permitted than in marine sustainable use areas. Since 2010, ICMBio has conducted *in situ* monitoring programmes in several federal protected areas in the Amazon, Atlantic Forest, Caatinga and Cerrado biomes.

These programmes could be further extended with a view to generating information needed to assess the effectiveness of conservation initiatives. More generally, Brazil should invest in monitoring and assessing the effectiveness of protected areas in delivering their expected environmental, social and economic benefits as a way to build political and society support for protected areas and mobilise the necessary resources.

5. Sustainable use of protected areas

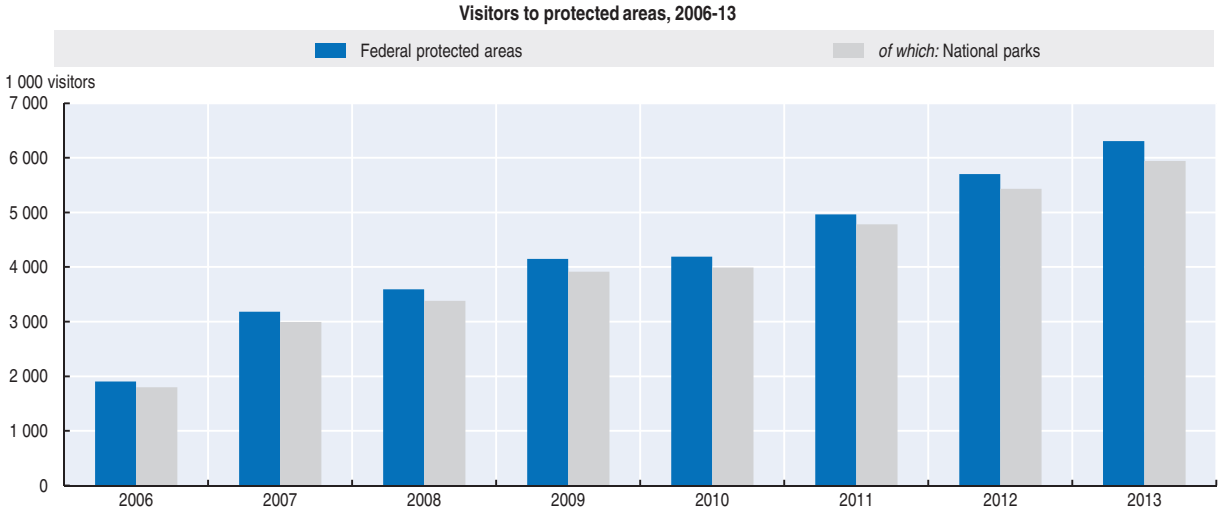
5.1. *Tourism and recreation*

According to the World Economic Forum, Brazil has the world's largest tourism potential with respect to natural resources but ranks only 53rd with respect to tourism competitiveness (TCU, 2013). There is, therefore, room to better exploit economic opportunities related to Brazil's natural wealth and protected areas. The economic benefits from public visitation of protected areas (including for tourism, recreation and environmental education) are estimated to be large. Brazil's national parks alone could generate between BRL 1.6 and 1.8 billion annually until 2016 (Medeiros and Young, 2011; also see Box 5.3). Semeia (2014) estimates that the potential income from tourism in protected areas could reach as much as BRL 53 billion over 10 years.

The number of people visiting federal protected areas more than tripled between 2006 and 2013, to 6.3 million (Figure 5.8). National parks attract by far the most visitors. Iguaçu and Tijuca national parks alone accounted for nearly 60% of visitors in 2013. Public investment in infrastructure and services, under programmes such as Parks of the World Cup and Tourism in the Parks, and concessions to private operators have helped increase tourist arrivals (ICMbio, 2012b). For example, concessions to private operators have been crucial for the tourism development of Foz do Iguaçu National Park. It has allowed the building of tourism infrastructure such as parking places, a visitor centre, inner-park transport and provision of food and beverage service and leisure and adventure activities. Concessions of this kind have also been used in other major parks, such as Tijuca and Fernando de Noronha, and new concessions are planned in coming years (ICMBio, 2012b).

While expanding, public visitation is still in its infancy. All protected area categories but two are open to visitors, but many areas receive none or very few (some areas receive visitors but do not register or track visitation). As of 2012, only 26 of the 68 national parks were officially open for tourism; the remaining received some visitors but with limited planning and control (ICMBio, 2012a). According to a survey conducted among protected area managers the same year, almost one-third of protected areas did not receive visitors at all and nearly 50% received fewer than 50 000 visitors a year. In addition, only 17% of protected areas that could receive visitors generated revenue from public visitation, with a slightly higher share for national parks (Semeia, 2012b).[14] This seems to be primarily related to the lack of adequate infrastructure and service provision for visitors (TCU, 2013; Semeia, 2012b), as the case of Chapada dos Veadeiros National Park shows (Box 5.9). In other cases, difficulty organising adequate fee collection systems is a major barrier.

Figure 5.8. **The number of visitors in national parks has increased**



Source: ICMBio (2014), *Relatório de Gestão 2013.*

StatLink http://dx.doi.org/10.1787/888933279834

Box 5.9. **The untapped tourism potential of Chapada dos Veadeiros National Park**

Chapada dos Veadeiros National Park is a World Heritage site encompassing unique vegetation, hundreds of waterfalls and other water bodies, and walking trails across the Cerrado biome. The park is primarily a weekend and holiday destination for people from the Centre-West region, especially from Brasília. In 2009 a total of 22 950 tourists visited the park (Medeiros and Young, 2011). Only a very limited part of the protected area has infrastructure adequate for tourism and there is only one official park entrance, in São Jorge district of Alto Paraíso de Goiás. Cavalcante, a town in which tourism has been growing due to popular attractions such as waterfalls and trails on private land, does not have any access to the park.

While an entrance fee could be charged and there is demand for facilities to sell food, drinks and souvenirs, ICMBio has neither the personnel nor the infrastructure to develop such services. Red tape and administrative constraints, as well as capacity constraints at the park level, have so far blocked the proposed bidding process to award a concession for tourism-related services. Overall, the park remains little known and poorly visited by Brazilians and international tourists, resulting in missed opportunities to generate much needed revenue and build a constituency for nature conservation.

Expanding public visitation could help enhance the financial sustainability of SNUC and would help build public support for protected areas, as the example of Canada illustrates (Box 5.10). Tourism and other forms of public visitation in protected areas are a significant source of revenue in other countries. In South Africa, for example, the public agency managing national parks receives 75% of its budget from concession fees and private investment related to tourism (Semeia, 2012a). Resources can be raised from entrance fees and from tourism-related services such as transport, food and beverages, and leisure. In 2011, ICMBio received BRL 24 million from access fees and services in federal parks, with four parks accounting for most of the revenue (ICMBio, 2012a).

Box 5.10. **The value of protected area visitation: The case of Parks Canada**

Parks Canada, the agency in charge of protected areas, conducts periodic surveys of the Canadian population's attitudes towards natural parks. The 2012 National Survey of Canadians revealed that visitation was critical in helping the population connect with protected areas and the institutions that manage them.*

In 2012, more than three-quarters of people who had visited one of the country's national parks had a "sense of connection" to them. Only about 15% of people who had not visited a national park were able to say the same. Visiting is an important factor in helping give people a sense of stewardship towards their national parks. In 2012, more than nine in ten people who had visited national parks strongly felt that the parks were meant to be enjoyed by future generations as much as by people today, and nearly 80% would miss national parks if they were gone; among people who had not visited a park, both shares were lower.

Canadians who have visited a national park are more likely to be supportive of the activities Parks Canada undertakes to fulfil its mandate. In 2012, about half of the interviewed park visitors strongly supported the use of taxpayer money for the creation of new parks, compared to 40% of people who had never visited a park. About 80% of visitors were also in favour of using public funds to maintain existing national parks, compared to about half of non-visitors.

* The survey was conducted by telephone in February and March 2012. In total, 3 786 adults responded. Visitors: those who had visited a Parks Canada-administered national park in the last three years; non-visitors: those who had never visited a Parks Canada-administered national park.

Source: Parks Canada (2012), *The VALUE of Visiting…continues*.

Protected areas are not yet integrated into Brazil's national tourism strategy and most tourists are not aware that some of the country's main tourist attractions are located in protected areas (TCU, 2013). A survey conducted in 2012 revealed that 44% of Brazilians did not know what a protected area was; only 1% of those who had knowledge of protected areas believed that their purpose was recreation and tourism (MMA, 2012). Protected area laws and regulations seem to be relatively inadequate to promote tourism and visitation. This partly reflects the fact that the protected areas created over the 2000s had the primary objective of controlling deforestation, and that no major strategy to promote public use has been developed since. Only recently has the government stepped up efforts to promote public use (Burns and Moreira, 2013). There is room for better integrating protected areas into Brazil's wider tourism strategy and for building capacity of park managers to develop strategies and partnerships that would increase the attractiveness of tourism and environmental education services.

Partnerships with private businesses and non-profit organisations to manage visitation services are relatively rare. Semeia (2012b) found that only 13% of protected areas had PPPs or concessions in place, though most protected area managers would be interested in expanding such arrangements. The main stumbling blocks were regulatory constraints, a lack of adequate management plans and limited resources and capacity of the park management. At the same time, private businesses (notably small and medium-sized ones) often lack capacity to comply with the legal obligations required for business relations with the government. Designing and negotiating partnership agreements and contracts are time- and resource-intensive and often exceed the capacity of park managers. Some steps have been taken to facilitate the use of PPPs and concessions,

including dedicated training programmes. In 2011, the MMA and the Ministry of Planning, Budget and Management agreed to launch pilot PPP agreements in ten national parks with high tourism potential. Brazil would benefit from expanding the use of PPPs and concessions, as they open possibilities to improve infrastructure and services for public visitation when public resources and capacities are limited.

5.2. *Sustainable forest use and forest concessions*

The government began granting forest concessions to promote sustainable timber logging in 2008, but a very little of the area eligible has been affected (Chapter 4). The MMA estimated income from forest concessions at about BRL 190 million annually over 2010-20 (MMA, 2010). The majority of such forests are located outside protected areas, but some categories of protected areas, such as national forests, are eligible for concessions. While the granting of forest concessions for large-scale forestry can be burdensome, small-scale extraction by traditional communities residing in public forests can also generate significant resources. In Tapajos National Forest in Pará state, for example, small-scale timber logging generated more than BRL 3 million in 2012 (TCU, 2013).

Despite the interest of national forest managers, the use of forest concessions in protected areas has been limited. In the early 2000s, only 3 of the 65 national forests had granted concessions, with part of the revenue channelled back to the protected areas (Funbio, 2014a). This situation is partly linked to the fact that most protected areas have not yet approved their management plan, which is necessary for such activities, or set the required zoning provisions (TCU, 2013). These problems add to the challenges that are common to sustainable forest concessions outside protected areas, including insufficient technical capacity, lack of infrastructure and unresolved land tenure conflicts (Chapter 4).

5.3. *Sustainable use of natural resources by local communities*

Many protected areas in Brazil are inhabited by small traditional communities, which depend on natural resources (e.g. fish, wood, nuts, oils, rubber) for their livelihoods. Effective management of such areas requires offering the communities meaningful economic opportunities to sustainably use natural resources. Although traditional communities generally have good knowledge about the use of natural resources, they often lack sufficient expertise for sustainable farming, forestry and fishing that meet market demand levels, and generally have limited access to markets (Prates and Sousa, 2014). This lack, in turn, may translate into a risk of increasing the pressure on the natural asset base.

For example, in the 2000s, Chico Mendes Extractive Reserve in Acre state experienced increased deforestation levels, partly due to declining demand for and prices of rubber and Brazil nuts, as well as poorly controlled local beef markets; this combination of factors had made forest conversion to cattle ranching more attractive (TCU, 2013). Similarly, low return on crabs harvested in Soure Marine Extractive Reserve in Pará state, and difficulties in transporting the animals to city markets, could result in increased harvest efforts and pressures on the mangrove ecosystem.[15]

Implementation problems persist in extractive reserves, including the lack of management plans and management agreements with local communities to regulate their use of natural resources. In addition, poor land delimitation and signposting in some areas create uncertainty about the protected area boundaries and associated restrictions on activities. Only 25% of protected areas in the Amazon biome are delimited and signposted (TCU, 2013). Staff is largely insufficient to manage extractive reserves. For example, in the early

2010s, Tapajós-Arapuins Extractive Reserve in the Amazon had only three staff members to manage an area of more than 6.7 million km^2 with about 18 000 inhabitants (TCU, 2013).

In addition to viable forms of livelihood, much of the population within extractive reserves needs better access to social services, such as education, health, housing and sanitation. Overall, this mix of issues goes beyond the responsibilities of the MMA and other environment authorities and necessitates stronger intersectoral co-ordination.

Multiple policy instruments have helped address these issues. They include the conditional cash-transfer programmes Bolsa Floresta and Bolsa Verde and the National Plan to Promote the Production Chain of Socio-Biodiversity Products (PNPSB). As Chapter 4 noted, Bolsa Floresta and Bolsa Verde aim at rewarding and improving the quality of life of traditional and poor communities that live from the use of natural resources and are committed to reducing deforestation and using resources sustainably. As many beneficiary families live in protected areas, these programmes contribute to the economic viability of living in such locations. The PNPSB includes a minimum price policy for socio-biodiversity products. As benefiting from such programmes tends to be easier in sustainable use protected areas, some producers have requested protected area status, in particular that of extractive reserve, for the areas they live and work in.

Recommendations on protected areas

Expansion and consolidation of the national system of protected areas

- Strengthen inter-institutional co-operation to ease the resolution of land tenure issues within existing or proposed new protected areas and improve social service provision to communities living in sustainable use reserves.
- Further expand the area under environmental protection to fully achieve the national 2020 targets and international commitments (including through official protected areas, indigenous lands and set-aside areas required by the Forest Code); prioritise areas with high biodiversity values and where pressures from infrastructure development, urbanisation and agriculture are the highest; expand the coverage of protected areas in marine and coastal zones to achieve the Aichi target.
- Develop a strategy for the territorial consolidation of protected areas; encourage the use of financial and land offset mechanisms provided in the protected area legislation and in the Forest Code once the Rural Environmental Cadastre is fully operational; and explore the use of transitional contractual agreements with landowners within protected areas to ensure compatible land use until property rights are clarified.

Management of protected areas

- Develop a comprehensive financial strategy for the National System of Protected Areas (SNUC), with a view to reducing dependency on the public budget and on international finance; explore alternative funding sources, including payments for ecosystem services, access fees, branding and sale of merchandise, and benefits generated from genetic resources.
- Strengthen efforts to develop the management plans of protected areas and review their implementation; ensure that the plans set clear priorities, targets and progress indicators.
- Develop targeted capacity building and skill development programmes for protected area managers and staff, with a view to enhancing management effectiveness; promote networks of protected area managers and exchange of experiences and best practices.

Recommendations on protected areas *(cont.)*

- Continue to periodically assess protected area management effectiveness and efficiency; further encourage protected area managers to provide accurate and timely information to the National Register of Protected Areas (CNUC), and systematically review this information to derive system-level recommendations.
- Develop standard biodiversity monitoring methods with a view to generating the information needed to assess the environmental effectiveness of protected areas; further expand federal monitoring programmes.

Scaling up public visitation

- Integrate protected areas into national and state tourism strategies and identify areas with high tourism potential; develop tourism products linked to protected areas.
- Extend the use of concessions and other public-private partnerships for public visitation and tourism in protected areas; simplify procedures and improve capacity of government officials and protected area managers to design and negotiate contracts; implement pilot programmes to test and develop new management models.
- Consider including regular visits to protected areas in educational programmes of schoolchildren.

Notes

1. The SNUC was established by Law 9985/2000 and is regulated by Decree 4340/2002.
2. This chapter uses the term "protected area" to refer to *stricto sensu* protected areas as defined and governed by the SNUC Law.
3. In 2010, the parties of the Convention on Biological Diversity adopted the Strategic Plan for Biodiversity 2011–20 with the mission of halting biodiversity loss and enhance the benefits biodiversity provides to people. The Strategic Plan includes 20 targets (the Aichi Targets), organised under five strategic goals.
4. A biome is a large naturally occurring community of flora and fauna occupying a geographic region.
5. The MMA is developing methodology to assess the ecological status of indigenous lands, as well as their management, demarcation and land regularisation, to verify their contribution to the national protected area targets (MMA, 2015a). The contribution of APPs and RLs will be known only after the full registration of these lands in the Rural Environmental Cadastre (Chapter 4).
6. In May 2015, ICMBio was responsible for the management of 320 protected areas (all federal protected areas except private natural heritage reserves).
7. Ecological corridors are areas of habitat connecting wildlife populations separated by human activities or structures such as roads development or logging.
8. The budget available to state and municipal protected areas was not studied.
9. The MMA, for example, channelled 20% of its 2008 budget to SNUC, and the Brazilian Forest Service allocated 30% to the SNUC national forests. IBAMA contributed to the SNUC budget through its fire prevention and control activities (MMA, 2009).
10. Resources from environmental compensation can be used for activities such as land tenure and demarcation, management plans, procurement of goods and services, technical studies and environmental education programmes.
11. As of 2011, only Portugal had followed, though similar systems had been proposed in India and Indonesia.
12. In 2009, the 11 states that had the ICMS-E in place received between USD 312 million and USD 1.5 billion to be distributed among municipalities (MMA, 2010).
13. The evaluation was based on the Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) tool, a methodology adopted by the WWF that is internationally recognised for assessing

management effectiveness of protected areas. Effectiveness is understood as the capacity for achieving the objectives of the protected area.

14. National parks generate between BRL 50 000 and BRL 1 million per year (Semeia, 2012b).

15. About 10 000 people live in the reserve, where crab harvesting is the main economic activity. The inefficient transport of crabs results in the deaths of many crabs, which ordinarily are sold alive.

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