Extract from:

BUILDING ON NATURE

Area-based conservation as a key tool for delivering SDGs

SDG 13: Climate Action

13 CLIMATE ACTION

Summary for policy makers

Effective area-based conservation can contribute to the climate strategy outlined in SDG 13 by reducing net emissions, helping reduce the impacts of a wide range of weather-related hazards and integrating climate change strategies into more general approaches to land and water management.

There are four main roles for area-based conservation in contributing to climate action:

- Disaster risk reduction (DRR) through buffering floods and providing storage space for flood water; stabilising soils against dust storms and desertification; protecting coastlines against storms; and blocking landslides and avalanches on steep slopes
- Providing other ecosystem services: to help humanity deal with climate-related changes, described throughout this report
- Storing and sequestering carbon: in forests, grasslands, peatlands, ocean ecosystems, and in managed ecosystems within protected landscapes
- Demonstrating impacts of climate change: for instance, through monitoring rate of glacier retreat

Well-located protected areas are key tools here, complemented by other tools such as carbon storage schemes (e.g. REDD+), Payment for Ecosystem Services schemes, and restoration opportunities, focused on likely future conditions.

What is the challenge?

Greenhouse gas emissions are more than 50 per cent higher than they were in 1990.[1] The impacts are evident throughout the world.[2] All the signals are that the rate and severity of climate change are both at the more severe end of past projections, and that climate change is also accelerating.[3]

Greenland lost 260 billion tonnes of ice per year, and Antarctica lost 115 billion tonnes per year from 1993-2006.[4] Arctic sea ice is also markedly declining.[5] Loss of spring snow cover and ski slopes in the northern hemisphere[6] brings the issue home to many national economies.[7] There are dramatic changes to the world's oceans. The top 700 metres of ocean show a warming of 0.4° Fahrenheit since 1969.[8] Resulting changes in the distribution and life cycles of marine species seem to be even greater than on land.[9] Global sea level rose about 20 centimetres in the last century, with the rate almost doubling in the last two decades and accelerating slightly every year,[10] leaving an estimated 570 global cities at risk of a 0.5 metre sea-level rise by 2050.[11] And ocean acidity has increased by 30 per cent since the start of the Industrial Revolution, which has profound implications for marine life.[12]

Life on land will also be changed in ways that are still hard to predict. Warming temperatures and an increase in climatic extremes are already impacting human livelihoods[13] as well as whole ecosystems and myriad species.[14] Climate change is a recognised factor in threats to food security,[15] water security[16] and human health.[17] The economic implications are profound for virtually every sector of the economy.

Additionally, the incidence and impacts of natural hazards continue to increase,[18] and are influenced by climate change.[19] Typhoons, hurricanes, floods, droughts, sand storms, landslides and the impacts of tidal waves are being exacerbated by a combination of increasing climatic uncertainty and extremes of weather,[20] rising sea levels and the removal or degradation of many of the natural ecosystems that have traditionally helped to buffer extreme weather events. Perhaps most dramatically of all, fire is increasing, in terms of both frequency and severity; the conflagrations that swept across huge areas of Australia in early 2020 were markedly different and more severe than anything seen before.[21] Increased fire is also being seen in the far north, in Canada[22] and Russia.[23]

While the majority of the world's population now accepts the reality of climate change and of our own role in this phenomenon,[24] targets to reduce the impacts of climate change, in particular the agreement reached in Paris at the Conference of Parties of the UN Framework Convention on Climate Change, are not being met; in many countries, emissions have still been increasing.[25]

There has also long been reluctance amongst some conservation groups to look at "solutions" to climate change other than a radical reduction in emissions. There is also a fear that the role of carbon storage and sequestration in ecosystems in contributing to climate mitigation strategies is being over-stated or could lead to perverse results.[26] When talking about the role of protected areas, these concerns focus on the risk that governments will report existing protected area coverage as progress towards addressing climate change and use this to disguise inaction elsewhere. Challenges in addressing climate change are therefore not only related to what actions to take, but also about how these might be perceived, used and misused.

SDG 13 has the overall aim to "*take urgent action to combat climate change and its impacts*".[27] Specific targets focus first on helping to strengthen resilience against climate-related disasters (13.1) and integrating climate change measures into national policies and planning (13.2). The indicator for this sub-target includes to "*adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production…*". In particular, "*low greenhouse gas emissions*" is a net target and includes reducing emissions from ecosystems and sequestering additional carbon. Other issues include building capacity and education around climate change and its impacts

(13.3), and linked aims to UNFCCC goals of US$100 billion a year to fight climate change (13.A) and raise capacity in Least Developed Countries and Small Island States (13.B). While mobilising the level of funding discussed falls outside natural resource management, all other elements have direct links to area-based conservation.

How can effective area-based conservation help?

There is a growing interest in the potential of nature-based solutions to climate change, and the role of protected areas within this approach. Protected areas and OECMs can provide a suite of responses to climate change, in terms of both mitigation and adaptation,[28,29] including: (i) use of natural ecosystems to prevent extreme weather events from developing into human disasters, through **disaster risk reduction** or *eco-DRR*;[30] (ii) by helping society adapt to rapidly changing environmental conditions through judicious use of **ecosystem services**; (iii) by fostering climate resilience by maintaining as far as possible intact, naturally resilient ecosystems; (iv) by mitigation of climate change through **carbon sequestration** and storage; and (v) as a key tool in **demonstrating the impacts of climate change** to politicians, companies and civil society.

Disaster risk reduction: Healthy natural ecosystems have proven roles in reducing the impacts of a wide range of weather-related hazards,[31] although like many other ecosystem services these are often only recognised once they have been degraded or destroyed. Natural flood plains and vegetation on steep slopes and riversides all help to absorb flood water or slow down the rate of flow.[32] Similarly, coastal mangroves[33] and other woodlands, sand banks, coral reefs and coastal marshes[34] help to mitigate the impacts of storm surges. Dryland vegetation stabilises soils,[35] reducing the chances of both dust storms[36] (and subsequent respiratory problems) and soil loss and desertification. Forested slopes help to prevent avalanches,[37] and rock and mud slides after extreme weather events, and incidentally play a similar role after earthquakes in mountainous areas.[38] In many situations fire is more likely to spread through degraded forests than healthy natural forests. Many protected areas already perform these functions,[39] and are managed with these values in mind;[40] one hope of a focus on SDG 13 is that these values will be more generally recognised. But additionally, many other areas are set aside, or are being set aside, for their role in coastal protection, flood prevention, halting desertification and similar. Some of these may in time become protected areas, but others are candidate OECMs, with the hope that if this takes place conservation values will receive higher attention than they have hitherto. Acceptance of the role of natural ecosystems in DRR has not come easily, despite the evidence, and there is considerable momentum (and money) behind maintaining the status quo, which has been to rely on "hard" engineering solutions. But these processes are generally changing.

Maintaining the supply of other ecosystem services: Climate change is the great disruptor, so that many, many other functions will be thrown under greater pressure than before. Many of the other services described in this report will become increasingly important under conditions of climate change: particularly food security (SDG 2), water security (SDG 6) and the underlying attempts to maintain healthy, functioning and dynamic ecosystems and other aspects of biodiversity (SDGs 14 and 15).

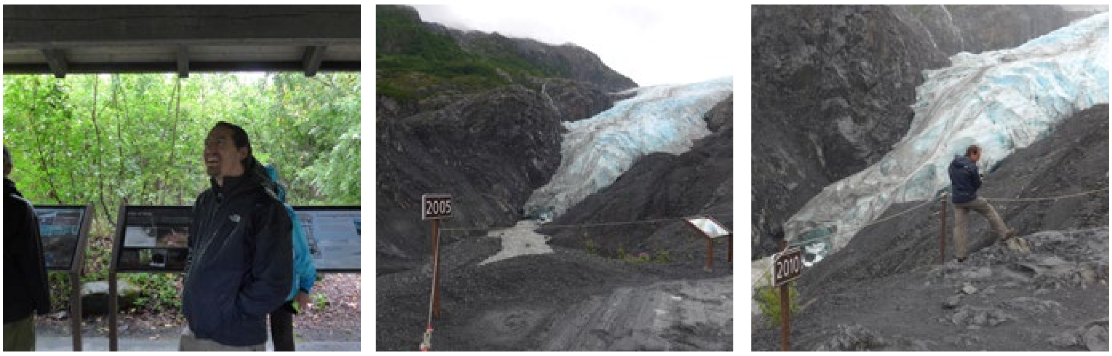
Climate resilience: The concept of ecosystem resilience is defined as the ability of a system to undergo, absorb and respond to change and disturbance while maintaining its functions.[41] There is a growing conviction amongst conservation biologists that greater biodiversity also confers greater resilience within ecosystems[42] and recognition that ecosystems with high carbon frequently also have high biodiversity.[43] This is a fast-moving and somewhat contentious field, but there is a general acceptance now that more intact ecosystems are better able to withstand perturbation than degraded, damaged or seriously fragmented ecosystems.[44] These values have been explicitly recognised by the Intergovernmental Panel on Climate Change for over a decade: "while *regrowth of trees* *due to effective protection will lead to carbon sequestration, adaptive management of protected areas also leads to conservation of biodiversity and reduced vulnerability to climate change*".[45] Yet many remaining intact ecosystems are being destroyed,[46] creating an urgent need for creation of protected areas to maintain resilience in these fragile places.[47] This also highlights the importance of maintaining intact ecosystems outside the global protected area systems, through OECMs and other area-based approaches. Managing biodiversity and ecosystem services for climate change requires a dynamic approach, taking into account likely future scenarios and incorporating flexibility.[48] Planning at landscape/seascape/water catchment scale is needed, where protected areas and OECMs form a mosaic, linked if necessary by corridors along climate gradients and connecting refugia that enable species to move in response to climate change.

Carbon sequestration and storage: It has taken a long time, but recognition of the importance of, and risks to, carbon stored in vegetation and soils is now centre stage in climate discussions and recognised as a key role for natural ecosystems. Associated financial support packages, such as REDD+, whilst still insufficient are nonetheless helping many communities to maintain ecosystems rather than convert them to other uses. Evidence has been building gradually over time. First, that forests stored significant amounts of carbon, and that they continued to do so in old-growth phases in the tropics[49, 50] and boreal[51] forests, making primary forests of particular importance,[52] while forest regrowth in the temperate region after historical losses is also providing important sequestration benefits.[53] Estimates suggest that in half the tropical forest countries, half national emissions could be balanced by effective protection, sustainable management and restoration of forests.[54] Then the focus increasingly shifted to peat, and the vast stores in the tropics[55] and in the boreal, where research now suggests that northern peatlands store over 1,000 Gt of carbon, double previous estimates.[56] More recent is the recognition of the extreme importance of blue carbon in marine ecosystems[57] such as mangroves,[58] seagrass, kelp and in the vast plankton populations. The concept of "blue natural capital" has been gaining increasing attention.[59] More recently still, the carbon storage[60] (and potential storage through restoration)[61] of grasslands and savannahs has been receiving increasing attention.[62]

The significance – and the value including economic value – of maintaining carbon rich natural ecosystems is increasingly realised.[63] This includes the world's protected area system, which has long been recognised as a significant carbon store,[64] but also increasingly land and water outside protected areas. Many REDD+[1] projects, for instance, are deliberately targeting currently unprotected ecosystems and providing incentives to maintain these; many are likely eventually to be recognised as OECMs or connectivity corridors. Many REDD+ projects aspire to deliver against multiple SDG goals,[65] although with mixed success.[66] There are increasing calls for massive tree planting to counter climate change impacts,[67] through initiatives such as the Bonn Challenge,[68] which could open up huge new areas of potential OECMs. But there are also cautionary voices questioning the extent to which such approaches can really address climate change,[69] and fears that enthusiasm for tree planting could have the perverse result of destroying old-growth and ecologically valuable grassland and savannah.[70]

Demonstrating climate change impacts: Protected areas can play a key role in monitoring and providing real-life examples of climate change in action; things that people can see in front of them and experience first-hand are more compelling than articles, books or films. For example, most of the world's glaciers are now retreating,[71] and some have already disappeared,[72] causing damage to specialist species.[73] A growing number of protected areas that contain glaciers are marking out their retreat.

[1] REDD+ stands for (in brief) "Reduced emissions from deforestation, forest degradation and other activities" and represents a mechanism under the UN Framework Convention on Climate Change to provide positive incentives to support developing countries improve forest protection and management.



Kenai Fjords National Park, Alaska, where displays show the reality of glacier retreat: The left-hand picture is the 1980s' viewing platform for the glacier, now surrounded by forest; the next two show the glacier front line in 2005 and 2010. Pictures taken in 2017.

Table 13.1: Protected and conserved areas providing Disaster Risk Reduction

Hazard	Hazard prevention	Role of protected areas
Floods[83]	Temporary storage in natural wetlands Regulation of water flow	Protecting natural floodplains Maintaining or restoring natural flow patterns Protecting wetlands and marshes to act for spillover and ponding
	Buffering effect of vegetation by waterways and on steep slopes	Protecting riparian and mountain vegetation Restoring degraded forests and moorland
	Preventing settlement in flood-prone areas	Zoning restrictions in protected landscapes, etc.
Droughts, desertification, dust storms	Maintaining natural vegetation and drought resistant plants to slow erosion, prevent desertification, maintain grazing options	Protection of natural vegetation Restoration where necessary Agreement on sustainable use within protected landscapes
	Emergency sources of wild food and animal fodder during periods of drought	Protecting natural forests in drought-prone areas Restoration where needed Sustainable use in protected landscapes
Typhoons and hurricanes	Physical protection against storms and ocean surge	Protection of coral reefs, sand dunes, barrier islands, mangroves, coastal marshes and coastal and inland forests
Sea-level rise	Physical protection	Protection, active management and where necessary relocation of coastal ecosystems
Avalanche and landslides	Using forest cover to reduce likelihood and impacts of snow avalanches and shallow landslides	Protect and where needed restore forests on slopes in high risk areas
Wildfire	Buffering against fire through retention of intact forest	Maintaining intact forest, particularly in areas where fire is not naturally prevalent
	Managing risk in fire-prone areas	Prescribed burning, fire prevention training, enforcement of fire regulations, communication programmes about fire risk

Approaches to support SDG 13

Protected areas

- Estimates show that protected areas already account for about one-fifth of all the carbon sequestered by terrestrial ecosystems each year.[74] Forests,[75] peatlands,[76] grasslands[77] and ocean sinks[78] are all important. Given the growing role of REDD+ schemes in forests, and interest in carbon storage in other ecosystems, the area of land set aside for carbon storage is likely to increase markedly in the future. As regards DRR, virtually any protected area or OECM can play a supportive role in disaster reduction, and in addressing the slower and more insidious changes that will affect human society as a result of climate change; many of the latter issues appear under other SDGs. Table 8.1 outlines some of the main ways in which this can be important and then we outline two important approaches that can help planning and support for such services.[79]

OECMs

- Many OECMs will also play roles in both carbon storage and sequestration and in DRR; indeed, both these recognised uses of lands and waters are likely to provide additional opportunities for conservation beyond designated protected areas

Key complementary approaches

These may be applied in protected areas, or OECMs, or in other effective area-based strategies:

- **Payment for Ecosystem Services schemes (PES)**: PES including REDD+ and other voluntary carbon storage schemes are ways to retain valuable natural ecosystems both inside and outside of officially protected areas. The main challenges are to identify and cost the likely benefits and find specific groups of people able and willing to pay for and sell these services. National governments still often play this role, although sub-national and municipal government can also have a role to play. There is also an important role for private sector users of ecosystem services.
- **Restoration**: Restoration is critical in many areas, and can create important carbon gains, but only if carefully planned and managed to avoid perverse results. Likely future climatic conditions need to be taken into account in planning restoration.[80] Fast-growing tree plantations offer little in terms of benefits if the resulting pulpwood is used in short-life products or biofuels[81] where carbon quickly enters the atmosphere again. Ploughing or even worse felling native forests to plant trees can release more carbon than will be regained in a realistic timescale. Restoration to improve net carbon balance is still an emerging set of methodologies that require further work to refine.
- **Areas identified as climate refugia**: These can be important in determining where conservation is most urgently needed to maintain reference populations.[82]

Case study

Climate adaptation through the protection of cultural landscape and practices

The Shouf Biosphere Reserve, Lebanon

13 CLIMATE ACTION

Co-benefit SDGs

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

10 REDUCED INEQUALITIES

11 SUSTAINABLE CITIES AND COMMUNITIES

15 LIFE ON LAND

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Lina Sarkis and Al-Shouf Cedar Society Team.

SHOUF BIOSPHERE RESERVE

"A biosphere reserve where protection of human health, wealth, and the environment are overarching goals – where boundaries are delineated, land-use regulations enforced, climate change mitigated, ecosystem services maximized, biodiversity conserved and natural resources protected."
– the vision of Shouf Biosphere Reserve –

Background: The Shouf Biosphere Reserve (SBR), Lebanon, declared in 2005, is one of the largest mountain protected areas in the Middle East. It includes the Shouf Cedar Nature Reserve (established in 1996) and is located in the Shouf mountains of central Lebanon, the Ammiq Wetland, east of the Shouf in the Beqaa Valley, a Ramsar site and one of the last remaining wetlands in the Middle East, in addition to twenty-two villages surrounding the Nature Reserve from the eastern and western sides of the Barouk and Niha mountains. It has an area of approximately 50,000 hectares, equivalent to 5 per cent of the total area of Lebanon and extends along an altitudinal gradient ranging from about 1,100 to 1,900 metres in the Shouf district and the West Bekaa.

SBR has adopted a landscape approach in its work, which consists of understanding the functions, studying societal demands, designing landscape options and finally supporting implementation through capacity building and creating sustainable models.

Sustainability challenge: The cultural landscape of the Shouf and its associated traditional practices are impacted by various threats: (i) Forest loss, degradation and fragmentation due to intense logging, wood and fodder collection, and uncontrolled grazing; (ii) Overgrazing caused by the decline of traditional transhumance systems, and by land tenure changes; (iii) Uncontrolled harvesting of non-wood forest and pasture products, threatening the natural populations of some species; (iv) Environmental threats, which are exacerbated by climate change: land degradation caused by rural abandonment, forest fires caused by the burning of agriculture waste and the accumulation of dry biomass on abandoned land, urban sprawl caused by unregulated spatial planning; (v) Lack of economic incentives to reverse rural abandonment and unemployment, which mostly impact women and youth. Climate change poses additional threats to this fragile ecosystem. The famous cedar trees (*Cedrus libani*) **could be pushed to higher elevation refugia**[84] and are also threatened by invasive sawfly pests, necessitating an active conservation programme.[85]

The Shouf Biosphere Reserve remains a pivot site in agriculture and diversification of species. This diversity is essential for human survival; therefore, concrete measures and strategies must be taken to ensure conservation and to face the growing pressures of climate change.

The Shouf Biosphere Reserve unremittingly strives to remain a learning site for sustainable development, restoring the ecological functionality of the landscape, building the capacities and enhancing the welfare of the surrounding communities. These actions are all seen as a key in ensuring adaptation to climate change for the local communities and the underpinning ecosystem alike.

Fundamentally, SBR is trying to address the negative impact of agricultural and other types of practices on ecosystem stability and biodiversity. Modernisation and the introduction of "perverse" practices that aimed at increasing production and consequently profit without any concern for human health nor for the environment started in the late 1960s and were exacerbated during the Lebanese civil war that led to rural migration and land abandonment. These practices have shown their limitations, and the solution will happen through the re-introduction and/or consolidation of cultural and traditional practices that are known to have a positive impact.

Key benefits to sustainability: The Shouf region is one of Lebanon's great centres of biodiversity. The SBR is home to 32 species of wildlife, 275 species of birds, 31 species of reptiles and amphibians and 1,054 species of plants. The site also provides essential resources and ecosystem services that are linked to human health, support the maintenance of good water supply, produce bioenergy and also support economic activities, namely agriculture and ecotourism. The reserve also delivers the basic services for production, consumption and habitation.

An economic valuation study was conducted to determine the economic benefits generated by SBR. Most of its benefits derive from water related ecosystem services including maintenance of water quality, for both the water grid and as source for bottled water. Benefits linked to carbon sequestration by SBR vegetation are estimated to be significant. The reserve is also an important local source for biomass briquettes and compost. The reserve has enhanced ecotourism and it supports local employment equivalent to circa 100 jobs, in addition to the increasing number of visitors (118,000 to the reserve in 2019).

The sustainable management of the cultural practices as implemented by SBR helps maintain healthy and biologically diverse agro-silvo-pastoral systems where transhumance grazing has a strong effect on species and community diversity, and vegetation dynamics creating openings and corridors in forest and rangelands resulting in the emergence of a mosaic-like, diversified landscape that displays greater stability. For example, the traditional harvesting of non-timber products from forests and pastures has led to a more or less intense domestication of plant species resulting in higher levels of genetic diversity that display greater resilience; traditional cultivation in terraces allowed the selection of a highly diversified number of local crop varieties while their dry stonewalls played an important role in terms of biodiversity conservation, as micro-habitats for rocky plants, insects, reptiles, amphibians, birds and mammals.

Well preserved cultural practices also play an instrumental role in environmental risk reduction. Stonewall terrace systems help create a warmer micro-climate, facilitate soil water infiltration and storage, and act as firebreaks reducing the risk of fire spread, and providing access and water for firefighting. A mosaic-like landscape with forest, scrub and pasture stands, and opening and corridors created by transhumant grazing systems, create natural firebreak areas, regulate water runoff, are home to beneficial insects that increase biological control of crop insect pests, and provide pollination services.

Conservation solution: To support adaptation to climate change,[86] SBR has vastly increased its efforts over the past few years. It has begun to take actions that will lead to greater prosperity and better livelihood while building climate resilience.

Forest restoration is a critical action taken by the SBR to respond to national commitments on biodiversity conservation and climate change. Maintaining and restoring Mediterranean mosaic-like landscapes with a high diversity of land uses, habitat types, and wild and cultivated species and varieties, is also critical to increase resilience against climate change.[87]

Multi-cropping is an important practice maintained by the reserve; and higher diversity of species is more resilient against climate variability and change because each species can cope differently with temperature and humidity conditions, and thus environmental change can be handled easier. For instance, planting different species and varieties of the same species at the farmland and landscape levels reduces the risk of losing the entire crop if an exceptional climatic event occurs and increases opportunities for economic diversification.

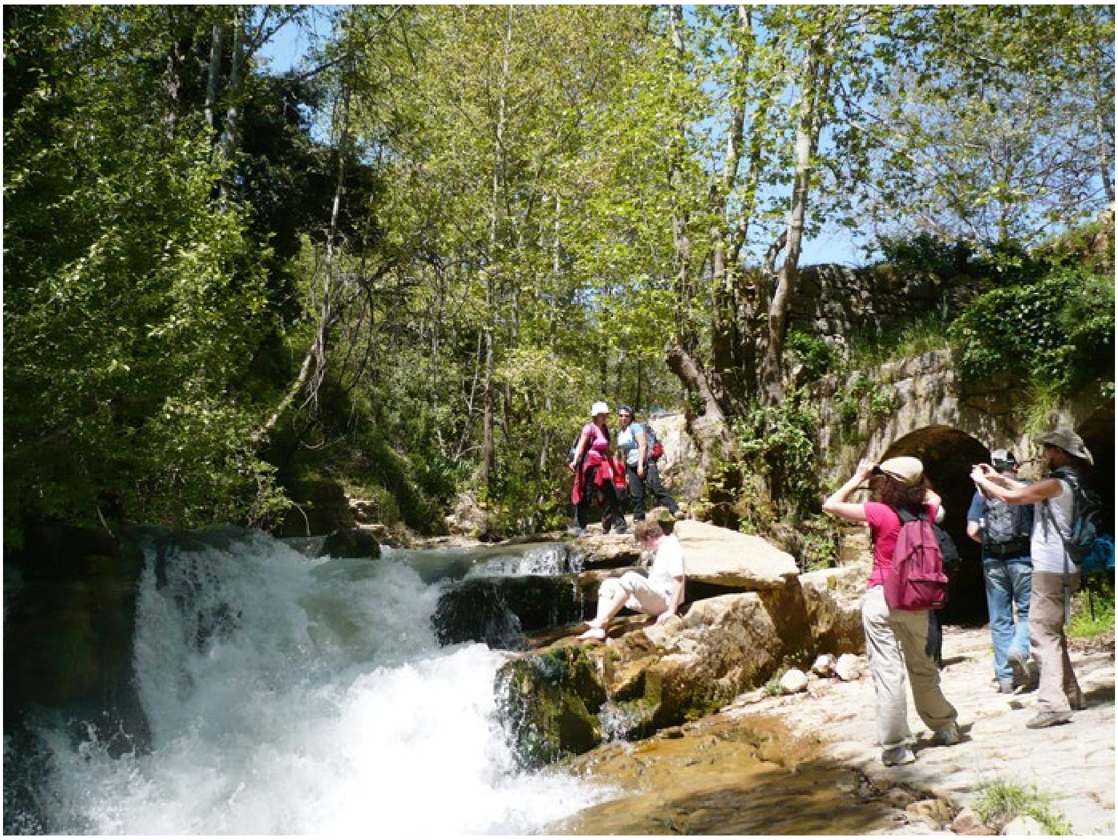
Enhancing the green economy in the SBR landscape is another action taken by the SBR through the promotion of small local businesses that respond to climate change, and value chain development around goods and services from the landscape ecosystems, because agriculture is not only a fundamental human activity at risk from climate change, it is a major driver of environmental and climate change itself. It has the largest human impact on land and water resources.

More specifically, through its programmes, the reserve continuously adapts comprehensive measures aiming at recovering the landscape after the disturbances that have affected it due to climate change. In view of climate change mitigation and adaptation, the reserve is currently active in implementing a range of measures, including for example:

- Management of biomass quantity and composting through thinning activities and the production of eco-briquettes and compost with the multiple objectives of reducing climate-related risks (e.g. forest fires) while creating economic opportunities (e.g. briquettes production for house heating).
- Conserving and sustainably managing high mountain forests by monitoring biodiversity to determine the impact of cultural practices on biodiversity.
- Promoting ecotourism (trails, guest houses, tables d'hôtes, creation of a botanical trail, etc.).
- Restoring stonewall terraces and abandoned lands, plantation of 70,000 seedlings in 2019 to increase forest areas and planting native species of high economic value.
- Preserving water sources (treatment, establishment of gabions…), and effective forest planting techniques to improve soil water harvesting and storage in the planting sites to help compensate for the growing trend of water deficit during summer and increase the survival rate of seedlings.
- Encouraging business actors in the trade chain to support and promote traditional, biodiversity-friendly land-use practices.
- Raising awareness of the importance and benefit of conservation and climate change mitigation and adaptation through capacity building campaigns.
- Designing and setting up monitoring systems and tools to periodically assess the evolution of the ecological and cultural values of the agro-silvo-pastoral systems and traditional practices, the natural habitats and key species populations. This will lead to improved scientific knowledge and ability to monitor the state of biodiversity and eco-cultural indicators of the landscape. These systems will include a form of citizen science, involving the local communities in the process.

Lessons learned: The rationale of the activities within the reserve builds on the awareness that the agro-silvo-pastoral landscape of the Shouf is the product of

Case study



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centuries of interaction between nature and people, which nowadays is threatened by climatic, economic and social changes. The conservation of this unique Mediterranean landscape and its inhabitants will only be possible if its resilience to such changes is strengthened through an integrated programme that tackles and supports all the natural, economic, social and cultural factors that contribute to its balance.

Next steps: In the future, the reserve will aim to unceasingly promote and implement solutions to reconcile the conservation of biodiversity with its sustainable use and actions to limit damage from climate change, and will manage forest ecosystems to better adapt to climate change and all other altering conditions.

Agriculture is an important component of the lives of the local communities and SBR has developed a sustainable agriculture roadmap as a means to support the adaptation of local communities to climate change, dealing with its consequences, such as water scarcity and drought, through proper water harvesting and planting rain fed endemic crops. It also includes an important marketing component that will enhance the green growth of the local communities.

In addition to all the above-mentioned plans, current and future activities, SBR has started the construction of a “House of Biodiversity”. It is destined to be a hub for the dissemination of knowledge on biodiversity and ecocultural practices and the commercialisation of products resulting from the application of these practices, generating income that will feed into socio-economic development and biodiversity management.

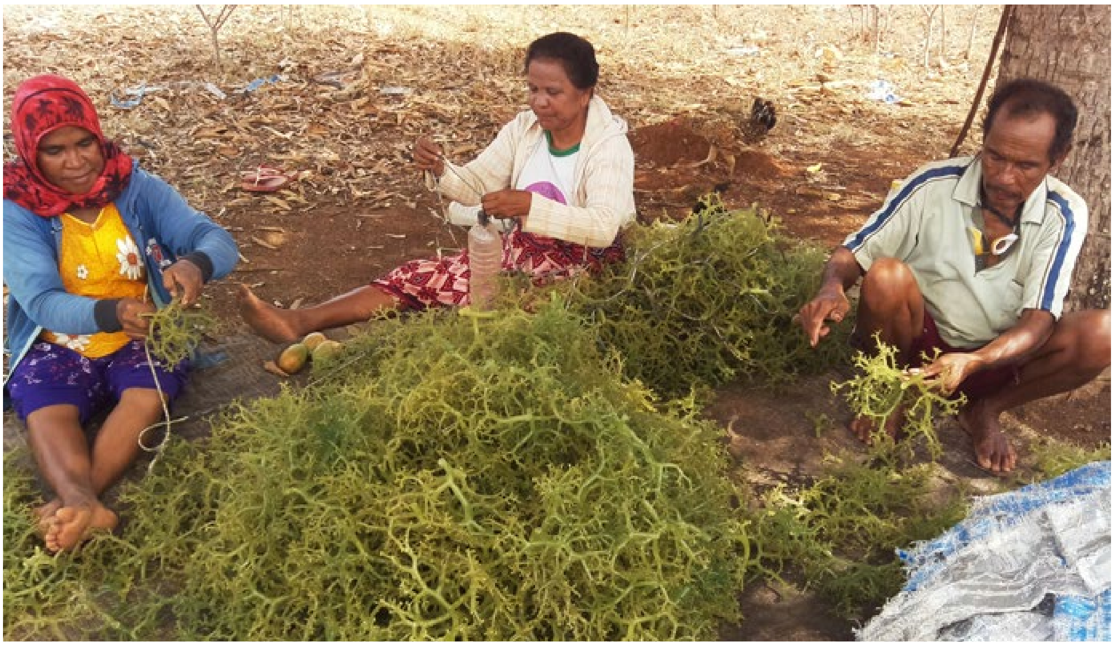
It is not only the use of the building that is linked to biodiversity, but also its structure whereby all the materials used come from biomass to cover the roof and some of the walls, in addition to the stones used in stonewall terraces. It will show how biodiversity, linked to traditional practices, delivers basic services and conditions that enable and support habitation.

Information linked to this case study can also be found through the PANORAMA initiative.

Case study

Adapting to climate change through community-led conservation

Customary Conservation Areas, Semau Island, Indonesia



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13 CLIMATE ACTION

Co-benefit SDGs

1 NO POVERTY

2 ZERO HUNGER

6 CLEAN WATER AND SANITATION

8 DECENT WORK AND ECONOMIC GROWTH

11 SUSTAINABLE CITIES AND COMMUNITIES

15 LIFE ON LAND

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"The People here are only willing to work on something that would benefit them. That is why I provide them the free sample of natural fertiliser so they could directly use it for their land. That way they will know the effect and try to make the fertiliser voluntarily."

– Mama Mariana Soled (female farmer from Uitiuhtuan Village) –

Background: Semau Island with an area of 265 km^2, located in the western part of Kupang District, the capital of East Nusa Tenggara Province of Indonesia, comprises customary conservation areas governed by community leaders (initiated since 2014) and surrounding government-protected areas including the Marine National Recreation Park (established in 1993) and the Sawu Marine National Park (established in 2009). With 11,756 inhabitants as of 2013, Semau Island contains 14 villages constituting two ethnic groups (i.e. clans) each of which has different cultural backgrounds and languages. As a lowland island surrounded by the Sawu Sea, and one of the world's richest coral reef areas, it hosts monsoon forests that provide tree species used for building materials, food and medicines, whereas farming and fishing support the livelihoods of the population. In the coastal communities, seaweed farming and fishing provide the main source of income. Short-term cash crops (e.g. fruits and vegetables) provide another source of income when freshwater from wells is available, while the locally grown staple crops (i.e. rice and corn) are the primary source of food and kept for family consumption. The common belief that the Semau people have magical powers has constrained development initiatives in the past, keeping government officials mostly away from the region.[88]

Sustainability challenge: Change in agricultural practices and land use with the limited freshwater supply on the thin soil layer has resulted in soil degradation, pollution, deforestation and biodiversity loss. At the same time, environmental and social vulnerabilities have increased due to climate change leading to extreme weather events, limited freshwater supplies and the impacts on a thin soil layer dominated by karst rock.[89] The use of agricultural chemicals has continuously increased over the past two decades, further degrading the quality of the naturally nutrient poor soil and harming local biodiversity both on land and sea through rainwater carrying chemicals to the ocean. Soil degradation has forced farmers to regularly abandon farmland after five to six years of use for recovery of soil fertility. Consequently, deforestation has expanded due to land clearance for agricultural use along with population growth, furthering threats to biodiversity and land management.

Moreover, extreme weather events have increased in frequency in recent years, posing a disproportionate risk from climate change on biodiversity and local communities where annual precipitation ranging from 700-1,000 mm is the primary source of agricultural water and a limited number of wells offer drinking and bathing water.[90] Consequently, it is understood that dedicated efforts are needed to support a shift to more sustainable land and resource management regimes on the island, with a view to help the adaptation of local communities to climate change.

The customary conservation areas, together with the two marine protected areas, help to support climate change adaptation in multiple ways. This includes promoting restoration of mangrove forests to protect against extreme weather, watershed protection, sustainable seaweed farming and organic agriculture. In particular, the watershed conservation areas facilitate an increase in water access, improvement of irrigation systems and a decrease in agricultural chemical usage.

Conservation solution: Based on the clan-based land tenure system, a total of 67 hectares of forest has been placed under community initiatives and agreements to protect community resources and local biodiversity. For instance, a 3-ha water conservation zone in Batuinan Village is under the villagers' agreement through customary oaths to restrict the land lease for non-conservation purposes and limit the number of private wells in the surrounding area to raise the water table. The villagers have also agreed to plant about 1,650 mahogany trees in their family gardens to regenerate local forest cover. Additionally, an 11-ha area in Uitiuhana Village was dedicated by a clan leader as a nursery to raise endemic tree seedlings under a communal agreement that stipulates rules for forest management (e.g. trees cannot be cut for 20 years) and specifies a monitoring system. Moreover, 12 organic agriculture demonstration plots have been established across communities, where organic crops (e.g. bananas, eggplant and tomatoes) have been grown in an effort to increase market access and improve irrigation efficiency, leading to zero chemical inputs, less need for irrigation, and higher yields and prices of produce.

To support the adaptation to climate change further, information on weather and climate forecasts have been disseminated to the villagers to better inform their decision-making on agriculture, aquaculture and fishing. With a study on land cover and water supply and demand, more resilient plants and better seaweed cultivation methods have been introduced and practised at the demonstration plots, as potential alternative income generators. In collaboration with experts from Kupang District Agriculture and Fisheries Extension Agencies, extension services (e.g. information on agricultural practices provided by extension staff) have been improved and experience-sharing sessions have been regularly held. In addition, training and community education have been given to village governments and community groups with regard to seed preparation, water management and the use of fertilisers and pesticides.

Business case: Based on studies of the market opportunities for agriculture and aquaculture commodities on the Kupang and East Nusa Tenggara markets, an increase in market access for organic crops has been sought through organic agriculture with more efficient irrigation. This has resulted in about 20 per cent higher yields as well as higher prices for organic produce from the 12 demonstration plots. Also, seaweed farming has been improved through training in product manufacturing, packaging and storage methods. This has led to higher quality and quantity of seaweed for wholesale, and the development of seaweed-related secondary products with added value to the seaweed farming enterprise.

Lessons learned: Funded by the Japan Biodiversity Fund, the Community Development and Knowledge Management for the Satoyama Initiative (COMDEKS) programme implemented by UNDP in partnership with the Ministry of the

Environment of Japan, the CBD Secretariat and the United Nations University Institute for the Advanced Studies of Sustainability between 2011-2018 through the GEF Small Grants Programme promoted participatory landscape planning through community consultation. Under this approach, a set of 20 resilience indicators were used for conducting a baseline assessment, developing a landscape strategy, and identifying potential community actions at the landscape level. Through awareness raising and participatory planning, this has not only helped establish the customary conservation areas but also enhanced the government-protected areas for mangrove forest restoration, to provide additional coastal protection. In particular, the customary conservation areas allowed for new institutions built on the local land tenure system (e.g. communal agreements), which have mobilised environmental commitments by local clan leaders, village governments and community members. Community engagement and addressing governance issues are key to sustainable approaches to building landscape resilience.

Next steps: The formation of community groups as well as their commitments to environmental conservation have been confined to each clan and are yet to cut across the two different ethnic groups.[91] Nevertheless, seven environmental forums have built a mechanism for inter-village meetings to discuss issues reaching beyond the village level, which may possibly extend to an island-wide community to engage in biodiversity conservation. Bringing together multiple stakeholders including community leaders and government officials, these forums are also nurturing a foundation for collaboration and synergies between the customary conservation areas and the surrounding government-protected areas.

This case study was based on the observation of the COMDEKS programme implementation by the first four authors, plus written material and input from the partner communities on Semau Island.[92]


© UNDP

Seaweed


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Dry and critcial land

Case study

Conserving intact forests for climate mitigation and adaptation

Okapi Wildlife Reserve, Democratic Republic of Congo (DRC)

13 CLIMATE ACTION

Co-benefit SDGs

1 NO POVERTY

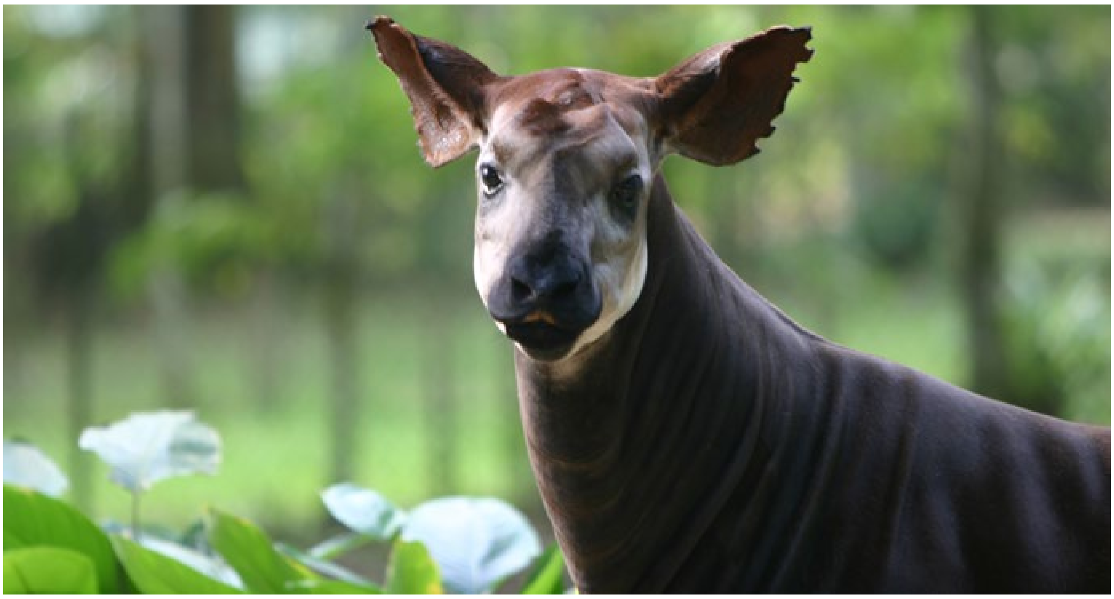
2 ZERO HUNGER

3 GOOD HEALTH AND WELL-BEING

6 CLEAN WATER AND SANITATION

8 DECENT WORK AND ECONOMIC GROWTH

15 LIFE ON LAND



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Tom Evans, Jean-Paul Kibambe and **Pacifique Madibi** (Wildlife Conservation Society).

WCS

"The intact forests of central Africa are key parts of the global carbon cycle – they contain huge stores of carbon, are active sinks absorbing more carbon each year, and are expected to be resilient to future climate change. It is essential to maintain the ecological integrity and function of these forests, including their wildlife populations, and we see the Ituri landscape as a great example of how this can be achieved in very challenging circumstances."

– Dr Emma Stokes, WCS Regional Director for Central Africa–

Description of the site: The Okapi Wildlife Reserve (OWR) lies in Ituri Province, in the north-east of the Congo Basin. It conserves the largest tract of intact lowland rainforest in the Democratic Republic of the Congo, covering 1.38 million hectares, and its legal zone of influence covers a much larger contiguous forest landscape of 4.02 million hectares. OWR has been declared a Natural World Heritage site in recognition of its exceptional ecological integrity, including the highest diversity of primates of any site in Africa (17 species), by far the largest remaining population of the okapi (*Okapia johnstoni* ~5,000), which is endemic to the DRC, and one of the last viable populations of forest elephants (*Loxodonta cyclotis* ~500) in DRC.

Sustainability challenge: The lowland rainforest protected by OWR is subject to severe threats of forest degradation and deforestation from uncontrolled in-migration driven by illegal artisanal gold mining within its boundaries, artisanal logging, and the use of land for shifting cultivation and cacao farming in surrounding areas. Furthermore, the bushmeat trade and ivory poaching are driving declines of many ecologically important species. These threats interact; gold mining by its very lucrative nature typically exacerbates armed conflict, destabilisation of local communities, and local population booms that exert further pressure on the forests and wildlife.

Key benefits: 95 per cent of the OWR and 79 per cent of the broader landscape are classified as "Intact Forest Landscapes",[93] indicating that they are very largely free of significant human degradation. These intact areas provide a huge range of benefits. From the perspective of climate mitigation, they secure exceptionally large carbon stocks and sinks.[94] Using a conservative average of 747 tCo_2equivalent/ha (tCo_2e/ha) including above ground and root biomass, OWR is estimated to store around 1.03 billion tCO_2e, and OWR plus the broader landscape together are estimated to store around 4.11 billion tCO_2e.

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Furthermore, intact forests across Africa are rapidly accumulating additional biomass (probably due to fertilisation by increased CO_2 levels in the air); as such, OWR is conservatively estimated to accumulate around 4.32 million tCO_2e per year, conservatively assuming that the sink only occurs within intact forest landscapes, and is equal to the annual average of 0.9tC/ha/yr found for tropical humid forests in Africa.[95] Intact forests across the broader landscape are estimated to accumulate around 10.47 million tCO_2e per year. For comparison, this active absorption by OWR and the broader landscape is equivalent to the annual emissions of 938,000 and 2.23 million cars in the USA, respectively.[96]

Intact forests such as this also underpin regional rainfall patterns (through the water vapour they release);[97] help to regulate major watersheds, limit the risk from new emerging infectious diseases,[98] and act as huge reservoirs of biodiversity.

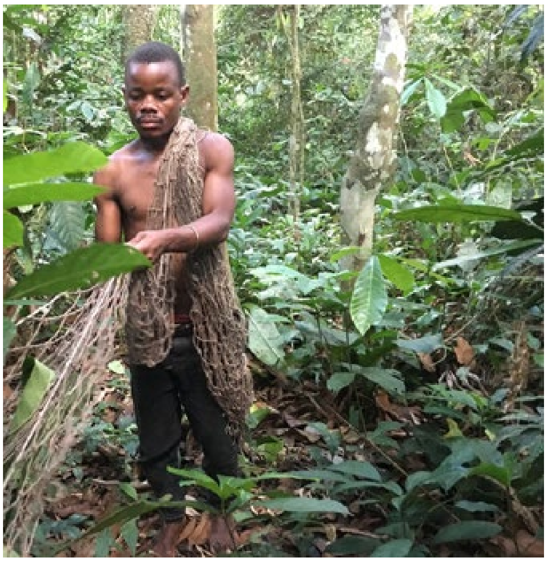
Around 27,000 people reside within the OWR and have rights to farm and pursue other livelihood activities there. A quarter of these are Indigenous Mbuti and Efe forest peoples whose traditional hunting areas and other customary rights are respected. The broader landscape provides food, shelter and a way of life for more than 500,000 people with whom the future integrity of the OWR is inextricably linked.

The many benefits of these intact forests are further enhanced by their relatively high resilience to drought, storms and fires, stemming from their high integrity.[99] For example, their intact faunal communities help to ensure the continuation of many key ecological processes that ensure the health and structure of the vegetation.[100]

Conservation solution: The management goals of OWR have long been to prevent the occurrence of destructive illegal activities whilst enhancing the livelihoods of local resident communities, leveraging both the institutional strength of the protected area and the opportunities for community forest management in the surroundings. As road access improves, so the demand for land, timber, bushmeat and other resources from surrounding human populations grows and the OWR landscape faces rapidly intensifying threats. The Government of Congo signed a new partnership agreement with the Wildlife Conservation Society in 2018 for the management of the OWR.[101] This brought new hope for strengthened financial and technical support to combat the escalating challenges.

The OWR has been zoned through participatory processes. Core areas have been identified where human use is kept to a minimum. Surrounding these are large zones where the main permitted use is forest product harvesting, fishing and hunting by the Efe and Mbuti forest peoples, in

Case study



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accordance with their traditional practices. On the margins of the reserve and along the one significant road corridor through it, agricultural zones have been agreed and demarcated around long-established villages. The OWR authorities organise intelligence-led law enforcement patrols and other activities to minimise illegal activities, and also support community development programmes that provide assistance with, among other things, improved agricultural techniques and processing/marketing, as well as support to health and education services.

In the broader landscape, the emphasis is on support to the establishment of community forest and land tenure, as well as livelihood assistance and targeted law enforcement activities. The reserve team works closely with the local authorities, and is integrating conservation into provincial development planning including the provincial REDD+ strategy.[1]

Financing for the reserve is a long-running challenge, because state budgets for protected areas remain limited – per capita, DRC is one of the poorest countries in the world – and chronic security challenges make ecotourism unfeasible. Since its inception, OWR has primarily been supported by international biodiversity funds from public and philanthropic sources. As the climate value of intact ecosystems becomes better recognised,[102] international climate finance may increasingly become available as well. Whilst bringing increased threats, improved road networks also bring the possibility for private sector investment in sustainable agriculture models in selected parts of the landscape, benefitting both livelihoods and the environment.

Lessons learned: Experience in OWR has shown that the existence of the protected area, and the vision for its future, have been very valuable concepts to inspire action, collaboration and investment by many stakeholders, from the local to the international scale, over many years. OWR has experienced severe challenges since its creation in 1992, including periods of war and near total societal breakdown, but continues to retain its key values, as a result of a long-term commitment to the values of the reserve by several institutions and many courageous individuals, and as a result of sustained efforts to link communities, including Indigenous people, with reserve management.

Next steps: The new phase of management will enable new strategies and an increased level of investment to address illegal gold mining, elephant poaching and other linked threats. This will be underpinned by an investment plan for the long-term management of the OWR and its buffer zone that will protect its forests and promote sustainable economic development in the larger landscape. Development opportunities include legal artisanal mining outside of the OWR, alternative skills building through business and small enterprise capacity building, and the creation of new markets for other supply chains, including agricultural and agroforestry products.

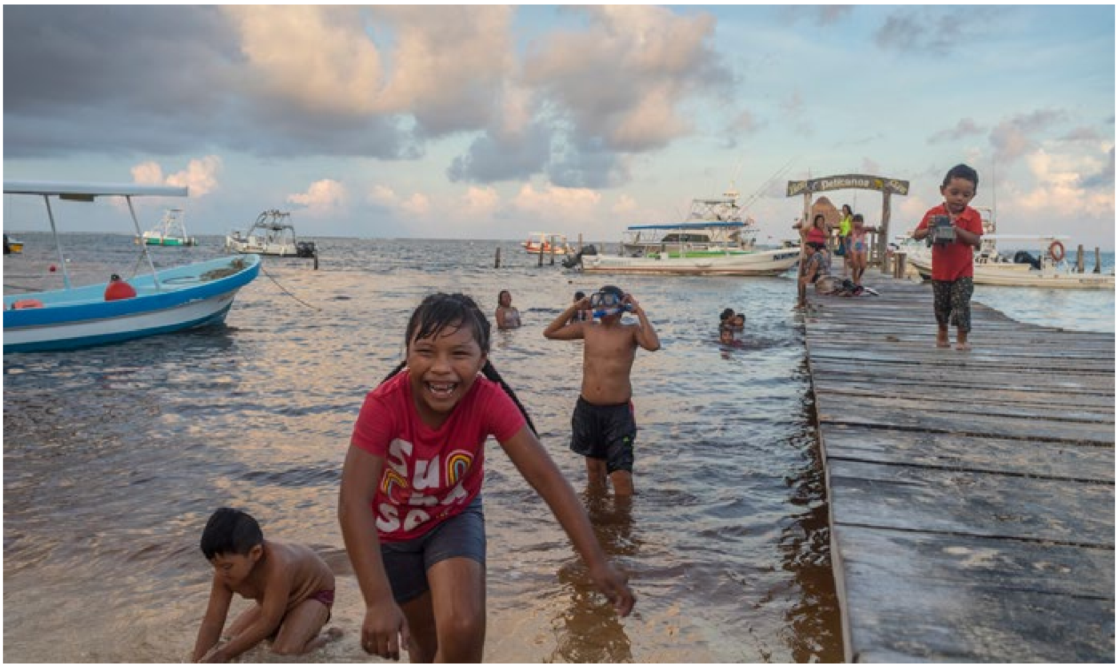
The Wildlife Conservation Society (WCS) has been active in the OWR for more than 30 years, supporting its creation and subsequently working closely with ICCN (Institut Congolais pour la Conservation de la Nature) — the government agency responsible for protected areas and wildlife — in its management.

1 REDD+ stands for (in brief) "Reduced emissions from deforestation, forest degradation and other activities" and represents a mechanism under the UN Framework Convention on Climate Change to provide positive incentives to support developing countries improve forest protection and management.

Case study

Protecting and restoring the Mesoamerican Coral Reef to improve climate resilience and adaptation

Network of marine and coastal protected areas, Quintana Roo, Mexico



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13 CLIMATE ACTION

Co-benefit SDGs

8 DECENT WORK AND ECONOMIC GROWTH

11 SUSTAINABLE CITIES AND COMMUNITIES

14 LIFE BELOW WATER

15 LIFE ON LAND

Fernando Secaira and **Mark Way** (The Nature Conservancy).

The Nature Conservancy
Protecting nature. Preserving life.

Background: Stretching over 1,000 km, the Meso-American coral reef is the second longest barrier reef system in the world, home to 500 fish and 70 coral species. It is considered a critically endangered ecosystem by IUCN and provides habitat for numerous threatened and endangered species such as sea turtles and whale sharks.

Reefs also sustain the tourism industry in the Mexican Caribbean, the most important destination in Mexico, attracting more than 12 million visitors per year and sustaining the US$12 billion tourist economy of Quintana Roo.

A comprehensive network of well-managed marine and coastal protected areas, stretching from the Yum Balam and Whale Shark Biosphere Reserves in the north to Xcalak Reef National Park and Manatee Marine Reserve in the south, is core to maintaining the health of the reef, and therefore its ability to protect the coastline. National parks protecting reefs include Puerto Morelos, Cancun-Nizuc and Isla Mujeres, Kian Ka´an, Xcalak and Cozumel; the whole regional tourism industry depends on them.

Sustainability challenge: Climate change is causing sea-level rise and stronger tropical storms, exposing communities to coastal flood risk and beach erosion, and at the same time it threatens the health of the coral reef. Coral reefs can reduce more than 90 per cent of wave energy during storms[103] protecting coastal communities and infrastructure. Reefs also reduce 40-65 per cent of off-shore wave energy under normal conditions,[104] protecting beaches from steady erosion. However, hurricanes can diminish live coral cover from 15 to 60 per cent[105] and reef complexity in a few hours.[106]

Ensuring the health of the Mesoamerican Reef, including having a well-managed network of protected areas in place, improves the physical and financial resilience of the area to climate-driven storms. Healthy reefs provide coastal protection, reduce damages to communities and tourism infrastructure and sustain businesses, jobs and livelihoods.

If reefs are degraded, losses to infrastructure from storms with a 10 to 100 years return period could double.[107] If dunes are removed, losses will increase from 42 per cent to 63 per cent. Seven protected areas have been established along the Mexican Caribbean to protect coral reefs, reducing some threats, such as overfishing and regulating boat traffic and tourism. Despite these efforts, the reefs have lost 80 per cent of live coral cover.[108] Ensuring continued protection and restoration of the reef after damaging incidents is essential to strengthen Quintana Roo's resilience to climate change.

Conservation solution: The National Commission of Natural Protected Areas (CONANP) and The Nature Conservancy (TNC) are working to address the threats to coral reefs within the protected areas network and expand ongoing reef and dune restoration efforts to secure the Mesoamerican Reef and allow it to provide the maximum level of protection to the communities.

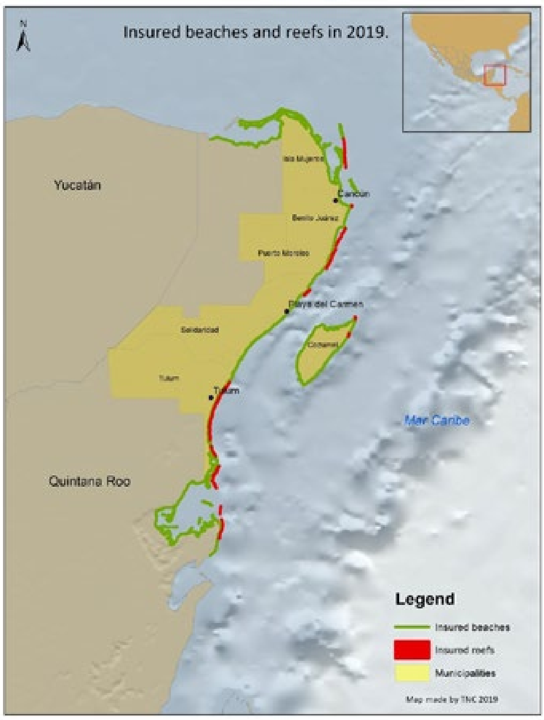
Building local capacities and awareness are essential to scale up restoration efforts. CONANP, TNC, UNAM (National University) and the National Fisheries Institute (INAPESCA) have developed guidelines on how to restore dunes and reefs for coastal protection, how to design beach erosion projects considering natural systems and how to repair reefs after a storm. This consortium, under TNC leadership, is training tourism-oriented consultants, reef managers and hotel staff on how to implement such projects.

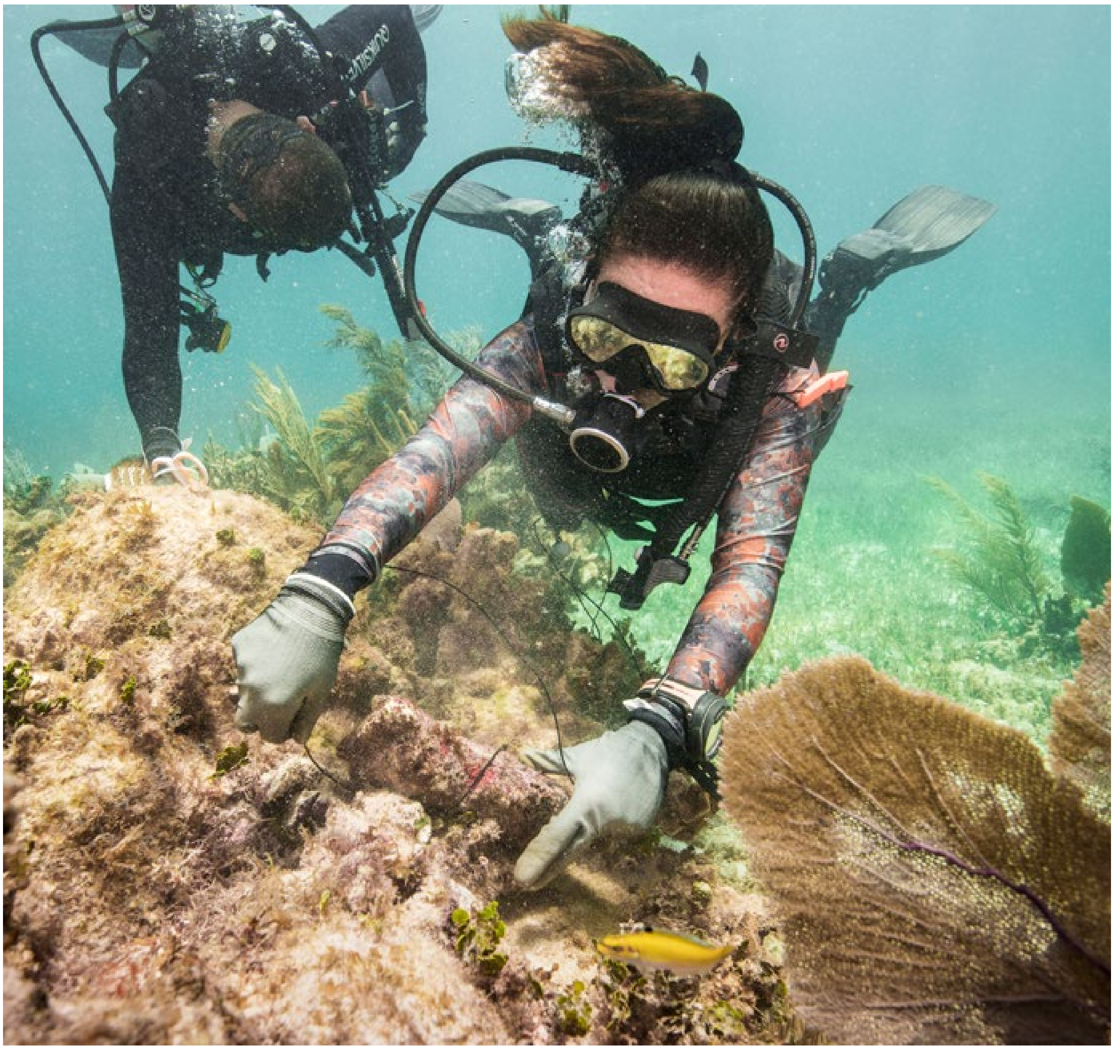
The response from the hotel industry and local communities has been very positive, with more than 60 fishers and tour operators trained in post-storm response, 60 hotel gardeners trained in dune vegetation management, and 80 private and state representatives on reef restoration for coastal protection.

In addition, an innovative financial solution developed by the state of Quintana Roo, TNC and other partners demonstrates how coastal ecosystems can be insured to provide for enhanced reef management and protection. The policy is based on protecting a marine ecosystem and maintaining its capacity to wave attenuation as an ecosystem service. The insurance covers 167 km of coastline of six municipalities and their towns – Cancún, Puerto Morelos, Playa del Carmen, Tulum and Cozumel. The parametric insurance product – whose pay-out is automatically triggered by a given storm strength – supports critical work to reduce and repair damages to the reef after a storm. This is essential to ensure that the protective potential of the reef is restored even after a catastrophic event.

After building local capacities, additional reef and dune restoration efforts are spontaneously emerging, many financed by the hotel industry. A group of hotel owners is embracing the importance of dune and reef restoration and is committing resources to protect and restore them.

For the post-storm response, CONANP, the Research Center for Aquaculture and Fisheries (CRIAP-INAPESCA) and TNC developed a protocol[109] to repair the reefs after a storm, established the governance to lead a response and trained 60 brigadists to conduct a post-storm response. These brigades will be mobilised after a damaging weather event to remove debris from reefs to prevent further damage (such as sand, loose stones or broken corals and other objects washed into the ocean); fix and consolidate loose colonies and broken fragments; and collect broken pieces and set up nurseries for future transplanting. If this response is implemented up to 60 days after the storm it will greatly increase chances for the coral to survive and recover while reducing the overall damage that the storm has caused.





Securing corals to the reefs helps to restore them after a hurricane.

Business case: The reef reduces exposure to coastal flood risk from tropical storms and stabilises beaches to protect the US$12 billion per year tourism industry along the coastline of Quintana Roo. Restoring the reef is estimated to be at most half the cost of the grey infrastructure needed to provide equivalent protection. Furthermore, much of the existing built infrastructure for coastal protection is situated within the national parks; restoring and improving the capacity of natural ecosystems to provide coastal defence is more in line with the conservation, tourism and recreational objectives of the parks.

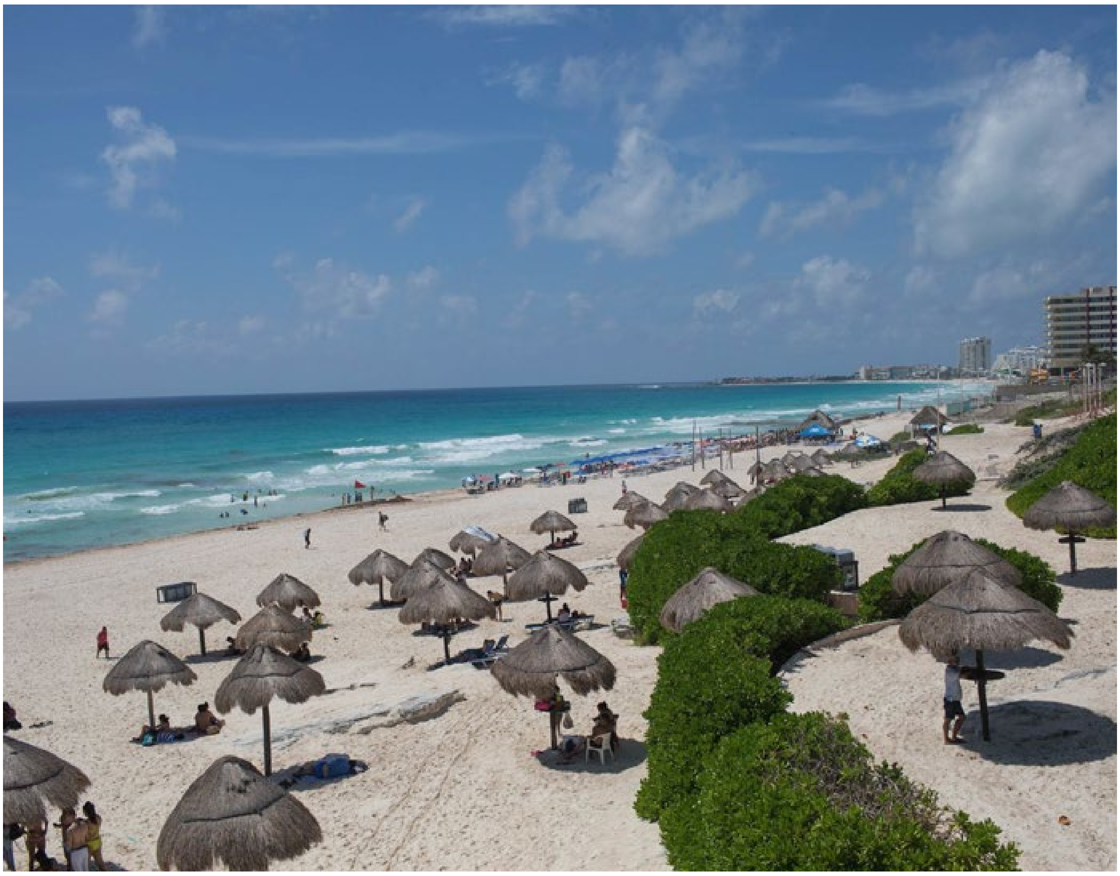
Rigorous studies led by the University of California Santa Cruz (UCSC), Institute of Hydraulics University of Cantabria (IHC), the Autonomous University of Mexico (UNAM) and TNC have shown the value of the Mesoamerican reef for risk reduction.[110] The reef's risk reduction value to properties and people protected along the coastline behind it is the foundation for building local capacities to restore reefs and dunes, to increase awareness and interest in the tourism industry to implement them and of the development of the first weather risk insurance placed in the market.

Lessons learned: The tourism industry is willing to work to sustain the natural capital on which their income depends. One frequent barrier, however, is a lack of financial information to compare the cost of natural solutions with traditional practices and infrastructure. Developing local capacity to use natural systems to reduce the risk from beach erosion and storms is also a challenge. But when these needs can be met, i.e. when information and capacities are achieved, then a change in attitudes and practices can take off. Several hotel owners are increasingly supporting reef and dune management within natural protected areas of their own accord.

Through the project and the introduction of the insurance contract, institutional

Case study

Economy of the Yukatan Peninsula is reliant on healthy beaches and coral reefs.



governance was strengthened around the management of a trust fund. This fund is designed to be able to accept different forms of funding for the protection and repair of coral reefs and the adjacent beaches – a source of finance that did not exist before in this transparent manner.

Insurance and the trust fund are risk transfer and financial instruments that work to help fund comprehensive management of the reef and coastal zone. The scope of work within the coastal risk and resilience initiative, by parks management and partners, encompasses reef and dune restoration, Sargasso removal, attention to diseases and fishing control.

Next steps: CONANP, TNC and partners will continue building the capacities and awareness of the tourism industry and will support them in the implementation of the reef and dune restoration projects within and nearby protected areas. The work will also expand well beyond Quintana Roo: TNC is building reef brigades in Belize, Guatemala and Honduras and will expand the brigades elsewhere in Mexico – to 180 team members in the four countries.

Ongoing monitoring is being conducted. The Healthy Reef Initiative,[111] in partnership with marine protected areas, research institutions and community leaders, has had a monitoring protocol in place since 2006. This monitoring programme, which tracks changes in reef health over time, will allow assessment to determine if the anticipated risk reduction benefits materialise and coastal resilience increases.

Information linked to this case study can also be found through the PANORAMA initiative.

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