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# Implementing SDG 15: Can large-scale public programs help deliver biodiversity conservation, restoration and management, while assisting human development?

Peter Bridgewater, Mathieu Régnier and Roberto Cruz García

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## Abstract

*Among the Sustainable Development Goals (SDGs), the proposed SDG 15 promotes activities that, inter alia, “Protect, restore and promote sustainable use of terrestrial ecosystems”. An important potential contribution in achieving SDG 15 is through public programmes designed to jointly promote human development through poverty alleviation and improvement of human livelihoods and biodiversity conservation/management/restoration. An analysis of twenty public programmes with such joint objectives yielded twelve lessons learned. In addition to financial commitments, government and intergovernmental agency input for such public programmes includes ensuring political will and appropriate legal frameworks. Local communities and civil society provide input through traditional and indigenous ecological knowledge and stewardship. Appropriate shared inputs in development and the implementation of such public programmes, with communication between local community, broader civil society, the scientific community and governments will result in: better use and management of biodiversity; alleviation of poverty; security of livelihoods and better governance systems. The Ecosystem Approach of the Convention on Biological Diversity provides an ideal framework when planning and implementing new programmes. Application of the lessons learned to new public programmes will ensure that the answer to the question posed in the title is an emphatic “Yes”, and assist with the achievement of SDG 15.*

**Keywords:** SDGs; livelihood improvement; poverty alleviation; biodiversity, ecosystem approach; ecosystem conservation; ecosystem restoration; environmental stewardship; policy support tools.

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## 1. Introduction

*“Landscapes have become complex social-ecological systems in which anthropogenic activities and biophysical factors interact across multiple scales. The integration of socio-economic development processes into conservation strategies as a means of sustainable resource management requires a deep understanding of the interactions between human activities and natural processes” (Junker et al., 2015, p. 27).*

The *Global Biodiversity Outlook 4* (SCBD, 2014) noted that overall changes in biodiversity are becoming more negative. With that in mind, among the post-2015 Sustainable Development Goals (SDGs) (UNSDG, 2015), the proposed SDG 15 advocates activities that: “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss”. This suggests that mechanisms that embrace biodiversity conservation, restoration and management jointly with human development will be vital to the success of SDG 15.

Especially since the 1990s, many countries and intergovernmental bodies have recognized the importance of biodiversity conservation, management and restoration by investing in large-scale public programs designed to achieve benefits for both biodiversity and human society. Recent evidence-based reviews comment on the importance that ecosystem restoration has in linking positive socio-economic and biodiversity-related outcomes (Aronson

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*et al.*, 2010; Wortley *et al.*, 2013). Both of these meta-analyses, as well as views expressed in Aronson and Alexander (2013), emphasize the need to promote synergies between biodiversity conservation, its management and policy implementation aimed at improving human livelihoods.

These observations from scientific reviews have been echoed and amplified in national and international policy discussions. At the eleventh meeting of the Conference of the Parties (COP) to the Convention on Biological Diversity (hereafter CBD), parties launched the *Hyderabad Call for a Concerted Effort on Ecosystem Restoration* (see Aronson and Alexander, 2013), which invited governments to recognize the importance of ecosystem restoration. At CBD COP12, a Decision — XII.19 — (CBD, 2014) brought the work being undertaken up-to-date. This international momentum sees the restoration of degraded ecosystems as having multiple benefits for the environment in general and for biodiversity more specifically, as well as improving the human condition. CBD Decision XII.19 also noted the importance “in the context of the ongoing discussions on the post-2015 United Nations Development Agenda, the contribution of ecosystem conservation and restoration, and related ecosystem functions and services, to sustainable development and poverty eradication”.

Within other biodiversity-related and Rio conventions there has also been a lot of focus on these issues: for example, the Convention on Wetlands (Ramsar, Iran in 1971; Ramsar, 2012); the Convention on Combating Desertification (UNCCD, 2015); and the UN Framework Convention on Climate Change through its REDD (Reducing Emissions from Deforestation and Forest Degradation) programme (UNFCCC, 2015). Given this research and policy momentum, and in the context of the nascent UN Sustainable Development Goals, we undertook in 2014 a qualitative desk review of public programmes, which had the dual objectives to achieve ecosystem conservation and restoration with human development *sensu lato*.

Our review sought to analyze the overall effectiveness of programmes linking positive biodiversity changes (including ecosystem service delivery) with human livelihoods — important features in achieving SDG 15. In our analysis we sought to identify strengths and weaknesses in programme results, and use that information to build a set of “lessons learned” to assist with the development and implementation of such programmes in the future. Brief notes on each of the programmes analyzed are included in the appendix.

## 2. Methods

To identify significant case studies for our review we assessed published literature, including both peer-reviewed publications and “grey” literature from intergovernmental

institutions such as the World Bank. We sought the most recent information available on the status of projects that involve human development or the conservation/management/restoration of biodiversity or *vice-versa*. We focused especially on the most relevant literature from 2005 onwards, particularly since 2009. Programmes with their own websites were also trawled to access the most recent information.

The following keyword strings were used to search for relevant cases: Integrated Conservation and Development Programme (ICDP); payment for ecosystem services (PES); landscape/ecosystem restoration; employment guarantee scheme; reducing emissions from deforestation and forest degradation (REDD<sup>(+)</sup>). Terms were used both singularly and as part of different combinations in trawling across Google Scholar and specialized databases, including the Web of Science (<http://isiknowledge.com>), and the World Bank Databank (<http://databank.worldbank.org/data/home.aspx>).

In total, we reviewed 51 programmes. Twenty were found to be especially relevant, with an additional 31 of a more specific nature or with a smaller footprint, which were not further considered. The 20 programmes retained were analyzed for the degree to which they had, or were achieving, effective outcomes for economic, human and natural capital.

The approach taken was largely qualitative, simply because there were many differences in subject, style and longevity among the programmes. The following four questions were used to structure the analysis:

- What were the imperatives for programme development?
- Was ecosystem restoration/management or human development the primary objective?
- Was management of natural, social, economic and cultural capital treated in an integrated way?
- What was the potential of the programme for replication?

We also analyzed the legal framework and design behind each programme. And while some programmes had finished, others saw a continuing life-span into years or even decades ahead.

## 3. Lessons learned

From the 20 programmes analyzed, we synthesize 12 key lessons. Overall, the programmes reviewed revealed that success is contingent upon more than governments providing financial commitments; government input also must ensure political support and appropriate legal frameworks. Success also means local communities and civil society provide input to the programmes through traditional and indigenous ecological knowledge and natural resource stewardship. We illustrate the lessons learned below with key, but not exhaustive, examples.

*3.1. Lesson 1. Intervene according to natural boundaries, regardless of administrative or political boundaries that may intersect with them*

While this should be obvious, it is especially important when programmes may involve cross-biome activity, encompassing multiple ecosystems. An excellent example here is the Atlantic Forest Restoration Pact (AFRP; Melo *et al.*, 2013). The AFRP has the main aim of promoting, facilitating and carrying out ecosystem conservation and restoration projects in the Atlantic Forest ecosystem across eight states in Brazil, irrespective of political boundaries.

Restoration on the river basin scale is an example of necessary large-scale activity to ensure comprehensive and integrated delivery of programme benefits. The work of l'Organisation Pour la Mise en Valeur du Fleuve Sénégal unites Mali, Mauritania, Guinea and Senegal in development and restoration activities of degraded sites as part of improving livelihood conditions, and the River Senegal basin is an excellent example (Vick, 2006). Landcare Australia also establishes its component groups largely on a river catchment basis, again excluding political and administrative boundaries (DAFF Australia, 2015).

*3.2. Lesson 2. Ensure that the landscape/seascape scale for ecosystem restoration activities in a public programme is appropriate*

The Kasigau Corridor Project — Kenya attempts to build green infrastructure, providing connectivity and reducing fragmentation, between large protected areas (Atela, 2013). Further examples are the complementary Natural Forest Conservation Programme (NFCP) and Grain for Green Programme (GGP) in China. The NFCP has the aim of conserving native forests through forest ecosystem restoration. The GGP aims at restoring crop lands on steep slopes back to the native ecosystems formerly found there — either forest or grassland. The GGP provides affected farmers with compensation, including “in kind” grain and direct cash subsidies, and extends over large swathes of western and northern China (Liu *et al.*, 2008). While the scale is large, it is also appropriate to the impact needed to arrest advancing desertification.

*3.3. Lesson 3. Ensure balanced and tangible benefits and improvement in natural, social, cultural and economic capital when developing and implementing programmes*

This lesson is crucial, as it underscores the need to link natural capital with all forms of human capital. In socio-cultural terms, it is important that public programmes recognize the need to develop innovative social transformation proposals, improve social outcomes for beneficiaries, and encourage activities that improve

conservation, management and sustainable use of biodiversity. Bringing the concept of natural and cultural heritage into the restoration discussion could also be helpful. This discussion could spread beyond the sphere of restoration to include activities such as art awards, local festivals, and other cultural and recreational activities. Landcare Australia has achieved this in many different ways, and has helped drive similar initiatives in other countries (Prior, 2012). Forest conservation and restoration driven by the AFRP also had a range of socio-cultural objectives (Melo *et al.*, 2013).

*3.4. Lesson 4. Combine programmes aiming for improved socio-economic conditions arising from ecosystem restoration with other environmental initiatives only when all elements of natural and human capital are clearly complementary*

Development of protected forest corridors in Kenya in the context of REDD+ efforts is a case in point (Atela, 2013). Restoration and subsequent management of forest corridors inevitably involves ensuring there are appropriate levels of disturbance to allow the development of suitable ecosystems to function as green infrastructure. REDD+, on the other hand, is primarily concerned with carbon sequestration and requires undisturbed terrain. These two aims are contradictory and programmes thus need to be clear about which ecosystem functions are intended to result from any ecosystem conservation or restoration activity, and tailor the programme to achieve those results.

*3.5. Lesson 5. Focus on the biodiversity and ecosystem services that will be conserved, managed or restored, including assuring appropriate genetic provenance, species composition and ecosystem structure*

While vegetation cover and forest area have increased under the National Forest Conservation/Grain for Green programmes in China, some of the tree species chosen for reforestation have caused lower species diversity from the original forest. There may be other unforeseen effects; for example, while the conversion of farmland to woodland and grassland has resulted in enhanced soil conservation and carbon sequestration, there is evidence of some decreased regional water yield under a warming and drying climate trend (Lü *et al.*, 2012). However, this may change with further development of the forest, also emphasizing the need for the monitoring of results to be part of all public programmes.

Afforestation activities under Landcare in Australia face similar issues — where enthusiastic community-led large-scale tree plantings can assume “any tree is good enough,” rather than asking “Is this tree the right tree for this place?” (see e.g., Cocks, 1994).

*3.6. Lesson 6. Ensure that the size of community groups involved in ecosystem restoration programmes and their links with programme outputs and with relevant levels of government are appropriate to the scale and timing of the programme and its intended outcomes*

Decentralizing institutional structures is a vital component of successful programmes. Establishing an efficient network of stakeholders, avoiding unnecessary hierarchy to foster democratic institutions, and ensuring a bottom-up approach through the involvement of *inter alia*, local or regional community groups are all ways that successful programmes have applied decentralization. Landcare activities in Australia and the Philippines, and the Working for Water programme in South Africa provide excellent positive examples (Cramb, 2005; Buch and Dixon, 2009; Tennent and Lockie, 2012).

An example that raises doubts and questions is the *Pago por Servicios Ambientales-Hidrológicos* (payment for ecosystem services — PES) in Mexico. To emphasize this lesson, Alix-Garcia and Wolff (2014, p. 373) observe that “PES programmes impact people, both the owners and the ‘purchasers’ of these services, and the information available at the moment does little to help us quantify the welfare effects of these new relationships”. Similar concerns were found in the Makira National Park REDD programme in Madagascar (Ratsimbazafy *et al.*, 2012).

*3.7. Lesson 7. Use a sufficiently long time frame and adequate resources and commitment to ensure the programme’s effectiveness and sustainability*

The length of time for restoration to occur varies from a decade for highly active coastal wetland systems to several decades or centuries for complex forest ecosystems. It may also involve different routes to a final destination, sometimes yielding hybrid or novel ecosystems (Hobbs *et al.*, 2014), the management of which should be considered in programme implementation.

Planning for long term goal setting and durability through active engagement with the private sector and seeking funds through market-based mechanisms, *inter alia*, carbon markets and PES can help set the right time frame and ensure adequate resources are available. It is also essential that programmes develop a structure and secure funding sources that guarantee long-term delivery of programme objectives, regardless of political changes. The role of the private sector can be very important in this context, and Lopa *et al.* (2012) discuss this for the Equitable Payments for Watersheds programme in Tanzania.

The AFRP results indicate slow progress in meeting its target because the challenge of rapidly providing jobs through sustainable forest extraction is difficult to overcome. In such cases achieving the impact in a time-frame normally acceptable to the political process ( $\leq 5$  years) is unlikely, and that message needs to be

communicated clearly and in advance, both to the government and civic society, to avoid disappointment from over-expectation.

The Coastal Wetlands Protection and Development Project — Vietnam (World Bank, 2008), while not suffering from time-related issues, does have problems with long-term sustainability. Mangrove replacement by shrimp aquaculture did provide significant income and social support, and so the project should have attempted to achieve a more balanced approach between full restoration of mangrove forest and retention/improvement of some high-quality aquaculture.

*3.8. Lesson 8. Periodically review programme effectiveness, allowing adaptive management and improvement of the programme’s institutional structure to meet and address new ecological and economic challenges*

One approach here is to encourage stakeholder feedback on design and implementation through initial stakeholder consultation, followed by input from annual stakeholder advisory groups for project managers. It is also valuable to implement internal and external monitoring schemes. A good example here is the CAMPFIRE programme from Zimbabwe (Taylor, 2009). The *Política de Seguro-Desemprego e Pesca Artesanal No Brasil* programme is another instance — fishers are paid subsistence during periods of fishing bans, which allows for restoration of fish populations used in artisanal fisheries. Regular monitoring of fish stocks takes place to determine catch size and length of “no-fishing” periods (Begossi *et al.*, 2011).

*3.9. Lesson 9. Create policy support tools that ensure the provision and improvement of ecosystem services to the public, on both public and private land*

Development of policy support tools at an early stage in programme implementation will both assist with implementation and allow for the use of adaptive management techniques as the programme evolves. All policies and their implementation tools should be inclusive and transparent, and concretely address a targeted problem. Fiscal devolution can encourage policy tools that promote rural democratization, decentralized governance and community-based natural resource management, underpinned by science-based restoration/conservation activities.

A good example is the Mahatma Gandhi Rural Employment Guarantee Scheme (MGNREGS), which has policy tools aimed at raising the living conditions of the rural poor through increasing food, water and environmental security (Sebastian and Azeez, 2014). Restoration and conservation activities in this programme generated environmental benefits across all forms of landholding, both public and private. The public



infrastructure produced through the programme is related mainly to water issues: restoration of traditional waterbodies, groundwater recharge, soil, water and biodiversity conservation, sustainable food production, and halting land degradation, and also contributed to increasing resistance to risks from extreme weather events.

*3.10. Lesson 10. Communicate the aims, outputs and intended outcomes of the programme in clear language to the local communities who will be involved in delivering them*

Simplifying the programme aims, ensuring coherent objectives and getting the language right is an important enabling factor when restoration, management and peoples' aspirations and livelihoods are involved. Local people are often wary when told they are to be involved in "biodiversity protection", but much more positive when told they are to be given more responsibility for "management of their local ecosystems" (see Adenle *et al.*, 2015). Morgan (2010) alludes to this with respect to the failures and successes of the Mawas Peatlands Conservation Programme in Indonesia.

*3.11. Lesson 11. Engage international actors with local stakeholders in programme development prior to handing ownership to local bodies*

A good example is the Makira Forest Programme of the Government of Madagascar. Driven by the Wildlife Conservation Society, it is one of five pilot projects being implemented in Madagascar as a part of a REDD initiative. This project's aim is carbon trading from avoided deforestation and restoration of degraded areas, as well as improving community land stewardship and governance and supporting sustainable livelihood practices for local people. Collaboration between the three stakeholders, which include the government (forest administration), the Wildlife Conservation Society (project development and management) and the local community, ensures successful outcomes (Ratsimbazafy *et al.*, 2012).

Similarly, the AFRP (Calmon *et al.*, 2011) was implemented by a large number of stakeholders, among them national and international non-governmental organizations (NGOs), governmental agencies, private companies and research institutions. This mix of actors enabled activities to take place at the right combination of scales to achieve the programme's ambitious goals.

*3.12. Lesson 12. Implement a rights-based legal framework and involve indigenous and local communities, ensuring indigenous and local knowledge alongside other knowledge, thus informing landscape-scale ecosystem management strategies*

Following this lesson can ensure the sharing of all relevant sustainable land management knowledge among

stakeholders, as exemplified in the Landcare and AFRP examples. Forest restoration driven by the AFRP also had several socio-cultural objectives that benefited local and indigenous people. There may be contention between indigenous practices and "western science", and it is therefore important to perceive these as different world views, and not two concepts that must be conflated. Work currently being undertaken by the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) Task Force on indigenous and local knowledge is relevant here (IPBES, 2015).

While it is normal to use the term "stakeholders", there is a clear and separate group better known as "rightsholders" — individuals or groups with legal or customary rights to natural resources. Lack of a rights-based framework, despite otherwise good intentions of public programmes, can lead to the alienation of local communities. Issues include modifying national laws to allow rural communities under communal/customary land tenure to obtain authority for the use and commercialization of wildlife, for example. This can be an alternative to subsistence agriculture on marginal lands, and a better prospect for economic development that benefits the poor, and is exemplified in the MGNREGS programme (Sebastian and Azeez, 2014), and the CAMPFIRE programme in Zimbabwe (Taylor, 2009).

#### 4. Concluding remarks

Successful outcomes from dual-objective public programmes include: improved governance mechanisms, alleviation of poverty, and the development of sustainable livelihoods for local communities, as well as better management and conservation of ecosystems, which will enable the continued provision of ecosystem services for people and the rest of biodiversity. Additionally, all share one over-arching commonality: in essence they are a pact between governments and local communities striving for the best possible environments for people and the rest of biodiversity. Both governments and local communities need to be in regular and unambiguous communication about programme delivery and the monitoring of results. And a favourable environmental response will be likely if governments and civil societies work together, but unlikely if there is conflict or ambiguity between restoration/conservation activity and human development *desiderata*.

Interestingly, in all programmes reviewed, the 12 principles and five points of operational guidance of the ecosystem approach (EA) of the CBD (CBD, 2000) would have formed an ideal framework for design and implementation. Through its principles, the EA promotes building up from basic conservation tasks to more comprehensive objectives (livelihood improvement, biodiversity conservation, health, education, etc.). The EA also promotes adaptive management. Finally, the EA has been embraced by all biodiversity-relevant conventions to

help achieve their individual strategic objectives. A *caveat* noted by Fee *et al.* (2009) remains an issue, which is that the EA is often talked about at both the international and national levels, but poorly applied, or even known about, at the local level — as it is with the programmes we reviewed. Although not specifically a “lesson” for activities under public programmes, we suggest that use of the EA is a suitable framework for the development of such programmes, and can ensure clarity of purpose amongst all potential actors in development as the programmes are being implemented. The particular feature of most value is the focus on using adaptive management to reshape programmes that do not deliver the desired results.

As all areas and locations are unique, strict adherence to any one “successful” design does not in itself guarantee success, rather flexibility in application of these lessons, with the Ecosystem Approach in mind, does just that. Finance is clearly important, but support of local communities from programme design is key. Unintended consequences can and do occur, which is why a well-designed and implemented monitoring protocol, with clear plans for adaptive management, is the final ingredient for successful programme implementation.

While public programmes focus strongly on natural and socio-economic capital, it is also important to ensure that cultural and heritage contexts are maintained. Such a focus will assist achievement of the strategic plans developed by the biodiversity-relevant conventions and maintain community ownership and pride in their environment. The twin objectives of reducing poverty/enhancing livelihoods and restoring/managing biodiversity must be implemented together, with appropriate weight on each, depending on the local conditions and imperatives. Use of the 12 lessons we describe will assist governments, international agencies and NGOs working together on public programmes to restore natural capital and improve human capital. Better design of such programmes will assist with more rapid achievement of SDG15, and also help improve the resilience of the global socio-ecosystem. Finally, should this level of cooperation between the twin objectives be obtained, the answer to the question posed in the title is an emphatic “yes!”

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## Appendix: Brief summaries of programmes analyzed

Each programme has at least one key reference, included in the references, for further insight.

### A.1. Atlantic Forest Restoration Pact — Brazil

The Atlantic Forest in Brazil is recognized as being one of the most species-rich terrestrial global ecosystems, yet current forest cover accounts for less than 14% of its original extension, and it is highly fragmented. Less than 20% of remaining forest patches is larger than 50 hectares, and 90% of remaining forest is on private land. The Atlantic Forest Restoration Pact (AFRP) was implemented by a large number of stakeholders, among them national and international NGOs, governmental agencies, private companies and research institutions. Its members include more than 200 partners/stakeholders, with the main aim of promoting, facilitating and carrying out conservation and restoration projects. The AFRP is on-going, and aims to restore 15 million ha of deforested land to native forest by 2050 (Calmon *et al.*, 2011). These lands are mostly degraded pasturelands and abandoned agricultural fields. Achievement of this goal will increase forest cover to 30% of the pre-Colombian status of the Atlantic Forest. This objective can be achieved without competing with more immediately economically profitable land uses, and help reward local (usually rural poor) populations.

### A.2. Grain for Green (GGP)/Natural Forest Conservation (NFCP) Programmes — China

The main catalyst for the implementation of the GGP was the effects of increasingly obvious deforestation, which lead to soil erosion and landscape degradation, with subsequent dust clouds reaching as far as Beijing. The NFC programme has the aim of conserving natural forests through the application of logging bans and reforestation by giving incentives to forest enterprises. The GGP mainly deals with the conversion of cropland located on steep slopes to forest and grassland, providing farmers with grain and cash subsidies. In addition to reversing deforestation and bringing soil erosion under control, two associated socio-economic goals of the programmes are the alleviation of poverty and the promotion of local economic development (Liu *et al.*, 2008).

### A.3. Hindu Kush-Himalayas Initiative

The International Center for Integrated Mountain Development (ICIMOD) is an institution formed by



regional member countries and partners that are committed to improving well-being and sustainability among the greater Himalayas population. Established in 1983, its primary area for action is the Hindu-Kush-Himalayan (HKH) region, which includes areas of Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan. The initiative's goal is to increase awareness of climate change on mountain ecosystems, and mitigate and adapt to climate change impacts *inter alia* through restoration and adaptive management actions (Schild, 2008).

#### *A.4. Mahatma Gandhi National Rural Employment Guarantee Scheme*

The Mahatma Gandhi Rural Employment Guarantee Scheme (MGNREGS) is a programme that was launched in 2005. Its main purpose is to improve livelihood security for populations in rural India by granting at least 100 days of paid employment every financial year for adults willing to undertake unskilled manual work in various public works projects. The main focus is on water harvesting and conservation, soil conservation and protection, irrigation provisioning and improvement, restoration of traditional water-bodies, land development and drought-proofing. These restoration and conservation activities generated environmental benefits across all forms of landholding, public and private (Sebastian and Azeez, 2014).

#### *A.5. Working for Water — South Africa*

South Africa is a chronically water-stressed country, with surface water used heavily and limited groundwater available. South Africa has also experienced introduction of many non-native tree species, several of which have led to conversion of native forests into single species stands, which intensifies the impact of fires and floods and increases soil erosion, with estimates that invasive plant species have reduced mean annual runoff by 7%. The Working for Water programme in South Africa has the purpose of maximizing the availability of water as an ecosystem service, enhancing sustainability by the elimination of invasive plants, and promoting social equity through job creation and training (van Wilgen *et al.*, 1998).

#### *A.6. Communal Areas Management Programme — Zimbabwe*

CAMPFIRE (Communal Areas Management Programme for Indigenous Resources) is a programme for devolving rural institutions the right to market and sustainable use of wildlife and other natural resources. In doing so, both governance of the institutions and local livelihoods are improved. The main aspect of the programme is the granting of rights to manage, use, dispose of, and benefit from natural resources by local communities (Taylor, 2009).

#### *A.7. Landcare — Australia*

“Landcare is a unique grass-roots movement that started in the 1980s through initiatives to tackle degradation of farmland, public land and waterways. The movement has expanded and evolved significantly since then, and is achieving results Australia-wide. Individuals and groups across Australia's vast and varied landscape are focused on best-practice sustainable agriculture and expert management of natural assets such as soil, water and native vegetation”. (DAFF Australia 2015).

The Australian Landcare movement is made up of several thousand individual Landcare groups comprised of about 30-50 farmers, and headed by an elected group leader. Joining Landcare is voluntary, with groups usually defined by a river catchment or peer groups with a common interest. A strong focus of Landcare is on soil protection and landscape management (including restoration) for agricultural, landscape stability and conservation benefits.

#### *A.8. Landcare — Philippines*

The Landcare movement in the Philippines followed (and has been supported by) Australian Landcare, and also works through community groups. These groups identify problems at the local level and act by encouraging community effort and financing support for improvement and management of soil, water and vegetation. Initially introduced in Claveria, municipality of Mindanao, the Landcare approach brings together farmers, representatives of the local government and technical facilitators from the World Agroforestry Center (Cramb, 2005).

#### *A.9. Política de Seguro-Desemprego e Pesca Artesanal No Brasil — Brazil*

This programme was originally developed with the aim of guaranteeing a minimal income for traditional (artisanal) fisherman, who are required to cease fishing activities during periods of fishing bans to allow for regeneration of fish stocks. A temporary income is available to fishers, and helps them adapt to the changing demands of the labour market, while maintaining social cohesion. Under the condition of fishers using only traditional methods, and not being employees of a third party, they receive a monthly minimum wage during the prohibition period. This measure ensures the overall sustainability of the artisanal fishery, and guarantees sustainable livelihoods for fishers (McGrath, 2012).

#### *A.10. L'Organisation Pour la Mise en Valeur du Fleuve Sénégal (OMVS)*

In 1972 Mali, Mauritania and Senegal signed a Convention on the Senegal River, declaring it an international river, and providing for the creation of an organization of cooperation for all matters related to the development of the river Basin. A further agreement created an institution (OMVS), under

which Governments relinquished sovereign control over river dependent resources. In 1978, an additional convention granted joint ownership of the river activities, giving each state equal right to them. These three conventions empower OMVS to restore degraded sites and develop sustainably the Senegal River (Vick, 2006). In 2006, Guinea was added as a member state of the OMVS agreement.

#### *A.11. Reserva Particular do Patrimônio Natural (RPPN) — Brazil*

In 1990, the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) developed the designation of Private Natural Heritage Reserves (RPPN), establishing the regulation of ownership of private natural protected areas, defining restrictions of use and benefits of landowners. Uses that are allowed in these RPPN areas are scientific, educational, cultural and recreation. RPPNs are defined as a “private area, protected in perpetuity, with the objective of biological diversity conservation”. The property rights over the area recognized as RPPN are unchanged, and the RPPN may be freely traded, since full ownership is maintained by the owners (Ring, 2008).

#### *A.12. Pago por Servicios Ambientales — Costa Rica*

Costa Rica’s Payment for Environmental Services (PES) programme started in 1997 as a programme for paying landowners to compensate for the provision of particular ecosystem services. In practice, even though each land area provides different ecosystem services, all receive equal payment. Legally, any contract established under Pago por Servicios Ambientales creates a legal easement that remains with the property, even if sold. Owners transfer to the national government rights to the climate-mitigation potential of the parcel. Funding was provided initially from a 15% consumer tax on fossil fuels established under the Forestry Law, but in 2001 subsequent legislation assigned a total of 3.5% of tax revenue to the programme. Funding of the programme also comes from voluntary contracts with private hydroelectric producers, who reimburse individuals (such as upstream landowners in watersheds) for continued water provision (Robalino and Pfaff, 2013).

#### *A.13. Payment for Hydrological Services Programme — Mexico*

Payment for Hydrological Environmental Services is a programme introduced by the federal government of Mexico in 2003. It grants landowners with forested property an economic incentive to avoid deforestation. It pays forest owners for the benefits of watershed protection and aquifer recharge, mainly in areas where commercial forestry is not competitive. Funding for the programme comes from a fee charged to federal water users, thus creating a link between those who receive environmental

benefits and those who help conserve them. Currently, the objectives of the programme are to: (1) decrease poverty levels in forest areas through adequate management and sustainable use of natural resources; (2) generate economic growth through conservation and sustainable exploitation of forest resources; and (3) improve forest management and planning (Perevochtchikova and Ochoa-Tamayo, 2012).

#### *A.14. Conservation Reserve Programme — United States of America*

The Conservation Reserve Program (CRP) was established in the USA in 1985 by the Food Security Act, establishing a scheme where eligible landowners would remove land from crop production in exchange for a fixed payment over an established period of time. Initially, the main criterion for enrolment was based on the potential of the land to be affected by soil erosion. The CRP is a voluntary programme that pays landowners to restore or convert environmentally sensitive croplands to grassland, forest or wetland. Its contracts are given on a multi-year basis, with penalties for those who withdraw before the contract expires. Originally, its main goal was to protect soil quality, but it now extends to water and air quality protection, as well as the enhancement of wildlife habitat (Hellerstein and Malcolm, 2011).

#### *A.15. Coastal Wetlands Protection and Development Project — Vietnam*

In the 1990s, Vietnam experienced an accelerated decline of its mangrove forests due to rapid coastal development expansion of shrimp aquaculture, much of it unsustainable. Vietnam experiences an average of seven storms annually, and mangroves help to attenuate the effects of storm surge during typhoons and other extreme events. The Coastal Wetlands Protection and Development Project was subsequently established, with two aims: (1) expand planting and sustainable management of the mangrove forest area; and (2) improve livelihoods of people in the coastal zone by increasing agricultural and aquatic production, and reducing the risk of natural disasters (World Bank, 2008).

#### *A.16. Makira National Park REDD+ — Madagascar*

The Government of Madagascar, in collaboration with a number of different institutions, particularly the Wildlife Conservation Society, created the Makira Forest Protected Area. It is one of the five pilot projects that are being implemented in Madagascar, and which is essentially part of the REDD initiative (Reducing Emissions from Deforestation and Forest Degradation). The project aims to attain carbon credit sales from avoided deforestation, financing the long-term conservation of one of Madagascar’s least-disturbed rainforest systems, containing globally significant biodiversity, as well as improving

community land stewardship and governance, and supporting sustainable livelihood practices for local people (Ratsimbazafy *et al.*, 2012).

#### *A.17. Socio Bosque — Ecuador*

In Ecuador, the Socio Bosque is a national conservation scheme, where beneficiaries owning native forests manage them for conservation, for which they receive direct financial incentives from the government. All individual landowners and local and indigenous communities can participate in the scheme. The agreements are voluntary and are monitored on a regular basis to assure compliance. The general goals of the programme are to conserve natural capital and alleviate poverty. The specific goals as defined by the Ministry of Environment of Ecuador are first to protect 3,600,000 ha of forest and other native ecosystems, and through this conserve biodiversity, reduce greenhouse emissions from deforestation, protect soils and water and mitigate natural disasters. In societal terms, the programme increases household income and improves livelihoods of the poorest rural communities (De Koning, 2011).

#### *A.18. Kasigau Corridor Project — Kenya*

The Kasigau Corridor project is a REDD scheme in Kenya, located in the Taita Taveta District, which aims to reduce carbon dioxide emissions by protecting natural carbon sinks that otherwise would have been deforested or degraded. The project aims at protecting a dryland forest that has potential as a biological corridor, linking the Tsavo East and Tsavo West National Parks.

The project's goal is to reduce greenhouse gas emissions, conserve and restore biodiversity and promote community development. It is designed in two phases. The first phase of the project aims at sequestering 300,000 metric tons of CO<sub>2</sub>, and the second phase of the project aims at sequestering about 49,000,000 metric tons. Carbon stored in both phases has been independently validated by accredited carbon market agencies. The land shareholders

will benefit directly from the carbon revenue, and also agree to fund several community projects (Atela, 2013).

#### *A.19. Mawas Peatlands Conservation Project — Indonesia*

The Mawas Peatland Conservation Project is located in Southern Borneo, Central Kalimantan, Indonesia. It is a sub-national project that has as its objective to maintain the status of peatland protected areas of this region, through collaboration with central and local authorities and enhancing local community livelihoods. The Mawas area has significant peatland, which makes the area a suitable storage area for carbon, and is also an important area for the orangutan. The project and associated protected area is being managed by the Borneo Orangutan Survival (BOS) Foundation, with approval by the national government. The specific objectives of the project are to conserve peat swamp forest and reforest degraded areas, to provide global greenhouse gas reductions through a REDD scheme. The project simultaneously provides access to health and education programmes and improves livelihoods in general (Mawas2, nd.).

#### *A.20. Equitable Payments for Watersheds Programme — Tanzania*

The programme is located in the Uluguru Mountains region, Tanzania, where the extension of farming onto steep slopes has caused an increase in silt run-off into the river, with a concomitant increase in downstream treatment costs. The project's location is the Ruvu river catchment, which is the local source of 90% of the water used domestically and industrially in Dar es Salaam. Economic incentives are provided to local farmers as compensation for ecosystem services maintained by the adoption of sustainable land management practices. While the project is mainly NGO driven, there is input from the private sector through involvement of a major water user (Coca Cola) (Lopa *et al.*, 2011).