CONTRACTUAL ARRANGEMENTS FOR FINANCING AND MANAGING AFRICAN PROTECTED AREAS: INSIGHTS FROM THREE CASE STUDIES

Renaud Lapeyre[1,*] and Yann Laurans[1]

[*] Corresponding author: renaud.lapeyre@iddri.org

[1] Institute for Sustainable Development and International Relations-IDDRI, Paris, France.

ABSTRACT

Protected areas and conservation are inadequately funded throughout the world, especially in Africa. In response to this challenge, 'innovative financial mechanisms' are meant to make use of markets and contractual arrangements to provide for additional and secured funding. The use of these instruments within nature conservation has increased in recent years. Proponents of these instruments argue that they may soon fill the funding gap. Critics warn that such instruments may favour market priorities, which could undervalue the overall conservation goals. This paper analyses the practical functioning of three cases of innovative financial mechanisms for African protected areas. It draws insights about their potential replication, with respect to their contractual design, their associated impacts and success factors, as well as the challenges encountered. The paper argues that these contractual approaches critically depend on enforcing conditionalities, maintaining long-term relations through intermediary organizations, as well as finding champions and building capacities. Challenges to be assessed in the future include the variability of markets and the significance of transaction costs.

Key words: Protected area management, contractual approaches, funding gap, innovative financial mechanisms, Africa

INTRODUCTION

Aichi Biodiversity Target 11 has set an ambitious goal: "By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes." Although this target appears as one of the very few for which some achievement is observed, progress remains insufficient (Secretariat of the Convention on Biological Diversity, 2014; Juffe-Bignoli et al., 2014). Protected area coverage of terrestrial area including inland waters has increased from 10 per cent in 1994 to 14.7 per cent in 2016 (UNEP-WCMC & IUCN, 2016). To reach 17 per cent of terrestrial coverage an additional 3.1 million km² of land needs to be protected. Additionally, most protected areas currently seem to be inadequately managed. Recent assessments show that most protected areas (62 per cent) only display a basic level of management (Leverington et al., 2010).

Africa is no exception. It represents only 3.3 per cent of the total number of sites protected globally (both terrestrial and marine). Protected area downgrading, downsizing, and degazettement (PADDD) is also a worrying trend on the continent (Mascia et al., 2014).

New and additional funding as well as better governance systems are needed to expand the protected area network, effectively and adequately. The challenge is daunting, but not impossible. The Convention on Biological Diversity (CBD) estimated that achieving target 11 would require spending between US$ 9.2 and 85 billion annually over the eight-year period from 2013 to 2020 (CBD, 2012). In Africa, more precise estimates of funding requirements for protected areas range from US$ 460 to US$ 2,048 per km² (Lindsey et al., 2016). Against these needs, available resources on the continent are really scarce.

To fill both these funding and management gaps, a broad range of instruments have been proposed to finance and manage biodiversity conservation within and outside protected areas, including economic and market instruments (McNeely, 1988; Emerton et al., 2006). In 2008, Parties to the CBD adopted the Strategy for Resource Mobilization and called to "explore new and innovative financial mechanisms at all levels with a view to increasing funding to support the three objectives of the Convention". Later in 2012, IUCN members further approved resolution 122 at the Vth World Conservation Congress in Jeju to promote such innovative financial mechanisms as complementary fundraising tools.

The leading group on Innovative Financing for Development[1] defines innovative financing as mechanisms for raising funds that are complementary to official development assistance, predictable and stable (Sandor et al., 2009). The characterization, advantages, limits and applicability of innovative financial mechanisms have been largely discussed (Vatn et al., 2014; Galaz et al., 2016). Potential advantages include economic incentives being efficient signals, optimal allocation of resources, and filling of the funding gap (Lapeyre & Pirard, 2013). Drawbacks of these mechanisms include the volatility and uncertainty of such instruments, and the possible commodification of nature (Melathopoulos & Stoner, 2015).

From both perspectives, the central contractual nature of these instruments, be it an opportunity or a risk, is emphasized. Yet, to move beyond wishful thinking, CBD Parties, donor agencies and practitioners now need to better analyse how these so-called innovative mechanisms are actually linked to renewed governance and what difference they make *on the ground*, especially in Africa. By bringing actual practice to theory and concepts, this article thus aims to investigate these contractual instruments and uncover their decisive characteristics, conditions for success, and challenges.

Based on a review of experiences (Lapeyre & Laurans, 2016) this article presents three case studies from protected areas in Côte d'Ivoire, Sierra Leone and South Africa. Selected in close co-operation with IUCN, the sample is intended to encompass a variety of contractual approaches to explore the potential role of contracts in funding and managing protected areas in Africa. This article describes the contractual design of these protected area management models and presents the results with respect to biodiversity conservation efforts. It aims to highlight some of the key principles that should be considered before replicating such instruments. Finally, it addresses the challenges of such approaches.

Funding the Gola Rainforest National Park through a non-profit company limited by guarantee (CLG) contributes to both conservation and development ©Renaud Lapeyre

UNCOVERING CONTRACTUAL APPROACHES FOR PROTECTED AREA FINANCE IN AFRICA: THREE MECHANISMS AND THEIR IMPACTS

Investigating in depth three case studies, and their differences in terms of rationale, institutional set-up, actors involved, and scale, allows us to uncover the role of various contractual arrangements in funding protected areas in Africa and improving their management.

- **A long-term innovative contractual approach in Sierra Leone**

The Gola rainforest occupies 70,000 hectares along the Liberian border. Situated within seven chiefdoms with a total of 140,000 inhabitants, its biodiversity is threatened by local slash-and-burn agricultural practices and mining.

Until the mid-1990s, logging concessions were granted over the forest. Yet, in 2004 a Conservation Concession was declared by the Government of Sierra Leone (GoSL) whereby two NGOs, the Royal Society for the Protection of Birds (RSPB) and the Conservation Society of Sierra Leone (CSSL), agreed to conserve the forest and compensate local actors for the loss of logging rights (Belvaux, 2012). A Benefit Sharing Agreement (BSA) was

In South Africa, landowners sign management plans and are provided with incentives to conserve biodiversity on their private lands © Yann Laurans

signed in 2007, which was funded by both the European Union and the French Global Environment Facility (FFEM). Through the BSA, the seven chiefdoms have so far received US$ 122,500 annually, conditional to their strict compliance with the forest management plan. In 2012, the Gola rainforest was eventually gazetted as a National Park (GRNP).

Since 2012, this contractual innovation was further developed into a REDD project in an attempt to sustainably fund GRNP over the longer term (Hipkiss & Tubbs, 2012). To sell credits for avoided deforestation on the voluntary carbon market, the project followed two leading international standards, the Verified Carbon Standard (VCS) and the Climate, Community and Biodiversity Alliance standard (CCBA). This created two important institutional changes. First, a Conservation and Cooperation Agreement was further signed with directly adjacent communities (within a leakage belt) to incentivize them and ensure enforcement of regulations. Second, a not-for-profit company limited by guarantee (CLG) was registered in 2015 to act as a legal entity to receive proceeds from the sale of verified carbon credits. Strategically, the government and both NGOs are the CLG's members. Operationally, the CLG is an autonomous, private body responsible for managing the GRNP area as a REDD project, meaning that it lawfully sells credits and pays for the management costs of GRNP and its leakage belt.

- **Signing biodiversity stewardship agreements with private landowners in South Africa**

Since the turn of the century, enrolling private properties in land-use management and conservation has been identified by South African authorities as a key condition to reaching the country's biodiversity objectives (Marnewick et al., 2015). Biodiversity legislation was redrafted in 2004 allowing private land to be officially and perennially registered as protected areas. This policy organization in turn gave rise to a "biodiversity stewardship" (BDS) approach, whereby everyone in the country is potentially called to steward natural assets that sit on their properties, in view of collectively forming a network of conservation through varied individual contributions (Cumming et al., 2015).

This brought the South African environmental NGOs, including BirdLife South Africa, and the Federal environmental authorities to think about sustaining landowners' motivation and incentivizing voluntary conservation. As a result, attention was given to building into legislation the ability to pay lower taxes, so as to induce a fiscal reward for landowners who committed their land to the conservation and management standards (Selinske et al., 2015). After an initial stage, during which the tax incentives were inadequately drafted, the fiscal provisions were re-worded and better adapted to the logic of business and taxes, and were adopted in March 2015.

Kob antelope (*Kobus kob*) in Comoé National Park, Cote d'Ivoire. FPRCI conditionally funds OIPR to manage the protected area network in Côte d'Ivoire © Wikimedia Commons

Based on national priorities, NGOs and provincial conservation agencies reach out to landowners whose land is considered important for conservation. After a technical site assessment, a protection status is proposed for the site by the provincial conservation authorities and a specific management plan is drafted. The selected site must then be officially declared as a protected area as defined in the legislation by the official representative of the Province. A preliminary agreement between the Provincial authority and the landowner is submitted for official public consultation after which the agreement is gazetted and the management plan is officially approved by the Province. The surface area covered in the agreement is officially delineated, and the resulting maps, declaration and management agreement are sent to the governmental deeds office to be attached to the land parcels through a notarial contract. On this basis, landowners are then allowed to apply for a tax reduction in their annual tax declaration. The relevant provincial conservation authority is responsible for annual monitoring of the management plan implementation.

- **Sustaining the protected area network in Côte d'Ivoire: debt swaps and funding agreements**

Forest area has been massively lost in Côte d'Ivoire, decreasing by 75 per cent in 50 years since 1960, in part due to rapid agricultural growth. Biodiversity in the country is highly threatened. To prevent further erosion Côte d'Ivoire has secured a network of eight protected areas and six natural reserves. One of these, the Tai National Park (TNP) consists of 536,017 ha of land in the west of the country. With one million people inhabiting its surroundings, main pressures for the park include commercial agricultural activities, especially cocoa production (Varlet et al., 2013).

Three types of innovation have been at work in Ivorian protected areas. First, the Foundation for Parks and Reserves of Côte d'Ivoire (FPRCI-CI) was created in 2003 as a private not-for-profit institution, the first Ivorian trust fund dedicated to funding the country's protected areas. FPRCI-CI is comprised of a General Assembly of ten founding members, a Board of nine directors and two observing members. FPRCI-CI's goal is to mobilize funds to generate returns on the international financial market. For this purpose, a sister foundation was registered in the UK in 2009 (FPRCI-UK) to legally host the endowment fund. Financial interests from the latter are then used to fund protected areas through FPRCI-CI.

Second, to capitalize this endowment fund, debt-for-nature swaps were undertaken. In this regard, both German and French governments signed debt swap agreements with the Government of Côte d'Ivoire, respectively in 2012 and 2014. Through these, the management of protected areas, including TNP, could be funded. In the latter case for instance, 9.5 million Euros were capitalized in FPRCI-UK's endowment fund to generate interests. To date, this has allowed FPRCI-CI to partially finance TNP's operational costs with 610,000 Euros every year [2].

Third, such FPRCI funding is contractually granted to an ad hoc management body. Created in 2002, the Côte d'Ivoire Parks and Reserves Office (OIPR) is an autonomous parastatal entity governed by a management committee, although supervised by the administration. Under the FPRCI's new financing role, OIPR's management responsibilities and results are closely checked by FPRCI as well as its donors. A Framework Agreement is signed with the foundation to define modalities and eligible expenses for each protected area. A yearly funding agreement is further discussed and monitored to determine FPRCI's regular disbursements to OIPR.

- **Contractual approaches' contribution to Aichi target 11: safeguarding biodiversity while ensuring equity**

When assessed against Aichi target 11, results suggest that innovative instruments potentially contribute to achieving three objectives simultaneously: increasing the geographical extent of protected areas, improving their management, and ensuring equity.

Table 1. Contribution of BDS to provincial protected area targets Source: Cumming et al., 2015.

Province	(a) Additional area still required in 2008 to meet the 2028 provincial protected area target (ha)	(b) Contract protected areas declared and in negotiation through biodiversity stewardship (ha)	(c) Percentage contribution of (b) to (a)	(d) Land acquired in the same time by the Provincial authority (other than with biodiversity stewardship) (ha)
Eastern Cape	1,570,000	234,074	15	0
Kwa-zulu Natal	842,000	268,668	32	1,165
Mpumalanga	632,000	129,325	20	0
Western Cape	1,004,000	87,447	9	100,026

First, cases in South Africa, Côte d'Ivoire and Sierra Leone suggest that innovative financial mechanisms are able to operate well beyond a pilot project's scale to encompass significant tracts of biodiversity-rich lands. In South Africa, based on the BDS approach, 70 different protected areas were declared and integrated in the national protected area register in 2014. This amounts to over 400,000 ha, i.e. 1 per cent of the total terrestrial protected areas. In March 2015, 153 sites totalling over 560,000 ha were in negotiation for protected area declaration (Cumming et al., 2015), potentially doubling these proportions. Overall, protected areas under BDS contribute to Provincial protection objectives in various proportions, from 9 to 32 per cent of surface area under protection (table 1).

In Côte d'Ivoire, the Taï national park (536,017 hectares) together with its peripheral zone (408,277 hectares) represents an area close to 3 per cent of Côte d'Ivoire inland territory where OIPR, with FPRCI's funding, manages and monitors biodiversity and human economic activities. Similarly in Sierra Leone, when counting the Gola Rainforest national park and its leakage belt, more than 132,000 ha of land fall under some sort of protected area management, approximately 2 per cent of the country's total territory.

Second, conservation activities in all these cases have proved successful in protecting biodiversity inside the concerned protected areas. In Sierra Leone, GRNP's budget is approximately US$ 1.6 million. The management unit permanently employs 170 local staff members, including 49 park rangers working full-time for the park's integrity. In 2015 and 2016, park rangers were provided with a patrol plan defined by the supervisor and assisted by a GIS specialist. They patrolled a total of 6,363 km and arrested several poachers and illegal miners [3]. Patrols have served as a strong deterrent: illegal activities (poaching, slash-and-burn farming) have decreased and deforestation is kept to a minimal level, if not zero. In Côte d'Ivoire, the Taï national park's budget also amounted to around US$ 1.68 million, out of which US$ 610,000 of operational costs were allocated by FPRCI. The latter thus provided critical support for the Taï national park's 140 staff, including 120 field officers in the park. In 2015, 203 patrols have been carried out inside (and just outside) Taï national park with 9,933 working days involved, mainly concentrated in vulnerable areas where encroachment and small-scale gold mining are occurring. This eventually led to the arrest of 174 offenders during 2015 (including three-quarters of illegal miners and 15 per cent of poachers). In total, despite the south-west region being the biggest cocoa producing area and as a result a place of migration, Taï national park is probably the most intact and best protected park within the Ivorian protected area network. Deforestation is kept to a minimum and wildlife numbers have stabilized or increased since 2012.

Third, these positive environmental results were to a certain degree equitably obtained with the participation of local communities. In Sierra Leone, results look impressive in reducing resentment and gaining local support for the GRNP and conservation in general (Tubbs et al., 2015). Since 2007, due to the benefit sharing agreement, US$ 122,500 has been spent annually for community development in the larger area and around 30 staff have been funded to provide critical support to communities around the park. The 122 forest edge communities (FECs), approximately 24,000 people living in the immediate surroundings of the park, have been supported with additional cocoa and agricultural assistance, 244 scholarships, as well as village savings and loan schemes. In South Africa, while sometimes criticized, the BDS approach actually also applies to land owned by communities, and the approach is cautiously kept neutral to all political criteria. The benefit acquired is limited in terms of fiscal resources, and the whole country benefits from the nature reserves.

Table 2. Principles to achieve success and their operationalization across the three cases

Case study Condition for success	Sierra Leone	South Africa	Côte d'Ivoire
Contractual agreements	1) Conservation Concession agreement between GoSL and both NGOs; 2) BSA between both NGOs and paramount chiefs, local authorities and FECs; 3) The same BSA between CLG and other actors; 4) Joint-venture agreement between GoSL and CLG.	1) BDS Agreement between Provincial Authority and private landowners. 2) Fiscal benefits agreement between Treasury, Province and landowners.	1) Debt swap agreements between the Ivorian government and its donor (France, Germany). 2) Framework Agreement (for each PA) between FPRCI-CI and OIPR. 3) Yearly funding agreement between FPRCI-CI and OIPR.
Conditionalities (Success condition #1)	To receive payments, Paramount Chiefs, local authorities and FECs should refrain from harmful practices in and around GRNP. BSA agreements shall be breached otherwise.	To benefit from land tax benefits, private landowners must implement their management plan. This is subject to annual verification by Provincial conservation authority.	To receive yearly annual funding from FPRCI, OIPR should implement its annual operation plan (completion rate). Subsequent disbursements shall be cancelled otherwise.
Intermediation for long-term relations (Success condition #2)	RSPB protecting biodiversity in the country and links with the government since the 1990s.	NGOS such as WWF and Birdlife SA protecting biodiversity in the country and linking with government authorities since 1995.	Bilateral donors (GiZ, KfW and AFD) in the country since independence.
Capacity building (Success condition #3)	Capacitate paramount chiefs, CSSL, National Protection Area Authority (NPAA), GoSL.	Capacitate Provincial authorities' reps, Treasury reps, etc.	Capacitate FPRCI-CI, OIPR, PA management teams at the decentralized level.
Sustaining 'champions' (Success condition #3)	A group of influential politicians actively support the project.	Very variable level of political willingness across Provinces, as evidenced with the different number of personnel recruited for BDS and contrasted smoothness of administrative processes.	Ministry for Environment involved from the beginning in setting FPRCI-CI; influential members of civil society on the FPRCI's board of Directors; very capacitated and motivated personnel at OIPR level.

REPLICATING CONTRACTUAL APPROACHES? DISCUSSING SUCCESS CONDITIONS

Arguably, the contractual approaches described do not display much highly qualified financial engineering. Rather than supplanting public finance, in all three cases innovative private funding constitutes a complement. The analysed case studies indicate that the most significant innovation consists in the renewed governance, combining both public and private involvement through contractual approaches. To generate additional funding and improve protected area management these contractual approaches build on a number of common principles: 1) the enforcement of conditionalities, 2) the existence of intermediary organizations to build and fund long-term relationships, and finally 3) sustaining "champions" and building capacity at both the local and national level. Table 2 above displays how in each case under scrutiny these principles were operationalized on the ground, while the following explains this in greater detail.

- **Success condition #1: A contractual approach with conditionalities**

Conditional agreements are central to the success of all three cases investigated. In each of them new governance architecture has emerged, where public, private and civil society actors' involvement is coordinated through institutional arrangements that define respective rights and responsibilities (Figure 1). Conditions attached to these contracts importantly explain the actual delivery of conservation results. Conditionalities induce verification and corresponding payments directly and explicitly depend on the observed realization of outputs. In the three cases studied, such conditional contractual agreements are applied at two different but complementary levels.

At the local level, individual farmers and rural communities are contracted to change their business-as-usual practices and adopt more sustainable land-use techniques. In Sierra Leone, the government and RSPB

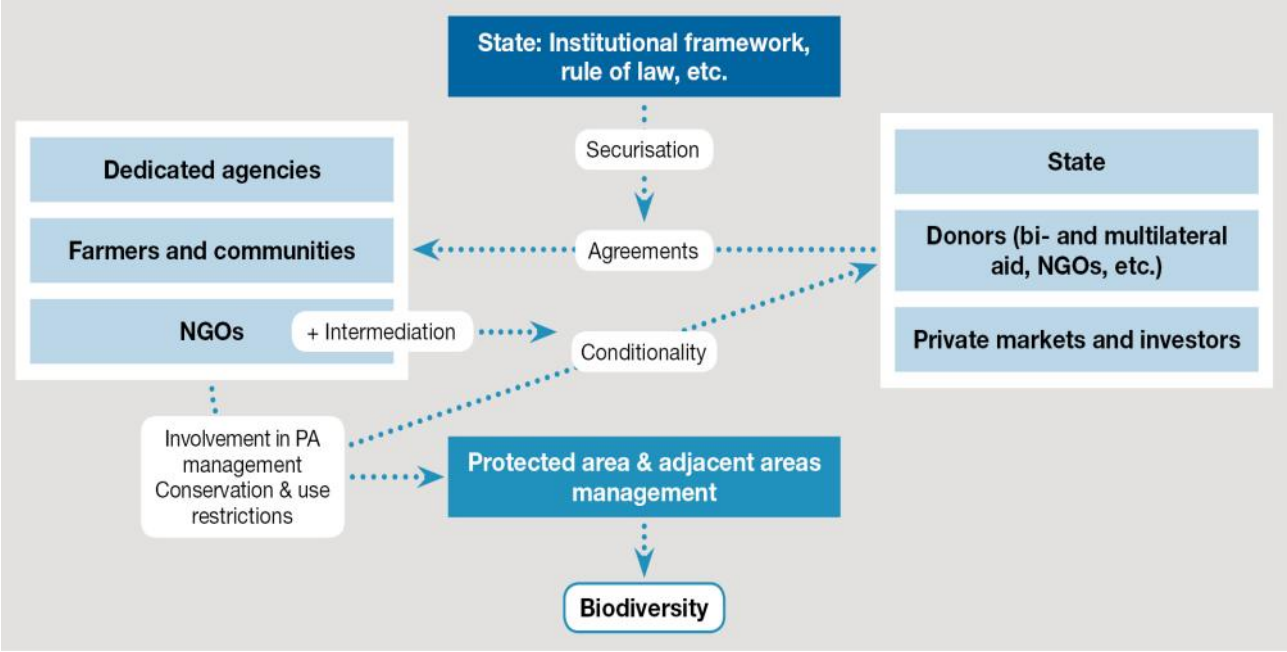

Figure 1: General governance design for contractual approaches Source: Lapeyre & Laurans, 2016.

first signed a conservation concession agreement to secure the Gola forest reserves' integrity, where local communities are compensated for the loss of rights and for adherence to the management plan (stopping logging and slash-and-burn agriculture). The newly registered company limited by guarantee and the government then additionally signed similar benefit sharing agreements with forest edge communities situated within the leakage belt. In South Africa, to be granted annual tax deductions private landowners need to respect a Biodiversity Stewardship agreement they have signed with the provincial conservation authorities. In both cases, contracts – be they payments for ecosystem services or conservation easements – are signed and involve payments that are, importantly, conditional to behaviours, actions and results agreed on in advance. In Sierra Leone, paramount chiefs must do all in their power to prevent poaching as well as slash-and-burn agriculture in and around the protected area. In South Africa, farmers must implement a management plan. In turn, if agreed conditions are not fulfilled, benefits can be withheld.

At the institutional level, the contractual approach is further reinforced by the design of new and innovative arrangements where public, private and civil society actors join to coordinate their efforts and improve protected area management. In Côte d'Ivoire, following typical concepts of New Public Management (Ferlie et al., 1996; Barzelay, 2001), a conservation-devoted agency, OIPR, was created by law to manage the national network of protected areas. The *ad hoc* entity is autonomous, and its board as well as its executive management independently manage funds based on agreed operational plans, although under the administration's supervision and with partial funding from the Ministry. In Sierra Leone, a specific private entity, a company limited by guarantee, was also set up where the government and NGOs share responsibilities and rights as regards the management of the Gola Rainforest National Park. This private company acts as an independent vehicle where public, private and NGO actors clearly define their respective roles, beyond political changes and funding cycles.

In both cases, the government is now 'steering not rowing', using market and quasi-market mechanisms in delivering public services, and separating politics from the management of public services (Marshall, 2008). Traditional boundaries of the State are modified (Birner & Wittmer, 2004) and a new principal-agent relationship is introduced, whereby the *ad hoc* agency is now responsible for reaching a set of negotiated objectives. In Côte d'Ivoire OIPR is accountable to both the Ministry, as well as the Foundation for Parks and Reserves in Côte d'Ivoire (FPRCI), which annually funds recurrent costs for several protected areas within the OIPR network. In the latter case, OIPR and FPRCI sign a yearly funding agreement where disbursements are conditional to fulfilling certain milestones.

In all, whether through public-private partnerships, co-management structures, shared governance (Borrini-Feyerabend et al., 2013), service contracts, or other governance arrangements, the contractual approach with conditionalities attached is arguably successful in improving protected area management (European Commission, 2015). As compared with a situation where

conservation activities are totally integrated within governmental administration, the contractual approach replaces the hierarchical relationship involved in public administration, where incentives are diluted and monitoring costs are significant (Mookherjee, 2006), and thus may potentially prove more service-oriented. This can increase cost effectiveness, policy capacity, responsiveness, monitoring and evaluation.

- **Success condition #2: intermediary organizations are key for long-term relationships**

The instruments described, based on contractual arrangements and attached conditionalities, are indeed complex tools. Hence, these need stability, continuity in time, as well as a good level of trust and understanding shared by all stakeholders. In turn, this requires organizations to link with all partners on a perennial basis to coordinate actions, mitigate conflicts and smooth processes and negotiations. NGOs and support agencies that provide technical assistance as well as multi- and bilateral donor money are therefore key to shape these mechanisms on the ground (Mermet et al., 2014).

Promoting and implementing innovative financial mechanisms requires the presence of already existing long-term relationships between support agencies and the involved local actors. In Côte d'Ivoire, German technical and financial cooperation agencies have been paramount in fostering funding and management of the Taï national park for many years. In Sierra Leone and South Africa, NGOs have also played, and still play, a crucial intermediary role. RSPB has been central in linking the Government of Sierra Leone, paramount chiefs and local communities on the ground, whereas environmental NGOs such as Birdlife South Africa play a crucial role as intermediaries between the Provincial administration, the national administration, the tax services and the landowners.

Innovative funding and incentive tools actually require a myriad of actors that already operate in and around protected areas and provide their expertise in cultural mediation, science, technical capacity, facilitation and brokering. The introduction of an innovative contractual approach is thus neither an absence of, nor a simplified role for, intermediaries and social-political processes. Rather, the promise lies in using players and processes differently from those of other instruments. Instead of starting new processes, innovative mechanisms open up space for new chains of intermediaries that may deliver better results in some cases where other instruments using other chains of intermediaries cannot (Mermet et al., 2014: 73-74).

- **Success condition #3: Building capacity and sustaining 'champions'**

Innovative financial instruments are complex mechanisms that need long-term support. Hence, they are social constructs that require people to be involved in their design and implementation.

All three cases indicate the importance of highly capable 'champions'. At the political and regulatory level, these champions need to work in ministries and public administration. In Sierra Leone, few people strongly support GRNP. In South Africa, continued development of the Biodiversity Stewardship approach relies on Provinces' support. In the Western Cape, Provincial authorities have dedicated 24 staff members to the BDS approach. In Côte d'Ivoire, the Ministry for Environment has lobbied for the creation of FPRCI. Such champions form the backbone of innovations' success and sustainability; building trust and investing in longer-term relationships with influential and like-minded people is a priority that should be recognized.

At the local and operational level, building capacity allows for smooth implementation of mechanisms. For effectiveness and sustainability reasons, a multitude of stakeholders who understand the contractual mechanisms at work are needed. These stakeholders should include park managers, *ad hoc* agency managers, government officers, NGO field staff as well as representatives from local communities and individual farmers. Without such shared understanding, for instance from paramount chiefs in Sierra Leone, resentment and conflicts will emerge based on misunderstandings while participation will decrease. Explaining rules, rights and responsibilities of stakeholders, as well as conditionalities and processes involved is an essential investment to guarantee the longer-term success of such innovative financial mechanisms.

THE SCALE'S THE LIMIT? DISCUSSING CHALLENGES OF CONTRACTUAL APPROACHES

Achievement of these principles often brings challenges and institutional frictions. Indeed results from the three case studies also highlight a number of limitations. These challenges may jeopardize the sustainability of innovative financial mechanisms for African protected areas and their capacity to be further replicated at a larger scale.

First, mobilizing markets – be they carbon or financial – might prove limited and unpredictable for protected area funding. A recent report indicated a total market value of

Adjacent communities in the market of the town of Tai, near the Tai National Park in Ivory Coast © Kafougue (Wikimedia Commons)

only US$ 216 million for forestry offsets in 2012 (Peters-Stanley et al., 2013), while the number of REDD+ projects has been decreasing since 2010 (Simonet et al., 2015). Easements, water credits, and carbon are actually not large fungible market revenue streams and cannot be considered "plain vanilla opportunities" (NatureVest & EKO Asset Management Partners, 2014). With respect to financial markets, the 2008 crisis and current low interest rates similarly limit possibilities to generate significant returns, for instance for environmental trust funds.

Second, the existence of significant transaction costs might hinder the implementation of this kind of instrument. The analysis presented here indicates that all three mechanisms strongly rely upon complex and numerous contractual arrangements: between landowners, NGOs and public administration; between private and public donors and dedicated *ad hoc* agencies; between donors and governments. Having to elaborate and then manage multiple contracts is a large burden felt by all partners. Future partners have to be looked for and approached, contracts and agreements have to be designed, negotiated and signed, and obligations need to be enforced and monitored. All these activities (commonly phrased as "transaction costs" in economic analysis) are not directly related to protected area management and biodiversity conservation. In South Africa, private landowners need to liaise and contract not only with the Provincial government but also with the South African National Biodiversity Institute (SANBI), the national government as well as with the tax administration. Getting the agreement signed off by the Provincial authorities can impose more than a one-year delay. In Sierra Leone, RSPB first signed a Conservation Concession Agreement with the government and then a benefit-sharing agreement with all seven chiefdoms. Now a private company limited by guarantee has been set up to sell voluntary carbon units. For this, a joint-venture agreement has been signed with CSSL and the government, a benefit-sharing agreement was signed with chiefdoms, additional and specific agreements were signed with each of the 122 forest-edge communities, and hundreds of agreements were signed with all family landowners having traditional land rights inside GRNP.

Innovation involves significant transaction costs, which are to be accounted for when evaluating the real efficiency of the contractual arrangements designed (Williamson, 1991; Birner & Wittmer, 2004). Accounting for these costs might better inform decision makers and practitioners when deciding over the boundaries of the

In Sierra Leone, benefit-sharing agreements are signed with forest edge communities to incentivize them and ensure enforcement of regulations © Annie Spratt (Unsplash.com)

State in protected area management (Birner & Wittmer, 2004). Contractual arrangements should not, however, be ruled out because of their significant transaction costs. First, it remains to be seen whether contractual arrangements incur higher transaction costs than those that would be generated by more traditional arrangements. As demonstrated by Cumming et al. (2015) in South Africa, public costs may be significant. Second, transaction costs involved in designing innovative mechanisms are primarily supported during the instrument's starting phase. Hence, whereas this might be a significant burden in the beginning, this should dramatically decrease during the running phase, when results from the innovation (conditionality, incentives, monitoring) become tangible. In the mid- to long-term, such mechanisms may well be cost-effective.

Finally, it is necessary to examine other sources of institutional friction. To ensure its stability and sustainability the new complex governance architecture needs to be understood and legitimate at the local level. Clear understanding of the scheme was not always shared by local communities and their paramount chiefs around GRNP in Sierra Leone. Additionally, their real full participation in discussing agreements and contractual conditions is unknown. In TNP in Côte d'Ivoire, socio-economic measures for poor adjacent communities were not always prioritized by FPRCI and OIPR when they contractually agreed on conditional yearly funding. The complex innovative institutional arrangements studied within the three case studies might have fallen short of widely including stakeholders, especially at the protected area local level. Without such equity – both procedural (actual participation, not mere tokenism) and distributive (economic support) – a resulting lack of legitimacy will trigger and accelerate misunderstanding, resentment, conflicts and park encroachment, and will increase transaction costs. Designing and respecting social and environmental safeguards are crucial when implementing innovative financial mechanisms on the ground.

CONCLUSION

In response to the challenge of filling both funding and management gaps for conservation in Africa, this paper has investigated three examples of "innovative finance" for protected areas. Our findings indicate that innovation can be found much less in finance than in governance. Financing sources do not make use of sophisticated and highly qualified finance engineering in all three case studies analysed. Rather, they are different forms of official development assistance mixed with NGOs' donations and public endowment or subsidies, with limited private funding so far.

Yet since financing sources of various origins are to work together, contracts and contract-based relations are paramount in this new type of organization. This contractual essence produces a need for security, accountability of the funds' recipients, and verifiable effectiveness of policy implementation. This contractual nature may explain both the main reasons for observed success as well as the challenges ahead, should this kind of organization be employed more extensively in the future.

Regarding success factors, the strength of conditions and enforcement thereof is favoured by the fact that funding is based on a specifically defined series of commitments to manage the areas as per plans, and that support from the funders is subject to the confirmation of implementation. The second success factor, the role of NGOs and development agencies as crucial intermediaries, could go unseen since it is generally not present in explicit regulatory texts, nor in established institutions. Yet all three case studies proved highly dependent on support from such intermediaries. The third success condition is directly related to the human factor. Even the most streamlined and crafted mechanisms eventually benefit from individuals who are in a position to support the initiatives and are willing to invest their time, their credibility and their skills in the setting up and in the day-to-day running of these projects.

Considering such achievements and success factors, a question thus arises: why would conservation not be extensively financed and managed based on this kind of approach? Whereas the three studied cases proved up to the task of protecting areas on a quite large scale, it appears that their ability to provide for conservation at the national scale is limited by what makes their very success: their contracting and tailored nature, with associated transaction costs, their dependency on personal involvement, and the need for enduring support from well-staffed intermediary organizations. It is important to note that in all three cases support organizations were international NGOs or agencies rather than local grassroot ones; without increased local legitimacy this might become another, important, limit to the generalization of these approaches.

ACKNOWLEDGEMENTS

This work was supported by the France-IUCN Partnership, as well as by the Agence Nationale de la Recherche of the French government through the Investissements d'Avenir [ANR-10-LABX-01] programme.

ENDNOTES

[1] www.leadinggroup.org/rubrique20.html. Created in 2006 under the leadership of France, Chile, Brazil and Spain, the Leading group is an informal network that currently brings together sixty-six States and international organizations, non-governmental organizations (NGOs), local entities and private foundations dedicated to the eradication of poverty and the preservation of global public goods (incl. biodiversity).

[2] More precisely, part of the 9.5 million Euros was actually disbursed into FPRCI's sinking fund so as to immediately cover TNP's operational costs. The other part is capitalized on FPRCI's endowment fund so as to generate interest payments that will cover TNP's costs in the (near) future.

[3] Although park rangers are not armed, they are allowed to arrest intruders and community members undertaking illegal activities within the National Park and hand them to the police for prosecution. If necessary, a Rapid Response Unit from the local Police is called to join the rangers to assist with the arrests.

ABOUT THE AUTHORS

Renaud Lapeyre holds a PhD in development and environmental economics. His main research has recently focused on community-based natural resource management, conservation, collective action and income-generating activities (ecotourism) in developing countries. He worked and conducted research during several years in Morocco, Namibia, South Africa and Kenya. His current specific research at the Institute for Sustainable Development and International Relations (IDDRI) focuses on market-based instruments for biodiversity and payments for environment services in developing countries, in particular in Africa and South-East Asia. He also teaches at the Paris School of International Affairs (Sciences Po).

Yann Laurans is a biodiversity and water economist, he works on the link between economic valuation and nature as well as water policies. His recent work also focuses on 'nature-based solutions' and the Convention on Biological Diversity. He teaches at the Paris School of International Affairs (Sciences Po). He is currently the Biodiversity Director of the Institute for Sustainable Development and International Relations (IDDRI/ Sciences Po).

Elephants on the shore of Lake Edward, Queen Elizabeth National Park © Grégoire Dubois

REFERENCES

Barzelay, M. (2001). *The New Public Management – Improving Research and Policy Dialogue.* Wildavsky Forum Series. Berkeley and Los Angeles, California, USA: University of California Press. www.ucpress.edu/book.php?isbn=9780520224438

Belvaux, E. (2012). *Final Evaluation Report – Conservation of the Gola Rain Forest: Sierra Leone, Report to the Fonds Français pour l'Environnement Mondial*. Paris: Gret.

Birner, R. and Wittmer, H. (2004). 'On the 'efficient boundaries of the state': the contribution of transaction-costs economics to the analysis of decentralization and devolution in natural resource management'. *Environment and Planning C: Government and Policy* 22 (5): 667-685. doi.org/10.1068/c03101s

Borrini-Feyerabend, G., Dudley, N. Jaeger, T., Lassen, B., Broome, N.P., Phillips, A. and Sandwith, T. (2013). *Governance of Protected Areas: From understanding to action*. Best Practice Protected Area Guidelines Series 20, Gland, Switzerland: IUCN. cmsdata.iucn.org/downloads/governance_of_protected_areas___from_understanding_to_action.pdf

CBD (2012). *Report of the High-Level Panel on Global Assessment of Resources for Implementing the Strategic Plan for Biodiversity 2011-2020*. Montreal: Convention on Biological Diversity. www.cbd.int/doc/meetings/cop/cop-11/information/cop-11-inf-20-en.pdf

Cumming, T., Driver, A., Pillay, P., Martindale, G., Purnell, K., McCann, K. and Maree, K. (2015). *The Business Case for Biodiversity Stewardship*. Pretoria, South Africa: South African National Biodiversity Institute.

Emerton, L., Bishop, J. and Thomas, L. (2006). *Sustainable Financing of Protected Areas: A global review of challenges and options*. Gland, Switzerland and Cambridge: IUCN. dx.doi.org/10.2305/IUCN.CH.2005.PAG.13.en

European Commission (2015). *Larger than Elephants. Inputs for an EU strategic approach to wildlife conservation in Africa – Synthesis*. Brussels: European Commission, Directorate-General for International Cooperation and Development. ec.europa.eu/europeaid/sites/devco/files/eu-wildlife-strategy-africa-synthesis-2015_en_0.pdf

Ferlie, E., Ashburner, L., Fitzgerald, L. and Pettigrew, A. (1996). *The New Public Management in Action*. Oxford, UK: Oxford University Press. doi.org/10.1093/acprof:oso/9780198289029.001.0001

Galaz, V., Gars, J., Moberg, F., Nykvist, B. and Repinski, C. (2016). 'Why ecologists should care about financial markets'. *Trends in Ecology & Evolution,* 30(10): 571-580. doi.org/10.1016/j.tree.2015.06.015

Hipkiss, A. and Tubbs, N. (2012). 'Innovative financing for sustainable conservation of the Gola Rainforest, Sierra Leone'. *NAPA News from African Protected Areas*, (56): 6-8. papaco.org/wp-content/uploads/2015/03/lettreNAPA-56-0912-EN.pdf

Juffe-Bignoli, D., Burgess, N.D., Bingham, H., Belle, E.M.S., de Lima, M.G., Deguignet, M., Bertzky, B., Milam, A.N., Martinez-Lopez, J., Lewis, E., Eassom, A., Wicander, S., Geldmann, J., van Soesbergen, A., Arnell, A.P., O'Connor, B., Park, S., Shi, Y.N., Danks, F.S., MacSharry, B. and Kingston, N. (2014). *Protected Planet Report 2014*. Cambridge, UK: UNEP-WCMC. www.unep-wcmc.org/

system/dataset_file_fields/files/000/000/289/original/Protected_Planet_Report_2014_01122014_EN_web.pdf?1420549522

Lapeyre, R. and Pirard, R. (2013). *Payments for environmental services and market-based instruments: next of kin or false friends?* Working Paper 14/13. Paris: IDDRI. www.iddri.org/Publications/Payments-for-environmental-services-and-market-based-instruments-next-of-kin-or-false-friends

Lapeyre, R., and Laurans, Y. (2016). *Innovating for Biodiversity Conservation in African Protected Areas: Funding and Incentives. Insights from Côte d'Ivoire, Sierra Leone and South Africa. Study summary*. Paris, France: ministère des Affaires étrangères et du Développement international, Institut du développement durable et des relations internationales, and France-IUCN Partnership. www.iddri.org/Publications/Innovating-for-biodiversity-conservation-in-african-protected-areas-a-study"

Leverington, F., Coasta, K.L., Courrau, J., Pavaese, H., Nolte, C., Marr, M., Coad, L., Burgess, N., Bomhard, B., and Hockings, M. (2010). *Management effectiveness evaluation in protected areas—a global study*. Second edition. Brisbane, Australia: The University of Queensland.

Lindsey, P.A., Balme, G.A, Funston, P.J., Henschel, P.H. and Hunter, L.T.B. (2016). 'Life after Cecil: Channelling global outrage into funding for conservation in Africa'. *Conservation Letters,* 9(4): 296-301. doi.org/10.1111/conl.12224

Marnewick, D., Retief, E., Wright, D. and Theron, N. (2015). *South Africa's Important Bird and Biodiversity Areas Status Report 2015*. Johannesburg, South Africa: Birdlife South Africa. www.birdlife.org.za/images/IBA/Documents/IBA%20Status%20Report%20low%20res.pdf

Marshall, G.R. (2008). 'Nesting, subsidiarity, and community-based environmental governance beyond the local level'. *International Journal of the Commons* 2(1): 75-97. doi.org/10.18352/ijc.50

Mascia, M.B., Pailler, S., Krithivasan, R., Roshchanka, V., Burns, D., Mlotha, M.J., Roeber Murray, D. and Peng, N. (2014). 'Protected area downgrading, downsizing, and degazettement (PADDD) in Africa, Asia, and Latin America and the Caribbean, 1900–2010'. *Biological Conservation* 169: 355-361. doi.org/10.1016/j.biocon.2013.11.021

McNeely, J.A. (1988). *Economics and biological diversity: Developing and using economic incentives to conserve biological resources*. Washington: Island Press. www.iucn.org/content/economics-and-biological-diversity-developing-and-using-economic-incentives-conserve

Melathopoulos, A.P. and Stoner, A.M. (2015). 'Critique and transformation: On the hypothetical nature of ecosystem service value and its neo-Marxist, liberal and pragmatist criticisms'. *Ecological Economics* 117: 173-181. doi.org/10.1016/j.ecolecon.2015.06.023.

Mermet, L., Laurans, Y. and Leménager, T. (2014). *Tools for what trade? Analysing the Utilisation of Economic Instruments and Valuations in Biodiversity Management*. A Savoir, n°5. Paris: Agence Française de Développement. librairie.afd.fr/en/tools-for-what-trade-analysing-the-utilisation-of-economic-instruments-and-valuations-in-biodiversity-management/

Mookherjee, D. (2006). 'Decentralization, hierarchies, and incentives: A mechanism design perspective'. *Journal of Economic Literature* XLIV: 367-390. doi.org/10.1257/jel.44.2.367

NatureVest and EKO Asset Management Partners (2014). *Investing in conservation: A landscape assessment of an emerging market*. Washington DC: NatureVest. www.naturevesttnc.org/pdf/InvestingInConservation_Report.pdf

Peters-Stanley, M., Gonzalez, G. and Yin. D. (2013). *Covering new ground: State of the forest carbon markets 2013*. Washington, DC: Ecosystem Marketplace. www.forest-trends.org/fcm2013.php

Sandor, E., Scott, S. and Benn, J. (2009). *Innovative financing to fund development: Progress and prospects.* DCD Issues Brief. Paris: Development Co-operation Directorate, OECD. www.oecd.org/development/effectiveness/44087344.pdf

Secretariat of the Convention on Biological Diversity (2014). *Global Biodiversity Outlook 4*. Montreal: CBD. www.cbd.int/gbo4/

Selinske, M.J., Coetzee, J., Purnell, K. and Knight, A.T. (2015). 'Understanding the motivations, satisfaction, and retention of landowners in private land conservation programs: Landowner commitment to conservation'. *Conservation Letters* 8: 282-289. doi.org/10.1111/conl.12154

Simonet, G., Karsenty, A., Newton, P., de Perthuis, C., Schaap, B. and Seyller, C. (2015). *REDD+ projects in 2014: An overview based on a new database and typology*. Les Cahiers de la Chaire Economie du Climat, Information and debates Series 32. Paris: la Chaire Economie du Climat. www.chaireeconomieduclimat.org/publications/info-debats/information-et-debats-32/

Tubbs, N., Barnard, J., Kamara, S., Bangura, W. and Garbo, M. (2015). 'Sierra Leone's Gola Rainforest National Park REDD project improving livelihoods of 122 Forest Edge Communities'. Paper presented at the XIVth World Forestry Congress, Durban, South Africa, 7-11 September 2015.

UNEP-WCMC and IUCN (2016). *Protected Planet Report 2016*. Cambridge UK and Gland, Switzerland: UNEP-WCMC and IUCN. www.protectedplanet.net/c/protected-planet-report-2016

Varlet, F., Kouamé, G. and Caspary, H.A. (2013). *Etude de la production de cacao dans la zone riveraine du Parc National de Taï*. Study commissioned by, and on behalf of, the Economic Development and Biodiversity in Rural Areas Programme (PRODEMIR). Abidjan: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

Vatn, A., Barton, D.N., Porras, I., Rusch, G.M. and Stenslie, E. (2014). *Payments for Nature Values, Markets and Non-market instruments*. NORAD Report 5/2014. Oslo: Norwegian Agency for Development Cooperation. www.norad.no/en/toolspublications/publications/2014/payments-for-nature-values-market-and-non-market-instruments/

Williamson, E.O. (1991). 'Comparative economic organisation: The analysis of discrete structural alternatives'. *Administrative Science Quarterly* 36 (2): 269-296, in: Williamson, O.E. and Masten, S.E. (Eds.) (1999). *The Economics of Transaction Costs*. Cheltenham, UK and Northampton, MA, USA: An Elgar Critical Writings Reader: 101-128. doi.org/10.2307/2393356

RESUMEN

Las áreas protegidas y la conservación se financian de manera inadecuada en todo el mundo, especialmente en África. En respuesta a este desafío, los "mecanismos financieros innovadores" están concebidos para hacer uso de los mercados y los acuerdos contractuales para facilitar financiación adicional y garantizada. El uso de estos instrumentos en el ámbito de la conservación de la naturaleza ha aumentado en los últimos años. Los proponentes de los instrumentos sostienen que pronto podrán cubrir el déficit de financiación. Sus críticos advierten que estos instrumentos pueden favorecer las prioridades del mercado, lo que podría llevar a subestimar los objetivos generales de conservación. Este artículo analiza el funcionamiento práctico de tres casos de mecanismos financieros innovadores para las áreas protegidas africanas. Reúne las percepciones sobre la posibilidad de reproducirlos, tanto con respecto a su diseño contractual, como a sus repercusiones y factores de éxito, y los desafíos encontrados. El documento plantea que estos enfoques contractuales dependen esencialmente de la imposición de condiciones, de mantener relaciones de largo plazo a través de organizaciones intermediarias, y de la búsqueda de líderes y la creación de capacidades. Los desafíos que se evaluarán en el futuro incluyen la variabilidad de los mercados y la importancia de los costos de transacción.

RÉSUMÉ

Les aires protégées et la conservation de la biodiversité restent sous-financées au niveau mondial, en particulier en Afrique. Afin de répondre à ce problème, les « mécanismes innovants de financement » visent à faire appel aux marchés et aux approches contractuelles pour mobiliser et sécuriser des flux financiers additionnels. Le recours à de tels instruments dans le domaine de la conservation de la biodiversité a ainsi augmenté ces récentes années. Pour leurs promoteurs, ces instruments vont rapidement permettre de combler les besoins de financement. Mais pour leurs détracteurs, leur utilisation favorise le développement de marchés aux dépends d'objectifs environnementaux plus fondamentaux. Afin de contribuer utilement à ce débat, cet article présente en détail comment, dans trois cas différents d'aires protégées africaines, ces mécanismes innovants de financement fonctionnent *dans la pratique*. Il fournit des éléments d'analyse sur leur potentielle réplicabilité, étant donnés leur architecture contractuelle, leurs impacts environnementaux et leurs facteurs de succès, ainsi que les limites qui y sont associées. En substance, cet article indique que des approches contractuelles innovantes mises en œuvre pour financer et efficacement gérer les aires protégées africaines dépendent fortement 1) du strict respect des conditionnalités négociées, 2) du maintien de relations de long-terme assurées par des organismes faisant office d'intermédiaires, 3) du renforcement des capacités des acteurs nationaux et locaux, et 4) de l'existence de « champions » qui soutiennent activement ces mécanismes. Bien sûr, des questions subsistent avant d'augmenter l'échelle de mise en œuvre de tels instruments ; au premier rang desquelles sont la fluctuation imprévisible des marchés (financiers ou carbone) et le niveau élevé des coûts de transaction qui sont associés à ces approches contractuelles.

THE CHALLENGES OF THE ANTHROPOCENE FOR BIOSPHERE RESERVES

Susanne Stoll-Kleemann[1,*] and Tim O'Riordan[2]

* Corresponding author: susanne.stoll-Kleemann@uni-greifswald.de

[1] University of Greifswald, Germany.
[2] University of East Anglia, Norwich, UK.

ABSTRACT

This paper reviews how well Biosphere Reserves are prepared to respond to the challenges of the new era of the Anthropocene, including the expected breaching of some planetary boundaries. In this context, the endeavour of sustainable development requires critical re-examination and Biosphere Reserves should move further towards embracing more integrated and effective forms of sustainable livelihoods for their inhabitants. This means placing people even more at the heart of Biosphere Reserve policy and management, and enabling people to become pioneers and ambassadors for realizing effective sustainability in all Biosphere Reserves. This also means that Biosphere Reserves and related institutions have to work towards true integration of their ecological, social and economic potentials, and set up a framework of genuine sustainability governance. This paper widens the concept of Biosphere Reserves to provide creative transformation towards more liveable, sustainable landscapes as a global network. If this is achieved, it will be easier for Biosphere Reserves to pursue and nurture the implementation of the Sustainable Development Goals (SDGs) as their renewed central purpose.

Key words: Biosphere Reserves, Anthropocene, Sustainable Development Goals, Sustainable livelihoods, Planetary boundaries

THE CHALLENGES OF THE ANTHROPOCENE

This paper reviews the challenges of the new era of the Anthropocene, including its underlying causes and how Biosphere Reserves could develop further to better respond to them. A critical reflection of the concept of sustainable development is provided as a foundation for offering some ideas for a creative transformation away from quasi-independent collections of reserves towards more liveable, equitable and sustainable biosphere landscapes.

According to Steffen et al. (2007, p.614), "human activities have become so pervasive and profound that they now rival the great forces of nature and are pushing the Earth into planetary terra incognita". Four out of nine planetary boundaries (Figure 1) have already been exceeded: climate change, impacts on biosphere integrity, land system change and bio-geochemical cycles (Steffen et al., 2015).

The challenge of managing the Anthropocene encompasses the urgent need for innovative ways in which to showcase sustainable living practices in the light of dominating unsustainable patterns of human consumption (e.g. meat consumption, see Stoll-Kleemann & O'Riordan, 2015). Sustainable development is often described as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). This is so frequently quoted that readers' eyes glaze over the familiar words in the same way as seasoned air travellers ignore the mandatory safety advice from the cabin crew. Although it is within our abilities to redefine the Anthropocene to enable future generations to flourish in a decent and habitable world (O'Riordan & Lenton, 2013), it remains very difficult in an environment driven primarily by the fortress mindsets promoting economic growth to meet all the criteria for real sustainability. Present patterns of growth are contradictory to all three dimensions of sustainability (Asara et al., 2015; Hueting, 2010; Kallis et al., 2015; Kothari et al., 2014; Muraca, 2012). Hueting (2010, p. 525) asserts, "our planet is threatened by a wrong belief in a wrongly formulated growth". There is strong evidence of a tight correlation between GDP growth and environmental destruction (Muraca, 2012). The

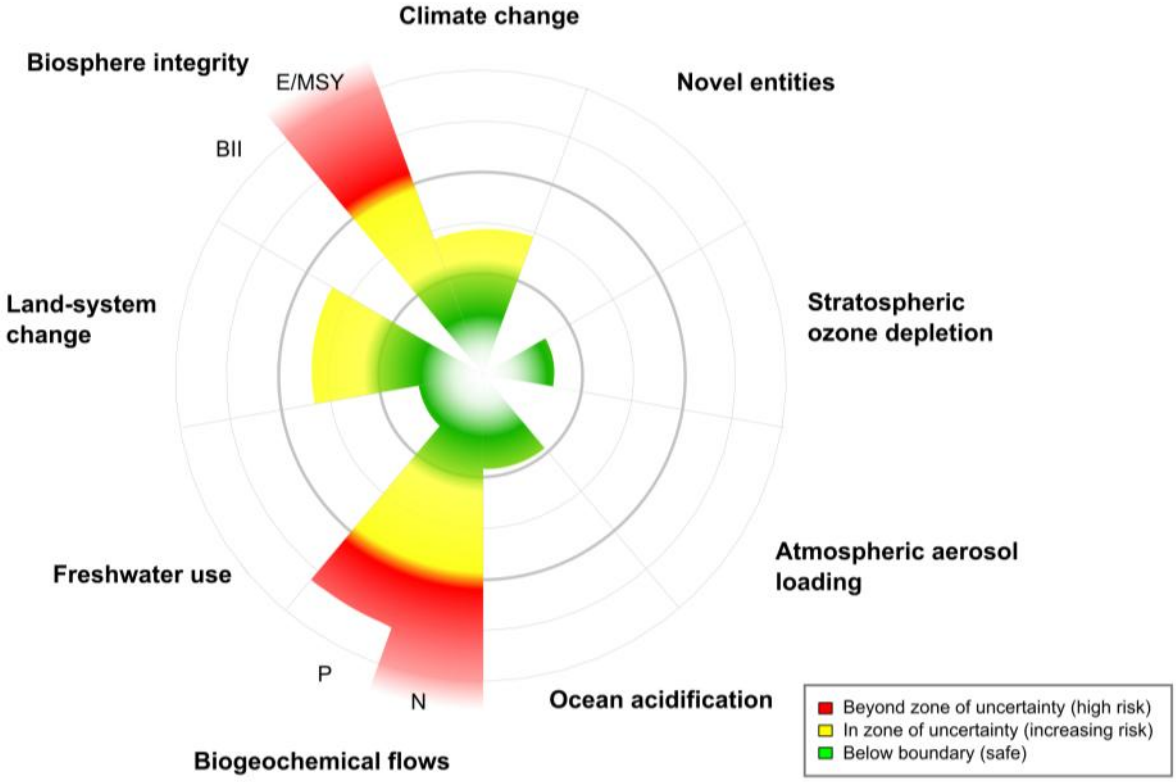

Figure 1. Current status of the control variables for seven of the planetary boundaries (from Steffen et al., 2015).

exploitation of resources at a rate that exceeds the regenerative capacity of ecosystems has been linked to the assumption of economic growth as the unique goal of economic activity (Muraca, 2012; Asara, 2015).

Yet there is still dispute aplenty about the role of economic growth and the social and economic dimensions of sustainability. Mainstream economists emphasize a constant rise in total GDP as the prime economic goal. They place less emphasis on the redistribution of income or of other wellbeing benefits of economic growth among all citizens. Others challenge this hegemony of wealth: "... the so-called 'trickle-down effect' by which the worst off in a society automatically would benefit from an overall increment in wealth does not seem to hold anymore even in terms of mere income" (Muraca, 2012, p.540). This widespread unjust distribution of wealth effects is difficult to change because of power relations: "Commodification, which is part and parcel of growth, is eroding sociality and mores. Care, hospitality, love, public duty, nature conservation, spiritual contemplation; traditionally, these relations or 'services' did not obey a logic of personal profit" (Kallis et al., 2015, p. 6; see also Kothari et al., 2014).

The sustainable way forward is the evolution of societies in which fewer natural resources are used and life is organized differently with "sharing, simplicity, care, and the commons as primary significations" (Kallis et al., 2015, p.5). Equitable downscaling of production and consumption would engender the creation of a new set of local commons with innovative forms of living and producing, such as eco-communities, cooperatives, urban or rural gardens, and local currencies (Marshall, 2016).

One approach here would be to create landscapes that took care of the needs of both humans and the natural environment coupled in responsible cooperation. Such lived-in landscapes would correspond to large tracts of land where biodiversity conservation is practised in coherence with people living and working in the area and striving for sustainable livelihoods. Different models of living landscapes already exist, of which the Biosphere Reserve model is the best known (UNESCO, 1996; Batisse, 1997; Ishwaran et al., 2008, Coetzer et al., 2014; Bridgewater, 2016; Reed, 2016).

What does the dawn of the Anthropocene mean for Biosphere Reserves and protected areas as conceived by practitioners? Establishing and managing protected areas is still a common strategy for enhancing ecological integrity. Yet in the Anthropocene, the destructive activities of human beings can become so overwhelming that such protected areas are no longer a safeguard. Watson et al. (2014) have argued that protected areas are becoming ripe for declassification and vulnerable to resource extraction because governments in both developing and developed countries (such as Australia,

the United States and Canada) have heavily reduced their support towards protected areas "through disproportionate funding cuts, reductions in professional staff and by ignoring their own policies" (p.70). "This practice has been labelled protected area downgrading, downsizing and degazettement (PADDD), where downgrading is the legal authorization of an increase in the number, magnitude or extent of human activities within a protected area; downsizing is the decrease in size of a protected area through a legal boundary change; and degazettement is the loss of legal protection for an entire protected area" (Watson et al., 2014, p.70). All three forms are increasing of PADDD are increasing (Mascia et al., 2014). This analysis shows that the problems with the dominant role of economic growth are not prevented by even by the legal strength of protected areas because the choice by governments to 'ignore their own policy' is the apparent inevitable outcome of the growth diktat. It is important to note here that economic growth is not a necessary condition for sustainable development. In fact, the opposite appears to be true: a clear contradiction between sustainability and economic growth is evident, and the "pathway towards a sustainable future is to be found in a democratic and redistributive downscaling of the biophysical size of the global economy" (Asara et al., 2015, p.375; see also Kothari et al., 2014). It is clear that on the local level in areas adjacent to protected areas, such as Biosphere Reserves, it is desirable to have some economic growth from which local people directly profit.

While one part of the Biosphere Reserve concept still seeks to focus on managing core zones for biodiversity conservation, it also tries to respond creatively to the underlying causes of ecosystem destruction by piloting more sustainable land use and living options in all realms of life (hopefully, based on the sufficiency principle).

BIOSPHERE RESERVES AND THEIR ROLE IN IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS

Biosphere Reserves, launched by the Man and the Biosphere (MAB) Programme of UNESCO in 1970, form a worldwide network of representative landscapes, with 669 sites across 120 countries. Their primary goal is to serve as learning sites for information exchange on environmental policy, sustainable development, and appropriate management practices (UNESCO, 1996). Furthermore, they were explicitly designed to be experimental where environmental change could be monitored and remediative policies or practices could be 'tested' (UNESCO, 1996; Batisse, 1997; Köck & Arnberger, 2017; Price et al., 2010; Reed, 2016).

According to the Statutory Framework (UNESCO, 1996), Biosphere Reserves are expected to fulfil three main complementary functions: the conservation function of in situ conservation of natural and semi-natural ecosystems and landscapes; a development function to foster sustainable economic and human development; and the logistic function to support research, monitoring, environmental education and training. These functions are implemented through a zonation system, including one or more core areas (strict protection), buffer zones (sustainable management), and transition areas that can extend beyond the territory where cooperation with local people for sustainable development can be organized (UNESCO, 1996).

The Lima Action Plan (LAP) and the MAB Strategy (both valid until 2025) are founded on the continuity of the Seville Strategy and the Statutory Framework of the World Network of Biosphere Reserves (WNBR). The important new element within the LAP is the goal "to help Member States and stakeholders to urgently meet the SDGs through experiences from the WNBR, in particular through exploring and testing policies, technologies and innovations for the sustainable management of biodiversity and natural resources and mitigation and adaptation to climate change"(UNESCO, 2016, p. 2). Concerning climate change, the emphasis has changed: within the Madrid Action Plan (2008) a stronger focus was put on climate change, whereas in the LAP, the focus is much more on the implementation of the SDGs (of which climate change mitigation and adaption is one of 17 goals) (UNESCO, 2008). The most recent and also most detailed summary of the development of UNESCO's MAB Programme can be found in Köck and Arnberger (2017).

Coetzer et al. (2014, p.83) warn that, "conceptually the Biosphere Reserve model is attractive, yet the practical reality is likely to be challenging". One reason is that Biosphere Reserves remain under the sovereignty and legislation of the country in which they are designated. Thus, the State can ignore the requirements of any designation, as well as the management objectives of the individual protected areas contained within the Biosphere Reserve. A further reason is that the implementation of the MAB Programme is struggling with horizontal integration at the local level, as well as vertical integration with national authorities (Pool-Stanvliet, 2014).

The result is a considerable gap between the Biosphere Reserve concept and reality worldwide (Bridgewater, 2016; Cuong et al., 2017a; Ishwaran et al., 2008; Price, 2002; Reed, 2016; Stoll-Kleemann & Welp, 2008). This

gap is mirrored in their heterogeneity. Although, theoretically, all Biosphere Reserves included in the WNBR share the same rationale, overall goals, and designation and assessment criteria, local contexts and multiple management approaches provide ample diversity and variation of management (Ishwaran et al., 2008).

One example is the South African Biosphere Reserve network, with its excellent conservation-related legislation and strategies addressing pressing topics such as sustainability and climate change. Yet South African Biosphere Reserves do not feature significantly in the national system of legislation and policies. In effect, each Biosphere Reserve is usually left to find its own ways to successfully make a difference through effective implementation of the MAB Programme (Coetzer et al., 2014; Pool-Stanvliet, 2014).

Further examples come from the Czech Republic, Hungary and Poland, where the MAB label is sometimes perceived as a "cosmetic add-on without content" (Schliep & Stoll-Kleemann, 2010). This can be ascribed to a number of causes, such as a perceived lack of effectively managed Biosphere Reserves; inadequate knowledge of the inherent opportunities for promoting the MAB Programme; visionary shortcomings with regard to the true nature of sustainable development; and the non-political nature of Biosphere Reserves (Pool-Stanvliet, 2014; Schliep & Stoll-Kleemann, 2010).

A survey of Vietnamese Biosphere Reserves showed that 55 per cent of respondents were concerned about the gap between theory and implementation, mainly because of the lack of legal status nationally (Cuong et al., 2017a). The traditional management practice in Vietnam is strongly based on laws and regulations, and the lack of a national framework might be a reason for delaying participation and collaboration under the Biosphere Reserve approach for most of the sector-based staff and managers. Lack of legal status can, however, provide a certain level of flexibility, allowing for adaptive interpretation and application of the central laws and regulations in order to fit local conditions (Cuong et al., 2017a). In Vietnam, nearly all the Biosphere Reserves are directly under the authority of the provincial government, which includes parks and protected area authorities, as well as other sectors such as agriculture, forestry, fisheries and tourism (Cuong et al., 2017a).

Generally, one of the most important purposes of Biosphere Reserves is to develop and initiate cooperation among authorities and other involved parties (UNESCO, 1996; Bouamrane, 2007; Schultz et al. 2011, UNESCO 2015, 2016). Strengthening Biosphere Reserves' advisory bodies to serve better management boards by adding representatives from different interest groups and agencies is one way to institute better overall cooperation (UNESCO 2015, 2016, Köck & Arnberger, 2017). In cases where a Biosphere Reserve administration does not have a strong regulatory role, it could nevertheless become an initiator and mediator of efforts towards improved participation and cooperation. This would also bundle limited resources, which has been mentioned previously as an obstacle to effective participation (Stoll-Kleemann & Welp, 2008; Schultz et al. 2011; Pool-Stanvliet, 2014).

The task of effectively engaging communities in the governance and management of Biosphere Reserves is a complex one that involves many hurdles. Substantial long-term commitments of financial and human resources are needed to establish continuity, competence and trust. Power asymmetries between conservation institutions and local populations, and among local actors themselves, need to be better related and resolved. Parties capable of and willing to work for common conservation compromises need to be found, championed and negotiated with (Cuong et al., 2017b; Pool-Stanvliet, 2014; Stoll-Kleemann et al., 2010; Stoll-Kleemann & Welp, 2008).

These ideal conditions are rarely in place. In addition, factors beyond the control of the Biosphere Reserve communities and their management, such as structural poverty, corruption and weak governance may overwhelm even the best-designed programmes, with degradation and destruction of biodiversity as the final output of these failures (Cuong et al., 2017b; Stoll-Kleemann et al., 2010).

In cases where the Biosphere Reserve administration has a strong regulatory function in regard to land use and construction activities, such as in some areas of Germany, the administration might be too involved in promoting nature and landscape-protection interests to be acknowledged by all actors as a legitimate 'neutral' governing partner (Stoll-Kleemann & Welp, 2008). In most Biosphere Reserves a number of agencies are involved in management, requiring messy negotiation strategies. Many bodies still perceive the typical Biosphere Reserve administration primarily as an authority for promoting nature conservation to the point of single-mindedness (Stoll-Kleemann & Welp, 2008). The many advantages of the special status of Biosphere Reserves as model regions, as stated in the Statutory Framework and the Seville Strategy, should be better acknowledged and tested.

Village next to the Sontecomapan sand spit on the outlet of the Sontecomapan lagoon, Buffer Zone, Los Tuxtlas Biosphere Reserve, Veracruz, Mexico © Cristina de la Vega-Leinert

PROBLEMS AND POTENTIALS FOR SUSTAINABLE DEVELOPMENT IN BIOSPHERE RESERVES

Nevertheless, the question remains as to how Biosphere Reserves can fulfil their promise on innovative thinking towards inclusive environmental management and being laboratories for research and education. Sustainable development lies at the heart of Biosphere Reserves, yet it remains contested. Kothari et al. (2014) criticize the concept of sustainable development "as an oxymoron" because it offers an inadequate response to unsustainability and inequity. Kallis et al. (2015, p. 5) add that sustainable development expresses "the denial of any ultimate collective end as well as the denial of anything but ascent. Development becomes self-referential: development for the sake of development".

It is necessary to examine carefully the SDGs themselves before they are implemented in Biosphere Reserves. Kothari et al. (2014 list nine points of critique of which three are relevant to the theme of this paper. This is because they should be considered in Biosphere Reserves much more than is currently the case. The first is that culture, ethics and spirituality are rarely considered, and the "importance of cultural diversity, and of ethical and spiritual values (especially towards fellow humans and the rest of nature) is greatly underplayed" (Kothari et al., 2014, p. 365). Secondly, "unbridled consumerism is not tackled head-on". Without attending to this, "the majority of humankind will never have the space needed to become more secure and genuinely prosperous" (Kothari et al., 2014, p. 365). And thirdly, and of particular importance for the evolution of a spatial concept such as that of Biosphere Reserves: "global relations built on localization and self-reliance are missing". The authors argue that "there is little attention to the need to create relatively self-reliant communities" in which a degree of genuine democratic autonomy prevails (Kothari et al., 2014, p. 365). One interesting example of more self-reliance is the establishment of local currencies (such as the Brixton Pound, the Totnes Pound or the Bristol Pound) because this is a way to achieve a low-carbon society via more transparent economies based on local ownership. Supply chains can be shortened and dependence on fossil-fuel-intensive transport infrastructure reduced. It is an appealing idea to be applied in Biosphere Reserves because these kinds of local money schemes are among the most immediate and tangible manifestations of a transition that captures the spirit of the place where one lives[1].

To be effective, "sustainable development [should] depoliticize genuine political antagonisms about the kind of future one wants to inhabit" (Kallis et al., 2015, p. 9). This suggests that Biosphere Reserves should follow the general vision of an 'ecologizing society' and demonstrate how it could work. This, in turn, means that they have to imagine and enact alternative visions to modern development instead of merely implementing better or greener development as an alternative.

Kothari et al. (2014) list and explain a range of various (cultural and social), more philosophical notions that

BOX 1: SUSTAINABLE DEVELOPMENT GOALS OF THE UNITED NATIONS

1) End poverty in all its forms everywhere

2) End hunger, achieve food security and improved nutrition and promote sustainable agriculture

3) Ensure healthy lives and promote well-being for all at all ages

4) Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

5) Achieve gender equality and empower all women and girls

6) Ensure availability and sustainable management of water and sanitation for all

7) Ensure access to affordable, reliable, sustainable and modern energy for all

8) Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

9) Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

10) Reduce inequality within and among countries

11) Make cities and human settlements inclusive, safe, resilient and sustainable

12) Ensure sustainable consumption and production patterns

13) Take urgent action to combat climate change and its impacts

14) Conserve and sustainably use the oceans, seas and marine resources for sustainable development

15) Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss

16) Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

17) Strengthen the means of implementation and revitalise the Global Partnership for Sustainable Development

Source: UN, 2015, p.14

have emerged in various regions of the world which seek to envision and achieve a more fundamental transformation. One example would be *Buen Vivir* (South America), a culture of life that encompasses harmony with nature; cultural diversity, and pluriculturalism; co-existence within and between communities; inseparability of all of life's elements (material, social, spiritual); opposition to the concept of perpetual accumulation; return to use values; and collective governance even beyond the concept of value. Others are South Africa's ethical concept of *Ubuntu* (and its analogues in other parts of the continent), with its emphasis on human mutuality; *Swaraj* in India, with its focus on self-reliance and self-governance; and from Europe, *degrowth,* the hypothesis that we can live well with less.

These more authentic worldviews and forms of life should be highly appreciated and fully incorporated within Biosphere Reserves, as they unify many of the principles promoted by the UNESCO MAB Programme. They are responses that are perfectly adapted to the encompassing environment and have evolved bottom-up from the grassroots level. Depending on the local, regional or national culture, different approaches can be adapted in different Biosphere Reserves.

SDGs *must* (not 'should') guide all development policies and strategies of all nations from now on as part of the 2030 Agenda on Sustainable Development. In 2015, the UN General Assembly agreed that progress towards reaching these 17 goals with their 167 targets will be assessed on a regular basis, with a major global stocktake set for 2030. These are outlined in Box 1. The concept beyond the agenda, with its new coherent way of thinking about how issues as diverse as poverty, education and climate change fit together and entwine economic, social and environmental targets in the 17 Sustainable Development Goals (SDGs) as an indivisible whole, is completely in line with that of Biosphere Reserves. The Biosphere Reserve concept sees them offering innovative thinking towards socially inclusive environmental management and being designed as laboratories for research and education. As Nilsson et al. (2016, p. 321) point out, it is important that countries interpret the SDGs according to "their national circumstances and levels of development" because "differences in geography, governance and technology make it dangerous to rely on generalized knowledge". SDGs are frequently criticized for overlapping, for confusing targets and idealism, and for being seemingly irrelevant to the main drivers and power -broking processes of conventional diplomacy and economic policy.

Sustainable Tourism in the Spreewald Biosphere Reserve, Germany © Reynaldo Paganelli_fotolia

In the light of the general goals of Biosphere Reserves as described above and the requirements of the LAP in particular, Biosphere Reserves should contribute to the implementation of the SDGs. The links to SDGs 13, 14 and 15 are obvious and need no further explanation; SDG 11 is interesting for Biosphere Reserves with significant urban populations; and SDG 12 offers a solution to many of the above-mentioned problems related to economic growth. The worldwide network of Biosphere Reserves (as well as regional, national, and in some countries, even local Biosphere Reserve networks) is in itself an interesting opportunity to implement SDG 17, but it is too early to explore in detail here.

Nilsson et al. (2016, p.320f) explain what makes the task more complex and offer what should function as a warning for Biosphere Reserve managers: "Implicit in the SDG logic is that the goals depend on each other — but no one has specified exactly how. International negotiations gloss over tricky trade-offs. Still, balancing interests and priorities is what policymakers do — and the need will surface when the goals are being implemented. If countries ignore the overlaps and simply start trying to tick off targets one by one, they risk perverse outcomes. For example, using coal to improve energy access (goal 7) in Asian nations, say, would accelerate climate change and acidify the oceans (undermining goals 13 and 14), as well as exacerbating other problems such as damage to health from air pollution (disrupting goal 3)."

For policy makers in general, as well as for Biosphere Reserve managers in particular, coherent policies and strategies demand: "a rubric for thinking systematically about the many interactions — beyond simply synergies and trade-offs — in order to quickly identify which groups could become their allies and which ones they will be negotiating with. And they need up-to-date empirical knowledge on how the goals and interventions of one sector affect another positively or negatively" (Nilsson et al., 2016 p. 321).

It follows that the discussion of the relevance of individual SDGs to Biosphere Reserves needs time and reflection, and in addition, the profound and thorough analysis of given projects and experiences in Biosphere Reserves.

Two specific examples have been picked to present here: SDG 11 stresses the role of cities and human settlements for sustainability. Indeed, urbanization is an important feature of the Anthropocene and among "the most critical

Cat Ba Biosphere Reserve, an archipelago of 366 limestone islands in northern Vietnam © Equilibrium Research

transformations that has had profound impacts on land use from local to global scale since the mid-twentieth century" (de la Vega-Leinert et al., 2012, p.26). More than half of the world's population lives in cities; furthermore, urban growth is most rapid in developing countries. In both emerging and developed countries, it represents one of the greatest challenges to ensuring basic human welfare and the functioning of viable ecosystems. Whereas the poor people who inhabit them have only limited access to basic services, are deprived of meaningful participation in decision-making, and face extreme vulnerability to natural disasters, urban areas are also loci of concentrations of knowledge, innovation and productive resources that could be harnessed by Biosphere Reserves. Therefore, de la Vega-Leinert et al. (2012) argue for Biosphere Reserves as learning laboratories to foster sustainable initiatives and practice at urban–rural interfaces. They can be seen as priority areas and large-scale laboratories for observation of the effects of global change on ecosystems (e.g. significant warming and increased nitrogen deposition).

It is useful to include urban–rural interfaces, where major environmental and societal transformations are occurring, and which critically affect the availability of and access to natural resources. This provides a welcome opportunity to found initiatives that adequately help to value and protect ecosystems for their own sake, as well as to improve local livelihoods (de la Vega-Leinert et al., 2012). Despite serious restraints due to a lack of powers and resources, Biosphere Reserve managers, by adjusting and revisiting their practices, have evolved power and responsibilities in actively supporting small but critical transformations at the local scale near large cities. In this respect, we suggest key areas in which Biosphere Reserve managers can make a difference. These include encouraging social learning, positive leadership, accountability and transparency, while recognizing and valuing the contribution local populations can make to shaping conservation action (de la Vega-Leinert et al., 2012).

Concerning SDG 12, while positive examples of sustainable consumption and production can be found (often at the micro-scale), in general, land scarcity is driving marginalized peasant farmers to convert forest to pasture or intensify cropping in and around Biosphere Reserves. This threatens the integrity of primary forest patches in core zones (de la Vega-Leinert et al., 2016; Tejeda-Cruz et al., 2010).

For example, pressure on agricultural land in the wake of the sharp increase in meat and dairy-product consumption, and the concomitant demand for huge swathes of terrain devoted to livestock feed cultivation (especially of soya and maize), constitute a major problem that is also detrimental to the implementation of sustainability in Biosphere Reserves worldwide (Foley et al., 2011; Garnett et al., 2013; Godfray et al., 2010). The consequences of the accompanying dramatic increase in the intensification of agriculture have not spared Biosphere Reserves from the land-grab that now affects protected areas around the world (European Green Party, 2013; Watson et al., 2014). Two recent papers in the magazine *Environment* attest to this destruction of Biosphere Reserves in the Brazilian Cerrado (Lahsen et al., 2014; Sawyer & Lahsen, 2016).

Even in Germany, where, according to the Federal Environment Agency (UBA), 60 per cent of agricultural land is used for the intensive production of feed for animal products (meat, dairy products and eggs), and a further 20 per cent for bioenergy plants (UBA, 2015), agricultural production is placing increasing pressure on Biosphere Reserves. Furthermore, the negative consequences of non-sustainable intensive land use are extending into Biosphere Reserves (see text and maps for Europe and Germany in Levers et al., 2016; Garnett et al., 2013; Stoll-Kleemann & Kettner, 2016). This makes it clear that the future of Biosphere Reserves depends less on classical nature conservation measures than on individual consumption patterns and the political and social pressures exerted by the true beneficiaries of this development: primarily, large-scale agri-businesses (Stoll -Kleemann & O'Riordan, 2015; Stoll-Kleemann & Kettner, 2016).

It is obvious that Biosphere Reserves face a number of challenges, both familiar and new, and that the issue of sustainable consumption will have to be more forcefully addressed – in practice and not merely in theory (e.g. through information centres or other environmental-education activities organized by Biosphere Reserve staff). In order to overcome these challenges, Biosphere Reserve management requires a political tailwind through the provision of human and financial resources that are adequate to meet the range of its tasks, combined with courageous political support, particularly vis-a-vis the agribusiness lobby (including fertilizer, pesticide and seed producers). In particular, the reduction of subsidies promoting environmentally destructive practices will reduce pressure on biodiversity and improve sustainability both inside and outside Biosphere Reserves.

Dyfi Biosphere, a biosphere reserve in mid-Wales, UK © Equilibrium Research

A search for new criteria for the establishment and transformation of Biosphere Reserves seems to be needed. These criteria should embrace both natural and human relationships and values. Here is where Biosphere Reserves should become showcases of the SDGs and beyond (including sustainable living patterns and consumption habits) and portals of the positive message of the Anthropocene.

CONCLUSIONS

The era of the Anthropocene is characterized by the breaching of planetary boundaries. Although some Biosphere Reserves have the potential to offer positive effects in terms of working through local economies with the long-term goal in mind to help strengthen fair-trade regimes and to deliver social fairness and justice for all of their inhabitants, Biosphere Reserves are not islands. The impacts of a globalized world, with a few big (and sadly often corrupt) players in the energy area, forestry and agricultural spheres, weigh heavily on what happens

within them. Tackling sustainability successfully goes against the grain of prevailing neoliberal economics and power politics. The overwhelming concern regarding the failure of both conventional government and of the markets to deliver fair sustainability has been universally regretted (Asara et al., 2015; Biermann et al., 2012; Kallis et al., 2015; Kothari et al., 2014; Marshall, 2016; Muraca, 2012). It is therefore a sign of the maturity of the Anthropocene that Biosphere Reserves are beginning to embrace decency, ecosystem care, and human well-being.

Hence, there is an urgent need to introduce innovative ways in which to showcase sustainable living practices in the light of dominating unsustainable patterns of growth and human consumption. The sustainability prize is the evolution of societies in which fewer natural resources are used and life is organized differently with "sharing, simplicity, care and the commons as primary significations" (Kallis et al., 2015, p.5).

The idea of widening the purpose of Biosphere Reserves offers an innovative way to combine sustainability with decent livelihoods. The global growth in the number and area of Biosphere Reserves, as well as their embrace of SDGs, are already positive developments.

In line with the current MAB Strategy and the LAP, Biosphere Reserves still need to build trust through real relationships with communities and other relevant stakeholders (UNESCO, 2015; UNESCO, 2016). To make this happen, they need to be conceived and then established through real local and community-led processes. Stakeholders need to be convinced of the added value of implementing the Biosphere Reserve model amidst a range of regional and national initiatives.

A range of public participation, moderation and conflict-management approaches, as well as statistical-survey methods, has been outlined in the relevant literature and handbooks (cf. e.g., Bouamrane, 2007; Creighton, 2005).

Biosphere Reserves can provide a dynamic framework for the establishment of valuable laboratories to address the challenges of the Anthropocene and contribute to a more sustainable world. In order to achieve this, some – or preferably all – of the visions described above, such as strengthening the urban–rural link and emphasizing the much needed critical assessment of the concepts of growth and sustainable development, and even the SDGs themselves, have to be taken more seriously. Only then will progress towards more responsible patterns of sustainable living based on sufficiency, such as Buen Vivir, be possible.

ENDNOTE

[1] transitionnetwork.org/stories/has-related-content

ACKNOWLEDGEMENTS

We are very grateful to Uta Schmidt for literature research and further support, Bernhard Schmidt-Ruhe for fruitful discussions on several stages of the manuscript, Marc Thiele and Cristina de la Vega-Leinert for providing photographs and to two anonymous reviewers for their extremely valuable comments.

ABOUT THE AUTHORS

Susanne Stoll-Kleemann is Professor and Chair of Sustainability Science and Applied Geography at the University of Greifswald, Germany, with previous positions at Humboldt University of Berlin, at the Potsdam Institute for Climate Impact Research, and at the Swiss Federal Institute of Technology (ETH) in Zurich with research on biodiversity conservation and climate change mitigation.

Tim O'Riordan retired in July 2005 from the post of Professor of Environmental Sciences at the University of East Anglia.

REFERENCES

Asara, V., Otero, L., Demaria, F. and Corbera, E. (2015). 'Socially sustainable degrowth as a social–ecological transformation: repoliticizing sustainability'. *Sustainability Science* 10 (3): 375-384. DOI: 10.1007/s11625-015-0321-9.

Batisse, M. (1997). 'Biosphere Reserves: a challenge for biodiversity conservation & regional development'. *Environment* 39 (5): 7-33. DOI: 10.1080/00139159709603644.

Biermann, F., Abbott, K., Andresen, S., Backstrand, K., Bernstein, S., Betsill, M.M., Bulkeley, H., Cashore, B., Clapp, J., Folke, C., Gupta, A., Gupta, J., Haas, P.M., Jordan, A., Kanie, N., Kluvankova-Oravska, T., Lebel, L., Liverman, D., Meadowcroft, J., Mitchell, R.B., Newell, P., Oberthur, S., Olsson, L., Pattberg, P., Sanchez-Rodriguez, R., Schroeder, H., Underdal, A., Vieira, S.C., Vogel, C., Young, O.R., Brock, A. and Zondervan, R. (2012). 'Navigating the Anthropocene: Improving Earth System Governance'. *Science* 335: 1306-1307. DOI: 10.1126/science.1217255.

Bouamrane, M. (ed.) (2007). *Dialogue in biosphere reserves: references, practices and experiences.* Biosphere Reserves – Technical Notes 2. Paris: UNESCO.

Bridgewater, P. (2016). 'The man and biosphere programme of UNESCO: rambunctious child of the sixties, but was the promise fulfilled?'. *Current Opinion in Environmental Sustainability* 19: 1-6. DOI: 10.1016/j.cosust.2015.08.009.

Coetzer, K.L., Witkowski, E.T.F. and Erasmus, B.F.N. (2014). 'Reviewing biosphere reserves globally: effective conservation action or bureaucratic label?' *Biological Reviews* 89: 82-104. DOI: 10.1111/brv.12044.

Creighton, J. L. (2005). *The public participation handbook. Making better decisions through citizen involvement*. San Francisco: John Wiley & Sons.

Cuong, C.V., Dart, P., Dudley, N. and Hockings, M. (2017a). 'Factors influencing successful implementation of Biosphere Reserves in Vietnam: Challenges, opportunities and lessons learnt'. *Environmental Science & Policy* 67: 16-26. DOI: 10.1016/j.envsci.2016.10.002.

Cuong, C.V., Dart, P. and Hockings, M. (2017b). 'Biosphere Reserves: Attributes for success'. *Journal of Environmental Management* 188: 9-17. DOI: 10.1016/j.jenvman.2016.11.069.

de la Vega-Leinert, A. C., Nolasco, M. A. and Stoll-Kleemann, S. (2012). 'UNESCO biosphere reserves in an urbanized world'. *Environment: Science and Policy for Sustainable Development* 54 (1): 26-37. DOI: 10.1080/00139157.2012.639603.

de la Vega Leinert, A.C., Brenner, L. and Stoll-Kleemann, S. (2016). 'Peasant coffee in the Los Tuxtlas Biosphere Reserve, Mexico: A critical evaluation of sustainable intensification and market integration potential'. *Elementa: Science of the Anthropocene* 4: 1-22. DOI: 10.12952/journal.elementa.000139.

European Green Party (2013). *On Land Grabs. Adopted Resolution of the 18th Council Meeting of the European Green Party*, Madrid, 10-12 May 2013.

Foley, J.A., Ramankutty, N., Brauman, K.A., Cassidy, E.S., Gerber, J.S., Johnston, M., Mueller, N.D., O'Connell, C., Ray, D.K., West, P.C., Balzer, C., Bennett, E.M., Carpenter, S.R., Hill, J., Monfreda, C., Polasky, S., Rockström, J., Sheehan, J., Siebert, S., Tilman, D. and Zaks, D.P.M. (2011). 'Solutions for a cultivated planet'. *Nature* 478: 337-342. DOI: 10.1038/nature10452.

Garnett, T., Appleby, M.C., Balmford, A., Bateman, I., Benton, T.G., Bloomer, P., Burlingame, B., Dawkins, M., Dolan, L., Fraser, D., Herrero, M., Hoffmann, I., Smith, P., Thornton, P.K., Toulmin, C., Vermeulen, S.J. and Godfray, H.C.J. (2013). 'Sustainable intensification in agriculture: premises and policies'. *Science* 341: 33-34. DOI: 10.1126/science.1234485.

Godfray, H.C.J., Beddington, J.R., Crute, I.R., Haddad, L., Lawrence, D., Muir, J.F., Pretty, J., Robinson, S., Thomas, S.M. and Toulmin, C. (2010). 'Food Security: The Challenge of Feeding 9 Billion People'. *Science* 327: 812-818. DOI: 10.1126/science.1185383.

Hueting, R. (2010). 'Why environmental sustainability can most probably not be attained with growing production'. *Journal of Cleaner Production* 18: 525-530. DOI: 10.1016/j.jclepro.2009.04.003.

Ishwaran, N., Persic, A. and Tri, N.H. (2008). 'Concept and practice: The case of UNESCO biosphere reserves'. *International Journal of Environment and Sustainable Development*. 7(7): 118-131. DOI: 10.1504/IJESD.2008.018358.

Kallis, G., Demaria, F. and D'Alisa, G. (2015). 'Introduction: Degrowth'. In: G. d'Alisa, Demaria, F. and Kallis, G. (eds.) *Degrowth: A vocabulary for a new era,* pp. 1-17. London: Routledge.

Köck, G. and Arnberger, A. (2017). 'The Austrian biosphere reserves in the light of changing MAB strategies'. *Management & Policy Issues* 9: 85-92. DOI: 0.1553/eco.mont-9-sis85.

Kothari, A., Demaria F. and Acosta A. (2014). 'Buen Vivir, Degrowth and Ecological Swaraj: Alternatives to sustainable development and the Green Economy'. *Development* 57 (3-4): 362-375. DOI: 10.1057/dev.2015.24.

Lahsen, M., Bustamante, M.M.C. and Dalla-Nova, E.L. (2014). 'Undervaluing and overexploiting the Brazilian Cerrado at our peril'. *Environment* 58 (6): 4-15. DOI: 10.1080/00139157.2016.1229537.

Levers, C., Butsic, V., Verburg, P.H., Müller, D. and Kuemmerle, T. (2016). 'Drivers of changes in agricultural intensity in Europe'. *Land Use Policy* 58: 380-393. DOI: 10.1016/j.landusepol.2016.08.013.

Marshall, A. (2016). *Ecotopia 2121: A vision for our green utopia*. London: Arcade Books.

Mascia, M.B., Pailler, S., Krithivasan, R., Roshchanka, V., Burns, D., Mlotha, M.J., Murray, D.R. and Peng, N. (2014). 'Protected area downgrading, downsizing, and degazettement (PADDD) in Africa, Asia, and Latin America and the Caribbean, 1900–2010'. *Biological Conservation* 169: 355–361. DOI: 10.1016/j.biocon.2013.11.021.

Meadows, D.H., Randers, J. and Meadows, D.L. (2005). *The Limits to Growth: The 30-year Update.* London: Earthscan.

Muraca, B. (2012). 'Towards a fair degrowth-society: Justice and the right to a 'good life' beyond growth'. *Futures* 44: 535-545. DOI: 10.1016/j.futures.2012.03.014.

Nilsson, M., Griggs, D. and Visbeck, M. (2016). 'Map the interactions between Sustainable Development Goals'. *Nature* 534: 302-302. DOI: 10.1038/534320a.

O'Riordan, T. and Lenton, T. (eds.) (2013). *Addressing tipping points for a precarious future*. Oxford: Oxford University Press/British Academy.

Pool-Stanvliet, R. (2014). 'The UNESCO MAB Programme in South Africa: Current challenges
and future options relating to the implementation of biosphere reserves'. PhD thesis, Greifswald: Ernst-Moritz-Arndt-University Greifswald.

Price, M.F. (2002). 'The periodic review of biosphere reserves: a mechanism to foster sites of excellence for conservation and sustainable development'. *Environmental Science and Policy* 5: 13-18. DOI: 10.1016/S1462-9011(02)00021-7.

Price, M.F., Park, J.J. and Bouamrane, M. (2010). 'Reporting Progress on Internationally-designated Sites: The Periodic Review of Biosphere Reserves'. *Environmental Science and Policy* 13: 549-557. DOI: 10.1016/j.envsci.2010.06.005.

Reed, M. G. (2016). 'Conservation (in)action: Renewing the relevance of UNESCO biosphere
reserves'. *Conservation Letters* 9 (6): 448-456. DOI: 10.1111/conl.12275.

Sawyer, D. and Lahsen, M. (2016). 'Civil society and environmental change in Brazil's Cerrado'. *Environment* 58 (6): 16-23. DOI: 10.1080/00139157.2016.1229541.

Schliep, R. and Stoll-Kleemann, S. (2010). 'Assessing governance of biosphere reserves in Central Europe'. *Land Use Policy* 27: 917-927. DOI: 10.1016/j.landusepol.2009.12.005.

Schultz, L., Duit, A. and Folke, C. (2011). 'Participation, Adaptive Co-management, and Management Performance in the World Network of Biosphere Reserves'. *World Development* 39 (4): 662-671. DOI: 10.1016/j.worlddev.2010.09.014.

Steffen, W., Crutzen, P. J. and McNeill, J. R. (2007). 'The Anthropocene: Are humans now overwhelming the great forces of nature?'. *Ambio* 36 (8): 614-621.

Steffen, W., Richardson, K., Rockström, J., Cornell, S.E., Fetzer, I., Bennett, E.M., Biggs, R., Carpenter, S.R., de Vries, W., de Witt, C.A., Folke, C., Gerten, D., Heincke, J., Mace, G.M., Persson, L.M., Ramanathan, V., Reyers, B. and

Sörlin, S. (2015). 'Planetary boundaries: Guiding human development on a changing planet'. *Science* 347(6223): 1-17. DOI: 10.1126/science.1259855.

Stoll-Kleemann, S. and Welp, M. (2008). 'Participatory and integrated management of biosphere reserves: Lessons from case studies and a global survey'. *GAIA* 17/S1: 161-168.

Stoll-Kleemann, S., de la Vega-Leinert, A. C. and Schultz, L. (2010). 'The role of community participation in the effectiveness of UNESCO Biosphere Reserve management: Evidence and reflections from two parallel global surveys'. *Environmental Conservation 37* (3): 227-238. DOI: 10.1017/S037689291000038X.

Stoll-Kleemann, S. and O'Riordan, T. (2015). 'The sustainability challenges of our meat and dairy diets'. *Environment: Science and Policy for Sustainable Development* 57 (3): 34-48. DOI: 10.1080/00139157.2015.1025644.

Stoll-Kleemann, S. and Kettner, A. (2016). 'Schutzgebiete'. In: K. Ott, Voget-Kleschin, L. and Dierks, J. (eds.) *Handbuch Umweltethik*, pp. 305-311. Stuttgart: Metzler Verlag.

Tejeda-Cruz, C., Silva-Rivera, E., Barton, J.L. and Sutherland, W.J. (2010). 'Why shade coffee does not guarantee biodiversity conservation'. *Ecology & Society* 15 (1): 13.

UBA (2015). *Umweltprobleme der Landwirtschaft – eine Bilanz. 30 Jahre SRU-Sondergutachten. Texte 28/2015.* Dessau-Roßlau: Umweltbundesamt.

UN (2015). *Resolution adopted by the General Assembly on 25 September 2015*. 70th session. New York: UN.

UNESCO. (1996). *Biosphere reserves: The Seville Strategy and the Statutory Framework of the World Network*. Paris: UNESCO.

UNESCO. (2008). *Madrid Action Plan for biosphere reserves (2008-2013).* Paris: UNESCO Division of Ecological and Earth Sciences.

RESUMEN

Este artículo analiza la capacidad de las reservas de biosfera para responder ante los desafíos de la nueva Era Antropócena, incluyendo la vulneración prevista de algunos límites planetarios. En este contexto, el esfuerzo del desarrollo sostenible precisa de un reexamen crítico, y las reservas de biosfera deben avanzar hacia la adopción de formas más integradas y efectivas de medios de subsistencia sostenibles para sus habitantes. Ello implica situar a las personas aún más en el centro de la política y la gestión de las reservas de biosfera en procura de que se conviertan en pioneros y embajadores para alcanzar una verdadera sostenibilidad en todas las reservas de biosfera. Significa asimismo que las reservas de biosfera y las instituciones relacionadas tienen que trabajar en pro de una verdadera integración de sus potencialidades ecológicas, sociales y económicas, y establecer un marco de verdadera gobernanza de la sostenibilidad. Este documento amplía el concepto de reservas de biosfera para facilitar una transformación creativa hacia paisajes más habitables y sostenibles como una red global. Si esto se lograra, para las reservas de biosfera sería más fácil perseguir y fomentar la implementación de los Objetivos de Desarrollo Sostenible (ODS) como su finalidad primordial renovada.

RÉSUMÉ

Cet article examine comment les réserves de la biosphère se préparent à répondre aux défis de la nouvelle ère de l'anthropocène, y compris au dépassement prévu de certaines limites planétaires. Dans ce contexte, l'effort de développement durable nécessite un réexamen critique, et les réserves de biosphère se doivent de tendre vers l'adoption de moyens de subsistance durables plus intégrés et plus efficaces pour leurs habitants. Cela signifie placer les individus encore plus au cœur du programme d'administration de la réserve de la biosphère et leur permettre de devenir des pionniers et des ambassadeurs afin de réaliser une durabilité efficace dans toutes les réserves de biosphère. Cela signifie également que les réserves de la biosphère et les institutions connexes doivent œuvrer pour une véritable intégration de leurs potentiels écologiques, sociaux et économiques, et mettre en place un cadre de gouvernance réellement durable. Cet article vise à élargir le concept de réserves de biosphère afin de les orienter vers une transformation créatrice de paysages plus viables et durables en tant que réseau mondial. Si cela est réalisé, il sera plus facile pour les réserves de biosphère de poursuivre et de favoriser la mise en œuvre des Objectifs de Développement Durable (SDGs), ce qui est leur objectif fondamental.