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CHAPTER 6

OPTIONS FOR GOVERNANCE AND DECISION-MAKING ACROSS SCALES AND SECTORS

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CHAPTER 6

OPTIONS FOR GOVERNANCE AND DECISION-MAKING ACROSS SCALES AND SECTORS

EXECUTIVE SUMMARY

African populations share a close relationship with, and are highly dependent on, biodiversity and ecosystem services. A major challenge lies in managing and governing this human-environment relationship for Africa's transformation towards sustainability and resilience *(high agreement, robust evidence).* A wide variety of governance options exist in Africa for the conservation of biodiversity and sustainable delivery of ecosystem services and benefits to people under a range of future scenarios. Progress in achieving the Strategic Plan for Biodiversity 2011–2020 and Aichi Biodiversity Targets, the 2030 Sustainable Development Goals and African Union Agenda 2063, will be shaped by the governance choices made on the continent (Chapter 5, Table 5.7). Good environmental governance is critical for enabling Africa's diversity to deliver ecosystem services to people. A polycentric governance system has always been practiced in Africa and has addressed different interests in managing natural resources. It is grounded in the processes of accountability through stakeholder and actor engagement, harnesses co-benefits and value added, and addresses trade-offs. As such, it entails working across scales, sectors, values and knowledge systems including indigenous and local knowledge and institutions and adaptive management. It also involves building a sense of social responsibility and vigorously pursuing 'no regrets' options, particularly in relation to drivers of changes (identified in Chapter 4) {6.1, 6.2.1, 6.4.5}.

African countries are party to a number of global environmental agreements and have made high-level commitments to achieve their targets. The commitments made aim to improve the conservation and sustainable use of biological resources. The implementation of the agreements by African parties needs to be supported by financial, human and infrastructure capacity and accompanied by efforts to mainstream biodiversity, ecosystem services and nature's contributions to people into regional, subregional, national and sectoral development frameworks {6.2.1, 6.3}.

Domestication and effective implementation of commitments on environmental global agreements is important for African countries to attain sustainable development *(high agreement, robust evidence).* Regional integration policies are extremely important considering the shared resources and the transboundary nature of Africa's freshwater and terrestrial ecosystems including transhumant systems. National policies must balance these higher-level needs with policies that support ecosystem service delivery to constituents. Polycentric governance and decision-making at and across multiple policy sectors and levels will be necessary in order to tackle related challenges, and can highlight opportunities for adopting innovative African approaches towards good environmental governance.

Indigenous people and their livelihoods are underrepresented and overlooked in international agreements and commitments *(high agreement, medium evidence).* In the African context, where people are highly dependent on biodiversity and ecosystem services for their everyday well-being, it is critical to incorporate indigenous and local knowledge in policy decisions around the management of nature's contributions to people. Only three of the existing agreements reported in this chapter **(Table 6.2)** are specific to indigenous people's rights and livelihoods and offer opportunities for only limited positive impacts. Policy processes would benefit from the explicit inclusion of indigenous people's organisations such the Indigenous Peoples of Africa Coordinating Committee to ensure the inclusiveness and relevance of existing and new regulatory instruments.

Weak institutions in many African countries undermine governance of biodiversity and ecosystem services. There is need to prioritise environmental governance across scales in order to support the equitable use of resources and conservation *(high agreement, medium evidence).* Institutional failures are among the main drivers of biodiversity loss and ecosystem degradation. Proposals to correct institutional failures, including market failures such as environmental externalities, and legal and policy failures such as the absence of secure property rights or distorted subsidies, must be both practicable and lead to better protection of biodiversity while balancing the ecological footprint of Africa's growing population and industrialisation

ambitions. Good environmental governance requires integration, coordination, harnessing synergies between formal and indigenous governance, and managing conflicts. It entails coordination in planning and implementation to diminish elements of uncertainty, reduce competition over resources and reinforce coherence and positive impacts, as well as allowing for analysis of cross-sectoral trade-offs in decision-making to achieve ecosystem sustainability.

Governance options that harness synergies and deliver multiple benefits can help to balance patterns of access and allocation of ecosystem services in Africa. Such governance linkages may also contribute towards poverty reduction and support resilience building more widely *(high agreement, robust evidence).* Harnessing synergies in multilateral agreements, protocols, Sustainable Development Goals and related targets and initiatives can foster the effective implementation of policies and strategies at different levels and scales and help to improve efficiency in the use and allocation of limited resources. Using existing entry points in spatial planning and land-use and management to leverage synergies can be particularly effective for policy implementation at regional and national levels. Africa's radical transformation towards sustainability in line with the 2030 Agenda for Sustainable Development and Agenda 2063 will depend on investments targeting multi-stakeholder, multi-level adaptive governance {6.3}.

Different policy instruments and governance options that address specific drivers (identified in Chapter 4), together with scenarios, (identified in Chapter 5) exist. However, challenges and opportunities arise, with choices creating or reinforcing particular patterns of 'winners' (who make gains) and 'losers' (who bear costs) *(medium agreement, medium evidence).* It is necessary to develop a suite of responses and to be aware that there is no single "correct" policy pathway. Rather, it is important to take steps so that policies are synergistic and coherent, and that new policies are able to make up for the weaknesses inherent in existing ones. Challenges to the sustainable provision of biodiversity and ecosystem services such that nature can continue to support Africa's human well-being are significant, requiring specific policy instruments that target conservation of unique and globally important biodiversity, and better articulation of nature's specific benefits to people, as captured in the Sustainable Development Goals. Challenges of population growth, food security, urbanisation, climate change, land degradation, ineffective/poor governance and path-dependent (unsustainable) historical development decisions, mean that achieving governance that works for both nature and society is not straightforward. Articulating clear processes, which allow the environment to contribute to food security through Africa's agricultural biodiversity, supporting ecosystem services (e.g., pollination, pest control, soil carbon), land restoration, and increased resilience to climate change, are critical to inform the decision-making process. Placing justice and fairness concerns at the centre of the continent's governance priorities can help to improve both the environment and human well-being, while also achieving key international biodiversity and development targets *(high agreement, robust evidence)* {6.1, 6.2, 6.4.6}.

Delivering environmental justice and fairness in access to Africa's diverse biodiversity and ecosystem services lies at the core of 'good environmental governance' on the continent *(high agreement, robust evidence).* Creating an enabling environment for the prioritisation and selection of appropriate policy and governance options depends on addressing political, legal, institutional and economic limitations as well as improving capacities and resources. Strategic adaptive management systems, that incorporate different knowledge systems, are critical to ensuring sustainability of the ecological system and human well-being. Avoiding a 'tragedy of the commons' requires effective institutional responses that can enable environmental resources to be managed so that they contribute towards human well-being without eroding natural capital {6.5}.

The African context is complex both environmentally and in terms of multiple governance systems, layers of policies, and different socio-economic trajectories that can be adopted. Policy options need to navigate across these levels and layers and adapt to include multiple interests from the international to local level.

6.1 INTRODUCTION

African populations share a close relationship with, and depend upon, biodiversity and ecosystem services for all their human needs. Maathai (2010) noted that Africa's resource conflicts are often fuelled by the need to access nature's benefits in order to sustain livelihoods. There is a critical link between the way natural resources are managed, and peace and security (Gleditsch, 1998). A major challenge lies in managing and governing this human-environment relationship for Africa's radical transformation towards sustainability. Enabling environmental justice and fairness in access to Africa's diverse biodiversity and ecosystem services lies at the core of 'good environmental governance' on the continent, in which transparency, accountability, participation, social justice, and sustainable development principles are integrated (Feris, 2010). Avoiding a perceived or actual 'tragedy of the commons' (Hardin, 1968) requires effective governance responses that can enable environmental resources to be managed so that they contribute towards human well-being without eroding natural capital. Useful lessons may be learned by rekindling traditional African natural resource management methods, which by virtue of being flexible and having strict provisions, are considered by some as largely capable of avoiding a 'tragedy of the commons' (Hardin, 1968). In addition to the African Union Agenda 2063 (AU, 2015), the Sustainable Development Goals (UN, 2015) and the Convention on Biological Diversity's Aichi Biodiversity Targets (CBD Secretariat, 2010) offer valuable international opportunities for framing Africa's diverse biodiversity as a key asset that can, and must, be sustainably and equitably accessed and used in order to reduce inequality and poverty. Nevertheless, there are historical and structural challenges in transforming Africa's environmental governance, and a multitude of environmental frameworks and institutions on the continent (see Chapter 1). Critically, progress towards policy goals will be shaped by the governance choices made.

Africa's encounters with a range of civilisations have precipitated into the concept of Africa's Triple Heritage: dependent, culturally mixed, and politically unstable (Mazrui, 2014). The influences and confluences of these civilisations have affected the structures and functioning of the institutions that govern biodiversity and ecosystem services. Institutions simply refer to conventions, norms and rules that help to determine patterns of resource use (Short, 2007), and can be either formal or informal. The current state of biodiversity and ecosystem services on the African continent (Chapter 1) is a consequence of its history and evolution of human and natural processes (Ash *et al.*, 2010). A good understanding of current and future governance and planning for biodiversity and ecosystem services depends on the legacy of past decisions. Experiences of various African countries reveal that effective conservation and protection of ecosystem services in the past has been lacking. This has been partly due to insufficient recognition of belief systems, customs, land tenure systems and rights to use these resources by former colonial administrations, and has perpetuated post-independence (Akuffo, 2011; Vonada *et al.*, 2011; Muhumuza *et al.*, 2013; see Chapter 1).

The colonisation of African countries and shifts towards a globalised economy, alongside post-independence centralisation, brought about unprecedented governance changes. For example, changes in the traditional institutions governing land tenure systems have deprived many African communities of their rights to use, as well as their rights to apply local knowledge and indigenous knowledge systems to the management of biodiversity and ecosystem services (e.g., Dalle *et al.* (2005) and Dixon (2008) on Ethiopia; Cormier-Salem *et al.* (2010) on Senegal and Guinea Bissau). It is important to seek holistic means of integrating local, regional, and international approaches to valuing biodiversity and ecosystem services, in the context of diverse African indigenous and local knowledge systems that are well suited to environmental conservation.

This chapter recognises the importance of taking a polycentric governance approach to assessing options, where multiple autonomous bodies, often across different sectors and operating at multiple levels and over different time frames, interact within a specific policy arena (Biggs *et al.*, 2015) and where space for plural perspectives can be created. A polycentric approach is an alternative to top-down approaches that can be insensitive to local constraints and bottom-up approaches that are sometimes inadequate for dealing with issues at higher levels (Termeer *et al.*, 2010). This chapter highlights the need for systems-based environmental governance and assesses governance options for Africa, to maintain and improve the continent's rich biodiversity and ecosystem services. The structure of the chapter is presented below **(Figure 6.1)**.

The chapter begins by setting out the governance context of biodiversity and ecosystem services in Africa, considering both polycentric and adaptive governance. It then presents an assessment of the existing multi-level policy context at continental, subregional and national levels. Options and mechanisms for mainstreaming biodiversity and ecosystem services into national development initiatives, strategic assessments, economic and financial decision-making are set out and some of the key benefits of mainstreaming biodiversity and ecosystem services are provided. Economic and financial instruments; legal, regulatory and rights-based instruments; and social and cultural instruments, that serve policy and decision-making in improving biodiversity and ecosystem services management, are then discussed. Subsequently, the necessary frameworks and inputs such as capacities, tools, methodologies and resources in creating an enabling environment for biodiversity and

ecosystem services governance are discussed. Building on the information outlined in SPM Table 2, Tables 5.6 and 5.7, and Appendix 5.1 where policy options in response to scenario archetypes are outlined, the chapter then summarises key policy instruments for achieving biodiversity and ecosystem services specific policy goals.

6.2 GOVERNANCE OF BIODIVERSITY AND ECOSYSTEM SERVICES IN AFRICA

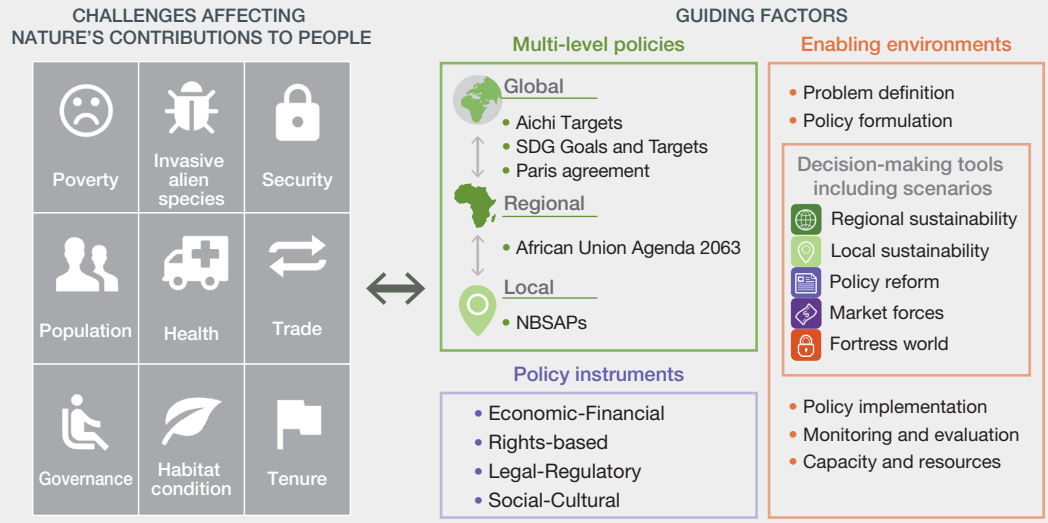
The governance and policy context provides a hierarchical, multi-level framing to address current challenges in maintaining and sustainably using Africa's natural capital over the different time frames of their implementation. At the national level, African countries have developed policies and strategies to respond to and align with global, regional and subregional scale development policies and strategies. However, ecosystems are dynamic, so it is imperative to identify which governance arrangements can be used to deal with future conditions, aspirations and uncertainties, especially as inter-linked systems often have non-linear feedbacks that can lead to irreversible changes in systems or regime shifts (Duit *et al.*, 2008). A key opportunity arises to integrate the concept of adaptive, flexible governance systems that can deal with future uncertainties into more mainstream governance approaches to ecosystem management (Berkes *et al.*, 2003; Chapin *et al.*, 2009; Novellie *et al.*, 2016). Furthermore, there is a need to deal with the transboundary nature of ecosystems and in particular the strong inter-dependencies of the food-energy-water nexus and other complex challenges noted in earlier chapters (see e.g., Chapters 1 and 4).

Adaptive governance has been put forward as a way in which to manage and cope with multiple and cross-scale interactions in social-ecological systems, especially during periods of abrupt change (Folke *et al.*, 2005). Key aspects of adaptive governance include the emergence of 'bridging organisations' that can lower the costs of collaboration and conflict resolution. They can also assist the development of policy and legislation that can support actors within the system to self-organise and therefore react more quickly, effectively and creatively to shocks (Folke *et al.*, 2005; Olsson *et al.*, 2006). Polycentric governance arrangements are important for being able to realise adaptive governance and facilitate collective action in tackling global environmental problems, such as climate change and deforestation, at multiple levels (Ostrom, 2010; Schoon *et al.*, 2015).

The flexible institutional arrangements of polycentric governance systems are often criticised for being inefficient

Figure 6 1 **The flow and development of chapter 6. The left panel shows the complex situation in Africa as laid out in Chapter 1.**

The green box represents the policy context within which Africa must work towards achieving various goals at multiple scales. There are a number of policy instruments (in the purple box) that can be used to guide Africa towards these goals, but in order for the policy instruments to work and the goals to be attained there needs to be an enabling environment (orange box). Together, the elements in the boxes can guide Africa towards a desirable future (see **Figure 6.7**).

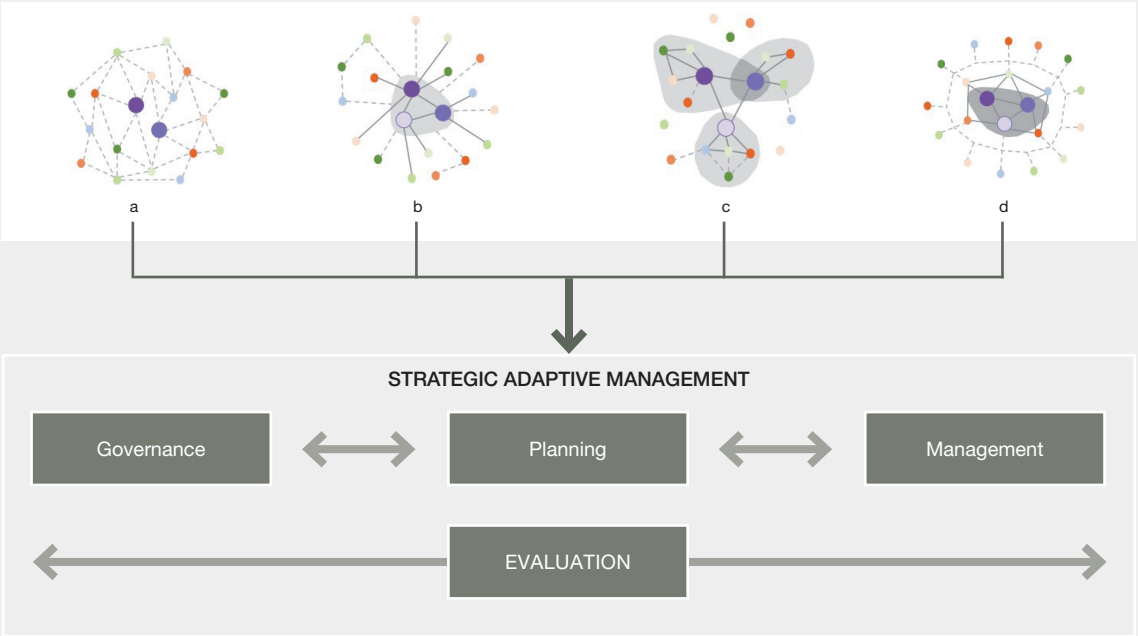


because they are non-hierarchical and complex in their organisation. Yet, in practice, they provide a framework that enables resource users at multiple levels to draw on general principles to craft new institutions that cope with changing situations on the ground (e.g., Folke *et al.*, 2005; Barau *et al.*, 2016; Novellie *et al.*, 2016; Ward *et al.*, 2018a; **Figure 6.2**). Furthermore, polycentricity provides a governance structure that can enable learning and experimentation, participation, connectivity and diversity, which are important characteristics for building resilient ecosystems (Schoon *et al.*, 2015). In the African context, it is even more important to create these plural governance spaces that acknowledge diverse and multiple knowledge systems and framings of nature (see also section 6.5.3 and **Figure 6.5**). However, building polycentric governance systems is not a simple task and can be derailed by conflicting interests.

As governance becomes more polycentric and networked, the active alignment of political and institutional factors becomes necessary, both across the same level (horizontal integration) and between different institutional levels (vertical integration) (Varis *et al.*, 2014). While institutions and platforms that facilitate cross-sector interaction and learning can assist with this (see Stringer *et al.* (2014) for examples of multi-stakeholder coordination platforms linked to managing climate change in Zimbabwe and Zambia), in the absence of such mechanisms, policy conflicts, competition for scarce resources and duplication of efforts can ensue (Stringer *et al.*, 2009; 2012). Ostrom (2010) highlights that devolving some decision-making to the local level whilst being able to maintain higher-level strategy is an important component for governing natural resources. This is particularly the case in situations with complex mixes of public and private decision-making. **Box 6.1** provides an example of the challenges in implementing such a polycentric governance in Guinea (Abe *et al.*, 2016). Other African countries provide further insights. Muller (2012) and Pollard *et al.*, (2011) focus on adaptive water governance in South Africa, while Ethiopia allows its regional states and indigenous institutions to be involved in decision-making (Hailu *et al.*, 2008).

Figure 6 2 **Polycentric and adaptive governance from 'weak' to 'strong' polycentricity across the four adaptive processes of strategic adaptive management.**

The figures a, b, c and d illustrate different processes of polycentric coordination and order: (a) illustrates a simple communication network that allows for mutual adjustment in multi-actor settings; (b) illustrates a stronger form of coordination as it combines communication linkages (dotted lines), with formal partnerships arrangements (solid lines); (c) denotes a stronger form of polycentricity involving tangible joint projects/experiments between actors (shaded areas) often with overlap; and (d) is the strongest form of polycentric order, and involves strong formal ties between key actors as well as a suite of joint projects, and the evolution of rules. Some external communication linkages to peripheral actors (dotted lines) co-exist with this stronger form of polycentric order often denoted as the 'polycentric system'. Colours illustrate the diversity of actors, and sizes are rough illustrations of the importance that different actors (nodes) play in the evolving network. These different configurations are important to understand at different stages of the adaptive management cycle as different configurations may be more appropriate depending on the level of co-production of knowledge it requires. Source: Galaz *et al.* (2012).



Box 6 1 Polycentric governance in the Gulf of Guinea Large Marine Ecosystem.

Out of a region-wide concern to curb continued degradation of the marine ecosystems and the risk of coastal erosion, 16 countries sharing the Gulf of Guinea Large Marine Ecosystem collectively initiated a trans-boundary project with a governance model that targeted actions to improve the socioeconomic conditions of the population across the shared coastal marine ecosystem. The broad objectives of the project were to recover depleted fishery stocks and ensure their sustainable utilisation, to reduce further pollution of the ocean and restore and maintain a healthy ecosystem. The success of the governance structure and institutional arrangement was centred on strength of the collective decision-making body, the steering committee formed by the member countries, with a real decision-making exercise by the countries over the management of their coastal marine ecosystem. The governance model resulted in more transparency and built trust among the participating countries easing access to disputed boundaries, which were access-restricted even for research purposes. The multilevel stakeholders (international, regional, national and sub-national) engagement in the governance structure underpinned the success of the project. One unique feature that built support for the initiative was its 'middle out' approach rather than a typical 'top-down' approach. The 'middle out' approach basically started building a network of large marine ecosystem professionals from the different levels of governance. This network worked together with those access to policy decision-makers, as well as engaging with the grassroots actors who utilise the marine ecosystem resources.

Challenges faced by the project, including interruptions of funding, were successfully managed and the effort eventually culminated in the creation of a commission by a protocol to the Convention for the Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central and Southern African Region in 2012. The resulting agreement is called the Abidjan Convention.

6.3 ASSESSING THE EXISTING MULTI-LEVEL POLICY CONTEXT FOR THE GOVERNANCE OF AFRICA'S BIODIVERSITY AND ECOSYSTEM SERVICES

Section 6.3.1 assesses the international agreements that constitute the current global policy framework within which Africa's polycentric governance options can be defined. It then evaluates the continent's progress towards the Convention on Biological Diversity's Aichi Biodiversity Targets, highlighting the links between these and the Sustainable Development Goals. Section 6.3.2 assesses the subregional level policy context and 6.3.3 focuses on the national level.

6.3.1 The international policy context

Maintaining and improving Africa's rich biodiversity and ecological infrastructure is essential to address the cross-cutting challenges identified in previous chapters (e.g., see Chapters 1 and 4), enabling nature's endurance, humans to live well in balance with nature, and the sustainable use of biodiversity and ecosystem services. The IPBES document on policy support tools and methodologies (IPBES, 2016a) identifies several Multilateral Environmental Agreements to which most African countries are signatories and that have relevance to biodiversity and ecosystem services, some of which also link to human development. These are set out in **Table 6.1**, alongside the other Rio Conventions (United Nations Convention to Combat Desertification, United Nations Framework Convention on Climate Change) in terms of their links to biodiversity and ecosystem services in Africa.

Under the Convention on Biological Diversity, African nations address biodiversity and ecosystem services via the Strategic Plan for Biodiversity 2011–2020 (CBD Secretariat, 2010), through their strategies, plans, programmes and projects, legislation and other measures. The Strategic Plan comprises a shared vision, mission, strategic goals and 20 targets, serving as a flexible framework for establishing national and regional targets and promoting the coherent and effective implementation of the Convention on Biological Diversity objectives. **Figure 6.3** summarises Africa's progress in relation to the Aichi Biodiversity Targets (see also Appendix 6.1), and demonstrates particularly that the continent has made important progress in awareness-raising about biodiversity by NGOs. There is also an improved understanding of metrics and tools for biodiversity stocktaking, recognising that as consumption of natural resources increases in Africa, the role of indigenous knowledge, science, and technology have also become more critical.

The SDGs (2015–2030) provide a further important international framing to the continent's environmental governance. They stipulate various measures and actions to be taken by national governments, directly targeted towards the protection, restoration, conservation and sustainable utilisation of ecosystems and biodiversity resources. They also support responsible consumption and production. Key to biodiversity

Table 6 1 **Links between key multilateral environmental agreements and related protocols, key agreements on indigenous and local knowledge, and biodiversity and ecosystem services in Africa.**

Multilateral Environmental Agreement	Focus and overview	Links to biodiversity and ecosystem services in Africa
CBD – *Convention on Biological Diversity*	The United Nations *Convention on Biological Diversity* (CBD Secretariat, 2010) has three objectives: i) to conserve biological diversity; ii) to use its components in a sustainable way, and; iii) to share fairly and equitably the benefits arising from the use of genetic resources. The Convention also has three protocols; the Cartagena Protocol on Biosafety, the Nagoya Kuala Lumpur Supplementary Protocol on Liability and Redress and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Use. The Strategic Plan for Biodiversity 2011–2020 is a ten-year framework for action by all countries and stakeholders to save biodiversity and enhance its benefits for people. It is a flexible framework used for developing national targets, based on the Aichi Biodiversity Targets. National targets are developed taking into account countries' priorities and capacities and their contribution to the collective efforts to reach the global Aichi Biodiversity Targets.	Africa, being immensely rich in biodiversity, supports nearly a quarter of global biodiversity, much of which plays a vital role in promoting ecosystem services (UNEP-WCMC, 2016). Although considerable progress has been made in the conservation of Africa's biodiversity, high population growth rates, rapid urbanisation and agricultural expansion, pose enormous challenges in reconciling environmental and economic issues with human well-being. In view of these challenges, there is a need to look into how national governments and other decision-makers can be involved to enhance and facilitate implementation of the Strategic Plan for Biodiversity 2011-2020 as well as progress towards attainment of Aichi Biodiversity Targets. National Biodiversity Strategies and Action Plans are vital instruments in the implementation of the *Convention on Biological Diversity* at the national level as stipulated in Article 6 of the *Convention on Biological Diversity*. It is commendable that 54 African countries are parties to the *Convention on Biological Diversity*, 39 to the Nagoya Protocol on Access and Benefit Sharing, 49 to the Cartagena Protocol on Biosafety and 18 to the Nagoya Kuala Lumpur Supplementary Protocol on Liability and Redress. Although 51 African countries have developed National Biodiversity Strategies and Action Plans, some of which are under revision, in revised or completed forms, a few countries are still at the inception stage, preparing their first drafts (https://www.cbd.int/nbsap/default.shtml). As such, concerted efforts are still needed in order to support plans for biodiversity conservation. These can be achieved through the regular update of the national biodiversity strategies and actions plans, and by facilitating policy coherence and mainstreaming of biodiversity within and across sectors, innovation and piloting of new ideas and encouraging the mobilisation of resources (UNEP-WCMC, 2016).
UNFCCC – *United Nations Framework Convention on Climate Change*	The *United Nations Framework Convention on Climate Change* (UN, 1992) provides an overall framework for intergovernmental efforts to address climate change. Its overall objective is to stabilise greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system. The *United Nations Framework Convention on Climate Change* has 196 parties and is the parent treaty of the 1997 Kyoto Protocol, ratified by 192 of the *United Nations Framework Convention on Climate Change* Parties.	All 54 African countries are parties to the *United Nations Framework Convention on Climate Change*. Projections suggest biodiversity losses will be exacerbated directly due to impacts of climate change on habitats. Africa has been centre stage in many *United Nations Framework Convention on Climate Change* decisions on mitigation, adaptation, climate finance, technology transfer, amongst others. For example, the Reducing Emissions from Deforestation and forest Degradation in developing countries (REDD+) agreed in Cancun in 2010 was based on Africa's diverse and dense forest ecosystems. Rural African communities who rely largely on ecosystems are most likely to lose their livelihoods due to the negative consequences of climate change and extremes. However, local level adaptation options are generally ecosystem-based and could contribute to increased ecosystem resilience, biodiversity conservation, carbon sequestration and ecological integrity (CBD Secretariat, 2009).
UNCCD – *United Nations Convention to Combat Desertification*	The *United Nations Convention to Combat Desertification* (UNCCD Secretariat, 1994) aims to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected countries.	The *United Nations Convention to Combat Desertification* appreciates that Africa is especially vulnerable to land degradation and drought and provides a framework for action to prevent and reverse degradation through sustainable land management and restoration of degraded ecosystems and the services they provide. Achieving this objective involves long-term integrated strategies that focus on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level. Africa has its own Annex to the *United Nations Convention to Combat Desertification*, highlighting the particular problems experienced by the continent. All United Nations member states in Africa are parties to the *United Nations Convention to Combat Desertification*. Conservation and use of biodiversity for its ecosystems services remains one of the primary means of protecting and restoring land from desertification.
Ramsar Convention	The *Ramsar Convention* of 1971 is the world's oldest Multilateral Environmental Agreement. It provides a framework for national actions and international cooperation in order to conserve and wisely use wetlands and their resources (Ramsar Convention, 1971).	There are currently 386 Ramsar sites in Africa in which sites' locations, uses and potentials are documented. Many of these, such as the Barotse floodplain are driven by flood pulse ecosystem services which provide the primary sources of nutrition, irrigation water, and wildlife habitat in the region. It is nevertheless difficult to say if African governments and conservation agencies have successfully implemented the principles of wise use in wetlands.

Table 6 1

Multilateral Environmental Agreement	Focus and overview	Links to biodiversity and ecosystem services in Africa
CITES – *Convention on the Illegal Trade of Endangered Species*	The aim of the *Convention on the Illegal Trade of Endangered Species* (CITES, 1973) is to ensure that global trading of wild animals and plants does not threaten their very existence. The *Convention on the Illegal Trade of Endangered Species* works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction from the range of species covered by the Convention has to be authorised through a licensing system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species.	All African countries, except South Sudan, are signatories to *Convention on the Illegal Trade of Endangered Species*. African wildlife and products are particularly susceptible to illegal trade, and the focus on *Convention on the Illegal Trade of Endangered Species* controls – including elephant ivory and rhinoceros horns. There are 4063 animal and plant species that are listed by *Convention on the Illegal Trade of Endangered Species* for Africa (checklist.cites.org), the third most populous regional list following Asia and Central and South America and the Caribbean. Despite its challenges, *Convention on the Illegal Trade of Endangered Species*-based approaches to biodiversity conservation are well established, receive strong international support, and have a significant impact on the public perception of the country in question.
CMS – *Convention on Conservation of Migratory Species of Wild Animals*	The *Convention on Conservation of Migratory Species of Wild Animals* (CMS, 1979), or the Bonn Convention aims to conserve terrestrial, marine and avian migratory species throughout their range. Parties to the *Convention on Conservation of Migratory Species of Wild Animals* work together to conserve migratory species and their habitats by providing strict protection for the most endangered migratory species, by concluding regional multilateral agreements for the conservation and management of specific species or categories of species, and by undertaking co-operative research and conservation activities.	Africa retains some of the largest and best-known land migrations made by mammals. Migrations by birds between Africa and both Asia and Europe are numerous and include amongst others the Black Sea Mediterranean flyway, the East Atlantic Flyway and the West Asian – East African flyway. These migrations are critical to biodiversity conservation, and in some cases, such as the Wildebeest migration, generate significant revenue through environmental tourism. Conservation of this biodiversity requires coordination between governments to facilitate movement across borders as well as land-use change policies that limit conflict between open migratory pathways and either agricultural or infrastructure development (including fencing).
ITPGRFA – *International Treaty on Plant Genetic Resources for Food and Agriculture*	The *International Treaty on Plant Genetic Resources for Food and Agriculture* (FAO, 2009) is an international agreement that aims to guarantee food security through the conservation, exchange and sustainable use of the world's plant genetic resources for food and agriculture, as well as fair and equitable benefit sharing arising from its use.	Africa is the centre of origin for more than 20 commonly traded crops (e.g., millet, sorghum, coffee, yams, cotton, okra), and crops with important nutritional, climate adaptation and market potential (e.g., teff, enset, fonio). Countless local species are used in day-to-day culinary traditions and are gaining increasing attention for their contribution to local dietary diversity and nutrition, as well as global interest in novelty crops and superfoods. The drought tolerance traits of sorghum and millet are driving a growing interest in the cultivation of these plants outside Africa in response to climate change or reduced access to groundwater. The treaty ensures that the benefits of trading such crops are received by 'custodian' farmers that have cultivated them. Smallholder farmers in Africa are notably dependent on the local trade of seeds and varieties. The Treaty seeks to ensure the continued capacity to trade seeds between individuals.
WHC – *World Heritage Convention*	The *World Heritage Convention* (UNESCO, 1972), also known as The Convention on the Protection of the World's Cultural and Natural Heritage was adopted by the United Nations Educational, Scientific and Cultural Organisation in 1972. The instrument aims to inventory, recognise and protect unique and irreplaceable locations of universal value. Through this convention, parties agree to amongst others: adopt a general policy giving cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programs, and set up services for the protection, conservation and interpretation of that heritage.	Africa is home to 135 listed World Cultural and Natural Heritage sites across 37 countries. These sites, however, are in danger or threatened by one or a combination of accelerated deterioration, large-scale public or private projects development, rapid urbanisation and increased tourism, changes in land-use and tenure, armed conflict, fires, earthquakes, landslides, volcanic eruptions, floods, tidal waves and changes in water levels. In view of this, parties to the *World Heritage Convention* pledge to conserve the cultural and natural sites within their borders that are recognised by the Convention as being of exceptional and universal value. In return, the international community helps to protect these treasures. In adherence to the treaty, Parties identify and nominate properties in their national territory to be considered for inscription on the World Heritage list. In doing so, they provide details of how the property is protected and a management plan for its upkeep. Parties are also expected to protect the World Heritage values of the properties inscribed and are encouraged to report periodically on their condition. Because it is the responsibility of member countries to safeguard World Heritage properties in their jurisdiction, they work closely with the World Heritage Committee which also compiles the List of World Heritage in danger.

Table 6 1

Multilateral Environmental Agreement	Focus and overview	Links to biodiversity and ecosystem services in Africa
UNDRIP – United Nations Declaration on the Rights of Indigenous People	The *United Nations Declaration on the Rights of Indigenous People* (UN, 2008) is an international instrument to enshrine the rights that "constitute the minimum standards for the survival, dignity and well-being of the indigenous peoples of the world."	Indigenous peoples are unique holders of knowledge on biodiversity and ecosystem services. By codifying the rights of indigenous people worldwide, protection against forced land dispossession, for self-determination, secured land tenure, right for cultural expression, and any form of association with land, nature and biodiversity the *United Nations Declaration on the Rights of Indigenous People* provides improved opportunities for indigenous people to continue to care for and nurture their bio-cultural heritages, thereby contributing to biodiversity conservation (Cittadino, 2014; Wright *et al.*, 2014).
Swakopmund Protocol	As part of the African Regional Intellectual Property Organisation, the *Swakopmund Protocol on the Protection of Traditional Knowledge and Expression of Folklore* (ARIPO *et al.*, 2010) codifies the protection of traditional knowledge held by African indigenous people from commercial exploitation by national and multinational corporations and provides ways of compensating or benefiting indigenous people for the use of their traditional knowledge.	By protecting the traditional knowledge of indigenous people in Africa, this protocol enables the conservation and protection of biodiversity, sacred places, specific fauna and flora from commercial and other forms of exploitation, thereby contributing to their protection (Hinz, 2012)
AUPFP – African Union Policy Framework for Pastoralism	The *African Union Policy Framework for Pastoralism* (AU, 2010) aims to secure, protect and improve the lives, livelihoods and rights of African pastoralists. The policy framework emphasises the need to fully involve pastoralist women and men in the national and regional development processes from which they are supposed to benefit. It emphasises the regional nature of many pastoralist ecosystems in Africa and therefore, the need to support and harmonise policies across the Regional Economic Communities and Member States.	Through a plan or proposition to secure sustainable pastoralism that allows traditional movement of pastoralists across large expanses of drylands, enabling them to follow traditional grazing cycles, the framework promises to encourage pastoralism that avoids the 'tragedy of the commons', where regulated pastoralism enables the utilisation of rangelands, without causing land degradation and biodiversity loss. The policy framework has the following two objectives: (1) Secure and protect the lives, livelihoods and rights of pastoral peoples and ensure continent-wide commitment to the political, social and economic development of pastoral communities and pastoral areas; and (2) reinforce the contribution of pastoral livestock to national, regional and continent-wide economies.

Figure 6 3 **Overview of the current and anticipated contribution of African countries towards the achievement of the Aichi Biodiversity Targets based on the fifth national reports submitted to the secretariat of the Convention on Biological Diversity as of September 2017 (50 African States).**

The figure paints a mixed picture with progress towards some targets substantially outperforming that of others. For example, there are worrying trends where more than 50% of countries are not on course to meet Targets (e.g., Targets 3, 4, 6, 12 and 20 show no countries on track). Of particular concern is target 5, where more than 25% of countries are moving away from the target, while targets 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, and 15 show no significant change for more than 25% of countries. Overall, progress is being made, but at an insufficient rate by more than 50% of countries towards Targets 1, 2, 11, 12, 14, 15, 17 and 19. Target 16, however, has one country set to exceed the target. All targets face a lack of information on progress from some countries. Source: adapted from UNEP-WCMC (2016).

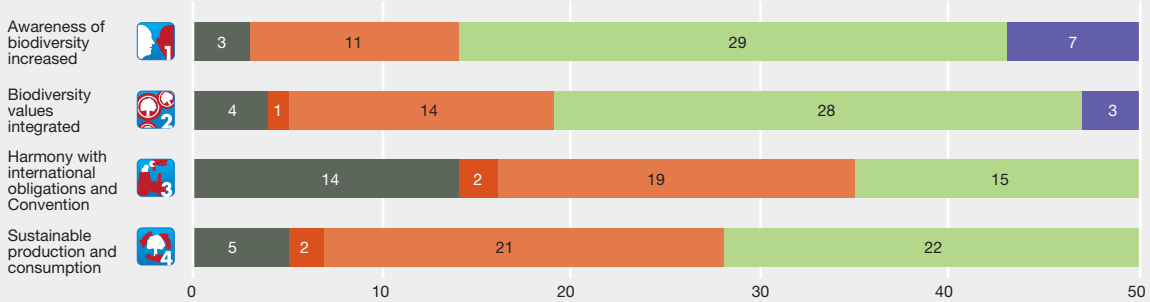
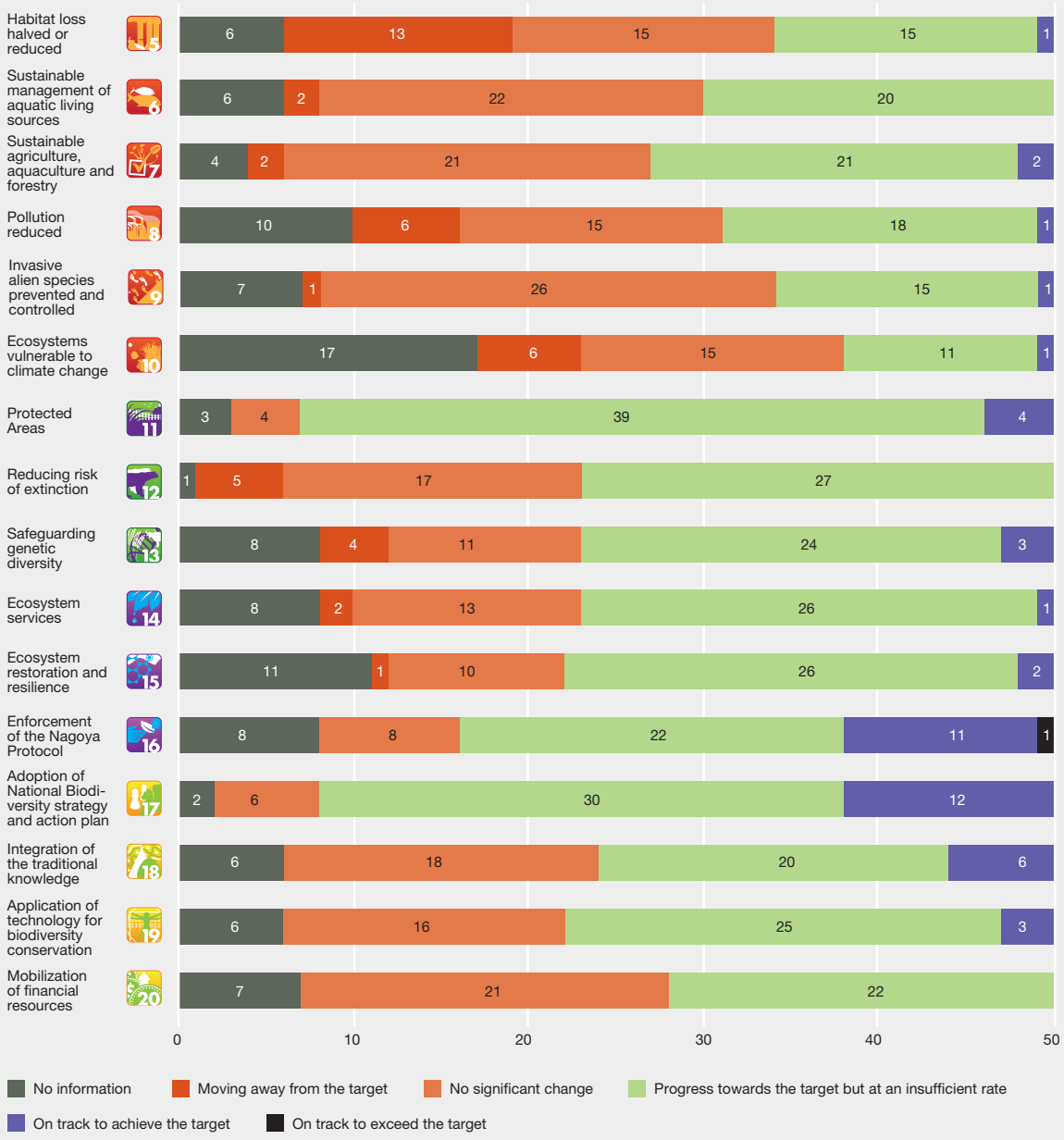


Figure 6 3



and ecosystem services approaches in Africa is demonstrating how investments in SDG 15 (focused on protection, restoration and promotion of sustainable utilisation of terrestrial ecosystems, sustainable management of forests, combating desertification, and reversing land degradation and biodiversity loss) significantly contribute to human well-being (e.g., SDGs 1, 2, 3, 6, and 7, on poverty reduction, food security, health, watershed management, energy production and ensuring economic growth without harming the environment). In addition, SDGs 11, 13 and 14 focus on building resilience to climate change impacts by strengthening adaptive capacity, policy responses and through conservation and sustainable utilisation of coastal and marine ecosystem resources.

Overall, there is a complex international policy landscape in which Africa's polycentric environmental governance options are situated. Despite the multi-scale, polycentric complexity, decision-making about biodiversity and ecosystem services at smaller scales plays a central role in making progress towards these global targets. Using existing entry points within these international agreements to leverage synergy can be particularly effective for policy implementation at regional and subregional levels, ensuring a resource efficient approach (Akhtar-Schuster *et al.*, 2011). However, globally there is a still a weakness in policy implementation and enforcement, complicated by issues such as corruption.

6.3.2 Africa's regional and subregional policy context

The main policy at the continental scale is Agenda 2063, which sets out an African approach. Through this, Africa can effectively learn from the past, build on current progress and harness opportunities in the short and medium terms to ensure positive socio-economic transformation in the next 50 years. The continental governance structure, supported by other policies and initiatives, offers opportunities to ensure that there is more effective balance in the use and conservation of biodiversity and ecosystem services in the region. This is important because many African countries share cross-border systems such as lakes, rivers and wetlands (e.g., the Okavango Basin/delta, Lake Chad Basin, Victoria Basin/lake, Nile Basin/delta and Niger Basin/delta, Congo Basin, Volta Basin), as well as national parks and sanctuaries that are rich and diverse in flora and fauna. Appendix 6.2 summarises some of the transboundary natural resources and their corresponding governance agreements.

Managing these natural resources requires coordinated cross-border governance structures as well as regional and subregional cooperation agreements. **Box 6.2** provides examples of these relating to transboundary water and land resources governance; **Box 6.3** presents examples of fisheries regulatory instruments, and; **Box 6.4** considers the conservation of genetic resources at a regional level. Most of

Box 6.2 Examples of transboundary water and land resource governance in Africa.

The Lake Tanganyika Basin, Lake Victoria Basin and Upper Nile Basin all have trans-boundary agreements/conventions and governing authorities. The Convention on the Sustainable Management of Lake Tanganyika sets out the rights and duties of Burundi, Democratic Republic of Congo, Tanzania, and Zambia, establishing institutional structures for co-operative management. The Nile Basin Initiative aims to achieve sustainable socio-economic development through equitable utilisation of, and benefit from, common Nile Basin water resources, including the Upper and Blue Nile rivers and their catchments. The East African Community Lake Victoria Basin Commission was established in 2001 to promote, facilitate and coordinate activities of different actors towards sustainable development and poverty eradication of the Lake Victoria Basin (International Waters Governance, n.d.). The Volta Basin Authority, representing the six riparian countries in the Volta watersheds, has established an ambitious Strategic Action Plan for which half the budget and activities target restoration of ecosystem functions and conservation (UNEP-GEF Volta project, 2013).

A notable example from West Africa is the New Partnership for Africa's Development and its Great Green Wall of the Sahara and Sahel initiative supported by the Global Environment Facility (GEF *et al.*, 2011). The Great Green Wall of the Sahara and Sahel involves reforesting a 15 km strip of land stretching 7,100 km from Dakar, Senegal to Djibouti and the use of sustainable land management practices to enhance productivity (http://www.greatgreenwall.org/). Specific ecosystem services targeted include carbon sequestration (climate change mitigation), nitrogen fixation, soil retention, regulation of climate extremes (floods and droughts) and provision of habitat for biodiversity (Abdou, 2014). Endorsed in 2007 by African Heads of State and Government, the Great Green Wall for the Sahara and the Sahel Initiative aims to reverse land degradation and desertification in the Sahel and Sahara, whilst mitigating social, economic and environmental crises for the region's most vulnerable people (Hertsgaard, 2011). The Initiative has since evolved into a regional vision of sustainable landscapes that generate multiple economic and environmental benefits and help build the resilience of the Sahel, where over half the population lives on less than $1.25 per day, and nearly 70% depend on the services provided by land resources. A new push for Africa's Great Green Wall Initiative also involved the establishment of a regional hub for the World Bank Sahel and West Africa program to share knowledge and strengthen institutional capacity. Through Global Environment Facility funded initiative, the project dubbed 'Building Resilience through Innovation, Communication and Knowledge Services', provides operational, technical and knowledge services to partner countries under World Bank Sahel and West Africa program. The 'Building Resilience through Innovation, Communication and Knowledge Services' project is a strategic effort designed to boost resilience in the Sahel and help countries and communities adapt to the challenges posed by a changing climate and rapidly degrading natural resource base. The overall aim is to enhance the resilience of landscapes and livelihoods and in doing so, contribute to poverty reduction, food and water security and curb natural resource degradation (O'Connor *et al.*, 2014).

At local level, regional institutions have formulated key recommendations for participating countries, including capitalisation and sharing of experiences acquired in the establishment of the green belts; consideration of existing initiatives and the development of synergies, complementarities and sound coordination with on-going projects and programmes to avoid duplication and improve interventions effectiveness; application of integrated and comprehensive approaches of planning which clarify and strengthen links between the different dimensions of the environment and areas of intervention; and the need to involve local communities, as indigenous and local communities remain fundamental in the successful implementation of the Great Green Wall for the Sahara and the Sahel Initiative. Scientific evidence assessing the effectiveness of the strategy at meeting both conservation and development goals is nevertheless lacking.

the institutions and policies are linked to regional economic groupings, for example, the Southern African Development Community's Regional Biodiversity Strategy (SADC, 2008), and the Regional Strategic Action Plan for Integrated Water Resources Development and Management (SADC, 2016), while Central Africa's Forest Commission (COMIFAC, 2014) coordinates the implementation of decisions of the Council of Ministers of its member states regarding conservation and sustainable management of forest ecosystems in the Central Africa region.

6.3.3 National level strategies and action plans

The United Nations General Assembly has stressed the need for enhanced cooperation among the Rio Conventions in implementation at national and sub-national levels. This is reiterated in the Sustainable Development Goals, encouraging coordination and cooperation between multilateral environmental agreements. Through the preparation of National Biodiversity Strategies and Action Plans, national and sectoral policies have responded to international agreements such as the Convention on Biological Diversity, alongside the United Nations Convention to Combat Desertification's National Action Programmes and the United Nations Framework Convention on Climate Change's National Adaptation Plans, and Intended Nationally Determined Contributions. Together, these agreements can help to align policies to achieve desired outcomes for biodiversity, climate change and desertification within the broader context of sustainable development. For example, ecosystem-based adaptation can help to achieve the goals of multiple multilateral environmental agreements through national level implementation **(Box 6.5)**.

National Biodiversity Strategies and Action Plans act as national instruments to incorporate biodiversity strategy into development planning. As stipulated in Aichi biodiversity target 17, each party to the Convention on Biological Diversity is expected to have developed, adopted or started implementation of National Biodiversity Strategies and Action Plans by 2015. Fifty-one African countries have National Biodiversity Strategies and Action Plans, some of which are under revision, in revised or completed forms. Some countries (e.g., Libyan Arab Jamahiriya, Somalia and South Sudan) have their first National Biodiversity Strategies and Action Plans under development at the time of writing this assessment. As of 2015, 49 African countries had reported their revised National Biodiversity Strategies and Action Plans to the Convention on Biological Diversity (with national targets for the period 2010–2020). National targets (e.g., reduction of habitat loss by 10%, increase conservation of threatened or endangered species by 30%, reduce impacts of mining on biodiversity, etc.) are well aligned to meeting many of the Aichi Biodiversity Targets by 2020. Nevertheless, moving towards effective national-scale implementation of global multilateral agreements is highly challenging.

Box 6 3 Examples of fisheries and fishery regulatory instruments.

The Common Market for Eastern and Southern Africa's Fisheries and Aquaculture Strategy aims to achieve long-term productivity of fisheries and aquaculture, to strengthen food security and the trade benefits of fish products to domestic, regional and international markets, as well as ensuring alignment of programmes and projects in the sector. Similarly, the South West Indian Ocean Fisheries Commission promotes sustainable use of the living marine resources of the South West Indian Ocean region (www.fao.org/fishery/rfb/swiofc/en), while the Indian Ocean Tuna Commission, headquartered in Victoria, Seychelles, promotes cooperation among Members to ensure conservation and optimum utilisation of stocks of tuna and tuna-like species, encouraging sustainable development of fisheries based on such stocks in the Indian Ocean and adjacent seas (www.iotc.org).

Box 6 4 The Southern African Development Community's Plant Genetic Resource Centre.

The Southern African Development Community's Plant Genetic Resource Centre is a regional gene bank that works with plant genetics centres in each Southern African Development Community member state to conserve and preserve genetic diversity and viability of southern African plant stocks. The centre now holds more than 18,000 diverse crop and wild relative accessions and is increasing its collection of traditional crop varieties and wild species. Other gene banks in Africa are located in Tanzania, Egypt and Sudan. Ensuring genetic retention of species and variability provides a buffer to local agriculture against shocks such as drought, flood, climate change or civil unrest. Regional fisheries bodies and agreements are also important for the region's management of biodiversity and ecosystem services (www.spgrc.org.zm/).

Box 6 5 Ecosystem-based adaptation to climate change.

A very important link between climate change and biodiversity is ecosystem-based adaptation, which provides for conservation, restoration and sustainable use of biodiversity while supporting societies adapt to climate change impacts (Scarano, 2017). Ecosystem-based adaptation is defined as *"the plans/measures that aim at integrating the use of biodiversity and ecosystem services into an overall adaptation strategy. It can be cost-effective and generate social, economic and cultural co-benefits and contribute to the conservation of biodiversity"* (Doswald, 2014).

Ecosystem-based adaptation measures implemented in many African countries include awareness creation and capacity building for sustainable management of natural resources, use of information and knowledge from all sources, including traditional knowledge, innovations and practices, design of policy measures to protect and control over-extraction of timber trees; establishment of protected areas, watershed management, shelterbelts and agroforestry. These measures have demonstrated multiple economic, environmental, social and cultural benefits by ensuring livelihood sustenance and food security, conservation of biodiversity, sustainable water management, and disaster risk reduction, among other benefits (http://unfccc.int).

According to UNEP (2015), improved coordination between national institutions responsible for various multilateral environmental agreements and relevant ministerial departments and agencies, is critical to the implementation of biodiversity and ecosystem services management strategies in a synergistic way within a polycentric governance system. Synergy can be harnessed between multilateral environmental agreements through mainstreaming national strategies into national and regional development plans, and projects for sustainable development. In turn, mainstreaming can help to identify and mitigate trade-offs. It requires coordinated efforts from many stakeholders (public and private), including intergovernmental and governmental institutions, NGOs, the private sector and local communities, in order to identify solutions to interlinked problems. Such an approach can also help to integrate decision-making across scales from the local to the international.

6.4 MAINSTREAMING BIODIVERSITY AND ECOSYSTEM SERVICES

The post-2015 agenda provides an opportunity to guide development pathways to benefit both biodiversity and poverty alleviation for the many smallholders in Africa, who depend on ecosystems for income, jobs, and food. It focuses particular attention on the status of the numerous female smallholders who face severely restricted opportunity space. Lack of consideration of biodiversity and ecosystem services when making major economic decisions produces a risk associated with crossing tipping points that arise from continued loss of biodiversity. One example of a possible tipping point in Africa is the Sahel, where pressure from climate change, land degradation and over-use of limited water resources threatens to degrade the area, which will further exacerbate desertification (Lambin *et al.*, 2014). This degradation and loss of vegetative cover is likely to have severe impacts resulting in the loss of biodiversity providing soil carbon, and loss of hydrological ecosystem services which are the foundations of food, fibre and water production in Sahelian Africa (CBD Secretariat, 2010; Lambin *et al.*, 2014).

This section examines options for mainstreaming biodiversity and ecosystem services. Some countries have embedded biodiversity considerations into policies, strategies and practices of key public and private actors that impact or rely on biodiversity, so that it is conserved, and sustainably used, locally, regionally and globally (Huntley *et al.*, 2014; Redford *et al.*, 2015).

6.4.1 National development processes

Integrating biodiversity and ecosystem services into development planning can be achieved in a variety of ways. However, there is still a challenge for African countries to coordinate and integrate development objectives with biodiversity conservation. Examples such as the Poverty and Conservation Learning Group (involving International Institute for Environment and Development) and Poverty Environment Initiative **(Box 6.6)** have nevertheless paved a way for countries like Malawi, Mozambique and Mauritania to mainstream poverty-environment linkages into national development plans (UNDP-UNEP, 2013).

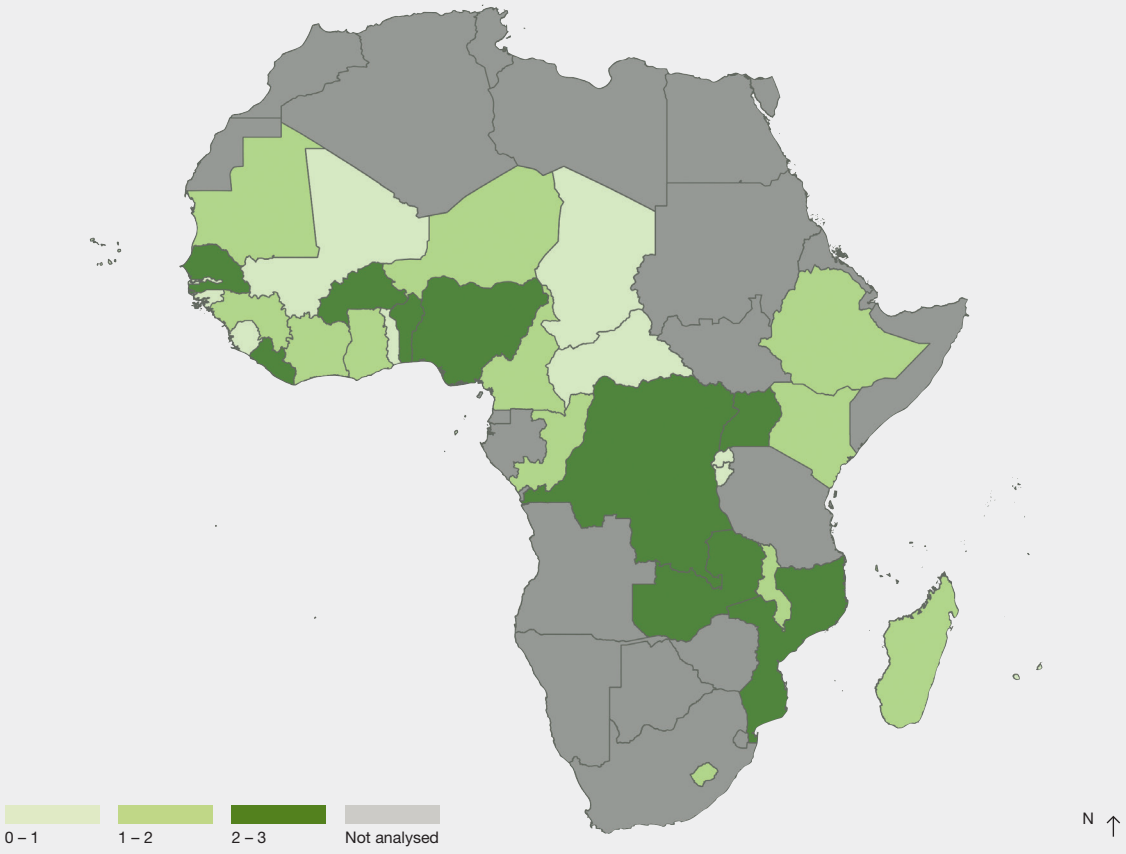
Other countries such as Mali, Botswana and Tanzania have even gone further to include biodiversity and ecosystem services into their Poverty Reduction Strategies. **Figure 6.4** shows the degree to which biodiversity is reflected in the

Box 6 6 Malawi Poverty Environment Initiative. Source: UNDP-UNEP (2013).

Prompted by a natural resources economic analysis and evidence of poverty-environment linkages, the government of Malawi has shifted the course of its national development planning. In January 2011 a study initiated by the Poverty-Environment Initiative, a joint programme of the United Nations Development Programme and United Nations Environment Programme, established for the first time the costs and benefits of sustainable and unsustainable natural resource management in Malawi. This quantification was done in four areas of forestry, fisheries, wildlife and soils. The findings showed that unsustainable natural resource use is costing the country the equivalent of 5.3% of GDP each year, more than the total funding allocated to education and health ministries in the national budget. Soil erosion alone reduces agricultural productivity by 6%, and if this yield was recovered, an additional 1.88 million people would have been lifted out of poverty by 2015. The study also revealed the untapped potential of the country's wealth of natural resources for tackling extreme poverty.

The study marked a turning point for both the government and its development partners. The economic analysis not only demonstrated the macro-economic contribution of natural resources to GDP but showed the links between investing in ecosystems and poverty alleviation and has marked a shift in the way government institutions understand the issues. The Poverty-Environment Initiative revealed that the most effective way to mainstream ecosystem management and poverty alleviation into government processes is to get the issues into the core of planning agendas and processes. As a result of the study, Malawi's Growth and Development Strategy II for 2011–2016 identified climate change and natural resource management as one of nine priority areas for the country. This shift in direction at the national level also prompted change across the sectors. As long as the momentum for change is not lost, most policies and plans in Malawi will take into account the linkages that exist between poverty alleviation and natural resources management.

Figure 6 4 Integration of biodiversity and ecosystem services into Poverty Reduction Strategy Papers in Africa, scored from 0 – 3, using a scale where 0 means that biodiversity is not reflected and 3 means its importance is strongly reflected. Source: adapted from UNEP-WCMC (2016).



Poverty Reduction Strategy Papers of different African countries (UNEP-WCMC, 2016).

In many countries, the most important national sectors have legislation, action plans and programmes which are developed with a wide range of stakeholders (GEF *et al.*, 2007). Mainstreaming biodiversity and ecosystem services into sectoral legislation and plans not only benefits biodiversity but also benefits other sectors because they reinforce the sustainability impacts of legislated activities. Countries like Guinea-Bissau, Malawi, Seychelles, Cameroon (see **Box 6.7**) and Sierra Leone have incorporated biodiversity conservation into development plans in agriculture and forestry (UNEP-WCMC, 2016).

6.4.2 Strategic Environmental Assessments and Environmental Impact Assessment

At regional and national levels, using Strategic Environmental Assessments for the purpose of including ecosystem services in planning provides an opportunity to mainstream ecosystem services into decisions at the strategic level (Ganeletti, 2011; see **Box 6.8**). A number of countries including Ethiopia, Kenya and Mauritius, have incorporated Strategic Environmental Assessments in their legal frameworks (UNEP-WCMC, 2016), though in several nations it is less explicit.

Environmental Impact Assessment offers another approach and has been widely used in Africa since 1995 when African Ministers of Environment endorsed its use at the African Ministerial Conference on the Environment. Numerous Environmental Impact Assessments have been conducted for different development projects and at least 48 African countries have enacted environmental laws, most including specific requirements for Environmental Impact Assessments (UNEP-WCMC, 2016). Environmental Impact Assessments thus provide a promising opportunity for mainstreaming biodiversity and ecosystem services with an emphasis on preventing biodiversity and ecosystem service losses and enhancing nature's contributions to people. However, while there are doubts about the ability of activity or site-specific Environmental Impact Assessments to fully report on the implications of project proposals on biodiversity and the ecosystem services that biodiversity provides and underpins, it nevertheless provides a useful entry point for their consideration within projects (de Villiers *et al.*, 2008).

Box 6.7 Mainstreaming biodiversity in Cameroon. Source: UNEP-WCMC (2016).

Cameroon's national Strategy Document on Growth and Employment is the country's framework for economic development. The Government of Cameroon included its Forest and Environment Sector Programme in the Strategy Document on Growth and Employment, to mainstream biodiversity into its economic development. The main components of the Forest and Environment Sector Programme are: i) knowledge of research and ecological monitoring; ii) development of production forest from state domains and products; iii) preservation of biodiversity and increasing the value of wildlife products; iv) community management of forestry and wildlife resources; v) environmental management of development operations; and vi) institutional strengthening, training and research. Subsequently, the Ministry of Forestry, the main body in charge of the Forest and Environment Sector Programme, assigned the task of implementing key components of the Forest and Environment Sector Programme to the Ministry of Social Affairs, the body responsible for improving the living standard of indigenous people (Eyebe *et al.*, 2012). Through the collaboration between the Ministry of Forestry and the Ministry of Social Affairs, and by incorporating the Forest and Environment Sector Programme into the Strategy Document on Growth and Employment, Cameroon has demonstrated that biodiversity can be mainstreamed into development sectors.

Box 6.8 Spatial biodiversity planning in South Africa. Source: Driver *et al.* (2012).

South Africa's National Spatial Biodiversity Assessment identifies priority biodiversity conservation areas to guide subsequent land-use policy and decision-making at national, provincial, and municipal levels. Action Plans have been developed for certain priority areas such as the Cape region. The new Grasslands Project aims to promote land-use opportunities compatible with the maintenance of biodiversity and to protect the most vulnerable high biodiversity sites. The National Spatial Biodiversity Assessment targets are aimed at 1) reducing loss and degradation of natural habitat in priority areas; 2) protecting critical ecosystems; and 3) restoring and enhancing ecological infrastructure.

6.4.3 Benefits of mainstreaming biodiversity and ecosystem services

Considering that the activities of several sectors across scales have an impact on biodiversity and ecosystem services, the wider benefits of mainstreaming biodiversity into plans, policies and financial activities cannot be overemphasised. Without mainstreaming biodiversity into the various sectors, the best efforts at sustaining production sectors' activities are likely to be threatened. An example of benefits from mainstreaming can be found in a study from Uganda, which showed that ecosystem services provided by the Nakivubo Swamp to the Greater City of Kampala, were estimated to have a value of $2 million a year in terms of water purification benefits- equal to the cost of building the infrastructure required to provide a similar service. In comparison, the cost estimation of managing the wetland to enhance its capacity to provide waste treatment services was $235,000 per year. These benefits identified through the study resulted in the reversal of the decision of the Ugandan Government to drain and reclaim the wetlands (UNEP-WCMC, 2016).

It is important that information generated from the assessment of natural capital accounts is used to inform policy decisions to support the mainstreaming of biodiversity and ecosystem services across sectors. Impacts can be further enhanced by disseminating results from these natural capital account assessments with various stakeholders (WAVES, 2013; **Box 6.9**; Chapter 2).

It is critical to monitor and evaluate mainstreaming efforts to determine benefits for biodiversity and ecosystem services, poverty alleviation and development outcomes. Monitoring and evaluation are generally difficult and where there are no nationally agreed upon baselines, it is difficult to develop targets and indicators. There is thus a need to develop monitoring and evaluation frameworks including indicators for biodiversity and ecosystem services mainstreaming in Africa. Policy instruments are vital in supporting this and are considered in the next section.

6.5 POLICY INSTRUMENTS

There is a range of policy instruments available and under development to help ensure that nature's contributions to people are manifested and have real impact. These are classified as economic and financial instruments, legal regulatory, and rights-based instruments, institutional aspects and socio-cultural perspectives, and multi-stakeholder approaches. The latter are particularly relevant to bottom-up based approaches and fit for polycentric governance processes in the region; these include community-based natural resource management, public-private partnerships, and co-management approaches. Economic and financial instruments emphasise the value of biodiversity and ecosystem services; they facilitate the integration of nature into development planning by articulating benefits in economic terms. Economic valuation is a complementary tool but is not fully capable of capturing the diversity of benefits nature makes to well-being.

6.5.1 Economic and financial instruments

There is continued debate on whether ecosystems should be viewed as economic assets that produce a flow of beneficial goods and services over time (Barbier, 2013). However, the benefits that biodiversity and ecosystem services provide to human populations are sometimes insufficiently taken into account by decision-makers in African development policies, in part because their contribution to national economies and transitions out of poverty are not always well demonstrated. Costs of biodiversity and ecosystem service loss are rarely internalised (Challender *et al.*, 2015). The interaction of market, policy, institutional and livelihood failures promotes under-valuation of biodiversity and environmental assets, causing public and private sectors to fail to appreciate or account for the cost of biodiversity loss and ecosystem degradation (Barbier, 1994; Dixon *et al.*, 1994; Barbier *et al.*, 1997).

Recognition has grown that economic concepts and instruments can substantially improve the status of biodiversity and ecosystems, as well as support social

Box 6 9 **Implementing the System of Environmental-Economic Accounting in Africa. Source: UNEP-WCMC (2016).**

The *Wealth Accounting and Valuation of Ecosystem Services* partnership initiated in 2010 aimed to mainstream natural resources into development planning and national economic accounts. The partnership has supported three African countries, Botswana, Madagascar and Rwanda, in developing accounting methodologies that take into account natural capital. Botswana has detailed water accounts for 2010–11 and 2011–12 that account for the supply and use of water. This can lead to programmes that support the efficient use of scarce natural resources that would contribute to conservation and sustainable use of biodiversity (World Bank, 2013).

prosperity and a green economy (Albers *et al.*, 1996; IIED, 2003; also see Chapter 2). A clearer understanding of the benefits that ecosystem services provide to populations in the African context can fuel sustainable development and improve social welfare (AfDB-WWF, 2012) especially in sub-Saharan Africa, where many biodiversity hotspots coincide with poor and growing human populations. Economic incentives can significantly promote biodiversity conservation policies (Amin, 2016).

Economic instruments can also be effectively employed to address economic drivers (see Chapter 4, section 4.4.3) of biodiversity loss and ecosystem degradation. Once the specific drivers are known, relevant economic and financial instruments can be selected to help shift people's behaviour towards promoting biodiversity conservation. Emerton (2014) notes that conservation actions involving behaviour change usually need to be economically attractive for those expected to adopt them, either as a standalone activity or related to alternative (unsustainable) options. Incentives can be broadly considered as direct (e.g., rewards for changes in behaviour) and indirect (e.g., creating enabling conditions that lead to behavioural change). It is important that incentives consider the "specific groups, activities and sectors which they aim to work on" and that they are "based on practically implementable actions, and…acceptable and sustainable within the broader social, political and cultural context within which they are being applied" (Emerton, 2000, p. 19). In this regard, South Africa provides a useful example that links eradication of invasive alien species with poverty alleviation and livelihood diversification (**Box 6.10**, Chapter 1). Alternatively, mechanisms that penalise people for their actions leading to biodiversity loss, such as taxes, charges and fees, or disincentives, can be applied to support sustainable resource extraction or use rates, or to produce revenue in support of ecosystem service conservation (Panayotou, 1994).

Economic instruments operate in different ways and through different mechanisms to correct the broader distortions and failures in markets, policies, laws, institutions and livelihoods comprising economic causes of biodiversity loss and degradation. The table in Appendix 6.3 provides several examples of economic incentives and financial instruments and their application in Africa, complementing those found in the boxes throughout this section. A key goal is to ensure people take account of the full economic value of biodiversity and the full economic costs associated with its loss. This needs to be considered when they produce, consume and trade biodiversity and ecosystem services. Total economic values need to be reflected in profits, prices and the returns they produce.

Key economic instruments include property rights, markets and charge systems, fiscal instruments, bonds and deposits, and livelihood support. Property rights grant or allocate rights to own, use and manage biodiversity (see **Box 6.11**), dealing with the fact that market failure is due in part to the absence of well defined, secure and transferable rights over land and biological resources. Common examples of such instruments include allocation of legal

Box 6 10 Incentives to tackle invasive species in South Africa.

The South African government's Working for Water programme, founded in 1995, employed marginal communities, mostly unskilled women in rural communities, to clear woody invasive alien plants such as Australian acacia species (wattles), *Pinus* spp., *Eucalyptus camaldulensis*, *Hakea* spp., *Prosopis* spp., and water weeds (e.g. *Eichhornia crassipes*), thus protecting biodiversity and ecosystem services while at the same time providing employment and securing water supplies (Richardson *et al.*, 2004). In 2014, the government had a national list of invasive alien species (total 559) in four categories for management under the National Environmental Management Biodiversity Act (Act 10 of 2004) and its Alien and Invasive Species Regulations. Invasive alien species are sometimes considered the single biggest threat to South Africa's biodiversity (Richardson *et al.*, 2004; van Wilgen *et al.*, 2014a; van Wilgen *et al.*, 2014b). This governance option thus tackled an ecosystem dis-service by seeking to improve ecosystem services.

Box 6 11 Property rights for access to biodiversity in South Africa.

The allocation of community property rights in National Parks and Forest Reserves is particularly widespread (through joint- or participatory forest management etc.). For example, in South Africa, the land upon which Richtersveld National Park lies is owned and occupied by local Nama villages. These communities have leased the land to the government while retaining the right to graze an agreed amount of livestock in the park and to engage in the controlled harvest of certain natural resources. Lease payments are deposited into a trust that has been appointed by the community to manage this resource.

rights, tenure, leases and concessions over the ownership, management and use of biological resources or biodiversity.

Market and charge systems aim to overcome the distortions and weaknesses in prices and markets that send signals to producers and consumers that encourage them to degrade biodiversity because it is cheaper, easier or more profitable to do so in the short-term. They entail trading in biodiversity goods and services and giving them a price that reflects their relative scarcity, costs and benefits. Examples of market instruments include tradable rights, shares and quotas in biological resources and environmental quality (fishing quotas, pollution permits or development rights), hunting permits, and setting new charges or rationalising existing charges (park entry fees, biological resource utilisation licenses, etc.). **Box 6.12** provides an example from Mozambique.

Fiscal measures aim at discouraging or encouraging the consumption and production of certain goods and products that have an impact on biodiversity. The measure could be to raise and spend budgetary revenues on increasing or lowering the relative prices of different products. Typical fiscal measures are taxes and subsidies (see **Box 6.13**), for example, attaching high tax rates on biodiversity-depleting land-uses, equipment, inputs and products, or providing subsidies to biodiversity conserving technologies, land-uses and enterprises.

Bonds and deposits are product surcharges which shift the responsibility for biodiversity depletion to individual producers and consumers. They are levied on activities that run the risk of harming biodiversity and require the person carrying out these activities to pay a bond or deposit before they start, refundable against the possibility of this damage occurring. By charging in advance for possible biodiversity damage, bonds and deposits provide funds for covering the costs of this damage and ensure that producers or consumers cover the cost themselves. They also present an incentive to avoid negatively affecting biodiversity and can be applied to natural resource-based industries such as forestry, mining, fisheries and other extractive utilisation activities as a tool to discourage negative biodiversity impacts at the same time as promoting efficiency in resource utilisation **(Boxes 6.14 and 6.15)**.

Livelihood measures acknowledge that livelihoods, and in particular their constraints and shortfalls, can sometimes drive people to degrade natural resources in the search for scarce subsistence, income and employment (see also Chapter 4). By strengthening livelihoods, diversifying them and making them more secure, these measures aim to decrease reliance on biodiversity and put people in a position where they will choose, and can afford, to curtail economic activities that degrade the environment.

These include direct incentives that encourage sustainable use and indirect incentives including diversifying income options and reducing reliance on non-renewable extractive activities with strong biodiversity impacts. A good example of such an instrument is community benefit-sharing, which is a widely-used livelihood incentive for biodiversity conservation, using revenues generated by protected areas to finance development activities in adjacent rural areas **(Box 6.16)**.

Other instruments such as subsidies, tradable permits, eco-labelling, liability and compensation schemes are incentive-based and include pricing mechanisms to stimulate biodiversity conservation and enhance the provision of ecosystem services. They can target both consumption side and production side actors and stakeholders **(Box 6.17)**.

Box 6 12 Access to marine resources in Mozambique.

In the Bazaruto Archipelago in Mozambique – one of the country's most vulnerable, diverse and valuable marine areas – a number of new markets and enterprises have been promoted among local fishing communities as a way of stimulating sustainable biological resource use, and in order to compensate for the economic losses in land and natural resources incurred by the establishment of a National Park.

Box 6 13 Biodiversity management: role of taxation and fiscal policies.

In Ethiopia and Eritrea, energy taxes and subsidies are used as incentives to encourage the use of energy-saving technologies to reduce deforestation for firewood and charcoal. These governments have implemented a series of fiscal reforms in the energy sector which aim to make wood fuel and wood-based cooking technologies more expensive to users. The reforms include subsidies for kerosene, promoting energy efficient wood fuel cooking stoves, and the dismantling of duties on imported solar equipment.

Box 6 14 Case study of forestry taxation in Liberia. Sources: FAO (2004); Schwidrowski *et al.* (2005).

Liberia is well-endowed with valuable forest resources, and the sector has made an important contribution to GDP over the past few decades. Liberia's forest resources are significant, containing a number of valuable species – such as African mahogany – that are in high demand on world markets. Timber activity began in the late 1960s, driven by low stumpage fees and the establishment of basic road infrastructure that opened access to forest areas. During the first half of the 1980s, the timber sector remained stagnant because of the weak global demand in key markets but also because of political instability in Liberia. The sector had recovered somewhat by the late 1980s, but the outbreak of civil strife interrupted the sector's formal activities until peace was restored in 1997. Thereafter, logging activity recovered very rapidly, driven also by the demand for charcoal and firewood, reflecting the breakdown of the country's regular electricity supply. The surge in logging soon raised concerns about its sustainability. Liberia enacted many charges and regulations for the purpose of forest product utilisation. Government has increasingly adopted pre-harvest fees such as concession fees and area fees. Over time, the number of taxes, charges, and fees on forestry activity has proliferated, driven particularly by the introduction of new taxes for specific purposes. Some of these related to severance charges ($1.50/m^3), reforestation charges ($5.00/m^3) and conservation charges ($4.00/m^3). Apart from these charges on timber products, non-timber forest products also attract charges of various levels. Fines occupy a very important position as a source of revenue to the country. Timber companies are also financially committed under concessions to the construction of schools, clinics, or roads. Furthermore, it became common practice for timber companies to undertake certain tasks that were originally the responsibility of the government, such as road construction, and they were granted tax credits for those activities.

Box 6 15 Regulating biodiversity exploitation in Democratic Republic of Congo.

In the Democratic Republic of Congo, a form of deposit bond on commercial forestry operations was established in the early 1990s. This arrangement grants an "interim concession license" which requires loggers to complete various forestry planning and management operations, including forest inventory and investigation of efficient harvesting and processing techniques. If the concessionaire does not make the necessary investments within 3 years, the interim license is cancelled and monies are not refunded.

Box 6 16 Biodiversity benefit-sharing.

Forest and wildlife departments in East Africa (e.g., in Ethiopia and Kenya), engage in benefit-sharing activities around protected area buffer zones. Kenya Wildlife Service's revenue sharing policy is typical, using a Wildlife Development Fund as a mechanism to distribute some of the revenues earned from protected areas to local communities (from entrance fees). A significant amount of money was spent on community-related activities in protected area buffers zones, including water, education, health, livestock and enterprise development as well as the provision of famine relief.

Box 6 17 Sustainable consumption: Managed marine protected area network, Madagascar. Source: Harris (2007).

In order to preserve local ecosystems and maintain traditional livelihoods and fisheries, Village leaders in the community of Andavadoaka partnered with marine conservationists to develop sustainable harvesting of octopus so as to protect local ecosystems and maintain traditional livelihoods. A plan was developed using both modern scientific methods and traditional ecological knowledge. This led to the seasonal bans on octopus harvesting and the establishment of marine protected areas that also include no-take zones. This initiative has resulted in increased number and size of the octopus caught. The project has been scaled-up to include twelve other communities to create a marine protected area network.

Mainstreaming biodiversity into production and consumption practices can be assisted through the participation of relevant stakeholders in the development and review of guidelines for sustainable management (GEF *et al.*, 2007). Such guidelines can include standards, codes and good practices to support sustainable resource management. The African Ministerial Conference on the Environment launched the African 10-Year Framework of Programmes on sustainable consumption and production to assist African countries to achieve sustainable consumption and production. One of the key initiatives launched by the 10-Year Framework of Programmes is the African Eco-labelling Mechanism. In addition, National Cleaner Production Centres have been established in countries such as Cape Verde, Egypt, Kenya, Ethiopia, Ghana and Morocco amongst others. These centres are responsible for capacity building, demonstrating the economic and environmental benefits of sustainable consumption and production and promoting new business opportunities (UNEP-WCMC, 2016). **Box 6.18** showcases involvement with the private sector.

Another approach of growing importance is that of geographical indications, which point to the origin of particular products and imply that they contain specific properties or characteristics **(Box 6.19)**. Biodiversity and ecosystem service conservation benefit when these indications of geographic origin include references to practices and places where specific commodities are produced in harmony with the environment.

For most sub-Saharan African countries, decentralisation policy is accompanied by a transfer of competences on the management of natural resources and the environment giving greater responsibility and power to local institutions. In Senegal, for example, local and regional authorities have been given the power to deliberate and recover the duties and taxes associated with the environment. This proximity management creates partnerships between local authorities and the private sector, which is now investing in conservation and human welfare. The strengthening of decentralisation stems from the political will to improve governance. Such political will has as its corollary the recognition of customary or traditional norms that more effectively protect wood, endangered species and forests, community heritage areas and other natural resources. Further information on the use of economic policy instruments to manage environmental degradation in Senegal is shown in **Box 6.20**.

Economic measures for biodiversity conservation must always be accompanied by broader supportive measures that reduce the ecological footprint through education, politics,

Box 6 18 Engagement with private sector in South Africa. Source: IIED *et al.* (2015).

Biodiversity and mining, is important to South Africa's economy, resulting in controversies between mining companies and civil society groups. This led to a joint initiative by the conflicting groups and the government to establish mutually agreed solutions. The South African Mining and Biodiversity Forum brought together industry, civil society, government and academic representatives to discuss the generation of a set of guidelines for the management of biodiversity and mining activities. Consensus-based and voluntary guidelines were preferred to regulation. The guidelines were framed to create an understanding of the ecological needs the mining companies while acknowledging existing business risks and opportunities. The guidelines were launched in May 2013 at an event attended by the Minister of Water and Environmental Affairs, the Minister of Mineral Resources, the Chamber of Mines and the and South African National Biodiversity Institute. This collaboration demonstrated a new attitude among policymakers towards the country's shared natural assets.

Box 6 19 Geographical Indications for biodiversity conservation.

Systems of Geographical Indications could be used to promote conservation of biodiversity. Cormier-Salem *et al.* (2010) assert that it has been used as a response to the problem of resolving both biodiversity erosion and local poverty, notably in countries such as in Senegal and Guinea Bissau. Though market-based incentives have been invoked by expert institutions e.g. the World Bank, International Monetary Fund, FAO, there is increasing acknowledgement by some policymakers of GI as potential policy tool to improve environmental incomes. Among these incentives, local speciality enhancement schemes are being implemented whether legal (i.e., fights against usurping of a product's name, counterfeiting, and the protection of intellectual property rights), commercial (i.e., eco-labelling, product promotion and livelihood improvement), and patrimonial (i.e., conservation of the various levels of biodiversity e.g. genes, animal species and vegetal varieties, ecosystems and landscapes, traditions and know-how). In general, however, these tools need to be applied cautiously and properly adapted to the needs of African nations. Countries could learn from the experiences of the South African wine industry (see Cormier-Salem, 1999; Barjolle et al, 2002; Jasanoff *et al.*, 2004; Roussel et al, 2007; Muchnik *et al.*, 2008; Cormier-Salem *et al.*, 2010).

Box 6.20 Policy instruments to manage environmental degradation in Senegal.

Empowered by the decentralization process, the populations of the southern region of Senegal, for example, were the first to denounce the illegal and illicit exploitation of the forest resources of this part of the country. Most of the illegal exploiters came from The Gambia, where this activity is prohibited. The response of rural populations in Senegal reveals the need for subregional collaboration between countries. In terms of mineral resource exploitation in Senegal, the country uses a range of management tools such as quotas, licenses and permits (Bromley, 1991; Brooks et al., 2001), which give rise to the payment of duties and taxes, and which limit respectively the quantities, the number of users and the rights of access and use of the resource. Currently, reforms are underway with respect to subsidies granted to mining companies and on improving transparency through the involvement of the local population and civil society in order to combat corruption and the acquisition of natural resources by foreign multinational companies.

information, awareness and social organisation (Bromley, 1991; Albers *et al.*, 1996; Jasanoff *et al.*, 2004; World Bank *et al.*, 2004). They may encompass efforts through national and global processes relating to public sector management, macroeconomic and sectoral policy reforms, proactiveness in implementing environmental agreements and favourable donor arrangements to enhance the conditions of national and local economies (Costanza *et al.*, 1997; McNeely, 1993; Myers *et al.*, 2000; Bagnoli *et al.*, 2008). Equally important instruments to support economic incentive measures for biodiversity conservation include legal, policy, institutional and social measures, as well as agreements, enforcement, and accreditation (Bromley, 1991; Brooks *et al.*, 2001). Any instrument to incentivise or financialise biodiversity and ecosystem services needs to be as innovative and sensitive as possible in order to reduce conflicts between conflicting stakeholder interests, while constantly assessing impacts on biodiversity and ecosystem services.

6.5.2 Legal, regulatory and rights-based instruments

To ensure sustainable development, preserve biodiversity and improve the use of ecosystem services and quality of life, both national and international legal instruments should be used effectively (Prevoste *et al.*, 2016). Political interests at all levels play a major role in the formulation of laws and decrees creating protected areas and species, or instituting codes for biodiversity and ecosystem service protection. The State plays an important role, particularly since biodiversity often exhibits the characteristics of a public good (Aubertin *et al.*, 2009). Supporting legislation should be properly designed with the appropriate technical capacity to be able to establish protection objectives, reduce degradation and promote environmental improvements that are compatible with sustainable exploitation of natural resources and while ensuring compliance (Lamarque *et al.*, 1973).

There has been remarkable progress in the past 20 years in the development of environmental policies and laws in Africa, although strategies and levels of implementation within and between countries differ. Over 25 African countries now have constitutional provisions on the environment, while 43 countries have framework environmental laws (AMCEN, 2014a). Most of these countries have also developed tools and strategies to ensure that environmental laws are implemented.

A tight regulatory framework defining the scope and extent of resource use is a precondition for reversing biodiversity losses. At times such measures can be controversial though, as illustrated through reoccurring conflicts between the allocation of hunting permits and calls for hunting bans. Botswana banned hunting in 2014 and now has more than 230,000 elephants which many perceive as having negative impacts on agriculture and livelihoods (Mbaiwa, 2017). The ban on safari hunting resulted in the loss of income and jobs to the local communities, a loss of rural livelihoods, loss of game meat, increasing poaching incidents, negative attitudes towards wildlife conservation and land-use tenure changes (Mbaiwa, 2017).

Regulation remains the most widely used instrument for biodiversity and ecosystem protection. The regulatory toolkit includes a series of 'command-and-control' restrictions, mandatory requirements and procedures by government that directly limit certain actions or impacts and damages to threatened species. There are three basic types of regulatory instruments for biodiversity and ecosystem services:

- Management prescriptions for good practice in natural resource exploitation or regulation of emissions through emissions standards, ambient quality standards and technical standards;
- Restrictions on the use of products (e.g., illegally logged timber, activities damaging to endangered species etc.) or establishing production standards (certification, best practice codes etc.);
- Spatial planning which involves regulation of land-uses that have direct implications for ecosystem services or habitats.

However, regulation needs to be compatible with sustainable exploitation and comply with good practices, as well as connecting to conventions and agreements linked to laws at other levels, and key standards. For example, the ISO 14000 family of standards addresses various aspects of environmental management (NQA, 2017). It provides practical tools for companies and organisations to identify and control their environmental impact and constantly improve their environmental performance. ISO 140001, is a practical tool to help organisations identify and control environmental impacts and improve performance. This certification helps with environmental policy, sustainability, resource and asset management, legal compliance, carbon footprint and impact reduction, pollution prevention, corporate social responsibility, cultural awareness and change management, brand reputation (see https://www.nqa.com/en-us/certification/standards/iso-14001). Another example is ISO 50001 (NRC, 2011), which provides organisations with a structured framework to manage energy such that it can increase energy efficiency, reduce costs and improve energy performance (see http://www.nrcan.gc.ca/energy/efficiency/industry/cipec/5379).

Laws and regulations further interface with rights-based instruments and customary norms. Nevertheless, while conservation projects target both ecosystems' and species' impacts on human well-being, in general, laws in Africa do not take a rights-based approach. This absence severely restricts community capacity to benefit directly and equitably from biodiversity through, for example, bioprospecting of plant species. It has been over four decades since the Kinshasa Resolution (1975) when African governments recognised the rights of indigenous communities and the importance of indigenous knowledge in natural resource conservation and management (Colchester, 2004). This resolution noted the importance of traditional ways of life and land ownership and called on governments to maintain and encourage customary ways of living. It urged governments to devise means by which indigenous peoples could bring their lands into conservation areas without relinquishing their ownership, use, and tenure rights. It also noted that indigenous peoples should not normally be displaced from their traditional lands in the establishment of protected areas, nor should protected areas be established without adequate consultation with the peoples to be directly affected. The same resolution was recalled in 1982 at the World National Parks Congress in Bali, Indonesia, which affirmed the rights of traditional societies to "social, economic, cultural, and spiritual self-determination" and "to participate in decisions affecting the land and natural resources on which they depend." The resolution advocated "the implementation of joint management arrangements between societies which have traditionally managed resources and protected area authorities (Colchester, 2004).

A further key step for Africa is found in the Swakopmund Protocol on the Protection of Traditional Knowledge and Expressions of Folklore within the Framework of the African Regional Intellectual Property Organisation, which was adopted in 2010 and entered into force in January 2012 (Colchester, 2004). It aims to: (a) protect traditional knowledge holders from any infringement on their rights as recognised within the protocol, and (b) protect cultural expressions against misappropriation, misuse and/or exploitation. The protocol employs a broad definition of traditional knowledge and folklore, along with a unique set of protections. Specifically, the holders of traditional knowledge under the protocol are deemed beneficiaries, and receive exclusive rights over the authorisation of use of their traditional knowledge, prevention of the exploitation of traditional knowledge without prior informed consent, the institution of legal proceedings to remedy infringements of rights protected under the protocol, and fair and equitable benefit-sharing arising from the commercial use of their traditional knowledge. Protocols such as this are vital for Africa, where traditional knowledge and indigenous and local knowledge remain important in the management of natural resources. Traditional knowledge and indigenous and local knowledge are examined in further in section 6.5.3.

6.5.3 Institutional aspects and social and cultural conditions

Institutions can be considered as constraints devised by humans to structure human interaction (North, 1994). Informal institutions are those that do not depend on the state for execution or enforcement (Colding *et al.*, 2001). They can include taboos and social norms. Informal institutions governing the use of environmental resources are present in many societies, and in certain conditions (relatively constant group membership, long-term residence in an area, and heavy reliance on natural resources) have led to the development of successful natural resource management (Ostrom, 1999; Jones *et al.*, 2008). The literature nevertheless suggests they can have both positive and negative impacts **(Box 6.21, Box 6.22)**.

African societies have rich social and cultural norms, characterised by peaceful co-existing and high-value cultural traditions and institutions (see Chapter 1). In particular, many of the stories and narratives within African culture create a pathway for instilling environmental ethics and the communication of environmental values (Barau *et al.*, 2016), which in turn play an instrumental part in shaping informal institutions, behaviours and roles in society with regard to conserving biodiversity and ecosystems. An example is the 'Gali saree' or camel praise songs, embedded in many social norms, activities and routine daily life of Afar that teach and instil knowledge of nature, biodiversity and 'biophilia' or love for nature to young pastoralists, thereby

Box 6 21 Informal institutions and customary norms can have both positive and negative effects on biodiversity and ecosystem services.

In Madagascar, 'Fadys' are systems of informal institutions that can make certain behaviours 'taboo' or forbidden, and are a strong part of Malagasy culture. They can vary from encouraging good manners, to strict rules linked to spiritual and ancestral beliefs and many are related to plant and animal species and natural resources (Jones *et al.*, 2008). Breaking fadys risks supernatural retribution, affecting individuals or leading to wider consequences; for example, a river drying up in western Madagascar was blamed on migrants breaking the fady banning pig farming in the region (Scales, 2012).

Fadys can protect endemic species and habitats: Jones *et al.*, (2008) concluded that in their study area in Eastern Madagascar, fadys provided significant protection to 5 species considered threatened according to IUCN. It is fady to kill many lemur species because they are believed to represent Malagasy ancestors, and fossa (*Cryptoprocta ferox,* Vulnerable) are fady to eat because they predate on lemurs i.e., eat the bodies of ancestors (Jones *et al.*, 2008).

When surveying hunting and consumption in Eastern Madagascar, Jenkins *et al.* (2011) found that species reported as fady to eat by a high proportion of respondents, tended to be eaten less frequently. Fadys may also offer protection to important habitats, with some areas of forest where people are not allowed to collect wood, clear forest or even travel through in cases where they contain family tombs (Scales, 2012).

However, fadys can also threaten wildlife: Beliefs that seeing an aye-aye (*Daubentonia madagascariensis*, Endangered) will result in sickness and death (Goodman, 2015) can lead to the killing those straying close to villages in parts of Madagascar. Little has been published on other fadys or cultural beliefs that may have negative outcomes for biodiversity, but there are particular snake species viewed as dangerous, despite not being venomous, and these can be killed out of fear (Tingle, 2012).

Over-reliance on informal institutions for biodiversity protection should be avoided: There can be a danger in relying too much on informal institutions alone for protection of biodiversity. Jones *et al.*, (2008) found evidence that fadys can evolve and change in response to economic drivers, e.g. a fady on selling wild-harvested species broke down in response to failed harvests. Jenkins *et al.*, (2011) documented increased in bushmeat consumption in eastern Madagascar, which included many typically fady species. Areas where consumption increased tended to have rapid recent immigration and economic development. Immigration leading to social change can weaken traditional beliefs (Jenkins *et al.*, 2013). Fadys may be very specific, only applying to certain people or areas. For example, Kaufmann (2014) found that a fady protecting radiated tortoises (*Astrochelys radiate,* Critically Endangered) was only prevalent in a few local villages, and the tortoises were still being killed in large numbers by other people passing through. Fadys may also break down where local people lose the right to manage their natural resources. After a clamp-down by park officials on tavy (slash and burn agriculture) in Ranomafana National Park, villagers were observed killing a radio-collared sifaka (*Propithecus edwardsi,* Endangered), which is normally fady to kill, in order to express their anger to park officials after being excluded from an area of forest (Jones *et al.*, 2008).

Box 6 22 The role of informal institutions in natural resource management.

Institutions and traditions among Afar communities include: 1) the *Adda* or a traditional Afar ruling system, where knowledgeable elders called '*Asayamaras*', respected and trusted by the community, direct almost all parts of life of Afar pastoral communities (Hailu *et al.*, 2008); 2) The *Edo*, which is a traditional range scouting, is practiced whenever Afar pastoralists are faced with the prospects of unpredictable future weather'. The 'Edo's' or traditional rangeland scouts, usually strong young men of the village, who are sent to different places to collect information about weather, rangeland condition, local politics and other information relevant to the livelihoods of the pastoral communities (Tesfay *et al.*, 2004), and; 3) The '*Dagu'* is an effective and reputable traditional human based information and knowledge sharing network, through which anything anywhere that is relevant to the pastoral life of the Afar, is made to reach to relevant individuals and households (Yimer, 2013).

When any village or community in the Afar land is faced with the prospect of uncertain weather and a question of how to utilize and manage rangeland resources, information about future weather is collected from observation of biophysical entities and by traditional experts. The *Adda* elders also gather to discuss what to do on the basis of this information. They most commonly decide to send strong, experienced herders who are versed in the traditional techniques of weather forecasting to collect information about weather in far located rangelands (Tesfay *et al.*, 2004). The individuals sent for rangeland scouting (*Edo*) make detailed observations about the plants, soil, atmosphere, and the condition of animals in the far located areas they are visiting. All observations for special indicators such as special plants, insects, birds and environmental variables are made to come to conclusion about the possible near future weather conditions in the rangeland they are visiting. The individuals in the '*Edo*' make a detailed analysis of different observations to come up with a recommendation that they will report back to the *Adda* elders.

contributing to positive community behaviours towards nature (Balehegn, 2016).

As globalisation processes have spread and property rights have followed a privatisation trajectory, social and cultural conditions and traditional institutions have changed, with the traditional organisation of African societies giving way to the state and the market **(Box 6.23)**. The local social and cultural systems responsible for managing forests, biodiversity and ecosystems have consequently altered, with impacts on the sustainable management of biodiversity and ecosystem services and important consequences for the social and cultural context of governance and decision-making. In the African context, where people are closely dependent on biodiversity and ecosystem services for their everyday well-being, it is critical to incorporate indigenous and local knowledge in policy decisions around the management of biodiversity and ecosystem services to avoid such damage.

Many studies in Africa indicate the consistency and similarity of indigenous knowledge with scientific knowledge **(Box 6.24)**. For instance, local knowledge was considered as effective as remotely sensed data in determining land-use and land cover changes, and in classifying land-use types in participatory GIS studies

Box 6 23 Multinational agricultural land acquisitions (land grabs) are leading to disappearance of the commons, local institutions, land degradation and other forms of injustices.

The food, fuel and financial crisis of the mid-2000s has resulted in a global rush to purchase and lease fertile African land (Anseeuw, 2013). This explosion of commercial land transactions and land speculation has been dubbed by many as 'land grabbing' instead of the depoliticised term 'large-scale land investment' (Borras *et al.*, 2012). Africa has been the centre of most of the land grabbing that has taken place (Cotula, 2012). According to the Land Matrix report (Nolte *et al.*, 2016), 422 land deals have been concluded on the continent, covering 10 million hectares. An important issue with regard to land grabbing in Africa is that it is usually done based on arguments of unused land, no man's land or wasteland (Hall *et al.*, 2015). However, because of the nature of traditional land-use in many African indigenous communities being communal, rotational or pastoral, what appears to be unused, under-utilised, or ambiguously owned land in a given time may not be so (Geisler, 2012). The impetus to increase agricultural yield on the African continent has placed a significant proportion of natural habitats that have never been cultivated throughout history, into the category of cultivable or arable. Such labelling resulted in 30-40% of remaining forest in Central Africa to be under concession (Clark *et al.*, 2009). Therefore, it provides an additional impetus for justifying the leasing of 'low-productivity' communal lands to capital-intensive investors (Balehegn, 2015). Large-scale land grabbers (investors) usually fence their newly acquired land and physically exclude wildlife, livestock and local people, causing a breakdown of traditional strategies and utilization and ecological balance of the land, causing pressure on other areas. For instance, in the Gabmella regional state of Ethiopia, 90,000 households were relocated through resettlement and land investment displacements, resulting in a loss of traditional livelihood for over one million people and enormous ecological pressure on newly resettled areas (Horne *et al.*, 2011). Moreover, the way land deals are being implemented in different African countries is marred by corruption where local uses and issues of biodiversity protection are deliberately overlooked by officials in charge of the land deals (Cotula *et al.*, 2009). For instance, due to lack of legal provisions in the agreements, in Ethiopia large-scale investors (usually foreign) clear natural vegetation with machinery and then burn the cleared wood and debris, while small-scale local investors generally clear forest, convert it to charcoal and carry out the illegal, but lucrative business of charcoal selling (Horne *et al.*, 2011).

For example, such land grabbing, instead of fulfilling their intended objectives of local food production, has resulted in 7,100 ha of Mabria forest being cleared for sugarcane in Uganda. This clearance is predicted to threaten 312 plant species, 287 butterfly species and 199 bird species that are available in the forest (Senelwa *et al.*, 2012). Similarly, a leasing of an upstream water source in Tanzania has resulted in a pollution of water pollution affecting 45,000 local consumers (Arduino *et al.*, 2012).

Despite seemingly being ignored by many African nations, there are many global agreements that can be adopted and implemented for effectively curbing the impact of land grabbing on communities and biodiversity. New mechanisms designed to assist smallholder in accessing inputs and integrating into global commodity chains, of international regulations e.g. the European Union Renewable Energy Directives (Jacobsson *et al.*, 2009) and Renewable Fuel Standard program (EPA, 2010) should be encouraged. In doing so the host governments not only obtain the much sought-after cash and technology (through international land deals) but also will largely enhance the rehabilitation of abandoned or degraded areas. African states can also sign and strictly implement many international agreements and certifications that can guide responsible investment in land. Examples of such investments that can be applied based on the specific state of land and biodiversity in countries include: the Roundtable on Sustainable Palm Oil (Laurance *et al.*, 2010; Schouten *et al.*, 2011), Roundtable on Responsible Soy (Schouten *et al.*, 2012), Bonsucro certification and its local implementation (Moura *et al.*, 2012; Cockburn *et al.*, 2017), and the Soy Moratorium initiative (Leão, 2009).

Box 6 24 Linking scientific and indigenous knowledge.

In Nigeria, Ayeni *et al.* (2016) showed a high consistency between indigenous people's perception of land cover changes, remotely sensed land cover products, and climate and surface water situations. Participatory approaches involving communities and local experts in assessing the impact of environmental change can, therefore, provide important insights into forest ecosystem services such as freshwater provision.

In Tanzania, Gaspare *et al.* (2015) compared traditional ecological knowledge with conventional scientific knowledge regarding the types of grouper (*Epinephelinae*), a fish species utilized by communities, and when they are caught. This information is of considerable value to fisheries managers and policy makers. Most of the resource-use patterns and effort exerted revealed in qualitative data collected about groupers on Mafia Island is consistent with that reported by Fischer *et al.* (1984). However, information on specific grouper species caught using 'nets' (as defined in this study) is lacking. In this case, fishers' traditional ecological knowledge is the only available source of information to complement conventional scientific data. The results indicated that confirmed scientific data and elicited knowledge that was new to both traditional ecological knowledge and science. It nevertheless highlighted some differences between traditional ecological knowledge and science (e.g. on spawning behaviour). Discrepancies in the two knowledge systems can be attributed to factors including observational scale differences, as well as methodological differences in gathering data (e.g. in sample sizes).

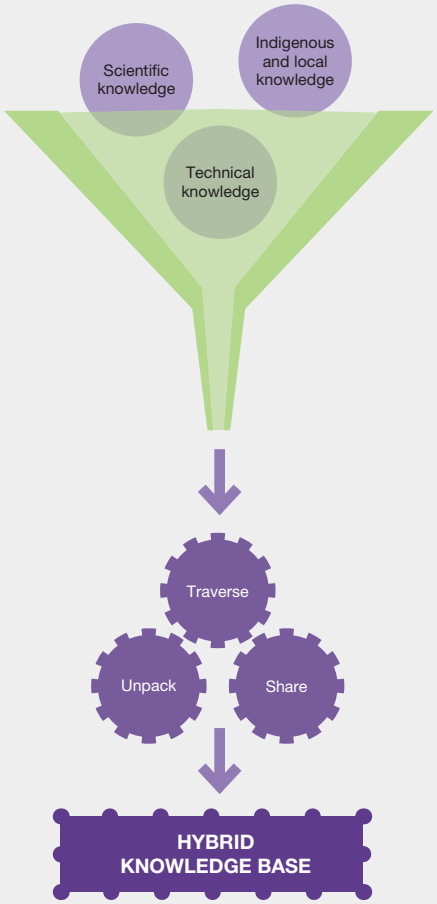
(Tripathi *et al.*, 2004). Similarly, traditional drought forecasting in many African countries (Ziervogel *et al.*, 2010; Le Fur *et al.*, 2011; Chisadza *et al.*, 2015), was as effective as, and in some cases more effective, than scientific techniques (Balehegn, 2016). Del Rio *et al.* (2016) conducted participatory mapping of the Barotse floodplain and found a strong correlation between the indigenous and local knowledge typology and risk of crop failure to drought and to flooding demonstrating the clear functional basis for the Barotse typology originating from many generations of observation and experience. There are also findings that suggest that when communities monitor natural resources, their results are similar to those of scientists.

This is because they know their forests better from years of experience in using and managing them. However, this only applies when monitoring of forests is related to a local perspective (Danielsen *et al.*, 2014). Other studies have established discrepancies among the two knowledge systems e.g., in weather forecasting, (Ziervogel *et al.*, 2010; Simelton *et al.*, 2013; Chisadza *et al.*, 2015) and valuation of plant species (Balehegn *et al.*, 2015). Discrepancies can result from differences in the nature of the two knowledge systems (e.g., variables observed), the system and approach to the comparison, or inherent failure of one or both of the systems to actually depict or perceive reality (Balehegn *et al.*, 2015). Nevertheless, in many local settings, indigenous knowledge has been observed to be more practical, accurate, locally relevant in terms of scale and parameters, as well as more understandable, interpretable and affordable (Roncoli *et al.*, 2002). Most interesting however is the complementarity between the two knowledge systems, which facilitates a deeper understanding of the coupled interactions between nature and its contributions to people, and highlights the risks of decoupling indigenous and local knowledge and conservation.

It is repeatedly underscored that local experts' knowledge should be used as a supplement to or in hybridisation with scientific knowledge, or there should be co-production of knowledge while considering capacity building in conservation and natural resource management (Johannes, 1998; Mercer *et al.*, 2007; Glasson *et al.*, 2010; Silvano *et al.*, 2010; Tengö *et al.*, 2014; Pereira *et al.*, 2017; Stringer *et al.*, 2017). Although there is limited literature using the terminology 'Nature's Contributions to People (NCP)' as an alternative expression to facilitate consideration of plural knowledges about nature, African societies are inherently coupled to the environment, though this is not always emphasised. **Figure 6.5** shows the combination or hybridisation of knowledge from different sources (indigenous, science and others) (Tengö *et al.*, 2014) alongside the key processes that can facilitate their combination (Stringer *et al.*, 2017).

Such approaches to hybridising traditional knowledge and science/ technology enable the production of a knowledge system that is both locally relevant and scientifically accurate (Glasson *et al.*, 2010; Balehegn *et al.*, 2015). Hybrid knowledge systems that successfully incorporate both indigenous and scientific knowledge on an equal footing are very rare. However, some examples of inclusive or integrated knowledge system include the use of cyber tracker for biodiversity monitoring by Kalahari desert bushmen (http://www.cybertracker.org/) and the co-production of weather forecasting knowledge for training farmers and scientists to improve the accuracy of weather prediction at various scales (Zuma-Netshiukhwi *et al.*, 2013); combining indigenous and scientific knowledge for improved weather forecasting in Tanzania (Mahoo *et al.*, 2011), and the Nganyi project in Kenya (Ouma *et al.*, 2015), as well as the production of integrated knowledge (science and indigenous and local knowledge) for monitoring land-use and land cover changes in South Africa (Chalmers *et al.*, 2007).

Figure 6 5 **The combination or hybridisation of knowledge from different sources (indigenous, science and others) and the key processes that can facilitate their combination. Sources: adapted from Tengö *et al.* (2014); Stringer *et al.* (2017).**



In Guinea, Le Fur *et al.* (2011) showed that ILK could complement scientific studies in describing the seabed, be used as a source of new scientific investigation, provide information on nursery location, and could substitute scientific surveys on fish diets provided the level of validity is identical, and constitute a satisfactory proxy for understanding trophic webs.

Such approaches can be extremely useful where capacity, data and resources are lacking, making the codification of local ecological knowledge highly practical (Johannes, 1998; Silvano et al., 2010), particularly in fisheries studies for which the cost of obtaining data is an important consideration (Cury et al., 2005; Garcia et al., 2005). Local ecological knowledge could help to provide answers to questions relating to the identification of sensitive areas in terms of ecosystem productivity (Aswani et al., 2004, 2006), for which diverse knowledge along entire coasts could be obtained.

Despite these advantages, a number of challenges remain in increasing the use of indigenous and local knowledge. There is a need for capacity building for those institutions tasked with the management of biodiversity and ecosystem services to identify and absorb relevant indigenous and local knowledge. Furthermore, it necessitates the fine-tuning of processes such as stakeholder engagement, participation, knowledge exchange and co-production, which are key vehicles for learning, information dissemination and communication. The importance of communication in the management of common assets such as biodiversity and ecosystem services cannot be over-emphasised. There are nevertheless suggestions that combining indigenous knowledge with western science would displace indigenous knowledge from its context or place-based significance, rendering it less useful (Tsegaye *et al.*, 2009). Moreover, there is widespread and steady inter-generational degradation of indigenous traditional knowledge in many African communities. Therefore, indigenous traditional knowledge needs not only incorporation or hybridisation with science but also conservation in its own right (see chapter 1).

6.5.3.1 Multi-stakeholder governance approaches

6.5.3.1.1 Co-management

One increasing way of integrating different knowledge and stakeholder perspectives in Africa's polycentric governance context is through co-management approaches. Co-management refers to governance that is shared among stakeholders in diverse ways through decentralisation of power and decision-making. This kind of approach is increasingly seen in wildlife and fisheries sectors, as well as in the governance of transboundary resources. However, it is not yet fully utilised in the same ways as in other regions such as Europe (Stöhr *et al.*, 2014). In some cases, authority sits with a government agency that is required to engage or consult other stakeholders in decision-making, drawing on their knowledge and expertise (e.g., the Lake Chad Basin Commission and the East Africa Trans-Boundary Parks Authorities, amongst others). In other cases, multiple stakeholders (sometimes including local communities) participate in a management body that has responsibility for decision-making (e.g., Tanji Bird Reserve in the Gambia (Wicander, 2015)). In the Afar rangeland management process in Ethiopia, indigenous/customary institutions work side by side with government and religious institutions to solve and address conflicts arising from rangeland resource utilisation/sharing (Hailu *et al.*, 2008). Co-management approaches are particularly useful in areas where conservation and development objectives sometimes conflict, and can help to balance differing objectives. There are nevertheless critiques that many such institutional approaches, including those that are devolved to the local level, present social justice issues, in particular by insufficiently involving participation of groups such as women and youth (see e.g., Hope (2012) who provides a useful review of approaches to engage the youth in Kenya) and that they can reinforce elite capture.

Indeed, involving local communities in protected area co-management has increased globally, in order to minimise costs on local communities from conservation interventions. This sharing of power and responsibilities aims to increase legitimacy, inclusivity, representation and empower marginalised groups (Berkes, 2009). A global review of protected areas found that co-managed approaches were more likely to have positive outcomes for biodiversity and local livelihoods (Oldekop *et al.*, 2016). Yet other studies suggest that these approaches can be susceptible to elite capture, increasing inequalities and marginalisation of some stakeholders (Persha *et al.*, 2014). For example, a study in Madagascar found that households perceived limited benefits and high costs to participating in co-management, and an uneven distribution of these within and between communities. Poorer households and villages further from roads and markets were more likely to report costs to co-management (Ward *et al.*, 2018b). This highlights that to prevent exacerbation of pre-existing inequalities there is a need for co-management approaches to understand the heterogeneous nature of communities, and to ensure that involvement of local communities is representative and inclusive. Mechanisms that can help to reduce elite capture include safeguards such as waiving costs of fees and licenses for poorer participants in co-management (Blomley *et al.*, 2009).

6.5.3.1.2 Public-private partnerships

Another policy approach that requires institutional development involves public-private partnerships, which can be developed to address shared conservation and ecosystem service management goals (see also the example in Appendix 6.3). In Malawi, public-private partnerships were successfully used to reverse poaching, agricultural encroachment and deforestation in Majete wildlife reserve (Trimble, 2015). In 2003, the Malawian government awarded Johannesburg-based African Parks a contract to provide management expertise, as well as resources, equipment, and capacity building for the rangers. By the year 2015, about 2,559 animals including 217 elephants had been stocked into the reserve. The public-private partnership's success in this case is being used as a model for other reserves in Africa (Trimble, 2015). In another case, the Nairobi Water Fund brings together many partners and or stakeholders (e.g., the Nairobi City Water & Sewerage Company, Kenya Electricity Generating Company, Pentair Inc., Coca-Cola, East Africa Breweries Ltd, International Centre for Tropical Agriculture, The Government of Kenya, Water Resources Management Authority, Tana & Athi Rivers Development Authority, International Fund for Agriculture and Frigoken Kenya Ltd), to link upstream agricultural practices to downstream water quality. The Tana River supplies water to 95% of Nairobi's population, as well as another five million people living in the watershed. It supports important agricultural areas and provides half of the country's hydropower output. Deforestation and land-use conversion for agriculture have degraded natural areas that previously stored water, thus increasing runoff and soil erosion, reducing land productivity and increasing sediments in rivers, which affects water supplies. Management of the ecosystem services in this project includes a $10 million investment in water fund-led conservation, and intervention measures are expected to deliver $21.5 million in economic benefits over a 30-year timeframe.

However, public-private partnerships are not always effective, especially in cases where the private partner fails to keep their commitments and fails to understand local ethno-politics or does not craft a working relationship with local or indigenous communities. This is exemplified by the case of the African Parks Network in the Nech-sar and Omo National parks in Ethiopia, where the African Parks Network failed to make any investment in improving the condition of

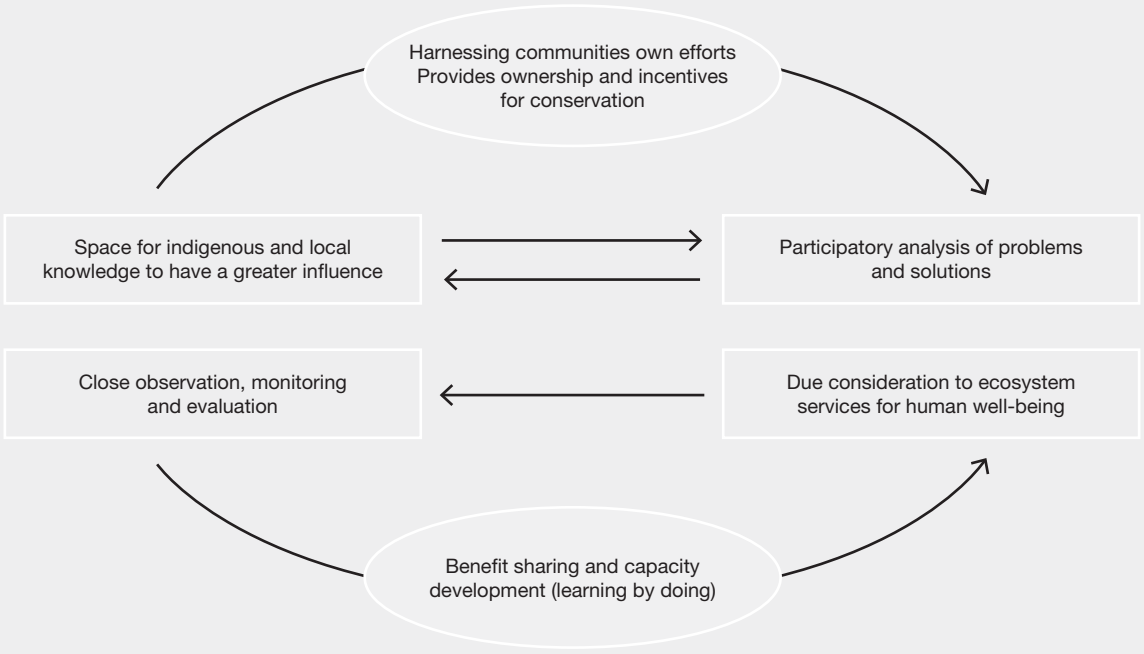
the park and local communities (Blonk, 2008). According to a local official in Ethiopia, African Parks Network's approach was described as 'exploitation of poverty in Africa' where the local population had little or no say in the fate of the parks, and usually had to move away, leaving communities feeling that animals are put above people to sustain the European myth of 'the wild', without allowing for human inhabitants and their livelihoods (Blonk, 2008). Lambooy *et al.*, (2011) identified a plethora of further challenges that limit the effectiveness of public-private partnerships in biodiversity conservation in Africa. These include lack of exchange of information and knowledge between the private sector and conservationists, high risks for private partners, high transaction cost for private partners, lack of management capacity and entrepreneurship among private partners, and very high transaction cost for private partners. It is therefore important that public-private partnerships in natural resource conservation start with the development of common understandings among government, local communities and other stakeholders, with each partner being open to compromise. Strong legal frameworks that can assure all parties are committed is a pre-requisite.

6.5.3.1.3 Community-Based Natural Resource Management

Many of the more devolved governance approaches can be broadly labelled as community management (e.g., community forests in Central Africa and communal lands in South Africa) or community-based natural resource management (often seen in Namibia, Botswana and Zimbabwe) (Ribot, 2003; Roe *et al.*, 2009). These approaches have increasingly been used in the agriculture, wildlife, forestry and fisheries sectors. Many African countries used wildlife protection and management as one of the community-based natural resource management goals. Community-based natural resource management passes decision-making authority over biodiversity and ecosystem services to local communities and can drive important institutional reforms and power redistributions (Roe *et al.*, 2009). Community-based natural resource management also theoretically provides a space for indigenous and local knowledge to have a greater influence (Gadgil *et al.*, 1993). **Figure 6.6** sets out the core characteristics of community-based natural resource management.

The literature presents a very mixed picture of the success of community-based natural resource management. In Tanzania, community-based forest management has been considered most effective because it provides sufficient incentives for communities to participate in long-term forest management. Community-based forest management has improved management of unreserved forests because villagers own the land and retain full rights to benefit from natural resources. Joint forest management initiatives in Tanzania, where central or local governments own land, perform slightly better than exclusive state-managed forests, though their viability remains uncertain. This is because joint forest management is considered restrictive and the guidelines on benefit

Figure 6 6 **Characteristics of community-based natural resource management (CBNRM).**



sharing are vague, resulting in minimal transfer of benefits to communities and inequitable transfer of management costs to resource managers (Blomley *et al.*, 2009).

In Francophone West Africa, community-based natural resource management encompasses the Gestion de Terroirs approach, which links conservation with local development (Binot *et al.*, 2009). Positive reports about this approach come from the fan-palm ecosystems in Niger which support both agricultural and pastoral livelihoods, as well as providing provisioning and pollination services. Before the introduction of Gestion de Terroirs, the area was state managed, with few benefits gained by local communities. By developing a new institutional framework for community-based ecosystem management, which included establishing new management agencies, environmental protection crews and harnessing communities' own efforts, local incomes substantially increased due to improved palm wood marketing and employment in environmental protection, whilst, at the same time, resulted in the regeneration of more than 3,000 hectares of land (Binot *et al.*, 2009). In addition, cases of conservation such as Hirola in Kenya have been analysed and compared with other successful cases of community-based natural resource management around the world and it was found that all the successful cases have the commonality of being initiated by local communities themselves, and not by external pushes (Measham *et al.*, 2013). In the Hirola case which aims at conserving the last living representative of the *Beatragus* genus, one of the largest antelopes in Africa, the communities requested the establishment of the Hirola conservation programme. This community-driven programme has ensured the implementation of socially acceptable conservation measures. Pastoralists in eastern Kenya have been more supportive of several rangeland restoration practices which improve Hirola habitat alongside local livelihoods (Ali, 2016). This has ensured the willingness of communities to enact the measures required which emphasises the need for local ownership in conservation initiatives. When community-based natural resource management is initiated out of necessity by local communities, then, local communities use all resources at their disposal (including ILK) to spearhead the success of projects. This emphasises the need for local ownership and initiatives. When these factors are lacking, community-based natural resource management can fail.

Despite many positive reports in the literature, community-based natural resource management has drawn considerable critique (e.g., Logan *et al.*, 2002; Frost *et al.*, 2008; Shackleton *et al.*, 2010; Pailler *et al.*, 2015). For example, the establishment of new, decentralised committees can sometimes conflict with traditional community governance systems, as found in Benin and Swaziland (Stringer *et al.*, 2007; Mongbo, 2008). Conflicts arise due to the need to redistribute power and authority, but this is opposed by some groups at the local level, particularly if such redistribution challenges traditional structures and processes. These situations can be difficult to manage, particularly if older and younger generations take different positions.

Opportunities for harnessing local, indigenous and traditional knowledge are not always taken in community-based natural resource management. Despite theoretical possibilities that it offers improved involvement of indigenous and local knowledge, in most African countries, this continues to be only a claim devoid of practical implementation (Shackleton *et al.*, 2002). In many cases, the true and beneficial involvement of indigenous knowledge and indigenous people is recommended in some ideal or hypothetical situation where indigenous and local knowledge is said to be able to provide potential support, as opposed to actually being used (Davis *et al.*, 2003). This is mainly because of the nature of indigenous knowledge, which is abstract, subjective and authoritative; this makes it difficult to be amenable to established scientific methodologies and approaches (Cocks, 2006; Briggs, 2008). It is important to note that the losers in this are not only the indigenous African communities, who are deprived of opportunities for participation but also the resource management sector which misses the multifaceted benefits that could have been obtained by involving local and indigenous knowledge (Berkes, 2004).

Community-based natural resource management initiatives can also fail because their design and selection do not take into account financial viability, or insufficiently consider the costs of undertaking sustainable ecosystem management. This can be detrimental to local participation in projects which contain financial incentives as a design element. The Tchuma Tchato project, Mozambique, and the community-based natural resource management programme in the Kwandu Conservancy, Namibia, revealed that benefits were often deficient in value and volume. In addition, many households believed that benefits were inequitably shared (Suich, 2013). Effective stakeholder engagement is essential to ensure that relevant issues are included and addressed; as well as being cautious in that existing policies and instruments that are relevant for conservation will not always originate only from environmental policies, but might stem from different sectoral policies, e.g., agriculture and forestry, energy, transport or trade policy, and from local communities.

A growing number of positive examples of decentralisation and community-based management exist in Africa, even though cases of successful community-based natural resource management where indigenous and local knowledge has been integrated and utilised remain lacking (Measham *et al.*, 2013). Important lessons can be derived from community-based natural resource management projects in Africa for the governance of biodiversity and ecosystem services (Snively, 2012; Pailler *et al.*, 2015).

6.6 CREATING AN ENABLING ENVIRONMENT FOR THE GOVERNANCE OF ECOSYSTEM SERVICES AND BIODIVERSITY

Key to the development of appropriate policy mixes for the governance of the continent's biodiversity and ecosystem services is an enabling environment: "the combination of contextual elements allowing progress to be made towards a clearly defined goal" (Akhtar-Schuster *et al.*, 2011: 300). It is important to identify key determinants for the effective development, uptake and implementation of particular governance and institutional options, and understand the limitations to their effectiveness. This section assesses the importance of capacity (including resources) and tools, drawing on examples from across the continent.

6.6.1 Tools and methodologies supporting policy design

Policy making does not follow defined steps and is increasingly reliant on support tools and methodologies which can help both to build capacity and guide policy decision-making. In Africa, these include 'Biodiversity Monitoring Transect Analysis in Africa' which uses spatial data through GIS and remote sensing and scientific support to improve governance and conservation of Africa's biodiversity (http://www.biota-africa.org). Other tools used include the ones used by South Africa's biodiversity research group under the Council for Scientific and Industrial Research and departments of biological sciences in several universities across the country. Universities in the continent also use similar tools while other stakeholders engage in emerging platforms such as the Ecosystem-Based Adaptation for Food Security Assembly which was created following the unanimous adoption of the Nairobi Action Agenda and the constitution of the Ecosystem-Based Adaptation for Food Security Assembly by several stakeholders in 2015 **(Box 6.25)**.

The IPBES (IPBES, 2016a; see also references therein) summarises seven families of policy support tools and methodologies according to their focus and use in: 1) assembling data and knowledge (including monitoring); 2) assessment and evaluation; 3) public discussion, involvement and participatory processes; 4) selection and design of policy instruments; 5) implementation, outreach and enforcement; 6) training and capacity building; and 7) social learning, innovation and adaptive governance. The availability and use of the best available data and information is critical in making policy decisions. Voluntary guidance meant to improve access to biodiversity-related data and information include[8]:

- use of common standards to enable integration and discovery of diverse data sets, government regulation and policy incentives to facilitate publication of publicly funded research and unrestricted access;
- digitisation of natural history collections;
- establishment of national biodiversity information facilities to promote coordination and sharing of data among stakeholders;
- enhancing capacity in biodiversity informatics through training programmes and through national, regional and global workshops, and collaboration through networks such as the Global Biodiversity Information Facility, as a means of increasing availability of data and filling knowledge gaps;
- public engagement in biodiversity observation through citizen science networks to enhance public awareness and to broaden the evidence base for research and decision-making;
- encouraging sharing of data obtained from the private sector;
- developing national platforms for data discovery, visualisation and use, e.g., through websites and portals;
- analysis of data and information gaps for prioritisation of new data mobilisation; and
- engagement with and support of both regional and global networks (e.g., the Global Biodiversity Information Facility, the Ocean Biogeographic Information System and the Group on Earth Observations Biodiversity Observation network for data mobilisation and access.

In addition to tools and protocols on data-sharing, the tools developed under the Convention on Biological Diversity are used to assist countries and other stakeholders in conserving and sustainably using biodiversity. Greater application of these tools could be of significant help in safeguarding biodiversity and avoiding the worst impacts of its loss.

The analysis of tools and methodologies presented in this section follows a conceptual framework of the

8. See CBD/COP/DEC/XIII/31 (https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-31-en.pdf)

Box 6 25 The Ecosystem-Based Adaptation for Food Security in Africa assembly (EBAFOSA).

EBAFOSA is a tool aimed at promoting investments in ecological techniques that improve agricultural productivity without negatively affecting the ecosystem's capacity to sustain future productivity. EBAFOSA has provided a platform, in the 16 countries that have so far launched the framework, where stakeholders forge mutually benefitting partnerships aimed at upscaling ecosystem-based adaptation driven agriculture and its value chains into policy and implementation through country driven processes to ensure food security, climate adaptation and enhanced productivity of ecosystems. It has also focused on enhancing value addition to create income and job opportunities, especially for the youth who form 60% of the unemployed in Africa (Munang *et al.*, 2015).

In Cote d'Ivoire, EBAFOSA has helped establish partnerships amongst various actors in developing clean energy and markets to build on the 'Attieké d'Or' initiative to incentivise use of climate resilient, high-value cassava crop in all high potential areas – starting with the city of Divo and the Tonkpi Region. This has resulted in enhancement of biophysical & socioeconomic resilience at community level whilst contributing to economic growth (UNEP *et al.*, 2017). In Malawi, on the other hand, through EBAFOSA an inter-agency task force has been formed and it has identified key existing policies for amendment towards complementing establishment of Ecosystem-Based Adaptation agro-industrial zones that will be powered by clean energy (UNEP *et al.*, 2017).

Integrated Policymaking cycle (UNEP, 2009) and IPBES conceptual framework (Díaz *et al.*, 2015). The Integrated Policymaking cycle identifies five steps in policy making and implementation: 1) Problem identification; 2) Policy formulation; 3) Decision-making; 4) Implementation; and 5) Monitoring and Evaluation.

6.6.1.1 Problem identification

As many countries in Africa are experiencing transitions in their demographic, urbanisation and economic development patterns (see Chapters 1 and 4), a careful policymaking approach is needed for Africa's biodiversity and ecosystem services. Problem identification takes place in the context of public policy, covering issues, potential and current, which affect various stakeholders, and that can benefit from policy intervention (UNECA, 2015). Some of the most common tools and methods used to identify these problems include vulnerability assessments, the DPSIR framework, scenarios and other forecasting tools (e.g., see Chapter 5). DPSIR is an acronym for driving forces-pressure-state-impact-response and it has been used since 1995 by European environmental agencies to develop indicators, map causal relations and policy options (Maxim *et al.*, 2009). Vulnerability assessments have been carried out for decades in relation to poverty, natural hazards and more recently climate impacts (Kelly *et al.*, 2000). Vulnerability assessment, DPSIR and forecasting tools can take into account local perspectives in problem identification and can use participatory approaches.

6.6.1.2 Policy formulation

Policy formulation includes identifying public policy alternatives to address the problem of focus, and following selection processes that narrow the options to deliver the final policy solution (Hai, 2013). Market and non-market valuation methodologies play an increasingly important role in policy making, with the valuation methodologies typically presented in typologies (see Pearce *et al.*, 2002; World Bank *et al.*, 2004; van Beukering *et al.*, 2007). These also complement decision-support frameworks (e.g., cost-benefit analysis and multi-criteria analysis) with a number of appraisal techniques that can collect and analyse qualitative information (e.g., questionnaires, interviews, focus groups, citizen's juries, participatory appraisal, Q-methodology, expert opinions). The strength of multi-criteria analysis as a decision-making tool allows inclusion of a full range of social, environmental, technical, economic and financial criteria, and is different from the use of cost-benefit analysis which typically focuses on economic efficiency.

6.6.1.3 Decision-making

Decisions can both exacerbate and address environmental problems in Africa (Boon, 2015). Toth (2004) contends that decision-making needs to be underpinned by the use of the best available information about the biophysical characteristics of the ecosystem for which the decision is being made, their changes and their socio-economic effects, the social context and values with which the environmental problem is imbued, including cumulative and cross-scale effects. Environmental policy decision-making should be undertaken in a participatory manner involving local and indigenous communities (Dyer *et al.*, 2013; Leventon *et al.*, 2014) in line with principles of good governance. It also leads to enhanced trust between the different actors involved (de Vente *et al.*, 2016) and allows for the recognition of values, vulnerability concerns, cross-scale effects and context (Toth, 2004) and helps to identify and resolve trade-offs, leading to more just distribution of costs and benefits. It can also help to deliver implementation on the ground.

6.6.1.4 Policy implementation

The African Ministerial Conference on the Environment's Report (AMCEN, 2014b) on enhancing the implementation and effectiveness of environmental law in Africa, identified administrative, socio-economic and legal causes as drivers of low implementation, weak enforcement and the ineffectiveness of laws and policies implementation in Africa. Serious concerns are still being raised about how the capacity in the areas of planning and financial, human and technical resources will be addressed (AMCEN, 2014b).

In terms of capacity building, at a national and regional level, United Nations agencies and other global and regional partners, institutions and organisations have supported several African countries in the areas of environmental law and policy implementation. Capacity building for implementation takes place during the development of instruments like the National Biodiversity Strategies and Action Plans, National Biodiversity Reports, resource mobilisation strategies and several other national, regional and subregional projects focus on national capacity building and the establishment of institutions.

NEPAD's, Action Plan for the Environment Initiative contains a detailed implementation plan assigning institutions within the Africa Region roles and responsibilities (NEPAD, 2003). The Plan has costed activities which can be presented to potential funders. From the Action Plan, Africa Flagship projects have been developed. The flagships put conserving biodiversity and reducing ecosystem service loss as a priority (NEPAD, 2003).

6.6.1.5 Policy monitoring and evaluation

Various methods and approaches have been developed to monitor the impact of policies, to identify gaps and potential unintended consequences/side effects of policy interventions, and plan alternative mitigation actions to ensure the achievement of initial desired goals. Processes such as knowledge co-creation and co-production (Ayre *et al.*, 2015), and approaches such as participatory rural appraisal can provide useful inputs to the monitoring and evaluation process and facilitate assessment of progress towards desired future goals.

6.6.2 Capacity and resources

Governance of biodiversity and ecosystem services requires capacity (financial, institutional, technical, information and communication capacity) as well as processes such as stakeholder engagement, participation, knowledge exchange and co-production, capacity building and the indispensable people working in the various fields of biodiversity and ecosystem management (King *et al.*, 2007). Investments in these areas are particularly vital under options appropriate to less centralised governance contexts. Building capacity in the governance of biodiversity and ecosystem services requires the identification of new approaches and tools that are aligned to local knowledge.

Capacity to develop and implement policies for the management of biodiversity and ecosystem services is a baseline requirement for an enabling environment. Technical capacity (the knowledge, skills of individuals, access to tools and technology) is also important. In Africa, interdisciplinary studies and projects focusing on the deployment of science and technology, and the understanding and documentation of the state of biodiversity, have been undertaken mostly through State of the Environment reports and in some cases the respective Atlases. Resources (financial, human, technological including ICT and other innovations; indigenous and local knowledge) are also essential but in the African context are relatively scarce despite a growing number of data sources (Google Earth) and tools (InVEST, Rios, MESH) being open source and open access (see also chapters 1 and 5).

The effective management and governance of biodiversity and ecosystem services would greatly benefit from the availability of financial, human and technological resources (ICT and other innovations). Dependence on donor funding and project-based management usually does not lead to sustainability of project activities once the donor leaves or the project ends (Lambert, 2006). Emerging new financing mechanisms (environmental fiscal reforms, payment for ecosystems services, biodiversity offsets, green markets or markets for green products, biodiversity in climate change funding and biodiversity in international development financing) and the emphasis on biodiversity conservation practices will greatly enhance biodiversity and ecosystem services.

Identifying new approaches requires that African countries have knowledge on their actual financial needs in terms of how much is needed and where it is most needed. Financial assessments are used to determine exactly how much is required for biodiversity conservation and whether the investments made translate into positive conservation, ecosystem service, and well-being impacts. Botswana, Uganda, Zambia and a few other African countries are participating in a Biodiversity Finance Initiative, a new United Nations Development programme global partnership seeking to address the biodiversity finance challenge in a comprehensive manner, providing support for countries to enhance financial management for biodiversity and ecosystems. The initiative uses detailed country assessments of biodiversity policies, strategies and expenditure reports to inform development of biodiversity financial plans using innovative methodologies and consultations with national and global experts. These kinds

of assessments are important for ensuring that countries are able to determine the existing resources and come up with innovative strategies for mobilising more resources for biodiversity and ecosystem services. For example, Uganda's Guidelines and Action Plan for Financing Biodiversity Conservation encourages the Government and stakeholders to utilise opportunities available within international and national regulatory and institutional frameworks to achieve optimal resource mobilisation for biodiversity conservation in the country. The action plans clearly indicate the amount of funding and the type of human resources required to achieve specific biodiversity and ecosystem services goals. It establishes a resource mobilisation focal point responsible for executing actions to generate the resources and ensures local communities are involved in the process (NEMA, 2015). If this is replicated in other African countries, it could create effective resource mobilisation actions and allow for redefining approaches to biodiversity and ecosystem services.

Capacity is also needed for policy implementation. A national level approach has been driven forward by the United Nations Development Programme and Global Environment Facility through National Capacity Self Assessments in 146 countries. Egypt, for instance, assessed its implementation status of United Nations Convention to Combat Desertification, United Nations Convention on Biological Diversity, and United Nations Framework Convention on Climate Change from 2005 to 2008. Capacity constraints were identified in order to prioritise action with regards to the Rio Conventions (Bellamy *et al.*, 2010).

The next section focuses on scenarios as tools for decision-making which can effectively harness existing capacities and resources, and be used at various stages in the policy cycle to inform decision-making by exploring options and alternatives.

6.7 SCENARIOS AS TOOLS FOR DECISION-MAKING

Scenario analysis and modelling have been suggested as important policy support tools for enhancing decision-making about the longer-term future, especially given the uncertainty in social-ecological systems (see Chapter 5 of this assessment; MA, 2005; Vervoort *et al.*, 2014; WWF-AfDB, 2015). Scenarios can be used to guide specific planning and policy development by testing assumptions and generating new policy ideas (Vervoort *et al.*, 2014; **Figure 6.5**). The inherent uncertainty and diversity of potential futures are challenging for designing policies. Policy options are only a first step toward acting on the insights generated by the scenarios (UNEP, 2016). Because a set of scenarios offers the opportunity to explore diverse future contexts, each with their own challenges and possibilities, they can be used to make elements of plans more robust (feasible under future conditions) and/or adaptable to future eventualities.

Scenarios are distinguished from other approaches for future decision-making, such as forecasting and risk assessment, by being specifically intended for situations in which the factors shaping the future are highly uncertain and largely uncontrollable (Peterson *et al.*, 2003, Biggs *et al.*, 2007). The main goals of using scenarios in assessments of biodiversity and ecosystem services and their contributions to human well-being are to synthesise knowledge and advance systems understanding; to alert decision-makers to undesirable future impacts of global changes such as habitat loss and degradation; to provide decision support for developing adaptive governance strategies; and to explore the implications of alternative social-ecological development pathways and policy options (IPBES, 2016b).

The IPBES Methodological Assessment Report on Scenarios and Models of Biodiversity and Ecosystem Services (IPBES, 2016b) highlights the important role that scenarios play in the decision-making process. Figure 5.1 shows that scenarios are helpful across the four major phases of the policy cycle relating to agenda setting, design, implementation and review. However, as highlighted by Chapter 5 (Section 5.2.2) most regional scenarios developed for Africa are 'exploratory scenarios' (80%) that explore plausible futures. Of those scenarios included in the assessment, 17% of them were policy screening, however, only 6% were target-seeking and only 1% represented retrospective evaluations of a policy (Section 5.2.2). An example of a policy screening scenario makes use of a global agricultural land-use model that was developed under two forest conservation scenarios reflecting two different policy goals, namely: maximising forest carbon storage and minimising impacts on agricultural production (Krause *et al.*, 2013). The results of these scenarios show that conserving undisturbed natural forest appears to be a low-cost option for reducing greenhouse gas emissions. There are no other regional scenario exercises that explicitly deal with testing policies – either through a target-seeking, policy-screening or retrospective policy evaluation process.

6.7.1 Policy implications under the different scenario archetypes

Chapter 5 of this assessment outlines five scenario archetypes (Fortress World, Market Forces, Policy Reform Local Sustainability, Regional Sustainability) and analyses how achieving specific biodiversity, ecosystem services and development targets in Africa can be enabled under

the contextual assumptions of these 5 archetypal futures (Box 5.2, Section 5.7 and Table 5.7.). Potential governance responses under these archetypes are discussed in Table 5.6. The following section highlights some implications for policy making based on these archetypes, linking more specifically to key policy goals that relate to biodiversity and ecosystem services in Africa (Table SPM 2, Table SPM 4, Table 5.7, **Figure 6.7** below). The majority of the assessment undertaken in Chapter 5 used six core studies for the assessment, including: to a lesser extent, the Intergovernmental Panel on Climate Change's (IPCC) climate change scenarios (Nakicenovic *et al.*, 2000; Moss *et al.*, 2008, 2010; Kriegler *et al.*, 2010; van Vuuren *et al.*, 2012); the Millennium Ecosystem Assessment (MA) Scenarios (MA, 2005); the Global Environment Outlook 4 (GEO-4) global assessment (UNEP, 2007); and the World Wide Fund for Nature (WWF) Ecological Futures scenarios (WWF-AfDB, 2015) that were specifically developed for Africa and also used in the sixth Global Environment Outlook (GEO-6) regional assessment (UNEP, 2016) (Section 5.3).

6.7.1.1 Policy reform

Under this type of future there is an increased need for proactive legal and regulatory instruments (e.g., Protected area zoning, access and benefit sharing legislation; see also section 6.5.2) and economic and financial instruments (e.g., certification schemes, carbon taxes; see section 6.5.1) that mediate the impacts of intensive agriculture, extractive industries and associated infrastructure (e.g., transport, water and energy). Policy reform envisions a more globally connected world where local economies are boosted and policies aligned with a green economy can potentially flourish, relieving pressure on marine resources which aligns with enhancing Sustainable Development Goal 14: Life below water (WWF-AfDB, 2015). Protected areas increase based on the political recognition that healthy ecosystems underpin development, however biodiversity outside these protected 'islands' declines. Trade-offs between some of the ecosystem services linked to Sustainable Development Goals (e.g., Sustainable Development Goal 2: Zero hunger and Sustainable Development Goal 6: Clean water and sanitation) and Aichi Biodiversity Targets (e.g., Target 5: Reduce habitat loss and degradation) are the most apparent related to these scenario types. Decision-makers in Africa under this scenario need to pay careful attention to tele-coupling, for example, the impacts of biofuels grown locally for foreign markets (Liu *et al.*, 2013) or diversion of river flows benefiting global markets at the expense of local livelihoods (Bohensky, 2006). Policies need to be proactively put in place to mitigate potential sustainability challenges associated with these transnational deals promoting Sustainable Development Goal 12: Responsible consumption and production.

While development under these scenarios is mainly at the expense of the environment, an African future under policy reform aligns well with the key targets of the New Partnership for Africa's Development and Blueprint for an Integrated Approach to implement Agenda 2063, and can potentially rapidly achieve some of the development objectives as there is slow population growth and strong policies which can help to reduce poverty (Sustainable Development Goal 1: No poverty) and inequality (Sustainable Development Goal 10: Reduced inequalities) and invest in public goods (Sustainable Development Goal 4: Quality education and infrastructure Sustainable Development Goal 9: Industry, innovation and infrastructure). Under policy reform, rapid technological development increases access to water by as much as 3 fold (Alcamo *et al.*, 2005). However, this comes with a projected 3–5 fold increase in waste-water discharge in sub-Saharan Africa, which will require additional policy and infrastructure interventions to ensure that poor water quality does not impact on human and environmental health (Alcamo *et al.*, 2005; MA, 2005). Policies that promote spatial and cross-sector investment and planning can minimise the impacts large-scale infrastructure development has on ecosystems, especially with the risk of climate variability. This scenario focuses on building resilience by encouraging policies that promote economic diversification and reduce market failure, but at the same time needs to strengthen environmental regulation to avoid the dependence on a few resources that can rapidly be depleted (Alcamo *et al.*, 2005). Under policy reform, governments actively work together with the private sector and civil society to co-develop new policies to strengthen economic growth (UNEP, 2007). It is vital that indigenous knowledge is integrated into this cooperation (see also section 6.5.3.1 on multi-stakeholder governance).

6.7.1.2 Market forces

In this scenario, economic development in Africa is most rapidly achieved under a market forces scenario based on policies which create open markets and see the government and private sector promoting the exploitation of the abundant natural resource base for global trade (Nakicenovic *et al.*, 2000; UNEP, 2007, 2016; van Vuuren *et al.*, 2012; WWF-AfDB, 2015). While there is also rapid technology development, there are limited investments in alternative energy and as nations abandon their climate agreements (which is at odds with Sustainable Development Goal 13), fossil fuels are used intensively to power development (Nakicenovic *et al.*, 2000; UNEP, 2007; van Vuuren *et al.*, 2012). Rapid economic growth can potentially benefit many people in the short-term, with inequality lessening (see section 5.5); promoting Sustainable Development Goals 1, 3, and 10. However, unless there are efforts from decision-makers to strengthen policies which promote ecosystem stewardship aligned

with global conventions (e.g., Strategic Goal A–C of the Aichi Biodiversity Targets and Sustainable Development Goals 6, 12, 14 and 15) there may also be rapid ecosystem transformation. Such transformation places long-term sustainable development, based on extractive industries, in jeopardy, and could fuel tensions between the private sector and local and indigenous communities (UNEP, 2016). To mitigate these negative impacts on local livelihoods, policy options that address issues related to weak centralised governance, limited environmental regulation, illegal or unsustainable harvesting or poaching are needed. Such options include adaptive governance and co-management (see sections 6.1 and 6.5.3.1). More innovative governance partnerships which include those between business, communities and government are needed to strengthen the resilience of infrastructure and spatial planning processes (Sustainable Development Goals 16 and 17). Here, policies linked to Strategic Environmental Assessments can be helpful as they can mediate potential conflicts between resource users and assist in mitigating the impacts of future global economic and climate variability (WWF-AfDB, 2015; UNEP, 2016). Strong cross-sectoral, national frameworks for regional and international trade agreements with a foundation of policies that incentivise the maintenance of ecological functions can potentially fast-track sustainable development, especially in areas with limited regulatory capacity (e.g., **Box 6.16**, East African example of Payment for Ecosystem Services in Appendix 6.3). Strong economic growth enables more equitable division of resources and together with slower population growth results in communities that are less vulnerable to the impacts of climate change (van Vuuren *et al.*, 2014).

6.7.1.3 Local Sustainability

A future under a local sustainability scenario favours policies that proactively facilitate environmental protection, social equality and human well-being at local levels (MA, 2005; UNEP, 2016). This type of future is aligned with multiple Sustainable Development Goals, especially since development activities will be implemented at national and local levels. This archetype enables the most rapid advancement towards to Aichi Biodiversity Targets (especially targets 5, 7, 11 and 14) and the United Nations Convention to Combat Desertification, aligned to Sustainable Development Goal 15. It is further associated with a reduction in habitat loss due to an assumption of low population growth and eventual adoption of sustainable practices. Proactive policies linked to reforestation see the expansion of forest cover by 2100 on the whole (Nakicenovic *et al.*, 2000, scenario B2). Agriculture is localised, cooperative and governed through participatory decision-making processes, however, these small-scale agricultural areas are fragmented and degradation continues outside these areas. Cumulatively the impacts of small-scale agriculture's effects on regional sustainability need consideration, alongside coherence in local land management, particularly when also addressing impacts that disasters (e.g., droughts or conflict) might have beyond the local scale. Policies focusing on investment mechanisms that enable financial and technical support for local ecosystem-based schemes (e.g., payments for ecosystem services) which link to international markets can strengthen more sustainable development in Africa (WWF-AfDB, 2015). Harnessing capacity and resources from key international organisations like the Consultative Group on International Agricultural Research and its various programmes, especially that on Water, Land and Ecosystems, African institutions like NEPAD and the African Union as well as subregional organisations like the Central African Forest Commission, to strengthen local institutions and empower local stakeholders with planning tools and technology, is critical for endogenous, equitable development in Africa. A focus on regional network weaving and integration of efforts is especially critical to ensure alignment with the aspirations of Agenda 2063. Policies which favour decentralised governance mechanisms and align with international frameworks (e.g., Sendai framework for Disaster Risk Reduction 2015–2030 (UNISDR, 2015) can assist with balancing trade-offs associated with agriculture and human settlements on ecosystems and enable more resilient futures, especially in the light of changing climates.

6.7.1.4 Fortress world

A future which focuses on strengthening regional and local identities through strong national governments with the main objective to strengthen security is still a plausible trajectory for Africa (Nakicenovic *et al.*, 2000; MA, 2005; UNEP, 2007). Within this scenario, environmental policies are mostly reactive and geared towards facilitating regional economic growth and there is rapid population growth. Under a fortress world future, habitat loss, mainly due to policies which promote extensive agriculture, are the highest relative to other scenarios, resulting in limited ability to achieve multiple Aichi Biodiversity Targets (targets 5, 7, 12, 15) and those Sustainable Development Goals strongly associated with maintaining ecological integrity (Sustainable Development Goals 11, 14, 15). Under this scenario, countries endowed with high levels of biodiversity and ecosystem services are able to develop faster, increasing species loss and local extinction rates (at odds with Biodiversity Target 12). There are few policies promoting inter-regional trade and the government and the private sector compete for control, with the elite remaining powerful and poverty worsening in many communities (impacting Sustainable Development Goal 10). Under this scenario, which envisions fragmented

and slower per capita growth and technological change (Nakicenovic *et al.*, 2000) with associated lower carbon emissions, policies are needed around climate adaptation as there is limited adaptive capacity to address existing climate-related impacts (limited action on Sustainable Development Goal 13) (van Vuuren *et al.*, 2014). Similarly, policies are needed that improve catchment management practices such as better regulation and application of agrochemicals under agricultural intensification, combined with riparian forest conservation to reduce the risk of runoff-driven water pollution (limiting Sustainable Development Goals 6 and 2).

6.7.1.5 Regional Sustainability

In this scenario the future of Africa is based on policies which support intra-regional trade for development with the main objective to contribute towards global or regional sustainability. There is an emphasis on evidence-based policy making with strong, capacitated regional governance systems and a focus on policies linked to strategic planning and implementation of infrastructure that has limited impact on sensitive ecosystems (e.g., Strategic Environmental Assessments and Environmental Impact Assessments) (WWF-AfDB, 2015). Technology advances are rapidly directed towards more proactive environmentally friendly practices (Sustainable Development Goal 12) with high land productivity from often engineered ecosystems (MA, 2005; UNEP, 2007) and lower carbon emissions (contributing to Sustainable Development Goals 2, 13) (Nakicenovic *et al.*, 2000; van Vuuren *et al.*, 2014) allowing for improved mitigation and adaptation of climate change. While the needs for increased infrastructure to support development increase, there is strong transboundary collaboration, investment and cooperation, aligned with national priorities. These aspects facilitate development in a more equitable manner (Sustainable Development Goals 10, 16) and permit resources to be used more efficiently (WWF-AfDB, 2015). In this scenario, regions work together to improve human well-being and ecosystem resilience (UNEP, 2007). However, success of this scenario is undermined if policies promoting conservation and infrastructure development are not aligned and well-coordinated with each other.

6.7.2 Governance responses under uncertain futures

There is a need to avoid duplication of effort, refrain from competition for the same resources, enhance efficiency, and instead to tap into the potential for shared knowledge management to harness co-benefits and reduce trade-offs. Such efforts require consideration of policy and institutional interplay, both at and across different scales and levels of governance (Young, 2002; Oberthür *et al.*, 2006). The key take-away policy implications from looking at the scenarios are that it is necessary to have a suite of responses available and that there is no ideal policy pathway that is any better than any other. Rather, it is important to ensure that policies are synergistic and coherent, where relevant and appropriate, and that one policy is enabled to make up for the weaknesses inherent in another policy.

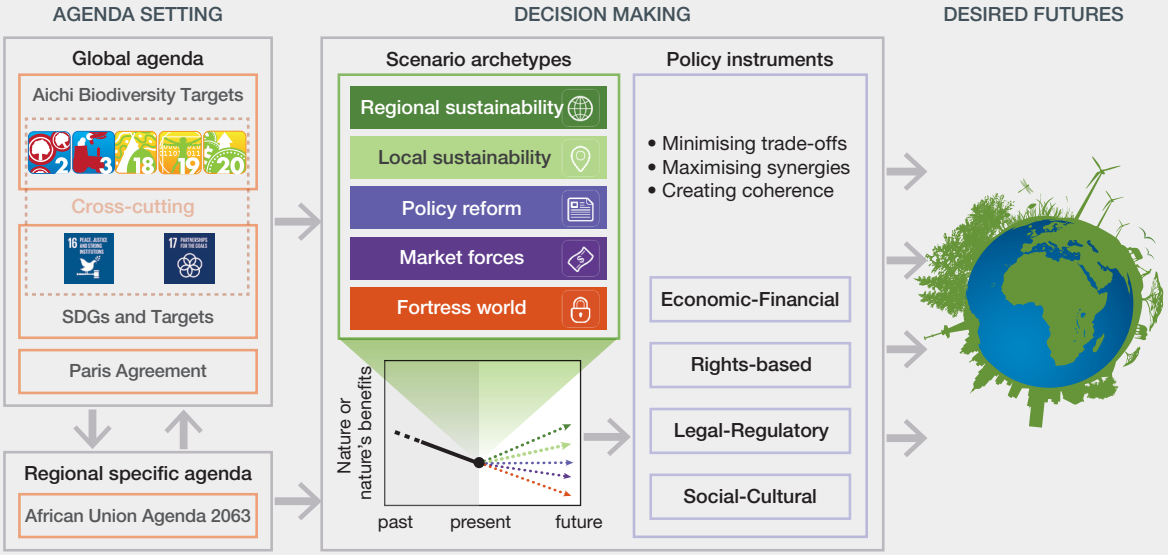
As described in section 6.5, an array of policy instruments is available to enhance the opportunities from, and address the challenges associated with, biodiversity and ecosystem services. These instruments include legal and regulatory instruments (e.g., environmental legislation, protected area establishment, land suitability zoning, and access and benefit sharing legislation), rights-based instruments and customary norms (e.g., access and benefit sharing legislation, particular land ownership and tenure), economic and financial instruments (e.g., taxes and charges), and social and cultural instruments (e.g., precedence or lack thereof over formalised legal systems). Such policy instruments can either be applied independently or in combination. Building on Table 5.7 in Chapter 5, **Table 6.2** provides examples of policy instruments for addressing the combination of the Sustainable Development Goals and Aichi Biodiversity Targets under the African Union's Agenda 2063 aspirations. In this table, based on a combination of expert opinion and available literature, some examples of potential policy instruments that could be useful in meeting these biodiversity and ecosystem services and development goals are provided. Whilst all policy needs to be context specific, here, the emphasis is placed on those instruments that target sustainable development more widely and that are attuned to Africa's social-ecological heterogeneity.

6.8 CONCLUSION

This chapter has assessed existing policies and governance options and actions in response to the current status of biodiversity and ecosystem services and trends and direct and indirect drivers of change (see chapters 3 and 4). It provided analysis of key policy instruments and governance options linked to specific scenarios identified in chapter 5. It assessed the links between relevant international agreements and initiatives and their mainstreaming across scales and sectors; analysed policy instruments and their application to the African context and considered the important role of indigenous and local knowledge in understanding nature's contributions to people. It highlighted the importance of creating an enabling environment for evidence-based decision-making, policy design and reviewed some of the existing policy support tools and methodologies.

Figure 6 7 **Summary of how effective global and regional agenda-setting combined with relevant decision-making tools can achieve desired future outcomes for Africa.**

Achieving a desirable and equitable future for Africa is based on an existing set of regional and global goals and targets. By using scenarios as a tool to think about how futures could play out, an enabling policy environment can be co-created to maximise synergies and coherence between actions and minimise trade-offs. This figure starts with a set of existing targets and objectives (Agenda 2063 of the African Union, the Sustainable Development Goals, the Aichi Biodiversity Targets and other globally agreed goals) that the majority of African nations have agreed to and that are necessary to achieve in order for the continent to reach a desirable future; some of these are cross-cutting because they aim to achieve institutional reform (e.g., Aichi Biodiversity Targets 2, 3, 18, 19 and 20 and Sustainable Development Goals 16 and 17) (See Table 5.7). Recognition of the cross-cutting institutional targets is critical as they focus on what needs to be done within and between institutions if a more desirable future is to be achieved. They not only map onto one cluster of targets e.g., around water or energy, but are necessary to achieve them all. To aid thinking about how to reach this agenda, there are a set of scenario archetypes that help us to conceptualise potential futures that could arise under different conditions and the trade-offs between each of these (See Box 5.2). None of these scenarios offer the desired future that we want; some of them get us closer to a desirable future than others, but the future is uncertain and a complex articulation of aspects of all these potential scenarios. In this light, scenarios are useful tools to help us think about the type of enabling environment necessary for achieving certain goals. Looking at the targets through the lens of the scenario archetypes enables decision-makers to make more informed decisions about what policy instruments could be employed (See Table 5.6), explicitly highlighting trade-offs and directing attention to specific synergies and coherence. The figure summarises how agenda-setting should be accompanied by effective decision-making that recognises future uncertainties in order to employ relevant policy instruments to achieve a desirable future.



Avoiding a perceived or real 'tragedy of the commons' requires effective institutional responses that can enable environmental resources to be managed so that they contribute towards human well-being without eroding natural capital. Many indigenous African systems are well placed to do this. Generally, the existence of weak institutional and human capacity undermine efforts for good governance of biodiversity and ecosystem services and nature's contributions to people, emphasising the need to prioritise environmental governance across scales in order to support the equitable use of resources and conservation.

Africans depend on biodiversity and ecosystem services for their livelihoods and well-being. Many of Africa's political, legal, institutional, economic, and social contexts present a major challenge for the sustainable management of natural resources. They are further manifested by different challenges faced by the population in Africa including devastating land degradation, population growth, invasive species and climate change.

Efforts have been taken by African countries to address issues of biodiversity conservation and ecosystem services preservation though signing and ratifying international agreements. This has resulted in African governments making high-level commitments to achieve their targets. However, despite their importance to local development, peace and security, issues of importance and relevance to indigenous and local people have not been incorporated into many of the agreements, while those that focused on indigenous issues, bringing little or no change to indigenous people's rights and livelihoods. The low level of domestication of these commitments has constrained the effective implementation and the achievement of agreed

targets. Efforts towards poverty reduction and scaling up of resilience will benefit from harnessing synergies between agreements to deliver multiple benefits, which can help to balance patterns of access and allocation of ecosystem services. Moreover, an enabling environment that embraces Africa's diversity will help to ensure justice and fairness in access to the continent's diverse biodiversity and ecosystem services.

This chapter represents one of the few assessments of the status of policy options and institutions, especially with regards to scenarios, on African biodiversity and ecosystem services. There is generally a dearth of accessible peer-reviewed and/or grey literature to support a comprehensive assessment of policy and governance. It has therefore created challenges in exploring these issues and creates an opportunity for more frequent, comprehensive and extensive assessments. It also presents an opportunity to develop case studies and pilot projects that explore the different policy options and instruments specifically in the African context.

Due to science-policy implementation disconnects, most research findings have not yet been taken up and translated into action. More co-engaged efforts and co-production of knowledge between practice, policy, science and ILK systems, are needed to ensure a high level of awareness and the achievement of commitments, particularly among policy makers. For example, the use of the different concepts associated with biodiversity and ecosystem services, especially associated with the use of scenarios, may be confusing to policy makers and constrain their translation into policy options. It is important that Africa develop its own common understanding and interpretation of the different concepts to inform decisions and facilitate the design of appropriate policies. Finally, there is not enough collaboration or sharing of information and lessons learned among countries in the various regions in Africa. Effective cooperation and lesson-sharing are needed. It is equally important to ensure a platform for collaborative initiatives to ensure synergies. In this regard, the role of regional institutions cannot be overemphasised.

Africa has an ambitious development agenda that is critically tied to maintaining and sustainably harnessing its diverse natural systems and ecosystem services. In order to achieve this agenda, it is necessary for all stakeholders to make use of effective policies that minimise trade-offs and maximise synergies under uncertainty so as to achieve a desirable and prosperous future for Africa **(Figure 6.7)**.

Table 6 2 **A non-exhaustive set of policy instruments to address an integrated set of environmental and biodiversity goals for Africa.**

POLICY GOALS				POLICY GOALS		
Agenda 2063 Goals	Aichi Biodiversity Targets		SDGs and Targets	Legal-Regulatory	Economic-Financial	Socio-Cultural
3 Healthy, well-nourished citizens		Ecosystem services	1 **No poverty** (Target 1.4) 2 **Zero hunger** (Target 2.3) 3 **Good health and well-being** (Target 3.3) 5 **Gender equality** (Target 5.A)	Food security policy, food safety, pro-poor and gender sensitive development strategies, land tenure system, right to food, right to healthy environment, indigenous people's rights	Payment for Ecosystem Services (PES), eco-labelling	Livelihood policy, social protection, pro-poor and gender sensitive development strategies
5 Modern agriculture for increased productivity and production		Sustainable agriculture, aquaculture and forestry	2 **Zero hunger** (Target 2.3, 2.4, 2.A) 12 **Responsible consumption & production** (Target 12.2, 12.3) 15 **Life on land** (Target 15.2, 15.B)	Land zoning, land tenure, protection of indigenous land, indigenous intellectual property rights	Smart agriculture, agricultural green economy, correct and prevent trade distortions in world agricultural markets, financial incentives, value addition, eliminate agricultural export subsidies, index based livestock insurance for pastoral people	Public works programmes, risk insurance index, integration of indigenous and local knowledge for better and adoptable technologies, indigenous knowledge and biodiversity: bio-prospecting
6 Blue ocean economy for accelerated growth		Sustainable management of aquatic living sources	2 **Zero hunger** (Target 2.3) 14 **Life below water** (Target 14.2, 14.4, 14.7, 14.B, 14.C)	Marine protected areas	PES, elimination of perverse incentives, taxes	Livelihoods and development strategies

Table 6 2

POLICY GOALS				POLICY GOALS		
Agenda 2063 Goals	Aichi Biodiversity Targets		SDGs and Targets	Legal-Regulatory	Economic-Financial	Socio-Cultural
7.1 Sustainable natural resource management		Pollution reduced	3 **Good health & well-being** (Target 3.9, 3.11) 6 **Clean water & sanitation** (Target 6.3) 11 **Sustainable cities & communities** (Target 11.6, 11.8) 12 **Responsible consumption & production** (Target 12.4) 14 **Life below water** (Target 14.C)	Bans (e.g. on plastic bags), pesticide and fertiliser regulations, enforced air and water quality regulation to reduce pollution-induced mortality and contamination	PES, elimination of perverse incentives, taxes or 'polluter pays' principles	Awareness and skills development, protection of indigenous land
		Invasive alien species prevented and controlled	15 **Life on land** (Target 15.8)	Biocontrol regulations, biosafety protocols, early detection and rapid response, risk analysis and risk assessment, eradication protocols, permits, indigenous people's land protection	Fees, elimination of perverse incentives, taxes	Working for water: government jobs for environmental jobs, raise awareness of impacts of invasive species
7.2 Biodiversity conservation, genetic resources and ecosystems		Safeguarding genetic diversity	2 **Zero hunger** (Target 2.5) 15 **Life on land** (Target 15.6)	Access and benefit sharing legislation (e.g. Nagoya Protocol), protection of indigenous knowledge and seed exchange processes, participation in national and international gene banks		Community gene banks, seed stores
		Habitat loss halved or reduced	14 **Life below water** (Target 14.C) 15 **Life on land** (Target 15.1, 15.2, 15.5)	Strategic environmental assessment regulations (incl. EIA), support creation, management and benefit-sharing of natural ecosystems outside of areas	Conservation offsets, environmental easements, PES, REDD+, resource use fees, transparent financial accounting, taxes, natural capital accounting, ecotourism	Participatory approaches for natural resource management, social forestry, REDD+, indigenous people's land protection
		Reducing risk of extinction	15 **Life on land** (Target 15.5, 15.7, 15.12) 16 **Peace, justice & strong institutions** (Target 16.4)	Hunting quotas and permits, hunting bans, NBSAPs, gene banks, indigenous people's intellectual property protections	Conservation offsets, environmental easements; PES, REDD+, resource use fees, transparent financial accounting, taxes, natural capital accounting, ecotourism	Herbaria, zoos, and gene banks
		Protected Areas	8 **Decent work and economic growth** (Targets 8.3, 8.9) 11 **Sustainable cities & communities** (Target 11.4) 14 **Life below water** (Target 14.2, 14.5) 15 **Life on land** (Target 15.4)	Protected area legislation, access and use rights, protections of indigenous and ancestral land rights, protection of traditional lands	Conservation offsets, environmental easements; PES, REDD+, resource use fees, transparent financial accounting, taxes, natural capital accounting, ecotourism	Participatory approaches to natural resource management, social forestry, REDD+, indigenous peoples' land protection

Table 6 2

POLICY GOALS				POLICY GOALS		
Agenda 2063 Goals	Aichi Biodiversity Targets		SDGs and Targets	Legal-Regulatory	Economic-Financial	Socio-Cultural
7.3 Sustainable production and consumption patterns		Sustainable production and consumption	6 **Clean water & sanitation** (Target 6.4) 9 **Industry, innovation & infrastructure** (Target 9.4) 11 **Sustainable cities & communities** (Target 11.6, 11.A) 12 **Responsible consumption & production** (Target 12.2 – 12.7) 14 **Life below water** (Target 14.10)	Policies to decouple environment from economic growth	Certification, taxes, incentives to reduce food waste and loss	Public Private Partnerships (PPPs)
	 	Awareness of biodiversity increased & Biodiversity values integrated	4 **Quality Education** (Target 4.1, 4.7) 11 **Sustainable cities & communities** (Target 11.7) 12 **Responsible consumption & production** (Target 12.8) 13 **Climate action** (Target 13.3) 15 **Life on land** (Target 15.9)	Urban planning, 'polluter pays principles', rewarding best practice for sustainable development and sustainable production and consumption	Certification schemes, taxes, financial incentives, PES	National curriculum, PPPs, corporate environmental and social responsibility and accountability, indigenous peoples' property rights protection
7.4 Water security		Ecosystem services	1 **No poverty** (Target 1.4) 5 **Gender equality** (Target 5.A) 6 **Clean water & sanitation** (Target 6.1 – 6.8) 15 **Life on land** (Target 15.4)	Transboundary water agreements, national water programmes, integrated water resources management, right to access to water, including that of indigenous peoples, protection of areas of culturally important areas	PES for water quality, watershed protection, taxes, water accounts	Community watershed management, ensured access to water
7.5 Climate resilience and natural disasters preparation and prevention		Ecosystem restoration and resilience	11 **Sustainable cities & communities** (Target 11.5, 11.9) 13 **Climate action** (Target 13.1) 15 **Life on land** (Target 15.1, 15.3, 15.4)	Disaster risk reduction strategies (e.g. flood and fire), early warning systems, restoration programme	Climate offsets	
		Ecosystems vulnerable to climate change	1 **No poverty** (Target 1.5) 13 **Climate action** (Target 13.2) 14 **Life below water** (Target 14.2, 14.3)	Climate change policy, environmental impact assessments, policy instruments for indigenous people's risk reduction, agricultural policy supporting food system resilience	REDD+, national adaptation plans, climate change investment plans, clean development mechanism, carbon offsets, carbon credits, green climate fund, climate change adaptation fund	Community-based adaptation, ecosystem-based adaptation, access and benefit sharing, indigenous knowledge systems
7.6 Renewable energy			7 **Affordable & clean energy** (Target 7.1 – 7.5) 9 **Industry, innovation & infrastructure** (Target 9.4, 9.A)	Renewable energy policy, integration of renewable energy, affordability and accessibility into development programmes, energy efficiency standards	Emissions trading, carbon taxes and payments, elimination of perverse incentives, technology transfer (agreements), life cycle analysis, internalization of environmental and social costs	Capacity and skills development

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APPENDIX 6.1

Africa's progress in relation to the Aichi biodiversity targets

Target 1: Awareness of biodiversity increased	African countries experience ongoing poaching activities, unsustainable management of land and water, reclamation of wetlands and other human activities that deplete natural resources and drive biodiversity loss. NGOs have developed ongoing activities to raise awareness of biodiversity and ecosystem service value in the region, helping decision-makers to weigh ecological, socio-cultural and economic values for development options, including conservation and sustainable use of natural resources. Indeed, according to the Green Africa Directory, there are more 50 African NGOs creating awareness on biodiversity and ecosystem services – see http://www.greenafricadirectory.org/listingtype/biodiversity-conservation-organisations/. The IUCN also leads an NGO Forum on Nature Conservation.
Target 2: Biodiversity values integrated	African countries are starting to use multiple natural capital accounting (NCA) tools to evaluate their biodiversity values and integrate them into national accounting, including ecosystem accounts, land and water accounts and location-specific tourism accounts. While challenges remain, these kinds of approaches help policymakers assess who 'wins' and 'loses' from ecosystem changes (WAVES, 2013) and provide complementary measures to GDP (Obst, 2015). In Zambia, the Reducing Emissions from Deforestation and Forest Degradation (REDD+) project has tried to put a value on the country's Forest reserves. Zambia's NBSAP also alludes to the values of biodiversity other than forest resources, including wetlands and wetlands resources, agro-ecosystems and agro-biodiversity resources as well as wildlife. The regulatory value of forest resources, for example in sediment retention by forests, is estimated at 274 million tons, generating a cost saving of $237 million per annum (Zambia's Second NBSAP-2 2015–2025). TEEB country studies in Liberia and Tanzania identify the ecosystem services vital to meeting countries' policy priorities and makes recommendations on how these services can be integrated into policies. The System of Environmental-Economic Accounting (SEEA) is also starting to be used as an international standard for producing national statistics on the environment and its relationship with the economy. The Wealth Accounting and the Evaluation of Ecosystem Services (WAVES) approach promotes sustainable development by ensuring that natural resources are mainstreamed in development planning and national economic accounts. WAVES helps countries to adopt and implement SEEA and has been applied in Botswana, Madagascar and Rwanda. Botswana aims to use natural capital as a diversification tool while Madagascar wants to tap into its biodiversity for sustainable growth. Rwanda wants to use NCA as a tool to realise sustainable development (WAVES, 2015). Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) have also been widely used since 1995 when African ministers of environment endorsed their use at the African Ministerial Conference on the Environment (AMCEN).
Target 3: Incentives reformed	African nations generally have fewer formal subsidies and incentive systems compared with other regions, yet are affected by subsidies and incentives elsewhere, making it hard for African countries to compete. REDD+ has emerged as an incentive opportunity for Africa. However, there is also a need to address subsidies that harm biodiversity, while also allowing Africa to develop greater food security and economic development.
Target 4: Sustainable consumption and production	Consumption of natural resources in Africa remains the lowest globally. However, Africa's consumption is growing, in line with human population increases, and this is putting increasing pressure on its ecosystems. Africa as a whole is predicted to soon show a bio-capacity deficit, where consumption footprints are greater than ecosystem capacity to provide goods, services and handle waste (AfDB-WWF, 2012). In response, an international process on achieving Sustainable Consumption and Production (SCP) has been launched. Africa has been active in this, hosting 162 of 1,015 SCP initiatives globally (SCP Clearing House, 2018). At the regional level, the African 10-Year Framework of Programmes (10-YFP) on Sustainable Consumption and Production launched by AMCEN, as part of the 2012 Marrakech Process on the 10-YFP, provides political impetus for the achievement of SCP in Africa. The Africa Roundtable on Sustainable Consumption and Production (ARSCP), a regional non-governmental not-for-profit organisation, has an overall objective to facilitate the development of national and regional capacities for SCP and promote effective implementation of the concepts and tools of SCP in African countries.

Target 5: Habitat loss halved or reduced	Despite positive efforts in many countries noting improvements in reducing habitat loss, mangrove and forest loss is continuing across Africa. Overall rates of loss indicate that several countries are moving away from reaching Target 5. Between 2001 and 2013 annual average tree cover loss for the African region was 0.2% and 2.57% of the total forest cover was lost during this period. In many places, these changes are being driven by rapid population growth and urbanisation (CBD Secretariat, 2014). Although loss continues in most countries, efforts are underway to reduce the rate of loss of forests and mangroves. Tanzania, Swaziland, Eritrea and Uganda proposed in their fifth national reports to increase and develop protected areas in order to rehabilitate forests in their countries. In other countries like Burkina Faso, there are efforts to promote dry season agriculture whilst in the Seychelles efforts are underway to promote a shift from forestry to ecotourism and fisheries. Other notable improvements in habitat loss can be noted in the Congo Basin in Central Africa where a study based on satellite images has revealed that deforestation rates have fallen by about a third since 2000, with fewer than 2,000 km^2 of rainforest lost every year between 2000 and 2010 (Mayaux *et al.*, 2013). This is due to the network of protected areas, forest gains on the margins of the Congo Basin forest, and the reduced expansion of commercial agriculture in the ten members of COMIFAC – Burundi, Cameroon, Chad, Congo, Democratic Republic of Congo, Central African Republic, Equatorial Guinea, Gabon, Rwanda, and São Tomé and Principe.
Target 6: Sustainable management of marine living resources	The achievement of this target is important in Africa as fishing is an important source of nutrition and income in the region. The main issues to be tackled are overfishing, bad fishing practices and pollution. According to the fifth national reports submitted to the CBD, most African countries are increasingly focusing their national policies on recovery plans for depleted fish stocks rather than on managing and reducing impacts of fishing practices. Some countries maintain subsidies of fishing fleets despite negative implications and the 1995 Fish Stocks Agreement (UN, 1995). There are initiatives by the FAO Fish Programme such as the *Strengthening the Knowledge Base for and implementing an Ecosystem Approach to Marine Fisheries in Developing Countries*. This programme supported Cote d'Ivoire to approve the Beach Seine fishery management plan in 2014, to contribute to the sustainable use of coastal fishery resources. Certification of fishery products such as that by the Marine Stewardship Council (MSC) has been used to promote sustainable fisheries in South Africa. There are nevertheless few fisheries in Africa that have been certified due to constraints that include mismatch between the reality of small-scale artisanal fisheries and the modern certification requirements. For most small-scale fisheries in developing countries, devolution of governance of fisheries to indigenous and local communities, shared governance and co-management have been found to produce successful outcomes. Examples of responsible stewardship and management of marine ecosystems include coastal communities through networks of several Locally-Managed Marine Areas (LMMAs) in Kenya, Tanzania and Senegal. Despite progress being made by African countries to achieve target 6, achieving sustainable fisheries remains a challenge. This is worsened by the presence of subsidised fleets in some regions of Africa, illegal fishing boats and slow progress with certification.
Target 7: Sustainable agriculture, aquaculture and forestry	There has been some successful effort to enhance the sustainability of forestry. However, the lack of data on sustainable agriculture and aquaculture has affected reporting of the extent and trends of these two sectors. The fifth national reports to the CBD suggest that in general, unsustainable agriculture, aquaculture and forestry are the main pressures on biodiversity whilst also recognising that these sectors are the major employers in Africa thus contributing to human well-being. In countries such as Burkina Faso, Ethiopia, Madagascar, Mozambique and Tanzania, over 75% of people are employed in agriculture, while in Congo, Egypt, Morocco and Senegal, 30–45% of employed people work in agriculture (FAO, 2013). Several countries are promoting community-based conservation agriculture (Swaziland) and organic farming (Egypt), and the setting up of guidelines for sustainable practices (South Africa). Similarly, in Burundi, Uganda, Sierra Leone and the Seychelles policies promoting sustainable forestry are in place and in Malawi, reforestation practices include national tree planting days. Use of forest concessions in the Congo Basin has helped to promote more sustainable forest management by providing logging companies with a long-term interest in managing the resource effectively. Further, the use of certification schemes, such as those promoted by the Forest Stewardship Council (FSC), is also helping to promote sustainable management (CBD Secretariat, 2014).
Target 8: Pollution reduced	To address challenges with nitrogen and phosphorous, 37 African countries adopted the *Kampala Statement for Action on Reactive Nitrogen in Africa and Globally* in 2013.The three issues addressed by the statement include (a) improving soil fertility status, nutrient use and supply; (b) acting on nutrient and fertiliser policy; and (c) reducing nitrogen's contribution to the degradation of water bodies and air pollution. Other sustainable land and water management measures being used by African countries include agroforestry in Malawi and Senegal; conservation agriculture in Zambia; rainwater harvesting in Burkina Faso; and integrated soil fertility management in West Africa. These practices have delivered positive results for soil quality and crop yields. Micro-dosing that involves combining conventional agriculture with improved seed varieties to reduce the amount of fertiliser used, has been used in Mali, Burkina Faso and Niger.
Target 9: Invasive alien species prevented and controlled	Efforts are underway to manage invasive alien species (IAS) in African countries. For example, Ethiopia, Malawi, Mali, Niger, Rwanda, South Africa and Uganda have programmes for the management of IAS. Other countries like Burkina Faso have established species lists. Egypt and Benin have allocated resources to study IAS and Sierra Leone, Somalia, Sudan and Swaziland have implemented programs to raise awareness of the effects of IAS.
Target 10: Pressures on vulnerable ecosystems reduced	Coral bleaching and damage to coral reefs has been well studied in East Africa and the Indian Ocean. Climate impacts on other vulnerable ecosystems, such as mountain peaks are also studied, for example, the retreat of ice on Mt Kilimanjaro. There is insufficient information on this target in the African region to assess progress.

Target 11: Protected areas increased and improved	Most African countries have already achieved, or are likely to achieve by 2020, elements of Target 11. Seychelles for example, surpassed the area suggested by Target 11 in 2011 when its government declared new protected areas in the archipelago, which resulted in over half of its total land area becoming protected areas (PAs) (Dogley, 2011). However, barriers still remain due to lack of institutional capacities, disparities in governance, social capital, and availability of ecological data. Twenty-two African countries and territories have over 17% of their land covered by PAs (including Reunion Island) and 4 have over 10% of their marine extent covered by PAs (including Mayotte) (UNEP-WCMC *et al.*, 2017). The unavailability of data makes it difficult to identify and develop protected areas because many countries cannot afford to undertake comprehensive and detailed research (Abdulla *et al.,* 2009). The focus in the expansion of reserves has been through the promotion of community-based forest and wildlife management, through engagement and management of local communities and through Indigenous and Community Conserved Areas (ICCAs) (http://www.iccaregistry.org). This kind of conservation management has provided a way for local people to benefit from conservation in countries like Namibia, whilst at the same time leading to increases in animal populations. Other undesirable outcomes, however, have included crop raiding by animals whose numbers have increased, and inadequate or insignificant benefits to the local communities.
Target 12: Extinction prevented	There is limited information to assess progress towards this target in Africa, although comprehensive data on extinction risk are now available through the IUCN Red List (see https://www.nature.com/articles/sdata20167). Similar to global trends, there is an indication that no progress is being made towards the prevention of the extinction of known threatened species. Populations of many species are still declining due to pressure from illegal trade in wildlife. CITES is working with a number of African countries in relation to wildlife crime. For example, *Operation Cobra II* led by Interpol, development of *National Ivory Action Plans*, production of *14 Urgent measures* in 2013, a monitoring programme called the *Monitoring of Illegal Killing of Elephants (MIKE)* and the *Wildlife Enforcement Monitoring System* (WEMS). At a regional level, there are conservation measures such as the *Regional Action Plan for the Conservation of the Cross River Gorilla* aimed at addressing the continued loss of gorillas by increasing the budget for law enforcement and deployment of eco-guards.
Target 13: Genetic diversity maintained	The genetic diversity of Africa's crops and livestock remains high. However, there have been some local declines but is still lower than in most regions. A number of actions have been undertaken in African countries to effectively capture and assess plant genetic resources. Molecular technologies have been adopted in Malawi, Namibia, Niger, Tanzania Zimbabwe Benin, Burkina Faso, Ethiopia and Kenya whilst conservation of indigenous, medicinal and traditional plant species has been promoted in Uganda and Nigeria. However, to effectively meet this target, more action needs to be undertaken. There is need to implement the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture and adopt existing and emerging information, computing, genomic technologies as possible responses to a conserve Africa's plant and animal genetic resources. Existing initiatives like Plant Breeding Capacity Building (GIPB), Biosciences Eastern and Central Africa (BECA) and the Southern African Development Community (SADC) Plant Genetic Resources Centre (SPGRC; http://www.spgrc.org.zm/) need to be supported to improve the institutional capacity of breeding systems, breeders and existing facilities.
Target 14: Ecosystem Services	African countries receive many benefits from biodiversity and in terms of ecosystem services to support livelihoods and well-being. However, the information base on the status and trends in ecosystem services in Africa is weak and considerable work is needed to assess how these services are changing in Africa and what actions are being taken to address negative changes.
Target 15: Ecosystems restored and resilience enhanced	Although there is not much data to measure the progress towards this target, the fifth National reports to the CBD have indicated the efforts that most African countries are taking to build ecosystem resilience. Most efforts have been through farmer-managed natural regeneration practices, mangrove restoration, and many other activities. Countries that have restoration projects including reforestation include Morocco, Niger, the Seychelles Algeria, Benin, Chad and Sudan. Others like Burundi and Côte D'Ivoire have initiated the process of determining carbon sequestration of forestry ecosystem through the integration of REDD+. AFR100, (the African Forest Landscape Restoration Initiative) was launched at UNFCCC COP21 and represents a regional effort aimed at restoring 100 million hectares of land in Africa by 2030. Currently, participating countries include Malawi Ethiopia, Kenya, Liberia, Madagascar Democratic Republic of Congo, Malawi, Rwanda, Togo and Uganda. Further action is however still needed for African countries to meet this target by 2020.
Target 16: Access to and sharing benefits from genetic resources	Twenty six countries have ratified the Nagoya Protocol and others are in the process of ratification. The COMIFAC project under UNEP helped ten countries in central Africa member of COMIFAC to ratify and implement the Nagoya Protocol. It aims for 70% of parliamentarians to be trained on the importance of ABS by 2016 and for at least 9 COMIFAC countries to have implementation strategies and action plans and execute activities by 2017. African countries nevertheless face several difficulties including lack of capacity in drafting legal and policy frameworks in order to integrate ABS into their national legislation.
Target 17: Biodiversity Strategies and Action Plans	Most of the post-2010 NBSAPs are developed and adopted at the national level, providing policy guidance on countries' actions on biodiversity and delivering action. Updating of NBSAPs not only helps Africa achieve Target 17, but will also aid countries to develop national poverty reduction strategies, national accounting, and other development plans. Updating and implementing NBSAPs fundamentally serves as an effective tool for mainstreaming biodiversity into broader national and local strategies, plans and policies.

Target 18: Traditional knowledge	Traditional knowledge is very important in Africa where many people remain closely connected to the land where they have lived for millennia and there are numerous distinct ethnic and language groups in the continent and its offshore islands. Language diversity in Africa started to decline after 1980 as people increasingly moved to large cities and the impacts of globalisation were starting to be felt. 338 languages in 34 African countries are now recorded as Vulnerable, Endangered or Extinct (Moseley, 2010), with Sudan having the highest number of threatened languages. Community-based natural resource management is one of the major ways to both conserve natural resources and promote traditional knowledge and is being increasingly utilised in Africa.
Target 19: Sharing information and knowledge	Knowledge, science and technology play a crucial role in assessing the status of biodiversity, identifying threats and setting priorities for conservation and sustainable use. In Africa, key information is still missing and data collection is limited. Between 2008 and 2014 the number of occurrences of African species records integrated into Global Biodiversity Information Facility (GBIF) increased from around 5 million to almost 20 million. However, many African species records are held in non-African institutions, and therefore the figures inaccurately reflect the data mobilisation capacity within the region.
Target 20: Mobilising resources from all sources	Serving as the major source of funding for developing countries to meet their obligations under the Convention on Biological Diversity (CBD), the major international financial mechanism assisting Africa for biodiversity conservation is the Global Environment Facility (GEF). GEF funds have been and are being utilised for 985 projects in Africa, of which 369 projects are based on biodiversity focal areas (GEF, 2014). The biodiversity projects are most commonly focused on mainstreaming biodiversity into laws, policies and regulations. African governments are pursuing other innovative ways of mobilising resources for biodiversity conservation.

APPENDIX 6.2

Policies and initiatives in Africa to support transboundary ecosystem governance

Policies and initiatives	Description	Institution
Agenda 2063 for Africa	Aspiration 1 and 3 – Ensures positive socio economic transformation	NEPAD, Regional Economic Communities (RECs) and Member States
NEPAD Strategy 2014 – 2017 / NEPAD/AU/ AMCEN Initiative on environment	Contains regional priorities based on national issues. Promotion of regional development through integration at sub regional level.	NEPAD, RECs and Member States.
Transboundary River and Lake Basin Commissions	Protection of the resources of the transboundary water resources (biodiversity and ecosystems)	Lake Chad, Lake Victoria, Nile River, Niger River, Okavango, Limpopo, Zambezi, Senegal River etc.,
Transfrontier conservation areas (TFCA)	Protection of transboundary terrestrial resources (biodiversity and Ecosystems)	Maloti-Drakensberg Transfrontier Conservation and Development Area, Great Limpopo Transfrontier Conservation Area, Niger Delta, Ruwenzori, Mount Elgon. COMIFAC, Miombo Trans-frontier Commission.
Landscape Commissions	Conservation of National Resources. Reforestation	Algiers and Maputo convention Great Green Wall for the Sahara and the Sahel Initiative (GGWSSI)
Terrestrial Commissions	Conserving genetic Biodiversity through gene banks	SADC Plant Genetic Resources
Aquatic (Fresh and Marine)	COMESA fisheries and Aquaculture Strategy, Tuna Commission, Protection, Management and Development of Marine and Coastal Resources	COMESA South West Indian Nairobi and Abidjan Convention

APPENDIX 6.3

Examples of economic incentives and financial instruments and their application in Africa

Instrument	Description	Illustrative applications in Africa
Payments for ecosystem services (PES)	PES schemes represent agreements in which beneficiaries of particular ecosystem services pay the providers of those services (Schomers *et al.*, 2013). Since their inception in the late 1990s, several PES schemes globally have influenced land-use change. Fewer studies have demonstrated impacts in increasing service provision, and fewer still the impacts on livelihoods. While significant risks and benefits of PES continue to be discussed, their capacity to link service providers to beneficiaries remains a powerful means of incentivising change through conservation.	Namirembe *et al.*, (2014) review 50 tree -based ecosystem service projects including co-investment, commodification, and compensation for carbon, water, habitat for biodiversity, and bundled services. Water Funds (e.g., the Nairobi Water Fund, and Tana Basin management) involve the private sector in incentivising land-use change upstream of urban drinking water sources. Tourism companies pay communities for the protection of wildlife (Tanzania, Kenya, Namibia, Zimbabwe (Campfire), Zambia (ADMADE). Revenue from wildlife accounts for up to 24% of GNP.
REDD+	REDD+ has been developed as an innovative way of mitigating climate change whilst at the same time generating considerable benefits for biodiversity and ecosystem services with the potential to extend the benefits to indigenous and local communities. Achievement of these multiple benefits requires close coordination between relevant stakeholders including local, international and national players. Activities aimed at achieving Afforestation and reforestation in the context of REDD+ therefore, if effectively implemented have potential to enhance ecological connectivity which is important in ecosystems adaptation (CBD Secretariat *et al.*, 2011)	Tanzania with the support of the government of Norway has piloted 9 REDD+ projects across Tanzania between 2009 and 2015. The pilots revealed the need for Tanzania to adapt participatory forest management to a REDD+ context which created funding and implementation opportunities for scaling up participatory forest management in various parts of the country. The pilots also showed that the REDD+ process contributed to strengthening forest management rights through community-based forest management. However, of the 9 pilot projects that were under the project, only 3 managed to produce (Project Design Documents) PDDs to support the sale of carbon credits. By 2015 however, none of these projects had managed to sell credits on the voluntary market. (Blomley *et al.*, 2016).
Overseas Development Assistance (ODA),	ODA has been a growing means of supporting biodiversity and ecosystem services. The Global Environment Facility (GEF) plays a key role in linking environmental quality and national development priorities through its role as the financial mechanism for the CBD, UNFCCC, and UNCCD amongst others.	The Volta Basin Authority with the financial support of the World Bank and the GEF has a $10 million project investing in large-scale "conservation and restoration of ecosystem function" including ten specific restoration activities that link environmental health with the water management priorities of the basin authority.
Emissions reductions trading	A market mechanism where emissions permits or allowances are distributed through trading. This is a global instrument introduced in the early 1990s to reduce national and trans-boundary air pollution (GHGs) through trading of certified carbon credits.	Examples from Africa are scanty and not as successful as those assessed in Asia and Latin America. However, the mechanism has shown promising results in Ethiopia (afforestation and reforestation) and Kenya (soil carbon).

Instrument	Description	Illustrative applications in Africa
Carbon taxes and payments	Carbon taxes and payments are of interest particularly through REDD+ mechanisms and because they target a regulating ecosystem service.	For Africa in particular, financial incentives to conserve central African forests to offset the emissions from non-African countries will be reviewed. In the Congo Basin, the Earth's second-largest tropical forest extending over six countries, several large-scale REDD+ initiatives are implemented. The Forest Carbon Partnership Facility (FCPF), the REDD+ Partnership, the UN-REDD Programme, the Congo Basin Forest Fund (CBFF), and the Forest Investment Program (FIP) support the shared vision of offsetting the emissions from non-African countries by financially rewarding local stakeholders for enhanced forest management. While REDD was initially focused on reducing emissions from deforestation and forest degradation, REDD+ additionally aims to conserve and enhance forest carbon stocks and to promote sustainable forest management, which positively affects biodiversity conservation (Pavageau *et al.*, 2014).
Bans or permanent conservation easements	Permanent conservation easements guarantee that a tract of land will not be used or farmed. This usually involves an annotation in the property title or at the land registry office – national parks would be in this category. The negative counterpart of easements – bans – can ensure that products harmful to health or environmental quality such as pesticides are not used.	The ban on plastic bags in Rwanda immensely contributed towards reduced environmental pollution. Such measures may prove effective but may also bear actions of strong monitoring and regulatory measures, which might be costly to enforce.
Resource use fees	Resources use fees are conservation approaches whereby resource users pay royalty fees to holders of protected areas in return for a particular service or resource use within the protected areas. One example is trophy hunting. This is widely practised globally and individuals can be granted the right to hunt a certain wildlife species or to collect a certain wild plant material for economic, social and recreation purposes. The revenue collected is invested in infrastructure and management capacity building.	Community-based conservation programmes which establish an economic value for wildlife and provide incentives for sustainable use are an increasingly popular mechanism for returning to local communities the responsibility of managing their natural resources. Trophy hunting, in particular, has been identified as a rewarding form of wildlife use which may provide both community benefits and incentives for wildlife conservation. This has been implemented many southern African countries and studies suggest that it is not a sustainable form of wildlife protection. As has been observed in Tanzania, Botswana, Zambia, Zimbabwe and Namibia, the following conditions must be fulfilled to be successful: scientifically-determined wildlife population estimates, comprehensive quotas which are enforced, reputable and honest outfitters, transparent and accountable revenue collection and disbursement mechanisms, competent management and oversight of the industry, and fair distribution of proceeds at the local level.
Tradable permits	Unique to the African context is the sale of permits to harvest African wildlife. Permits allowing the hunting of biodiversity, particularly Africa's mega-fauna, many of which are threatened or endangered, are largely controversial but have provided hundreds of thousands of dollars to conservation efforts.	While controversial, the financing from permits can be used to support conservation efforts (e.g., the hunting permit for a single black rhino was valued at $350,000). Unique to the African context is the sale of permits to harvest African wildlife. Permits allowing the hunting of Africa's mega-fauna, many of which are threatened or endangered. The mechanism is largely controversial but has provided hundreds of thousands of dollars to conservation efforts. The premise is that an appropriately defined tradable-permit system can minimise the cost of reaching a predefined environmental target (Tietenberg, 2003). It is expected that in a perfectly competitive market, permits will flow towards their highest-valued use, and those that would receive lower value from using the permits would have an incentive to trade them to someone who would value them more. Overall, such trade benefits both parties. However, the potential of this system to protect the economic value of the resource, rather than the resource itself, has attracted criticism.

Instrument	Description	Illustrative applications in Africa
Offsetting schemes	The concept of "Biodiversity offset scheme" is designed to compensate for biodiversity loss or degradation caused by development projects in a particular area through tantamount restoration actions and habitat expansion elsewhere. The "offsets" can be traded and a project developer can compensate by buying "credits" from reserve managers or landowners who have managed and conserved biodiversity according to set standards. The approach has been increasingly integrated into government and lender policies (IUCN, 2014). Despite the potential to advance biodiversity conservation, the scheme is not popularly implemented. There are concerns that it will undermine existing approaches and negatively encourages development against biodiversity conservation goals. The argument is there are hardly any success stories or empirical evidence and more uncertainty over the offset outcomes (IUCN, 2014). As governments and business seek to address the impacts of development projects on biodiversity, biodiversity offsets emerge as attractive option attracting increasing interest. They are largely based on the polluter pays principle. Biodiversity offsets are structured to compensate for critical damage to biodiversity through internalising the external costs of biodiversity loss and enforcing the payment of this cost in compensation for the loss (OECD, 2016).	A good case example in Africa is Liberia, where a national biodiversity offset scheme has been prepared for the mining sector by the World Bank Group (World Bank, 2015). In an effort to conserve protected areas (particularly forest areas) facing competing land-uses such as commercial forestry (logging), mining and agriculture, a national biodiversity offset scheme is currently proposed for the mining sector and biodiversity conservation credits are to be established before any mining project is implemented. Projects will be required to purchase credits that are made available through the scheme. However, the impact is yet to be seen in the years ahead. Another example is found in South Africa, where a biodiversity offsetting scheme has been exercised for the last six years (Jenner *et al.*, 2015). The most common objective adopted in offset programmes is to deliver "No Net Loss" to, for example, ecosystem function or a specific species (fauna or flora) etc. The AfDB Operational Safeguard 3 seeks to deliver a net benefit or no net loss on biodiversity and natural habitats. In this regard, biodiversity offsets are meant to be carried out as the final step of the mitigation pyramid (avoid, minimise, restore and offset) – to help meet a scheme's environmental objectives (AfDB, 2013). In South Africa, ecosystem mapping and classification has underlined the development and implementation of technical attributes of offsetting policy and has proved to be a crucial enabling factor in the design of offsets that are planned for biodiversity (Jenner *et al.*, 2015). Most African countries are undertaking significant infrastructural projects (roads, highways, dams, bridges, etc.) accompanied with ecosystem degradation significantly impacting the natural capital without real offsetting mechanisms. African biodiversity offsets are however attracting increasing interest as governments and the private sector seek to address biodiversity loss occurring through development activities. The African banking system could be better placed to play an active role in addressing ecosystem conservation. The African Development Bank is contributing to increased awareness amongst policy makers to closely align environmental impacts with those causing the damage and engaging the private sector, not only in financing conservation but also in implementing conservation solutions. This increases the possibility of governments allowing development in sensitive environments while assuring no net loss of ecosystem services and biodiversity and still gains the economic benefits of development. Types of biodiversity offsets considered include One-off offsets, In-lieu fees, and Bio-banking. Yet, markets in the continent remain underdeveloped for biodiversity mitigation and conservation. In Madagascar, Rio Tinto on its extraction at the Rio Tinto ilmenite mine is investing in biodiversity offsets at several forests (littoral and non-littoral) sites covering almost 6,000 ha of forest. If the project proceeds as planned, a net positive impact will be achieved thanks to biodiversity offset provisions.
Taxes and fiscal incentives	Environmental taxes are defined as: "Any compulsory, unrequited payment to general government levied on tax-bases deemed to be of particular environmental relevance" (OECD, 2017), where the tax bases "include energy products, motor vehicles, waste, measured or estimated emissions, natural resources etc." Taxes are used to address market failures and externalities: impacts on ecosystems that are side-effects of production and consumption, and which do not enter into the calculations of those responsible for the processes. Where the effects are negative, externalities are costs. By levying a tax or charge on the activity giving rise to the effect, the external cost can be partially or wholly internalised.	Examples in Africa mainly relate to the forestry sector to promote sustainable forest management. The most common taxation takes the form of concession fees, royalty fees, stumpage fees, and export levies. Ghana applies some of these taxes as post-harvest fees (e.g., on processed wood products, sawn wood or plywood) and Cameroon applies concession fees on an annual basis on the area of forest land given out on concession.

Instrument	Description	Illustrative applications in Africa
Trade and foreign investments (green economy)	Movement towards a green economy can reduce the impact of economic growth on biodiversity and ecosystem services. However, this is distinct from approaches that finance or recognise the values of biodiversity and ecosystem services. A green economy approach reduces negative externalities on the environment, aiming to "rebuild natural capital (e.g., biodiversity and ecosystem services) as a critical economic asset and source of public benefits, especially for poor people whose livelihoods and security depend strongly on nature" (Huff, 2015), whereas ecosystem service-based approaches value the positive externalities of the environment on economic growth.	The Southern Agricultural Growth Corridor of Tanzania (SAGCOT) is a project managed by the office of the vice president of Tanzania. It aims to reconcile conservation, agricultural development and livelihood objectives, linking policy, private capital investments with conservation, economic growth and ecosystem services in a risk-sharing public-private partnership. The ecosystem service approach is applied in the context to ensure that agriculture and livelihood dependencies on ecosystem services are accounted for and acknowledged. Presently, WWF and IUCN are collaborating with the SAGCOT Centre to ensure a minimal biodiversity and ecosystem services impact (since there is controversy whether SAGCOT is about "green growth", due to e.g., impact on water availability).