

Protected Areas Resilient to Climate Change, PARCC West Africa



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Managing and financing protected areas to adapt to climate change: A rapid review of options



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Executive Summary

Commissioned by the PARCC West Africa project, *Managing and financing protected areas to adapt to climate change: A rapid review of options* involved: a) researching a broad range of possible options – i.e., adaptation strategies – for managing PAs to minimise climate change impacts, and b) reviewing possible financing mechanisms. The report was compiled via a desktop literature review, consultation with key experts, and validation by the project’s technical advisory group. The document is targeted primarily at government and non-government agencies responsible for funding and managing PAs, although some findings may also be relevant to donor governments and agencies. It is intended that the report will inform the development of regional and national strategies (which are not part of this assignment), with a view to developing best approaches to managing and funding PAs to minimise the impacts of climate change.

Chapter 1 provides an overview of possible adaptation strategies, indicates those which are in use in West Africa already, and identifies how “change management” approaches can assist PA managers to successfully implement their chosen adaptation strategies. Chapter 1 finds that there are many CC adaptation strategies available and already in use for PAs. These adaptation strategies use similar tools and approaches to business-as-usual PA management, but integrate information about CC impacts and a much more dynamic understanding of biodiversity and climate. In West Africa, the PARCC project is at the forefront of efforts to assist PA managers with CC adaptation, and will produce locally relevant tools for other PA managers in the region. There are great challenges in adapting PA agencies to a new more dynamic approach, and change management techniques can assist with necessary transitions.

Chapter 2 reviews the broad number of PA financing mechanisms available, indicating which of these are commonly in use in West Africa, considers what’s different about adaptation financing for PAs, then suggests some specific criteria to take into account in developing PA adaptation and funding strategies in the region. Chapter 2 suggests that there are many available mechanisms to finance PAs, but only a small number are commonly used in West Africa: tourism charges (especially gate entry fees), central government budgets, and donor funds. Also, PA financing is not simply about having more funding, but also the mechanisms to manage and use the funding effectively; ultimately, questions of management effectiveness. It is difficult to distinguish financing for PA adaptation to CC from general PA management costs, and may not be useful to do so. West African PAs face particular challenges, which point to seeking out more straightforward solutions to CC adaptation and financing challenges.

Chapter 3 provides recommendations, taking into account the findings in Chapters 1 and 2. A simple nine-step model is proposed to provide general guidance to PA managers in West Africa to successfully meet the challenges – and indeed opportunities – presented by climate change. Recommended steps are: 1. Start up, 2. Build a coalition, 3. Get better information, 4. Set your evidence-based strategy, 5. Plan for change and manage adaptively, 6. Mobilise resources, 7. Implement, monitor, evaluation and improve, 8. Build capacity, 9. Share and exchange. The report identifies some available tools to help PA managers, and notes those that are forthcoming to assist further. It also provides wider recommendations for the project and other partners to support managers in the region.

Introduction

Climate change is expected to have considerable impact on Protected Areas (PAs), and some of these impacts have already been observed. Documented impacts range from shifts in species distributions, reductions in population size, extinction or extirpation of range-restricted or isolated species and populations, loss of ecosystems and habitat, increased spread of wildlife diseases or parasites, and increased spread of invasive or non-native species that can outcompete focal species (Mawdsley et al 2009). Conversely, PAs provide a powerful tool to address climate change, both to optimise carbon sequestration and storage and to support ecosystem-based adaptation (EbA; Dudley et al 2009). In response, governments and conservation organisations have been developing adaptation strategies to facilitate the adjustment of human and ecological systems to altered climate regimes.

Adaptation strategies involve looking for climate risks and opportunities (e.g. through the use of Strategic Environmental Assessment), within sectors and projects, using market-based climate mechanisms, and otherwise seeking out climate mainstreaming opportunities (Dallal-Clayton and Bass 2011; UNFCCC 2012; OECD 2012). The OECD (2012) suggests that while many countries are developing such strategies, fewer of them are being implemented; and Mertz et al (2008) looking at developing country implementation of adaptation policies conclude that there is still much to be done.

PARCC West Africa, officially known as 'Evolution of Protected Area Systems with Regard to Climate Change in the West Africa Region', is a Global Environment Facility (GEF)-funded project managed by UNEP-WCMC. The project is developing strategies and tools to increase the resilience of PAs to climate change, and build capacity in the region. The scope of the project is 5 core countries in West Africa: Chad, Gambia, Mali, Sierra Leone, and Togo. An additional 3 countries (Burkina Faso, Côte d'Ivoire and Ghana) are involved in activities related to the design of transboundary PAs and/or biodiversity corridors. This report was commissioned by the PARCC West Africa project to review options for managing PAs for climate change impacts and to suggest possibly appropriate financing mechanisms.

Chapter 1 Review of options for managing PAs to minimise CC impacts, especially for West Africa

This section provides an overview of possible adaptation strategies (1.1), indicates those which are in use in West Africa already (1.2), and identifies how “change management” approaches can assist PA managers to successfully implement their chosen adaptation strategies (1.3).

1.1 Options for managing PAs to minimise the impacts of climate change

There are numerous options for managing PAs to minimise the impacts of climate change, sometimes called ‘climate proofing’ (e.g. in Vos et al 2008). There is also an emerging paradigm of using PAs as part of a broader resilience-building strategy (Ervin et al 2010), which is closely linked. Together, many adaptation strategies have been proposed in the scientific literature, as well as in public policy and donor programming documents. Authors have conducted a variety of reviews, using different categorisations for these strategies, however there is no common framework in use and the frameworks proposed are not necessary geared to the needs of PA managers (Heller and Zavaleta 2009). For example, Dudley et al 2009 prioritise 6 recommendations for international policy-makers, while Mawdsley et al (2009) group strategies into four broad categories well-suited to research and practice, mirroring those used by The Heinz Centre (2008); Heller and Zavaleta (2009) identified condensed 524 cited adaptation strategies into 113 recommendation categories and ranked them by frequency of times cited in different articles; Baron (2009) takes a more institutional approach focusing on the culture around PA management; Dunwiddie et al 2009 looks at the issue from a state-wide management perspective; and so on. Indeed, it is no wonder Heller and Zavaleta (2009, 15) report that PA managers are “particularly uncertain” about how to factor climate change into their work.

For the purposes of this assignment, we devised a grouping from the perspective of the management community around PAs, recognising that management of PAs happens on multiple levels (Figure 1).

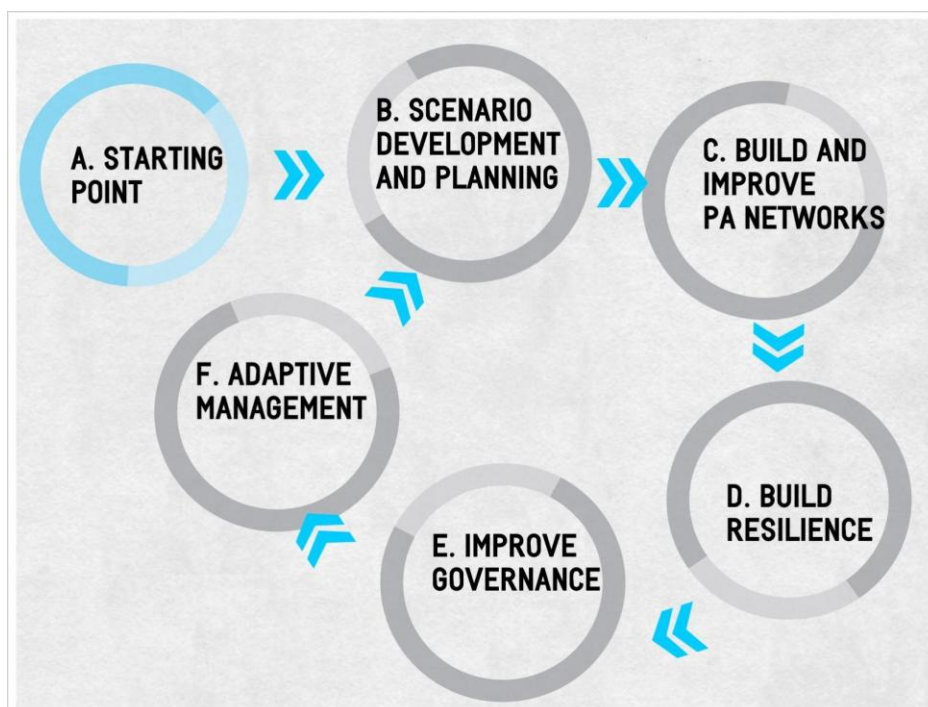


Figure 1: Adaptation strategies for Protected Areas

We attempted to be inclusive in our review of adaptation strategies, grouping very specific strategies identified under broader headings for ease of presentation. Some strategies proposed which were extremely generic conservation management good practices (e.g. build partnerships, increase evidence-based decision making) were not included. Annex 1 provides the detail of all of the main adaptation strategies identified through the literature (references noted throughout). We include key considerations or drawbacks of the strategies, noting that each strategy has distinct strengths and limitations and varies in its appropriateness for particular management contexts. Mawdsley et al (2009) note that many adaptation strategies are broad and general, such as might be adopted by management agencies at a national or sub-national level, but that much of the actual work of climate adaptation will necessarily occur at a finer scale. For these reasons and more, an overview at the level of this report can only be indicative and provide a reference document to facilitate further investigation by those with responsibility for PA management.

Here we provide an overview of the adaptation strategies identified (with full detail in Annex 1):

A. Starting point

Recognising that CC presents a challenge to PAs, and that PAs can be part of a resilience building strategy.

Strategy	Explanation
1. Identify the objective of CC adaptation (Baron et al 2009; Heller and Zavaleta 2008)	PAs are important for biodiversity conservation at different levels for many reasons. Given limited resources, identify the important aspects of PAs that adaptation strategies should address. Important for prioritising where to focus scarce time, money, and effort (Baron et al 2009)

B. Scenario development and planning

Considering how the impacts of CC will affect the PA network, and identifying opportunities for adaptive measures.

Strategy	Explanation
2. Define reference conditions (Baron et al 2009; Hansen et al 2003; Heller and Zavaleta 2009)	Begin with a broad understanding of changes in natural resources and their drivers of change; general projections should be sufficient initially. An established reference condition could be useful if the reference condition (i) provides greater opportunity for species or populations to adapt to changing climate, then it offers a goal for protection or restoration, or (ii) is highly dependent on past climate conditions, knowledge that the conditions that produced the reference state are irretrievable can reinforce the need for adaptation to new conditions (Baron et al 2009)
3. Assess risk: Identify the resources and processes at risk from CC (Baron et al 2009; Heller and Zavaleta 2009)	General projections of CC risk should be refined in subsequent iterations (Baron et al 2009). Identify societally acceptable versus unacceptable change, and also controllable versus uncontrollable change.

	Explicitly consider thresholds and consequences of exceeding thresholds (abrupt or relatively rapid change in an ecosystem quality, property, or phenomenon)
4. Incorporate CC impacts into programmes, and activities (Mawdsley et al 2009; Heller and Zavaleta 2009)	CC is not addressed in many existing natural resource management activities (Hannah et al. 2002). Incorporating CC considerations and information is also important to support lessons learning and the development of appropriate laws, policies, etc.

C. Build and improve PA networks

Strengthening and (if applicable) extend the PA network in order to respond to the expected CC scenario and manage risk.

Strategy	Explanation
5. Increase the extent of PAs, or 'more and larger' PAs and buffers (Dudley et al 2009; Mawdsley et al 2009; Heller and Zavaleta 2009)	This strategy would increase the extent of terrestrial and aquatic habitat protected from non-climate anthropogenic threats, particularly in ecosystems where much carbon is stored and/or captured and is likely to be lost without protection, or where important ecosystem services are under threat – particularly tropical forests, peatlands, mangroves, freshwater and coastal marshes and seagrass beds, as well as marine ecosystems (Dudley et al 2009)
6. Improve representation within PA networks (Mawdsley et al 2009; Heller and Zavaleta 2008)	Representation (of species, ecosystems, habitats) attempts to build a more comprehensive portfolio of PAs, e.g., protecting examples of all major ecosystem types within a country (Julius and West 2007)
7. Improve replication within PA networks, e.g. via component redundancy and functional redundancy (Dunwiddie et al 2009; Mawdsley et al 2009; Heller and Zavaleta 2008)	Replication (e.g. species redundancy attempts to conserve multiple examples of each ecosystem type) (Julius and West 2007) as a risk management strategy
8. Enhancing connectivity: Connect PAs within landscapes/seascapes and increase connectivity among PAs (Dudley et al 2009; Dunwiddie et al 2009; Vos et al 2008; Opdam and Wascher 2004; Da Fonseca et al 2005; Hannah and Hansen 2005; Heller and Zavaleta 2009; others); increase landscape permeability to species movement (Mawdsley et al 2009); Protect movement corridors, stepping stones, and refugia (Mawdsley et al 2009; Vos et al 2008), e.g. via systems of fixed reserves (Carroll et al 2009)	Increasing broader landscape connectivity and permeability to species movement (Da Fonseca et al 2005). This can include buffer zones, biological corridors and ecological stepping stones, which are important to build connectivity to increase ecosystem resilience to climate change at the landscape/seascape scale and to increase the total amount of habitat under some form of protection (Dudley et al 2009), especially outside PAs and PA networks. Such areas might include movement corridors for terrestrial species, habitat islands that could serve as stepping stones between larger reserves, stopover areas for migratory waterfowl, or refugia (areas with minimal climate impacts) (Julius and West 2007; Vos et al 2008). Also, linking isolated habitat that is within a new suitable climate zone to the nearest 'climate-proof' network (Vos et al 2008). Rather than focusing on a single species or ecosystem type, this approach would use a variety of existing

	management techniques to enhance the ability of the broader landscape matrix to support movements by large numbers of animal and plant species in response to CC (Mawdsley et al 2009)
9. Change management, including focusing some management specifically on mitigation and adaptation needs (Dudley et al 2009; Heller and Zavaleta 2009)	Managing PAs under conditions of CC will require significant changes in the way in which PA agencies do business, including with respect to issues that relate to planning, organisation, leadership and evaluation. Within PA agencies, implementing such wide-ranging changes will require that a major change strategy plan be developed at the PA systems level and management plans for individual protected areas. Capacity building will also be needed, to establish the know how at the institutional level and within staff cadres, to deal with the emerging management challenges and opportunities. Many of these skills will also be needed by local communities and others managing land (Dudley et al 2009)
10. Direct species management (Mawdsley et al 2009; Heller and Zavaleta 2009), notably: (i) Focus conservation resources on species that might become extinct; (ii) Translocate species at risk of extinction; and (iii) Establish captive populations of species that would otherwise go extinct	(i) Invest resources in the maintenance and continued survival of those species most likely to become extinct as a result of CC. (ii) Moving animals, plants, and other organisms from sites that are becoming unsuitable due to global climate change to other sites where conditions are thought to be more favorable for their continued existence. Other names for this strategy include assisted dispersal, assisted migration, and assisted colonization / increasing colonization capacity (Julius & West 2007; McLachlan et al. 2007; Mitchell et al. 2007; Hoegh-Guldberg et al. 2008; Vos et al 2008). (iii) Initiate captive maintenance programmes for species that would otherwise become extinct due to CC.

D. Build resilience

Employing resilience-building strategies taking into account that what happens outside PAs influences what happens inside (Da Fonseca et al 2005).

Strategy	Explanation
11. Improve management and restoration of existing PAs to facilitate resilience (Mawdsley et al 2009; Dudley et al 2009; Heller and Zavaleta 2008)	Better efforts to ensure that ecosystems and the services that they provide within PAs are recognised and not degraded or lost through illegal use or unwise management decisions (Dudley et al 2009).
12. Design new natural areas and restoration sites to maximise resilience (Mawdsley et al 2009; Heller and Zavaleta 2008); focus on ecosystem function (rather than specific components [species or assemblages]) (Dunwiddie et al 2009)	Protection of future habitat areas could be a key consideration whenever new natural areas or extensions to existing natural areas are proposed (Fischlin et al 2007), e.g., establishment of PA networks along elevational gradients may be a viable adaptation strategy for certain taxa; such networks would provide organisms with the spatial flexibility to shift distributions along elevational gradients as climatic conditions change (Mawdsley et al 2009).

<p>13. Increase the level of protection for carbon stores within PAs (Dudley et al 2009; Heller and Zavaleta 2008)</p>	<p>Recognising protection and management aimed at specific features that have high value in carbon storage, for example to maintain old-growth forest, avoid ground disturbance or drying out of peat and restore PAs where vegetation has been degraded (Dudley et al 2009).</p>
<p>14. Reduce (human-caused) pressures from sources other than CC (Baron et al 2009; Mawdsley et al 2009)</p>	<p>Removal of other stressors (e.g. decreasing the extent of poaching or other types of resource exploitation) may allow individual species the flexibility needed to adapt to CC.</p>
<p>15. Mainstreaming / Ensure wildlife and biodiversity needs are considered as part of the broader societal adaptation process (Mawdsley et al 2009)</p>	<p>Many of the adaptation strategies being developed in communities around the globe are focused on human health and infrastructure needs (The Heinz Center 2007). Mitchell et al (2007) recommend that biodiversity also be considered as part of the overall societal adaptation process.</p>

E. Improve governance

Putting the necessary frameworks in place (law, policy, management plans) so that the necessary changes are systematic and entrenched.

Strategy	Explanation
<p>16. Review the language and interpretations of laws, regulations, policies, and management guidelines for their continued applicability to management under CC, and modify accordingly (Baron et al 2009; Mawdsley et al 2009)</p>	<p>Many laws and regulations are decades old (designed for "static" biodiversity), and most were developed before CC became a significant concern. New legislative tools or regulations may be necessary to address specific CC impacts.</p>
<p>17. Recognise and implement the full range of PA governance types (Dudley et al 2009)</p>	<p>Encourage more stakeholders to become involved in declaring and managing protected areas as part of community CC response strategies, particularly through indigenous and community conserved areas and private protected areas. Includes modification of management plans, selection tools and management approaches as necessary (Dudley et al 2009)</p>

F. Adaptive management

Monitoring, assessment and making the necessary changes to continuously adapt so that PAs are healthy.

Strategy	Explanation
<p>18. Develop/enhance monitoring and assessment programmes (Mawdsley et al 2009; Hansen et al 2003; Baron et al 2009)</p>	<p>Ecological monitoring systems provide information that managers can use to adjust or modify their activities, evaluating the current state of the systems that collect, analyse, and interpret environmental information.</p>
<p>19. Include adaptive management and scenario building/planning in toolbox of PA management (Baron et al 2009; Hansen et al 2003)</p>	<p>Whether active or passive (see Baron et al 2009), information gathered throughout the iterative adaptive management cycle is used to increase</p>

	<p>ecological understanding, and adjust and refine management (Walters and Holling 1990). Scenario-based planning is a process, usually qualitative, that involves exploration of a wide set of alternative futures (Carpenter 2002; Peterson and others 2003; Raskin 2005). Scenario development is used routinely to assess a variety of environmental resource issues (NRC 1999). A finite number of future climate change scenarios, typically three to five, can be extremely useful for helping to develop and implement plans, and also can minimize the frustration that comes from having to deal with uncertainty.</p>
<p>20. Develop dynamic landscape conservation plans (Mawdsley et al 2009; Hannah and Hansen 2005; The Heinz Centre 2008); or, Assess, plan, and manage at multiple scales, letting the issues define the appropriate scales of time and space (Baron et al 2009)</p>	<p>Dynamic landscape conservation plans include information on fixed and dynamic spatial elements, along with management guidelines for target species, genetic resources, and ecosystems within the planning areas. Fixed spatial elements include PAs where land use has limited disturbance. Dynamic spatial elements include all other areas within the landscape matrix, where land use may change over time. The plan includes a desired future condition for each element, based on predicted shifts in distribution of species and other ecosystem components. It also describes any intermediate conditions that may be necessary for a species to transition between current and future conditions. The management guidelines suggest mechanisms and tools (e.g. modeling approaches which link wildlife population demographics and climate change) for management and provide specific recommendations to the government agencies responsible for implementation (Hannah and Hansen 2005).</p>

Reflections on adaptation strategies – What’s different here?

Some general findings indicated by the list of available adaptation strategies are:

- There are many recommendations for adaptation strategies, but fewer really sound case studies where adaptation strategies have shown great success. Heller and Zavaleta (2009, 17) note that “climate change adaptation work, at least in this literature, is still largely at the ‘idea’ stage – it is based predominately on ecological reasoning rather than specific research, case studies, or empirical data, and it is largely nonspecific in the geographic areas or biome types that it targets.”
- There is a large bias in the literature (specifically around PAs and climate change adaptation strategies) towards conservation strategies rather than social, political or economic adaptation measures (Heller and Zavaleta 2009).
- The overriding context of limited finances and human and technical management capacity for PAs more generally, and questions of balancing priority at different levels;
- The need for PA managers to develop a business case to help build internal (in the PA agency) awareness and support for action on CC (also, IEMA 2013a);
- The limitations of predicting future CC impacts, uncertainty of CC projections presents a challenge to convincing decision-makers;
- Several adaptation strategies are underpinned by a demand for more or larger PAs, which require more land to be dedicated for conservation (presenting a host of other challenges).

This suggests greater consideration for community and other governance types of PAs. Maiorano et al (2008) suggests small parks are not going to be viable but in many cases are the only option available, implying more attention to the non-protected matrix in which PAs must survive; and

- The fact that PAs are part of broader societal adaptation strategies which must deliver multiple goals, including in many cases poverty reduction and alleviation.

Mawdsley et al (2009) note that many adaptation strategies look like business-as-usual conservation work, and many of the adaptation strategies that are proposing new activities involve the review of existing approaches, rather than the development of new techniques. On the one hand, according to Mawdsley et al (2009), this can be reassuring since PA managers already possess many of the tools that will be necessary to help PAs adapt to CC. However, managers will increasingly need to view the ways in which they use these tools through the lens of a more dynamic understanding of changing ecosystems and changing climates (Lovejoy and Hannah 2005; especially Lovejoy 2005), which is a much less straightforward proposition. Terpstra (2013; see also section 2.2 Accounting for adaptation in PA financing) notes how challenging it is to clearly define adaptation activities:

“Adaptation is about going beyond business-as-usual and incorporating the possible effects of climate change into the design of an activity. It sounds fairly straightforward, but deciding which part of ‘beyond business-as-usual’ should count towards adaptation finance is difficult to determine. To make this a little easier to understand, an adaptation activity can be broken down into three steps:

1. Realizing that climate change affects the activity;
2. Designing the activity taking climate change into account; and
3. Implementing the activity.



“Most believe that step 3, the implementation phase, counts as adaptation. However, the real ‘adaptive step’ is the decision-making and the way in which the activity is designed—namely, steps 1 and 2.”

1.2 Adaptation strategies in use globally, and in West Africa

Globally, countries are increasingly using adaptation strategies to climate-proof PAs (Vos et al 2008), as well as using PAs as part of resilience-building approaches (Ervin et al 2010). These strategies have been identified particularly in North America, Europe and South Africa (by e.g. Mawdsley 2009; Dudley et al 2009; Baron 2009; Dunwiddie et al 2009; Carroll et al 2009; Hansen et al 2003). These have also been explicit public policy goals at the inter-governmental level since the Convention on Biological Diversity’s (CBD) Protected Areas Programme of Work (PoWPA) was agreed 2004. Explicitly, it calls on Parties to “1.4.5 Integrate climate change adaptation measures in protected

area planning, management strategies, and in the design of protected area systems.” CBD decision X/31 (para 14(a)) invited all Parties to the Convention to “Achieve target 1.2¹ of the programme of work on protected areas by 2015, through concerted efforts to integrate protected areas into wider landscapes and seascapes and sectors, including through the use of connectivity measures such as the development of ecological networks and ecological corridors, and the restoration of degraded habitats and landscapes in order to address climate change impacts and increase resilience to climate change.” The global status report to CBD COP11 on PoWPA goals shows climate change being integrated into PoWPA national plans around 75% of countries (roughly, 8% significant progress, 22% activities fully underway, 45% limited progress).²

In West Africa, the baseline of the PARCC project in 2009 was that the 5 core project countries (Chad, Gambia, Mali, Sierra Leone, and Togo; who participated in baseline studies) were not yet climate-proofing PAs, or using PAs as part of resilience building strategies. The project is innovative and aims to put forward a model for the region that would also build capacity.

Table 1 identifies examples of the adaptation strategies identified, where they have been or are being used in a West African context.

Table 1: Adaptation strategies, and examples from West Africa

	West African examples
A. Starting point	<p>PARCC project core countries (Chad, Gambia, Mali, Sierra Leone, and Togo), and additional 3 countries (Burkina Faso, Côte d’Ivoire and Ghana) have clearly identified ‘climate-proofing’ PAs and building resilience as important objective</p> <p>Taï National Park (Parc National de Taï), Côte d’Ivoire - BMZ project³ that targets the south-west of the country including the park. Assisting vulnerable groups to re-build their livelihoods post-conflict, adapt to climate change and increase their resilience to climate-based risks. Project is conducting interventions to strengthen agriculture, increase fish and livestock production, building wells and supporting decentralisation measures. These efforts are expected to take pressure off the park.</p> <p>The W-Arly-Pendjari⁴ protected area, commonly called the “WAP” complex, is combating the climate threat via: (i) Supportive communities within buffer and transition zones; (ii) Effective and linked PAs at sub-national level within the WAP complex; (iii) Coordinated WAP PA-system wide conservation efforts. A UNDP-GEF project ‘Enhancing the effectiveness and catalyzing the sustainability of the W-Arly-Pendjari (WAP) Protected Area System’ is supporting this effort.</p>
B. Scenario development and planning	<p>The PARCC project developed future regional CC scenarios and assessed the vulnerability of PAs to climate change by combining two approaches: Species Distribution Modeling and Traits-Based Assessments.</p>

¹ Goal 1.2 of PoWPA is “To integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function.”

² Data is not dis-aggregated to be able to show West African reports.

³ See www.giz.de/en/worldwide/19301.html.

⁴ See www.parc-w.net.

	<p>In The Gambia, within PARCC project framework, an updated METT ⁵ found that a 6 of 8 PAs have already included CC in their management plans. The same tool in Togo found 0 of 2 PA taking CC into account, although as the two PAs, will be preparing their management plan, they will now do so.</p> <p>The PARCC project will also implement at least 2 transboundary pilot sites.</p>
<p>C. Build and improve PA networks</p>	<p>The GEF had has a Strategic Program for West Africa (Lead Agency: World Bank) that aimed at: Enhancement of protected area management in more than 40 protected areas, including 11 new classified sites; Improvement of policy and legislative frameworks to support mainstreaming of biodiversity issues in at least six countries, with field projects impacting about 20 million hectares, which will test different governance systems to empower local communities in protected area management; and reduction of poverty through different social and economic incentives in buffer zones, corridors and other transition areas.</p> <p>An assessment of connectivity for the West Africa region is being carried out as part of the PARCC project.</p> <p>There is a general trend towards development of transboundary PAs (or Transfrontier Conservation Areas, TFCAs) e.g., the coming together of the “WAP” complex, Sierra Leone and Liberia new transboundary park in the Upper Guinea Area, and ongoing discussion of other TFCAs in the region.</p> <p>The Convention for Migratory Species (CMS) West African Manotee management plan addresses threats to the manatee from climate change, including via restoration and safeguarding of its habitats in the region.⁶</p>
<p>D. Build resilience</p>	<p>Mangrove restoration is taking place in PAs such as the Djoudj National Park in e.g. Guinea Bissau, Guinea Conakry, Sierra Leone, Senegal, including the transboundary area managed by the Senegal River Basin Authority (l’Organisation pour la Mise en Valeur du fleuve Senegal). This work is supported by <i>inter alia</i> Wetlands International and The Nature Conservancy.⁷</p> <p>UNDP-GEF are supporting the development of an ecosystem-based adaptation project in Burkina Faso for wetlands (including a Ramsar site) and forested areas, including classified forests. The project aims to build resilience to climate change amongst local populations depending on these resources.⁸</p> <p>Sierra Leone National Adaptation Programme of Action (NAPA) identifies the objective of “establishing forest reserves, PAs and National Parks/ Sanctuaries, and redemarcate existing ones in order to maintain their integrity” as a resilience building measure.⁹</p>

⁵ See cmsdata.iucn.org/downloads/parccnewsletter_issue3_july2013_en.pdf.

⁶ See www.cms.int/species/waam/manatee_ap_E.pdf.

⁷ See e.g. www.wetlands.org/News/Pressreleases/tabid/60/ArticleType/ArticleView/ArticleID/3361/PageID/3169/Default.aspx.

⁸ See undp-alm.org/projects/lcdf-burkina-faso.

⁹ See unfccc.int/resource/docs/napa/sle01.pdf.

E. Improve governance	The PARCC project will provide policy implementation support through at least 2 transboundary pilot sites.
F. Adaptive management	<p>The PARCC project developed an additional module for the METT including new questions on climate change. The PARCC project will also develop strategies at the regional and national level, and guidelines for PA managers on the best approaches to manage PAs for CC.</p> <p>IIED has conducted work on scenario planning in the region, though not specifically in PAs it can be highly relevant. Their work shows that scenario planning can be employed to help vulnerable or marginalised communities influence policy decisions that affect their lives. In West Africa, especially amongst pastoralists, oral traditions of reflection going back 50 or 100 years lends itself perfectly to the analytical concept of ‘drivers of change’ used in scenario planning.¹⁰</p>

It is clear that many of the relevant initiatives in the region are linked to the PARCC project. This is to be expected since the GEF funding supported an innovative initiative for the region, which is intended to encourage and inspire replication. It is the nature of innovative projects that there will be some lag time between when the project demonstrates its results and other initiatives emerging that take these results on board. It is also believed that in general terms CC adaptation initiatives in the region are focused on agriculture, energy, and water, rather than the environmental sector (Bora Masumbuko, *Pers.Comm.*).

1.3 Applying change management theory

Dudley et al (2009) note that managing PAs under conditions of CC will require significant changes in the way in which PA agencies do business. The authors highlight changes expected in planning, organisation, leadership and evaluation. They suggest that within PA agencies, implementing such wide-ranging changes will require that a major change strategy plan be developed at the PA systems level and management plans for individual PAs.

The field of change management is an established area of management theory dealing with approaches to such transitioning, for moving individuals, teams, and organisations to a desired future state. Key change management strategies are to: create a sense of urgency, recruit powerful change leaders, build a vision and effectively communicate it, remove obstacles, create quick wins, and build on your momentum (Kotter 1995).

Reflecting on his seminal 1995 book, *Leading Change*, Kotter (2007) re-affirms the basic principles of change management but recognises that the principles are notoriously challenging to apply successfully. The most general lesson to be learned from the more successful cases (according to Kotter) is that the change process goes through a series of phases that, in total, usually require a considerable length of time. Skipping steps creates only the illusion of speed and never produces a satisfying result. A second very general lesson is that critical mistakes in any of the phases can have a devastating impact, slowing momentum and negating hard-won gains. Kotter (2007) details the 8 main reasons why change efforts fail:

1. Not establishing a great enough sense of urgency
2. Not creating a powerful enough guiding coalition

¹⁰ See e.g. pubs.iied.org/10023IIED.html.

3. Lacking a vision
4. Under-communicating the vision by a factor of 10
5. Not removing obstacles to the new vision
6. Not systematically planning for, and creating, short-term wins
7. Declaring victory too soon
8. Not anchoring changes in the organisational culture

Using the findings from the change management field applied to climate change adaptation efforts, the Institute for Environmental Management and Assessment (IEMA) recommend developing a business case to support adaptation efforts (IEMA 2013a). Building from the experience of climate change adaptation practitioners, they recommend:

- Understand your organisation – an essential starting point
- Engage widely across your organisation – build awareness, seek interest and share the challenge and use relevant language
- Don't reinvent the wheel but do use existing decision-making opportunities
- 'Piggy back' opportunities onto other projects and developments
- Use recent and future weather impacts as an early opportunity for business response (can also help in building awareness for longer term climate change adaptation)
- Additional to risk, consider opportunities and dependencies, including any competitive advantage from increased resilience to extreme weather and climate
- Look for 'early mover' opportunities and do not underestimate the value of making a start, e.g. through trial schemes or adaptation linked to wider initiatives

IEMA (2013b) also published a useful 'Change Management for Sustainable Development' workbook, with practical tools and techniques provided via 15 worksheets (including Skills of a change maker, Your mandate and change opportunities, Barriers to change, Change SWOT, How will you know if change is happening?, Planning your communications with key players and stakeholders, and Understanding your organisational culture). The worksheets would provide a practical aid to any PA managers aiming to incorporate CC adaptation strategies into their parks or organisations.

1.4 Conclusions for Chapter 1

Chapter 1 suggests that:

- There are many CC adaptation strategies available and already in use for PAs;
- These adaptation strategies use similar tools and approaches to business-as-usual PA management, however with information about CC impacts and a much more dynamic understanding of biodiversity and climate;
- In West Africa, the PARCC project is at the forefront of efforts to assist PA managers with CC adaptation, and will produce relevant tools for other PA managers in the region; and
- There are great challenges in adapting PA agencies to the new more dynamic approach, and change management techniques can assist with necessary transitions.

Chapter 2: Review of financing mechanisms for PAs, especially in the context of climate change

This chapter reviews the broad number of PA financing mechanisms available (1), indicating which of these are commonly in use in West Africa (1), considers what is different about CC adaptation financing for PAs (2), then suggests some specific criteria to take into account in developing PA adaptation and funding strategies in the region (3).

2.1 Mechanisms for financing PAs

There are many strategies available for financing PAs, and a number of publications review these in detail (e.g. UNDP 2012b; WWF 2009; Fernández-Baca 2007; Gutman and Davidson 2007; Emerton et al 2006). Unlike the case of adaptation strategy categorisations, where there was little consensus between authors, other authors e.g. WWF and Fernández-Baca adopt similar characterisations and groupings, though Gutman and Davidson arrange financing mechanisms from most to least innovative, and UNDP (2012b) provides a straightforward 6 category model, focusing on the most often used mechanisms. Annex 2 provides the detail of all of the main financing mechanisms identified through the literature (references noted throughout).

Emerton et al (2006; see also Figure 2) arranges PA financing mechanisms on a spectrum from those which rely on grants to PAs from external sources (which may come with or without conditions; category includes domestic government budgets) to those which are based on charges for goods and services provided by the PA itself. According to Emerton et al. (2006), “the provision of grant funds is motivated by broader social or personal policies, goals or principles which place a value on the conservation of PAs – for example for their public good attributes, intrinsic values, development or conservation significance, or as areas of cultural or natural heritage. In contrast, PA revenues derived from fees and charges are linked to the use or provision of particular PA products and services (for example tourist gate fees, resource extraction licences or payments for ecosystem services). Another category of finance relates to incentives for activities that indirectly support the existence of a PA, such as extractive uses by indigenous peoples, certain forms of ‘green’ enterprises, etc. Between these extremes, there are a wide variety of PA financing mechanisms which combine aspects of private and public, grant and commercial funding.”

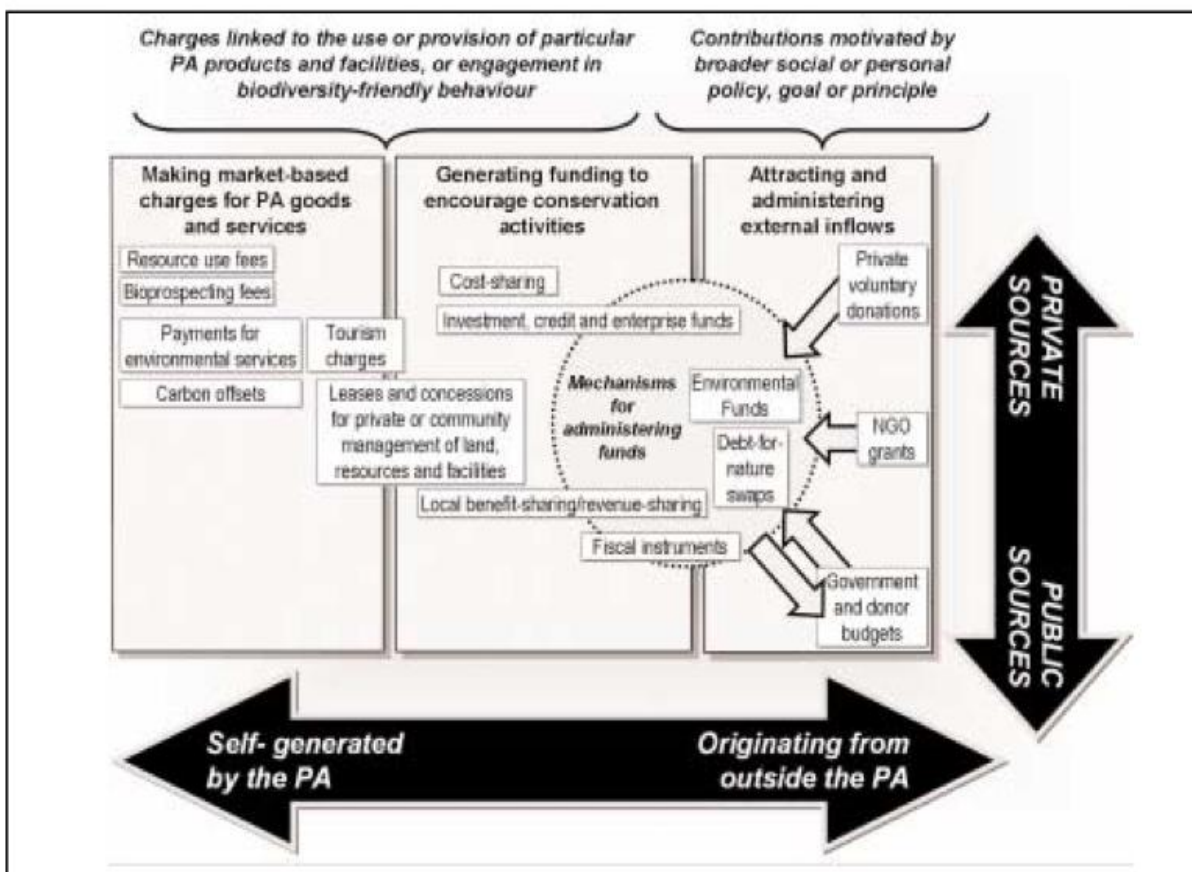


Figure 2: Typology of PA financing mechanisms, from Emerton et al (2006, 28)

In the sections below, we provide an overview of the main PA financing strategies (identified under the different categories used by Emerton et al 2006; with full detail in Annex 2).

A. Market-based charges for PA goods and services

Market-based charges for PA goods and services attempt to capture some of the willingness-to-pay of PA beneficiaries.

Funding mechanism	Explanation
1. Resource use/extraction fees, and direct sales	Can be applied for a conservation objective when natural resources are consistently extracted; PA authorities can charge users for the right to access these resources. Examples include licenses for sustainable hunting, fishing, or plant harvesting.
2. Bioprospecting fees/charges	Can be generated when a PA or PA system charges for the right to collect genetic or biochemical material found within the area. Much of the bio-prospecting is done by pharmaceutical companies searching for new active ingredients.
3. Payments for environmental/ecosystem services (PES)	Based on a PA providing environmental services to benefit the public. The idea is to generate a mechanism through which the PA can economically redistribute the cost of these services. Examples of environmental

	services include water filtration functions from wetlands, storm protection in the case of mangroves, and carbon sequestration from forest biomass.
4. Carbon offsets	A form of PES (mechanism 3), carbon markets can provide substantial new funding for PAs, in particular when: Carbon credits are professionally marketed to private sector buyers; Clear procedures and guidelines are in place; and A range of agencies ensure credibility.
5. Tourism fees/charges, e.g. gate fees	Earned by charging a fee for tourism services and recreation. In some PAs, the fee is charged in the form of an entrance fee or for recreational activities, and can generate an important portion of PA income.
6. Leases and concessions	Widely used as a means of enlisting outside support for the management of PA facilities (overlapping with mechanism 7: Cost-sharing). May involve delegating broad PA management responsibility to a private company or NGO. In other cases, companies or NGOs may be enlisted to manage specific PA facilities or to provide particular services on a commercial or cost-recovery basis.

B. Generating funding to encourage conservation

Primarily mechanisms for generating funding to encourage conservation activities among the groups who use or impact on PAs.

Funding mechanism	Explanation
7. Cost-sharing	Can arise when PA management costs are shared with other groups, companies, or individuals that can generate additional funds or cost savings. These include PA co-management schemes, as well as concessions, rent, and franchises (as in mechanism 6, above).
8. Investment, credit, business funds and enterprise fees	Include biodiversity business funds, which are financing mechanisms that provide business projects with long term capital and technical assistance based on conservation or sustainable biodiversity use.

C. Attracting and administering external inflows

Financing mechanisms that are concerned with attracting and administering external flows, from both international and domestic sources.

Funding mechanism	Explanation
9. Private voluntary donations:	
Philanthropic	Not-for-profit NGOs, usually with endowment funds established by wealthy individuals or companies.
Corporate	Corporate funding: this operates at international,

	national and local levels. Several companies have established special funds or programmes for biodiversity conservation, such as Shell and BP.
Personal	Originate from a range of sources (individuals, informal groups and organisations), raised and administered in many different ways: Cause-related marketing, e.g., eco-labelled products, special events and auctions, adoption and “friends of” programmes. Opportunities for concerned citizens to “sponsor” a species or (more rarely) a PA, or to donate funding or their time to conservation causes. Workplace donation schemes, enabling employees to agree a regular deduction from their salary, which is channelled via their employer to one or several charities. Also, drop-box donations (both on site and off site) and voluntary surcharges (e.g., voluntary guest contributions at hotels).
Social media / Crowd-sourcing	A variant on personal funding, using social media such as CBD LifeWeb (see Text Box 1) or Kickstarter (the world’s largest funding platform for creative projects – of which there is one example from the US for a protected area initiative).
10. NGO grants	Normally originating from other sources, e.g., private donors, or partnerships with other donors (e.g., USAID and WWF), but also from membership fees and other revenue sources of especially international NGOs.
11. International donors	Bilateral and multilateral. In many countries these funds are matched by government funds, and constitute the majority of PAs financing. Within the multilateral funds category is the Global Environment Facility (GEF), which is the largest funder.
12. National government funds	Includes resource allocations from national budgets for PA management. Other taxes and surcharges e.g., from gas, oil, mining, coal operations; airport surcharges for tourists; value-added taxes; hotel surcharges; Lottery proceeds; Sale of stamps.

D. Mechanisms for administering funds

Also falling under categories above (refer back to Figure 2), these mechanisms are considered unique for the way they are administered.

Funding mechanism	Explanation
13. Environmental funds	Consist of a management structure to invest funds raised from a variety of public, private, international, and domestic sources. The funds can be managed as fiduciary funds, sinking funds, or revolving funds.
14. Debt-for-nature swaps	Constitute a mechanism through which public debt is bought by an external agency (typically an NGO) and forgiven in exchange for the government debtor

	promising to finance conservation activities.
15. Local benefit-sharing/revenue sharing	Can arise when PAs assign part of raised resources for neighboring communities. For example, this can include transferring a portion of resources raised through tourism- related income to benefit the communities. In some cases, this can also consist of transferring PA user rights or management to local communities.
16. Fiscal instruments	Consist of mechanisms to raise and transfer funds between economic sectors. These mechanisms include taxes and subsidies.

In Table 2 below, we identified examples of the various funding mechanisms in use in the West Africa region.

Table 2: Funding mechanisms, and examples from West Africa

Funding mechanism	West African example
A. Market-based charges for PA goods and services	Used extensively in the region, although charges generally lower than elsewhere on the continent. The extent of tourism to PAs greatly varies between countries (and among PAs within countries). For example, tourism is certainly contributing to financing some PAs in The Gambia, where tourism is well developed, , but not in other countries such as Chad or Sierra Leone, where tourism is practically non-existent. (Elise Belle, <i>Pers. Comms.</i>)
B. Generating funding to encourage conservation	Kaboré Tambi National Park in Burkina Faso is managed by the NATURAMA Foundation on a ten-year renewable agreement. This is an oft-cited example of State-NGO cooperation for the management for forest resources, and NATURAMA is able to fundraise effectively from international donors (for example USAID) to secure the management of the PA. ¹¹
C. Attracting and administering external inflows	<p>LifeWeb entries from West Africa, e.g. the ‘Far West Africa Challenge’ (see Text Box 1) show an innovative mechanism for attracting funding for PAs.</p> <p>The EU-funded ECOPAS project in the WAP complex was a major donor-supported initiative, which has now ended. A follow-on called PAPE (<i>Projet d’Appui aux Parcs de l’Entente</i>) is underway supporting the sustainable management of the complex.¹²</p> <p>Germany (via GiZ/KfW) is active with projects supporting PAs in the region, including in Benin (Pendjari NP), Cote d’Ivoire (Tai NP), and Mauritania (Banc d’Arguin NP).</p> <p>National government funds are the main funding</p>

¹¹ See <ftp://ftp.fao.org/docrep/fao/006/x7760b/X7760B16.pdf>.

¹² See www.undp.org/content/benin/fr/home/operations/projects/environment_and_energy/project_sample11.html.

	<p>source for PAs in the region (nearly all PAs receive some government support), followed by donor funding.</p>
<p>D. Mechanisms for administering funds</p>	<p>A Trust Fund, Fondation des Savanes Ouest Africaines (FSOA), is designed to manage both national funds for the Pendjari and W PAs and biosphere reserves of Benin and later funds for the purpose of supporting the tri-national WAP complex, with the participation of Niger and Burkina Faso.¹³</p> <p>An example of a regional debt-for-nature swap is between Germany and Côte d’Ivoire. The Fondation pour les Parcs et Réserves de Côte d’Ivoire (FPRCI) - supports Parks & Reserves of Cote D'Ivoire (FPRCI), and aims eventually to support the full network of PAs in the country.¹⁴</p>

¹³ See www.beninactu.com/index.php?option=com_content&view=article&id=2202%3A%20environnement-la-fondation-des-savanes-ouest-africaines-pour-une-gestion-durables-des-parcs-nationaux&Itemid=64.

¹⁴ See www.parcnationaltai.com/index.php/media/revue-de-presse/177-parc-national-de-tai-lallemagne-offre-625-milliards-de-fca.html.

Text Box 1: The CBD LifeWeb initiative

[The CBD LifeWeb Initiative](#) facilitates financing for PAs to conserve biodiversity, secure livelihoods, and address CC, through implementation of PoWPA. LifeWeb Expressions of Interest are submitted by CBD Parties, and posted on the LifeWeb website to invite financial support from donors.

This is a sample of the West African submissions into LifeWeb:

Title	Country(ies)	Amount	Result
Far West African Challenge: Strengthening protected areas to preserve biodiversity, address climate change and secure livelihoods ¹⁵	Cape Verde, Gambia, Guinea, Guinea-Bissau, Mauritania, Senegal, Sierra Leone	€38 100 000 EUROS	Not yet funded
Renforcement de la surveillance dans les aires marines protégées de la Guinée-Bissau ¹⁶	Guinea-Bissau	€800 000 EUROS	Funded: €600 000 EUROS (Spain) €200 000 EUROS (Multiple Donors)
Renforcement des aires protégées clés pour la conservation du phoque moine et d'autres espèces menacées emblématiques en Mauritanie, à travers l'éducation à l'environnement et l'appui à la gestion et à la surveillance ¹⁷	Mauritania	€600 000 EUROS	Funded: €600 000 EUROS (Spain)
Achieving Marine and Coastal requirements of the Aichi Biodiversity Target 11 by 2020 through strengthening the Coastal and Marine Biodiversity Conservation ¹⁸	The Gambia	\$14 179 300 USD	Some secured funding \$287 891 USD (MAVA) \$300 000 USD (Multiple Donors) \$1 200 000 USD (GEF) \$1 500 000 USD (GEF) \$3 000 000 USD (GN) \$40 000 USD (BTF)
Support to the Liberian Protected Area Network through Strengthening Management Capacity and Livelihood Support ¹⁹	Liberia	\$13 500 000 USD	Not yet funded

LifeWeb also promotes Financing Roundtables as an effective way to strengthen and coordinate funding among multiple donors and partners, based on the recipient government's vision of PA priorities. A roundtable meeting on the financing of PAs in West Africa took place in 2011 hosted by Senegal, and attended by Cape Verde, Gambia, Guinea, Guinea Bissau, Mauritania, Sierra Leone.

Source: LifeWeb website (www.lifeweb.cbd.int)

¹⁵ See lifeweb.cbd.int/project?id=23219.

¹⁶ See lifeweb.cbd.int/project?id=23245.

¹⁷ See lifeweb.cbd.int/project?id=23255.

¹⁸ See lifeweb.cbd.int/project?id=23954.

¹⁹ See lifeweb.cbd.int/project?id=23257.

PA financing in West Africa is typically derived from national government budgets, with roughly 20-30% coming from gate fees (Bora Masumbuko, *Pers. Comm.*), although it varies widely between countries and PAs, as well as internationally-funded projects providing financing for fixed periods (typically, 3-5 years). The relatively well-funded Pendjari National Park in north-west Benin, provides an interesting picture of a funding scenario, showing a high degree of reliance on international funding sources (from CENAGREF 2007):

Source of funds	Percentage of annual PA budget
State funding	17%
Funding from the PA agency (CENAGREF)	20%
Funds from international sources:	
• UNESCO	4%
• GTZ (now GIZ)	37%
• KfW	22%

Management Effectiveness Tracking Tool (METT) assessments have been carried out in the region, although data is not maintained in a central system. The METT assesses budgets via several sections:

- 15. Current budget: Is the current budget sufficient?
- 16. Security of budget :Is the budget secure?
- 17. Management of budget : Is the budget managed to meet critical management needs?
- 29. Fees: If fees (i.e. entry fees or fines) are applied, do they help protected area management?

In most cases, PA managers themselves do not have direct responsibility for fundraising for their PAs, but it's believed that they would like to have more responsibility for generating funds (Bora Masumbuko, *Pers. Comm.*).

UNDP (2012b) concluded that “even the most straightforward tools can take years to successfully implement, and rather than creating new and complex tools, decision makers should look to maximize impacts by improving the most common tools already in use. Furthermore, effectively combining and sequencing may mean the difference between success and failure, and capacity development is essential to the sustainability of the tools.”

On the basis of the lessons learned from PA financing (adapted from UNDP 2012), we can identify the following criteria for successful PA financing:

- PAs must have a business plan.²⁰ PA financing must be viewed as financial investments, and the criteria that define any good investment should be present before a PA financing tool is implemented.
- Should include mechanisms to self-generate and retain revenues at the PA level.
- Should be simple enough, but lay the foundation for more complex funding options.

²⁰ A reviewer highlighted the nature of the capacity challenge in that many of the areas that most need funding will not have the skills or resources to develop a business plan.

- Should be based on the ability to understand market demand, e.g., capture and analyse tourism volumes and market segmentations
- Should either have stakeholder approval, or take measures to gain approval, e.g., by establishing mechanism with external oversight (such as a trust fund).
- Should be quick to generate revenue, be able to be implemented quickly, and as simple as possible
- Must have appropriate policies, legal frameworks and governance structures in place
- Should help to reduce perverse incentives.

Along this line, UNDP has developed a PA financing scorecard (see Bovarnick 2010; also, Bovarnick et al 2010 has excellent analysis for Latin America and the Caribbean) which gauges the financial sustainability of a PA system. This scorecard identifies four core components of sustainable finance: 1. Assessing annual financial gaps; 2. Developing legal, regulatory and institutional frameworks for generating revenue; 3. Developing a business plan and associated financial management tools; and 4. Generating revenue from a diversified portfolio of mechanisms. The scorecard could also be used as a practical tool for considering PA financing strategies.

2.2 Accounting for adaptation in PA financing

In section 1 we introduced the challenge of precisely defining adaptation activities. Terpstra (2013) emphasises that while defining an adaptation activity itself is difficult, this is compounded when trying to measure what is adaptation finance. To illustrate, adapting his example:

Consider, for example, that PA officials in Senegal are deciding to improve park infrastructure – specifically roads for game drives. In our hypothetical scenario, they can: (A) improve the business-as-usual road network for \$300 million CFA, or (B) install an improved system of roads for \$400 million CFA that modifies game routes taking account of potential climate-induced movement of species.

Choice B would be similar to carrying out steps 1, 2, and 3 in the model (recopied here from Chapter 1):



Since decision B is an adaptation activity and A isn't, should we count the \$400 million CFA as adaptation finance, or only the \$100 million CFA additional cost of the improved route? What if instead of a retrofit, the park installs a climate-sensitive route into a park that has never had game drive routes before? Should we then count the adaptation finance total as \$0, or does it still matter that the improved route was more expensive than other potential road layout options? Or, for both the retrofit and the new installation, should we count adaptation finance as only the cost of the planning study that determined the best size and location for the game drive routes, given uncertainties about future species movements because of climate change? Following this logic, the adaptation finance figure might be quite a bit lower, say, \$20 million CFA. Only counting the \$20 million CFA would mean only counting funding going to steps 1 and 2. In this example, we can define adaptation finance in three different ways—broad,

incremental, or narrow. The broad definition counts all of the funding going into strategy B as “adaptation funding”—in our example, \$400 million CFA. The incremental definition counts only the funding going towards “climate-proofing” activities—upgrading to the larger pipes—which would be \$100 million CFA.

The narrow definition, on the other hand, only counts funding that goes into the decision-making process, so \$20 million CFA. Which definition is most appropriate? And can a single definition apply to all types of adaptation?

It is therefore appropriate that we use a flexible definition of adaptation financing when applied to PA adaptation finance. We consider any funding to enhance the management of PAs under this banner, assuming they can make a contribution to the adaptation measures identified in section 1, which again are broad and can look like business-as-usual conservation work.

2.3 Considerations for West Africa

In order to understand what might be suitable CC adaptation strategies, and what might be appropriate funding mechanisms for the region, we reflect on some of the unique circumstances in the West African region:

The context of PAs

- A region of very high poverty levels, with many countries in the region at the very bottom of the Human Development Index (of 186 countries, the 5 PARCC project countries are rated between 159 and 184, with Togo 159, The Gambia 165, Sierra Leone 177, Mali 182, and Chad 184; UNDP 2012).
- A population of approximately 250 million people, cover an area of roughly 5 million km². With an average annual population growth rate of 3%, it is forecast that the sub-region’s population will reach 430 million by 2020 (UN DESA 2012).
- Agriculture employs 60 percent of the workforce, and accounts for 35% of the region’s gross domestic product (GDP).
- Food insecurity: Throughout 2012 over 18 million people were affected by a severe food crisis caused by drought, a failure of several crops and sharp rises in food prices.
- Most West African economies are highly dependent on natural resources (agricultural products, such as coffee, cocoa, palm oil, cotton, and oil in Nigeria), which are regarded as having the strongest potential to be a motor for West African economic development.
- Livestock is critically important to West African economies. In the Sahel, livestock production constitutes 40% of agricultural GDP, and if labour and organic manure are counted as livestock products, this increases to nearly 50% (ECOWAS and SWAC/OECD, 2008). The movement of animals is a key strategy for pastoralists across West Africa. Amadou and Boutrais (2012) suggest that pastoralists are increasingly moving (illegally) into PAs such as the WAP complex.
- The state generally retains a high degree of centralised control over land and resources (Roe et al 2012). PAs still tend to be focused on strict wildlife protection rather than sustainable use and very rarely have governance structures emerged that allow community participation (Roe et al 2012).
- Weak implementation and enforcement of land, NRM, and PA-related laws, meaning that a pluralistic land management system – a mixture of traditional and government tenure laws – evolved and has tended to dominate until the present day, and has sometimes led to conflict (Roe et al 2012; Boutrais 2012).

- Decentralisation processes mean that conservation areas are being progressively transferred to communities; but often without the means required to integrate their management in local or regional territorial planning.²¹ PAs often have very active communities adjacent their borders, with active village associations.
- Large PA financing gap: the difference between what is required to manage PAs effectively and what is actually available.
-

The context of CC adaptation

- Projections for West African countries show that the temperature will increase by an average of 2°C throughout the region by 2050, with at least one model showing a rise of up to 3.5°C in some countries (Jalloh et al 2013).
- The climate models differ in predictions of annual precipitation (Jalloh et al 2013), but generally indicate some areas of increased rainfall, and other areas of decline.
- The region is a large spatial area with limited monitoring already in place, and limited technical capacity for modelling and information management.
-

The context of PA financing

- The challenge is not only the financing gap (IUCN 2011), but even if funds are available, there is a need for financial systems to manage funding successfully, management capacity to use funds effectively, suitable management plans in place, management plans to be reviewed every few years to take account of changes, etc. There are many inter-related challenges, which are basically about management effectiveness.
- Limited high-end eco-tourism proposition (e.g. luxury ecolodges as in Sabi Sands, the Okavango Delta, etc), as compared to southern and eastern Africa. Also lower volume of tourism: IUCN/PACO (2011) compare 7000-10,000 visitors to the popular Penjari National Park with 300,000 visitors to Ngorongoro Park in Tanzania.
- Security concerns in parts of the region, and health issues such as malaria and Tsetse fly. Few middle-market or regional tourists (as you would find in southern & eastern Africa, for example).
- Lower prospects for carbon-based financing as compared to central Africa.

2.3 Conclusions from Chapter 2

Chapter 2 suggests that:

- There are many available mechanisms to finance PAs, but only a small number are commonly used in West Africa: tourism charges especially gate entry fees (with a great variation between countries), central government budgets, and donor funds;
- PA financing is not simply about having more funding, but also the mechanisms to manage and use the funding effectively; ultimately, these are questions of management effectiveness;
- It is difficult to distinguish financing for PA adaptation to CC from general PA management costs, and may not be useful to do so; and
- West African PAs face particular challenges that point to seeking out more straightforward solutions to CC adaptation and financing challenges.

²¹ The [West Africa Conservation Territories project](#) is a relevant initiative here.

Chapter 3: Recommendations

This chapter provides overall recommendations based on the findings in Chapter 1 and 2 of this report. Chapter 2 left off identifying the unique circumstances and challenges faced by West African PAs and PA managers. Indeed, the first point is not to become over-whelmed by the apparent challenges and in fact ...

Be optimistic! Climate challenges can provide a rallying point to improve management of PAs. They can be a vehicle to attract new sources of funding, or for example provide momentum to provide alternative livelihood options for local communities (to reduce non-climate pressure on the PA). From a conservation perspective, CC provides a much-needed impetus to evaluate how PA management policies respond to change in general (Heller and Zavaleta 2009), which can only lead to improvements in overall management effectiveness. At the individual level, there are opportunities to gain recognition for pro-active efforts. More broadly, there are first-mover advantages for those individuals who can seize the opportunity and be on the cutting edge of efforts in the region.

3.1 A 9-Step approach for PA managers

We can synthesize the available strategies with the over-arching conditions to identify steps to guide PA managers in meeting meet the challenges – and indeed opportunities – presented by climate change. Heller and Zavaleta (2009) is particularly helpful here, as well as work on change management (Kotter 1995 and 2007), the IEMA practical tools (IEMA 2013a and b; IEMA and Defra 2013), and climate adaptation mainstreaming guidance (PEI 2009, Dallal-Clayton and Bass 2011, UNFCCC 2012, etc). These steps will obviously vary based on starting points and other factors, but are presented as a cycle to emphasise generating and using management information and a spirit of continuous improvement. Heller and Zavaleta (2009) note that despite the “the sea of adaptation ideas and recommendations”, few practical resources, tools or capacity exist to concretely guide an adaptation planning process. Wherever possible, therefore, we try to list practical tools that can be of assistance through the process – and mentioned those that are forthcoming that PA managers can look out for.

The recommended steps for West African PA managers (including PA network managers) are:



1. **Start up:** Identify the climate challenge faced by your PA (or PA network, as appropriate). Consider your starting point – appraise the current conservation and management practice in the context of climate change with the goal of scoping out low-hanging fruit (such as updating the management plan) and then more involved measures (such as extending the PA itself). The literature contains some suggestions for how to do this (see Heller and Zavalesta 2009). Narrow down as much as possible, taking into account – ideally through consultation and dialogue with partners – the various values of the PA at different levels and by different groups. Other guidance on priority-setting processes can be of use here (IIED 2013).
2. **Build a coalition:** Kotter (1995) asserts that to lead change, you need to bring together a coalition, or team, of influential people whose power comes from a variety of sources, including job title, status, expertise, and political importance. Coalitions are a partnering or alliance to achieve a common purpose. They are essential for getting any reforms to happen, especially when a weaker party want to achieve a change where it does not have the necessary skills, tools, resources or influence to do so. Coalitions can enable access to these assets. Once formed, your "change coalition" needs to work as a team, continuing to build urgency and momentum around the need for change. Check your team for weak areas, and ensure that you have a good mix of people from the various organisation that are needed to achieve the necessary changes – e.g. local communities, national and provincial/regional authorities, scientists, donors or other sponsors.
3. **Get better information:** Good data on climate change impacts underpins the development of sound adaptation strategies. Working with your coalition, identify sources of capacity, e.g. in research institutes, universities and so on, who can assist in strengthening your understanding of potential impacts of climate change on the PA (species, habitats, ecosystems). There are many

available models for this (see Heller and Zavaleta 2009), including those used by countries participating in the PARCC project (see Smith 2013; Jones et al. 2012). Existing data will only get you started – eventually, try to ensure that monitoring systems are fit-for-purpose to take climate change-related changes into account (see below recommendation ‘Implement, monitor and improve’).

4. **Set your evidence-based strategy:** Assess and debate priorities with stakeholders and partners. Build a common understanding of the severity of the problem and the urgency of action. Heller and Zavaleta (2009) suggest that a complete adaptation strategy should span the risk continuum of adaptation measures (from risk-averse to risk-tolerant, see Figure 3). There needs to be some intellectual and political leadership to guide this process successfully. A strategy with 3-5 clear and precise adaptation initiatives, at least initially, will be easier to rally around than one which is lengthy and complex with dozens of proposed measures.

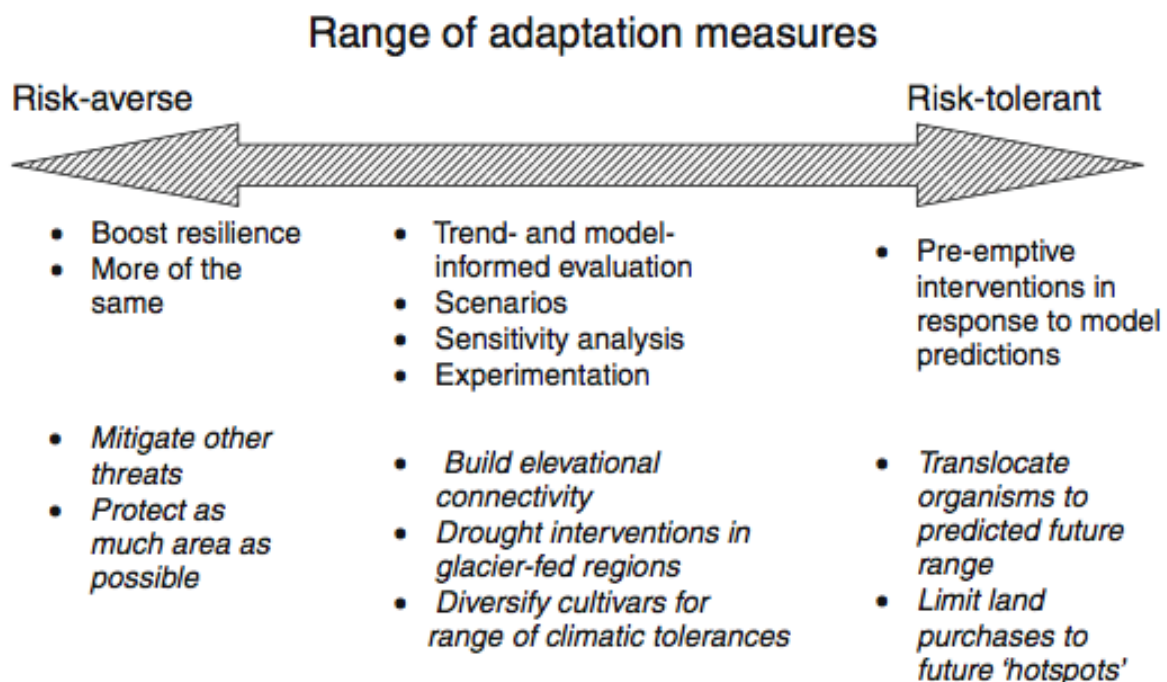


Figure 3: Example of a range of adaptation measures along a risk continuum (Heller and Zavaleta, 2009, 27)

5. **Plan for change, and manage adaptively:** Draw from the skills in your coalition to assist with adaptation planning, and developing a business plan for the PA. A good plan will draw more support than a weak one. Heller and Zavaleta (2009) suggest that adaptation planning involves at least a few key steps, each complex and requiring collaboration among actors such as land managers, the public, scientists, funders and lawmakers. Adaptation plans should be part and parcel of the overall PA management plan – avoid creating duplicate processes or incoherency. Adaptive management is an essential approach in the face of climate change (Dudley et al 2009). Key principles are: 1. Iterative decision-making – evaluating results and adjusting actions on the basis of what has been learned; 2. Feedback between monitoring and decisions, i.e. learning; and 3. Embracing risk and uncertainty as a way of building understanding.
6. **Mobilise resources:** UNDP (2012) proposes the principle of ‘SIMPLER = EASIER = FASTER’ for PA financing. There is often scope to increase gate fees – IUCN/PACO (2011) suggest this is the case for West Africa, a claim which should be verified at individual PA levels. The ability to capture and analyse tourism volumes and market segmentations is essential for fees to reach

their full revenue potential as a financial tool. Consider also the sequencing of financial tools: effective implementation of a basic gate fee structures can create the framework needed for more complex financial tools in the future (e.g. by building staff capacity and institutional procedures for more complex financial management). Taxes can generate substantial revenue (UNDP 2012). Stakeholder approval can be facilitated by establishing a mechanism with external oversight (such as a trust fund) to receive and allocate the funds. Revenue generation capability, implementation time, and a low degree of complexity make this tool worth consideration, especially when compared with other tools. PES and other market-based mechanisms are long-term endeavours to devise and implement – for which donor-funded projects can be of assistance to develop. A solid business plan and persuasive case to central government can also raise funds for the PA. The well-studied Namibian PA system has good case examples on how this can be done (Turpie et al 2010). In order to make a strong case for earmarking funds for PA management, an accurate estimate of PA management costs, the financial and economic benefits of the PAs, and the values of biodiversity and ecosystem services must be determined and presented. In particular, showing the PA system’s direct contribution to poverty alleviation and other national development objectives is critical to making the case for retaining PA revenues for PA management (UNDP 2010). UNDP also offers practical tools here including the PA financing scorecard (Bovarnick 2010) and the forthcoming biodiversity finance workbook.

7. **Implement, monitor, evaluate and improve:** With new and existing funding to hand, carry through with your adaptation strategies. Use enhanced ecological monitoring, and tools like METT and RAPPAM, to gain information on progress, results, and well as help to synthesise lessons learned.
8. **Build capacity:** Capacity building goes beyond training and includes human resource development, organisation development, and institutional and legal framework development. The former (see e.g. Dudley et al 2009) can address dedicated climate change adaptation and mitigation capacity, while the latter can include governance and ‘mainstreaming’ strategies described in Chapter 1. UNDP considers it the core of development, and the ‘Practice Note’ on capacity (UNDP 2008) gives a basic understanding of core capacity issues, why such capacities are important, and how practitioners can support efforts to further deepen and effectively utilise such capacities.
9. **Share and exchange:** As these efforts are being pioneered in the region, it is particularly important to share experiences, lessons, tools, and practical insight. The UNDP Adaptation and Learning Mechanism (www.adaptationlearning.net) is one possible forum, as well as existing channels already in use.

3.2 Recommendations for the region and its supporters

Elsewhere we note that climate change is just one type of change that a PA can face and need to respond to through their management. Many of the PAs in the region are struggling with management systems at the most basic level, without the added challenge of climate change. IUCN (2011) note that some PAs in the region do not even have official documentation. Most PAs in the region do have management plans, but few are operational or validated and many have expired (IUCN 2011). While many of the PAs without up-to-date management plans also lack human, financial and material capacity to conduct this task. There are many general recommendations to improve management of PAs in the region, e.g. as detailed in IUCN (2011), which take account of the realities outlined in section 2.3 Considerations for West Africa. However, as above, we

emphasise that climate change can be seen as an opportunity to improve management more generally, and potentially an entry point for new channels of funding , interest and support.

The PARCC project, and other initiatives that develop along this line, can be instrumental in building the necessary capacity, via for example:

- Ensuring that relevant materials on climate change adaptation strategies and PA financing are also available in French (most currently are in English) and more reflective of regional experiences. The project could develop a more detailed 'how to' manual based on this rapid overview, which takes into account the field-based experience of regional practitioners and is published in both French and English.
- Recognising 'champions', i.e. the efforts of individuals and institutions who are leading regional efforts to adapt to climate change and ensure successful management of PAs and PA networks. An awards scheme would also serve to identify and then promote the strategies that the champions have used successfully in the region.
- Use social media as far as possible to connect practitioners in the region, in order to share experiences and information.
- Provide opportunities for practitioners in the region to exchange with those in other regions where adaptation and financing strategies have been successfully advanced.

In order to support these efforts, research partners, donors, and other supportive partners can:

- Join coalitions;
- Identify capacity and funding opportunities;
- Share information through existing networks, and join networks together; and
- Use their influence in policy and funding processes.

Conclusions

Chapter 1 identified a range of recommended adaptation strategies for PAs, and Chapter 2 identified funding options. While there is a lot of academic literature on adaptation strategies for PAs, there is a dearth of practical tools to help PA managers with the task (Heller and Zalveta 2009). Similarly, there are many possible funding options, but a few are commonly used and practical to implement at the PA level in most cases (UNDP 2012). Capacity is a challenge, particularly in West Africa. Taking into account the circumstances, a simple nine-step model is proposed in Chapter 3 to provide general guidance to PA managers in West Africa to successfully meet the challenges – and opportunities – presented by climate change. The report also identifies some available tools to help PA managers, and notes those that are forthcoming to assist further, as well as further efforts that the project and other supporters could make to assist the region’s PA managers in this regard.

The closing note is an encouragement – the PARCC project and its partners are working to develop practical tools to help the PA network in the region adapt to climate change. Methods are constantly being refined and improved, lessons learned and shared, and capacity build. There are more reasons for optimism, and PA managers who act quickly will reap benefits. Climate change is indeed a grave challenge, but resilience building is feasible and there are many possible pathways.

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Annex 1: Detail of climate change adaptation strategies for PAs

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
A. Starting point	1. Identify the objective of CC adaptation (Baron et al 2009; Heller and Zavaleta 2009)	PAs are important for biodiversity conservation at different levels for many reasons. Given limited resources, identify the important aspects of PAs that adaptation strategies should address. Important for prioritising where to focus scarce time, money, and effort (Baron et al 2009)	Different benefits generated by PAs to different groups. Consider marginalised groups and poverty reduction aspects of PAs	Global / inter-governmental, Regional/transboundary, National, Sub-National, Protected Areas, Community and other landscapes	
B. Scenario development and planning	2. Define reference conditions (Baron et al 2009; Hansen et al 2003; Heller and Zavaleta 2009)	Begin with a broad understanding of changes in natural resources and the drivers of this change; general projections should be sufficient initially. An established reference condition could be useful if the reference condition (i) provides greater opportunity for species or populations to adapt to changing climate, then it offers a goal for protection or restoration, or (ii) is highly dependent on past climate conditions, knowledge that the conditions that produced the reference state are irretrievable can reinforce the need for adaptation to new		National, Sub-National (e.g. Watershed), Protected Areas, Community and other landscapes	

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
		conditions (Baron et al 2009)			
	3. Assess risk: Identify the resources and processes at risk from CC (Baron et al 2009; Heller and Zavaleta 2009)	General projections of CC risk should be refined in subsequent iterations (Baron et al 2009). Identify societally acceptable versus unacceptable change, and also controllable versus uncontrollable change. Explicitly consider thresholds and consequences of exceeding thresholds (abrupt or relatively rapid change in an ecosystem quality, property, or phenomenon)	Although complex, some threshold concepts, including critical loads, are already actively used by national parks in the United States and Europe (Groffman et al 2006 in Baron et al 2009)	Global / inter-governmental, Regional/transboundary, National, Sub-National, Protected Areas, Community and other landscapes	
	4. Incorporate CC impacts into programmes, and activities (Mawdsley et al 2009; Heller and Zavaleta 2009)	CC is not addressed in many existing natural resource management activities (Hannah et al. 2002). Incorporating CC considerations and information is also important to support lessons learning and the development of appropriate laws, policies, etc.		Inter-governmental, Regional/transboundary, National, Sub-National, Protected Areas, Community and other landscapes	Goal 1.4.5 Integrate climate change adaptation measures in protected area planning, management strategies, and in the design of protected area systems.
C. Build and improve PA networks	5. Increase the extent of PAs, or 'more and larger' PAs and buffers (Dudley et al 2009; Mawdsley et al 2009; Heller and Zavaleta 2009)	This strategy would increase the extent of terrestrial and aquatic habitat protected from non-climate anthropogenic threats, particularly in ecosystems where much carbon is stored	Given the resource needs of the world's growing human population, it is unlikely that society will be able to directly protect enough land to facilitate the movement of all species	Regional/transboundary, National	Goal 1.1.2 Expand or enhance the PA network

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
		and/or captured and is likely to be lost without protection, or where important ecosystem services are under threat – particularly tropical forests, peatlands, mangroves, freshwater and coastal marshes and seagrass beds, as well as marine ecosystems (Dudley et al 2009)	and communities (Mawdsley et al 2009)		
	6. Improve representation within PA networks (Mawdsley et al 2009; Heller and Zavaleta 2009)	Representation (of species, ecosystems, habitat) attempts to build a more comprehensive portfolio of PAs, e.g., protecting examples of all major ecosystem types within a country (Julius and West 2007)	Representation may not be relevant over the long-term because distributions of the individual components of ecosystems may shift in different ways as a result of climate change, potentially resulting in new combinations of species and even new ecosystem types (Mawdsley et al 2009)	Regional/transboundary, National	Goal 1.1.5: Complete PA system gap analyses based on the requirements for representative systems of PAs; Also Goal 1.1.6, establish a representative network on this basis
	7. Improve replication within PA networks, e.g. via component redundancy and functional redundancy (Dunwiddie et al 2009; Mawdsley et al 2009; Heller and Zavaleta 2009)	Replication (e.g. species redundancy attempts to conserve multiple examples of each ecosystem type (Julius and West 2007) as a risk management strategy	Similar challenges as Strategy 5	Regional/transboundary, National, Protected Areas, Community and other landscapes	
	8. Enhancing connectivity: Connect PAs within landscapes/seascapes and increase connectivity among PAs (Dudley et al 2009; Dunwiddie et al 2009; Vos et al	Increasing broader landscape connectivity and permeability to species movement (Da Fonseca et al 2005). This can include buffer zones, biological corridors and	It can be difficult to predict future species movements with confidence. Other challenges in common with Strategy 5	Inter-governmental, Regional/transboundary, National, Protected Areas, Community and other landscapes	Goal 1.2.3. Integrate PA systems broader land- and seascape, inter alia by establishing and managing ecological networks, ecological corridors and/or buffer zones; Goal 1.2.4. Develop tools of ecological

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
	<p>2008; Opdam and Wascher 2004; Da Fonseca et al 2005; Hannah and Hansen 2005; Heller and Zavaleta 2009; others); increase landscape permeability to species movement (Mawdsley et al 2009); Protect movement corridors, stepping stones, and refugia (Mawdsley et al 2009; Vos et al 2008), e.g. via systems of fixed reserves (Carroll et al 2009)</p>	<p>ecological stepping stones, which are important to build connectivity to increase ecosystem resilience to climate change at the landscape/seascape scale and to increase the total amount of habitat under some form of protection (Dudley et al 2009), especially outside PAs and PA networks. Such areas might include movement corridors for terrestrial species, habitat islands that could serve as stepping stones between larger reserves, stopover areas for migratory waterfowl, or refugia (areas with minimal climate impacts) (Julius and West 2007; Vos et al 2008). Also, linking isolated habitat that is within a new suitable climate zone to the nearest 'climate-proof' network (Vos et al 2008). Rather than focusing on a single species or ecosystem type, this approach would use a variety of existing management techniques to enhance the ability of the broader landscape matrix to support movements by large numbers of animal and plant species in</p>			<p>connectivity, such as ecological corridors, linking together PAs. Also, Goal 1.3 is all about transboundary/transfrontier PA establishment and management</p>

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
		response to CC (Mawdsley et al 2009)			
	9. Change management, including focusing some management specifically on mitigation and adaptation needs (Dudley et al 2009)	Managing PAs under conditions of CC will require significant changes in the way in which PA agencies do business, including with respect to issues that relate to planning, organisation, leadership and evaluation. Within PA agencies, implementing such wide-ranging changes will require that a major change strategy plan be developed at the PA systems level and management plans for individual protected areas. Capacity building will also be needed, to establish the know how at the institutional level and within staff cadres, to deal with the emerging management challenges and opportunities. Many of these skills will also be needed by local communities and others managing land (Dudley et al 2009)	PA agencies already facing high levels of challenges addressing immediate concerns.	National, Protected Area agencies	Goal 3.2.1: Strengthening protected area capacity
	10. Direct species management (Mawdsley et al 2009; Heller and Zavaleta 2009), notably: (i) Focus conservation resources on species that might become extinct; (ii) Translocate species	(i) Invest resources in the maintenance and continued survival of those species most likely to become extinct as a result of CC. (ii) Moving animals, plants, and other	(i) Traditional endangered species management can also be extraordinarily expensive. Unless significant new sources of funding are developed,	Inter-governmental, National	

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
	at risk of extinction; and (iii) Establish captive populations of species that would otherwise go extinct	organisms from sites that are becoming unsuitable due to global climate change to other sites where conditions are thought to be more favorable for their continued existence. Other names for this strategy include assisted dispersal, assisted migration, and assisted colonization / increasing colonization capacity (Julius & West 2007; McLachlan et al. 2007; Mitchell et al. 2007; Hoegh-Guldberg et al. 2008; Vos et al 2008). (iii) Initiate captive maintenance programmes for species that would otherwise become extinct due to CC.	resources will simply not be available for comprehensive conservation actions targeting every species threatened by CC (Mawsdley et al 2009). (ii) with any translocation attempt, there is a risk of failure and even extinction (Maxfield et al. 2003; Groombridge et al. 2004). For many species, it will be difficult to predict optimal locations for assisted dispersal. (iii) Given the resources required for captive maintenance programs, this is unlikely to be a viable long-term strategy for any more than a few species.		
D. Build resilience	11. Improve management and restoration of existing PAs to facilitate resilience (Mawsdley et al 2009; Dudley et al 2009; Heller and Zavaleta 2009)	Better efforts to ensure that ecosystems and the services that they provide within PAs are recognised and not degraded or lost through illegal use or unwise management decisions (Dudley et al 2009)	Direct management is expensive and may only be feasible for small sites and limited areas (Fischlin et al. 2007). Given the resource needs of the world’s growing human population, it is unlikely that society will be able to directly protect enough land to facilitate the movement of all species and communities (Mawsdley et al 2009)	National, Protected Areas	Goal 1.2.5.Rehabilitate and restore habitats and degraded ecosystems; Also, Goal 1.5.3 Establish and implement measures for the rehabilitation and restoration

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
	12. Design new natural areas and restoration sites to maximise resilience (Mawdsley et al 2009; Heller and Zavaleta 2009); focus on ecosystem function (rather than specific components [species or assemblages]) (Dunwiddie et al 2009)	Protection of future habitat areas could be a key consideration whenever new natural areas or extensions to existing natural areas are proposed (Fischlin et al 2007), e.g., establishment of PA networks along elevational gradients may be a viable adaptation strategy for certain taxa; such networks would provide organisms with the spatial flexibility to shift distributions along elevational gradients as climatic conditions change (Mawdsley et al 2009).	Mawdsley et al 2009: This strategy is likely to serve as an important filter criterion for future protection and restoration efforts. Funders and project managers may question the wisdom of investing scarce conservation dollars in projects that are not sustainable in the face of CC. Nevertheless, projects that are not sustainable over the long-term may nonetheless have important short-term benefits, for example providing intermediate areas of habitat for climate-sensitive species until longer-term refugia are identified (Hannah & Hansen 2005). Ecological conditions at individual sites are likely to shift in ways that are difficult to predict and that differ from historic reference conditions (Harris et al 2006). Shifting the focus of management from components to functions may mean some components will become extirpated or extinct (Mawdsley et al 2009).	National, Sub-National	Goal 1.2.1 Establish or expand the PA network in any large, intact or relatively unfragmented or highly irreplaceable natural areas, or areas under high threat, as well as areas securing the most threatened species

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
	13. Increase the level of protection for carbon stores within PAs (Dudley et al 2009; Heller and Zavaleta 2009)	Recognising protection and management aimed at specific features that have high value in carbon storage, for example to maintain old-growth forest, avoid ground disturbance or drying out of peat and restore PAs where vegetation has been degraded (Dudley et al 2009)		National, Protected Areas	
	14. Reduce (human-caused) pressures from sources other than CC (Baron et al 2009; Mawdsley et al 2009)	Removal of other stressors (e.g. decreasing the extent of poaching or other types of resource exploitation) may allow individual species the flexibility needed to adapt to CC	potential for a loss of focus and much diffuse action across a broad range of stressors (Mawdsley et al 2009)		Goal 1.5.6 Develop policies, improve governance, and ensure enforcement of urgent measures that can halt the illegal exploitation of resources from PAs
	15. Mainstreaming / Ensure wildlife and biodiversity needs are considered as part of the broader societal adaptation process (Mawdsley et al 2009)	Many of the adaptation strategies being developed in communities around the globe are focused on human health and infrastructure needs (The Heinz Center 2007). Mitchell et al (2007) recommend that biodiversity also be considered as part of the overall societal adaptation process.	Challenge of short-term human crises caused by CC, versus long-term benefits of Ecosystem based Adaptation strategies / benefits delivered by PAs	Inter-governmental, National, Sub-national	Goal 2.1: To promote equity and benefit-sharing
E. Improve governance	16. Review the language and interpretations of laws, regulations, policies, and management guidelines for their continued applicability to	Many laws and regulations are decades old (designed for "static" biodiversity), and most were developed before CC became a significant	Addressing the deficiencies may be difficult without significant political will.	Inter-governmental, National, Sub-National, Protected Areas	Goal 3.1: To provide an enabling policy, institutional and socio-economic environment for PAs

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
	management under CC, and modify accordingly (Baron et al 2009; Mawdsley et al 2009)	concern. New legislative tools or regulations may be necessary to address specific CC impacts.			
	17. Recognise and implement the full range of PA governance types (Dudley et al 2009)	Encourage more stakeholders to become involved in declaring and managing protected areas as part of community CC response strategies, particularly through indigenous and community conserved areas and private protected areas. Includes modification of management plans, selection tools and management approaches as necessary (Dudley et al 2009)		National, Sub-National, Protected Areas, Community and other landscapes	Goal 2.2: To enhance and secure involvement of indigenous and local communities and relevant stakeholders, esp Goal 2.1.2: Promoting diverse protected area types;
F. Adaptive management	18. Develop/enhance monitoring and assessment programmes (Mawdsley et al 2009; Hansen et al 2003; Baron et al 2009)	Ecological monitoring systems provide information that managers can use to adjust or modify their activities, evaluating the current state of the systems that collect, analyse, and interpret environmental information.	Costs to adapt existing monitoring systems and develop new monitoring systems are likely to be high, in many cases requiring new legislation and regulations and possibly new tools and approaches to monitoring. Also required is better integration and coordination across the existing monitoring programs (Heinz Center 2006)	National, Protected Areas	Goal 4.2.4 Implement key recommendations arising from site- and system-level management effectiveness evaluations, as an integral part of adaptive management strategies.

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
	20. Include adaptive management and scenario building/planning in toolbox of PA management (Baron et al 2009; Hansen et al 2003)	Whether active or passive (see Baron et al 2009), information gathered throughout the iterative adaptive management cycle is used to increase ecological understanding, and adjust and refine management (Walters and Holling 1990). Scenario-based planning is a process, usually qualitative, that involves exploration of a wide set of alternative futures (Carpenter 2002; Peterson and others 2003; Raskin 2005). Scenario development is used routinely to assess a variety of environmental resource issues (NRC 1999). A finite number of scenarios, typically three to five, can be extremely useful for helping to develop and implement plans, and also can minimize the frustration that comes from having to deal with uncertainty.	The uncertainties associated with projections of climate change and its effects are substantial. Requires HR policies with a recognition of "safe to fail" approaches (Barron et al 2009)	National, Protected Areas	Goal 4.2.4 (as above)
	20. Develop dynamic landscape conservation plans (Mawdsley et al 2009; Hannah and Hansen 2005; The Heinz Centre 2008); or, Assess, plan, and manage at multiple scales, letting the issues define the appropriate	Dynamic landscape conservation plans include information on fixed and dynamic spatial elements, along with management guidelines for target species, genetic resources, and	Planning efforts can be resource-intensive, and many natural resource management (NRM) plans have been developed but not implemented. Dynamic landscape plans may	National, Protected Areas	

	Strategy	Explanation	Considerations	Main level(s) of intervention	Relevant to PoWPA goal(s)
	scales of time and space (Baron et al 2009)	ecosystems within the planning areas. Fixed spatial elements include PAs where land use is has limited disturbance. Dynamic spatial elements include all other areas within the landscape matrix, where land use may change over time. The plan includes a desired future condition for each element, based on predicted shifts in distribution of species and other ecosystem components. It also describes any intermediate conditions that may be necessary for a species to transition between current and future conditions. The management guidelines suggest mechanisms and tools (e.g. modeling approaches which link wildlife population demographics and climate change) for management and provide specific recommendations to the government agencies responsible for implementation (Hannah and Hansen 2005).	recommend that certain spatial elements (areas of land or water) be converted from human uses to “natural” management to facilitate species movements. Such recommendations are likely to prove controversial, especially in settings where the condemnation of private property or the translocation of human populations would be required (Mawsdley et al 2009).		

Annex 2: Detail of funding strategies for PAs

PA funding mechanisms:	Explanation of the mechanism	Current importance	Recent trend	Future prospect
A. Market-based charges for PA goods and services				
1. Resource use/extraction fees, and direct sales	Can be applied when natural resources are consistently extracted for a conservation objective, PA authorities can charge users for the right to access these resources. Examples include licenses for hunting, fishing, or plant harvesting.	Low	Growing	
2. Bioprospecting fees/charges	Can be generated when a PA or PA system charges for the right to collect genetic or biochemical material found within the area. Much of the bio-prospecting is done by pharmaceutical companies searching for new active ingredients.	Low, not meeting earlier expectations	Technical issues in discussion	Moderate, new GEF strategy to support ABS business hubs could assist
3. Payments for environmental/ecosystem services (PES)	Based on a PA providing environmental services to benefit the public. The idea is to generate a mechanism through which the PA can economically redistribute the cost of these services. Examples of environmental services include water filtration functions from wetlands, storm protection in the case of mangroves, and carbon sequestration from forest biomass.	Low, mostly local scale	Compared to the time and money invested, PES and Market based Mechanisms have been slow to achieve anticipated revenue levels.	Moderate, increasing GEF assistance to develop PES schemes. Also, capacity and processes built to implement a PES or carbon project can be stepping-stones to climate policy funding, such as REDD+.
4. Carbon offsets	A form of PES (mechanism 3), carbon markets can provide substantial new funding for PAs, in particular when: Carbon credits are professionally marketed to private sector buyers; Clear procedures and guidelines are in place; and A range of agencies ensure credibility.	Low	Technical issues in discussion	
5. Tourism fees/charges,	Earned by charging a fee for tourism	High to low, depending on location.	Fast growing, but impact on PA can	High growth potential

PA funding mechanisms:	Explanation of the mechanism	Current importance	Recent trend	Future prospect
e.g. gate fees	services and recreation. In some PAs, the fee is charged in the form of an entrance fee or for recreational activities, and can generate an important portion of PA income.	Even where low, effective implementation of fee structures can create the framework needed for more productive financial tool implementations in the future. Also, Entrance fee research shows that there is room for revenue growth within existing implementations. (UNDP 2012).	be problematic and distribution of tourism benefits poses challenges in some areas.	
6. Leases and concessions	Widely used as a means of enlisting outside support for the management of PA facilities. May involve delegating broad PA management responsibility to a private company or NGO. In other cases, companies or NGOs may be enlisted to manage specific PA facilities or to provide particular services on a commercial or cost-recovery basis.	Low to moderate		Good.
B. Generating funding to encourage conservation				
7. Cost-sharing	Can arise when PA management costs are shared with other groups, companies, or individuals that can generate additional funds or cost savings. These include PA co-management schemes, as well as concessions, rent, and franchises.	Low.	Growing.	Good.
8. Investment, credit, business funds and enterprise fees	Include these include biodiversity business funds, which are financing mechanisms that provide business projects with long term capital and technical assistance based on conservation or sustainable biodiversity use.	Low	Growing	
C. Attracting and administering external inflows				

PA funding mechanisms:	Explanation of the mechanism	Current importance	Recent trend	Future prospect
9. Private voluntary donations:				
Philanthropic	Not-for-profit NGOs, usually with endowment funds established by wealthy individuals or companies.	Low	Growing	
Corporate	Corporate funding: this operates at international, national and local levels. Several companies have established special funds or programmes for biodiversity conservation, such as Shell and BP.	Medium	Growing	Good, with ever greater demand for CSR
Personal	Originate from a range of sources (individuals, informal groups and organisations), raised and administered in many different ways: Cause-related marketing, e.g., eco-labelled products, special events and auctions, adoption and “friends of” programmes. Opportunities for concerned citizens to “sponsor” an elephant or a whale, or to donate funding or their time to conservation causes. Workplace donation schemes, enabling employees to agree a regular deduction from their salary, which is channelled via their employer to one or several charities. Also, drop-box donations (both on site and off site) and voluntary surcharges (e.g., voluntary guest contributions at hotels)	Thousands of initiatives of varying size and impact		
Crowd-sourcing	A variant on personal funding, using social media such as Kickstarter	No examples known?		
10. NGO grants	Normally originating from other sources, e.g., private donors, or partnerships with other donors (e.g., USAID and WWF), but also from membership fees and other	Low to moderate	Growing. Beginning to account for an increasingly important share of foreign assistance to PAs, especially in key biodiversity “hotspots” and	

PA funding mechanisms:	Explanation of the mechanism	Current importance	Recent trend	Future prospect
	revenue sources of especially international NGOs		tropical biomes, through funds set up by large international NGOs.	
11. International donors	bilateral and multilateral. In many countries these funds are matched by government funds, and constitute the majority of PAs financing. Within the multilateral funds category is the Global Environment Fund (GEF)	High. Many PAs in the developing world rely on funding from international agencies and other foreign donors. Multilateral donors, especially GEF and the EU, are a key source of funding for PAs in the developing world.	Steady or slight decline. There is some evidence that bilateral finance for PAs has declined somewhat, although the large Millennium Challenge Account grants in some countries have a PA focus (e.g. Namibia). GEF has increased BD funding focus to production landscapes, mainstreaming, ABS and other issues.	
12. National government funds	includes resource allocations from national budgets for PA management. Other taxes and surcharges e.g., from gas, oil, mining, coal operations; airport surcharges for tourists; value-added taxes; hotel surcharges; Lottery proceeds; Sale of stamps	High. The single largest source of PA financing in most countries.	Steady or slight decline. Some evidence that it is in decline, e.g. since the mid-1990s. Also, PA networks have grown while the resources to manage them have not. UNDP (2012): Revenues generated by taxes, e.g., a departure tax, can be substantial.	
D. Mechanisms for administering funds				
13. Environmental funds	Consist of a management structure to invest funds raised from a variety of public, private, international, and domestic sources. The funds can be managed as fiduciary funds, sinking funds, or revolving funds.			
14. Debt-for-nature swaps	Constitute a mechanism through which public debt is bought by an external agency (typically an NGO) and forgiven in exchange for the government debtor promising to finance conservation activities.		Moderate growth.	
15. Local benefit-	Can arise when PAs assign part of raised		Growing.	Good.

PA funding mechanisms:	Explanation of the mechanism	Current importance	Recent trend	Future prospect
sharing/revenue sharing	resources for neighboring communities. For example, this can include transferring a portion of resources raised through tourism- related income to benefit the communities. In some cases, this can also consist of transferring PA user rights or management to local communities.			
16. Fiscal instruments	Consist of mechanisms to raise and transfer funds between economic sectors. These mechanisms include taxes and subsidies.			
	* from Fernández-Baca 2007 and Emerton 2006	** From Emerton 2006, Gutman and Davidson 2007, authors' own analysis		
Others financing mechanisms were identified but not included, e.g., because they have not been used before (see especially from Gutman and Davidson for innovative but untested, but also WWF 2009 - used in the US but not a developing country context)				