Governing Through Networks: Working Toward a Sustainable Management of West Africa's Coastal Mangrove Ecosystems

Dominique Duval-Diop, Ahmed Senhoury, and Pierre Campredon

Abstract

The West African coastal environment's extremely productive and biologically diverse estuaries and mangrove ecosystems have suffered increasing stress due to natural and human-induced pressures. Conserving biodiversity in this region is full of complexity as a result of the myriad connections inherent in natural ecosystems and the variety of perspectives and interests arising at multiple scales and out of varying social and cultural contexts. Therefore, a participatory system of interregional governance is necessary in order to develop appropriate solutions to achieve effective conservation. Two case studies are presented that demonstrate the usefulness of the networked governance approach to engage actors as all levels in the preservation of mangrove ecosystems. The Regional coastal and marine conservation partnership in West Africa (PRCM) and the West African network of marine protected areas (RAMPAO) demonstrate the effectiveness of coordinating local actions with the development of national and regional policies. Challenges remain including the impact of competing goals, communication difficulties, uncertain funding, unequal capacity, and political instability.

Keywords

Networked governance • Mangrove conservation • Marine protected area network • Cross-scale dynamics • Participation

Context

The West African coastal and marine environment is composed of extremely productive upwellings, estuaries and mangrove swamps, rich fishing zones, and ecosystems that are home to biologically diverse habitats and species. Local and national economies depend on assets such as sand and shells, minerals, oil, and tourism. A critical resource for these economies and for the food security of coastal populations remains the fish produced and harbored by these ecosystems.

However, these ecosystems have suffered increasing stress due to both natural and human-induced changes emanating from a number of sources. Intensified environmental degradation due to irresponsible exploitation of

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mineral resources, concentrated pressure on fishing stocks, and urbanization of coastal areas presents challenges that call for effective strategies and coordinated action. Furthermore, in implementing solutions to one set of problems, conflicts often arise as regional stakeholders strive to preserve their ecosystems while effectively developing other sectors (agriculture, extractive industries, trade, finance, and fishing) (PRCM 2010).

Such conflicts render the management of West African natural resources complex. The complexity increases when the elements of individual ecosystems are interconnected and interdependent, and more so in *regional* environmental systems. One excellent example is the mangrove estuaries that play a critical ecological and economic role in coastal countries throughout West Africa. Eight true mangrove species are found in West Africa and the mangroves of West and Central Africa represent 13.2 % of global mangrove coverage (Spalding et al. 2010). Characterized by a high level of biodiversity and biological productivity, these ecosystems offer abundant fish and wood resources, which support agriculture and fishing and other economic activities. Mangroves play an important role in sustaining coastal fisheries and in acting as breeding and nursery grounds for many commercial species (Ong and Gong 2013). They also provide refuge for numerous endangered species, filter sediment runoff from human and natural activities, and serve as natural buffers against the erosive power of waves and rising seas (Wolf 2012).

Over the years, mangrove ecosystems in the West African region spanning Mauritania to Sierra Leone have experienced an accelerated rate of degradation. In spite of their significance, a poor understanding of the value of the services they provide has led to intensified human efforts to convert them for agricultural use, to clear them for residential and infrastructure developments, and to extract wood for salt production, fish smoking, and unsustainable timber harvesting (Rönnbäck 1999; Dayton et al. 2005; Mangrove Charter 2009; PRCM 2007). Sea-level rise and drought caused by climatic variation are also accelerating the degradation. The subsequent decline in revenue coming from resources extracted from this ecosystem has a detrimental effect on the people who depend on mangrove ecosystem services. Resulting increases in the poverty of indigenous coastal populations can further destabilize the ecosystem as they exert even more pressure on the natural resources to alleviate income losses (Dayton et al. 2005).

Understanding the nature of the interactions between human activities and ecological systems is the main focus of those who study 'coupled human and natural systems or systems in which human and natural components interact' (Lui et al. 2007). These systems can be characterized as entities that have layered hierarchies where people and nature form complex webs of interactions across organizational levels, and spatial and temporal scales. Positive or negative feedback from both human and natural actions, direct and indirect effects, and the emergence of new behaviors and properties serve to accelerate change and complicate our ability to understand these processes in order to reduce the vulnerability and degradation of mangrove ecosystems. The globalization of modern world social and economic systems has increased the need to take into account the spatial coupling of natural ecosystems since 'local couplings are influenced by broad-scale processes that in turn act in the context of still larger-scale processes and ultimately global-scale processes' (Lui et al. 2007, p. 642).

When an endangered natural resource or ecosystem such as mangroves physically extend beyond the artificial lines of national borders, and the impacts of local actions and localized natural events are felt at broader scales, the development of national and regional policies to better manage and protect them requires a high level of coordination at the regional scale (Van Lavieren et al. 2012). Because many of the activities that threaten the survival of mangroves occur in local communities in close proximity to these ecosystems, local conservation efforts must also accompany sub-regional approaches. The challenge is that policy making to establish legal protection mechanisms most often occurs at the national level and favors local and national priorities. Therefore, solutions demand a substantial and meaningful engagement of a myriad of actors at multiple scales. 'Tackling complex policy problems requires multi-level governance systems that work at multiple, interlinked levels, promoting learning and cooperation' (Jones 2011, p. 22).

Applying an understanding of the network of interactions arising between human social systems and the environment is a first and necessary step to developing a regional approach to mangrove conservation. Just as the systems in each human body work side by side to make it function, human networks, if they work together, can increase the resiliency of mangrove ecosystems (Quill 2012). By harnessing the knowledge that human-driven networks deeply influence and are affected by natural cycles, these arrangements can surmount the challenges of insufficient technical and financial resources that hinder the effective implementation of public policies governing coastal planning and management. Furthermore, networks and a greater understanding of their role in human–natural interactions can mitigate conflicts of interest occurring across scale, and among institutions and sector-based policies, thus increasing the coherence mangrove conservation efforts.

This chapter demonstrates how the system of interregional governance implemented in the West African coastal region, harnesses networks, and applies complex resolution processes that implicate a variety of actors. Two networks are presented in this chapter as illustrations of governance

through collaboration that have produced major successes in the West African marine and coastal region over the past several years. Thematic networks that target a specific functional unit, such as the marine protected area, are shown to achieve success in developing strong relationships among actors who share knowledge about how to best preserve and manage critical habitats and thus take coherent and effective action. But they have also encountered many of the challenges that typically arise when networked governance approaches are applied to complex policy problems. These networks—the Regional Coastal and Marine Conservation Partnership (PRCM), the West African network for marine protected areas (RAMPAO)—have revealed the utility and challenges of using networked governance models to address mangrove conservation.

Complexity and Governance

Species losses are often the 'result of interactions between a number of highly context-dependent causal factors' (Blaustein and Kiesecker 2002, p. 597). Therefore, instead of focusing on single factors that may endanger a species or critical habitat, Blaustein and Kiesecker (2002) assert the need to understand the complex interactions among multiple factors affecting ecosystems in order to fully understand the causes of biodiversity loss. Such an approach allows the examination of how human actions such as habitat destruction, overexploitation of natural resources, and the release of contaminants interact with environmental factors to exacerbate species or habitat losses.

Human–environment interactions and policy solutions occur within the intricate structures of ecosystems (Fig. 1). These systems are themselves naturally in a constant state of flux and change due to environmental forces such as climate, gravitational pull, and the amount of precipitation or carbon dioxide in the air (Blaustein and Kiesecker 2002; Lui et al. 2007; Dayton et al. 2005). This state of constant action and reaction creates an atmosphere of seeming chaos where the causes and effects of various changes are difficult to distinguish. However, the dynamic nature of ecosystems actually indicates the capacity of such systems to engage in continual adaptation. For example, the Science for the Protection of Indonesian Coastal Ecosystems (SPICE III) program discovered the presence of a new faunal species in the Segara Anakan Lagoon, representing a habitat adaptation in response to a high concentration of organic pollutants in the sediment (ZMT 2012). Social systems such as policy governance[1] systems are in a similar state of constant transition, meaning that opportunities to influence change are always available to be exploited by actors within the system (Waldrop 1994; Huitema et al. 2009). The combination of human activities, such as the clearance of mangroves for aquaculture, and environmental pressures, such as sea-level rise, necessitate the development of a different policy framework for mangrove conservation.

This chapter employs the concept of networked governance as a useful framework for managing the often overlapping or conflicting conservation goals that simultaneously attempt to enhance human well-being and ecological resilience (Hirsch et al. 2010; McShane et al. 2011). We present two case studies of how networks can be used to mitigate the degradation of mangrove ecosystems and the negative effects emanating from conservation policy implementation. Enhanced collaboration among various government bodies, and between those bodies and non-governmental stakeholders, is a key ingredient to the success of networked governance. If we acknowledge that both natural and human agents contribute to environmental degradation through complicated interactions at multiple scales, then conservation efforts will be more coherent.

Networks offer a powerful tool for enhancing coordination and synergy, and for making sense of the trade-offs. They represent an important mechanism that works to capitalize on the effectiveness of local communities in addressing complex problems that have regional and even global consequences. Lessons learned on the ground from experience and experimentation can be effectively transmitted to the national and regional levels through networked governance to effect policy change. This model of governance permits each participating institution and entity to focus on its core mission while multiplying the impact of its individual actions. This multiplier effect is transmitted through the interconnections or relationships that connect the various parts of these human networks. These connections are sustained through information flows, or, in some cases, through contractual arrangements (Meadows 2008). The network brings together the combined might of individual organizations whose missions complement each other and address different aspects and scales of complex policy and conservation problems.

While Huitema et al. (2009) conclude that there is little empirical evidence proving that polycentric governance systems (systems characterized by multiple centers of authority or control) are more flexible and resilient than centralized hierarchical systems, many case studies (including this one) have demonstrated the advantages of systems that distribute ecosystem management responsibilities across scales and actors (Imperial 2005; PRCM 2012). Indeed, effectiveness increases as opportunities to collaborate are multiplied, allowing the development of trust.

[1] Following Huitema et al. (2009), in this study, governance is defined to include the gamut of formal and informal structures and relationships that are implicated in governing.

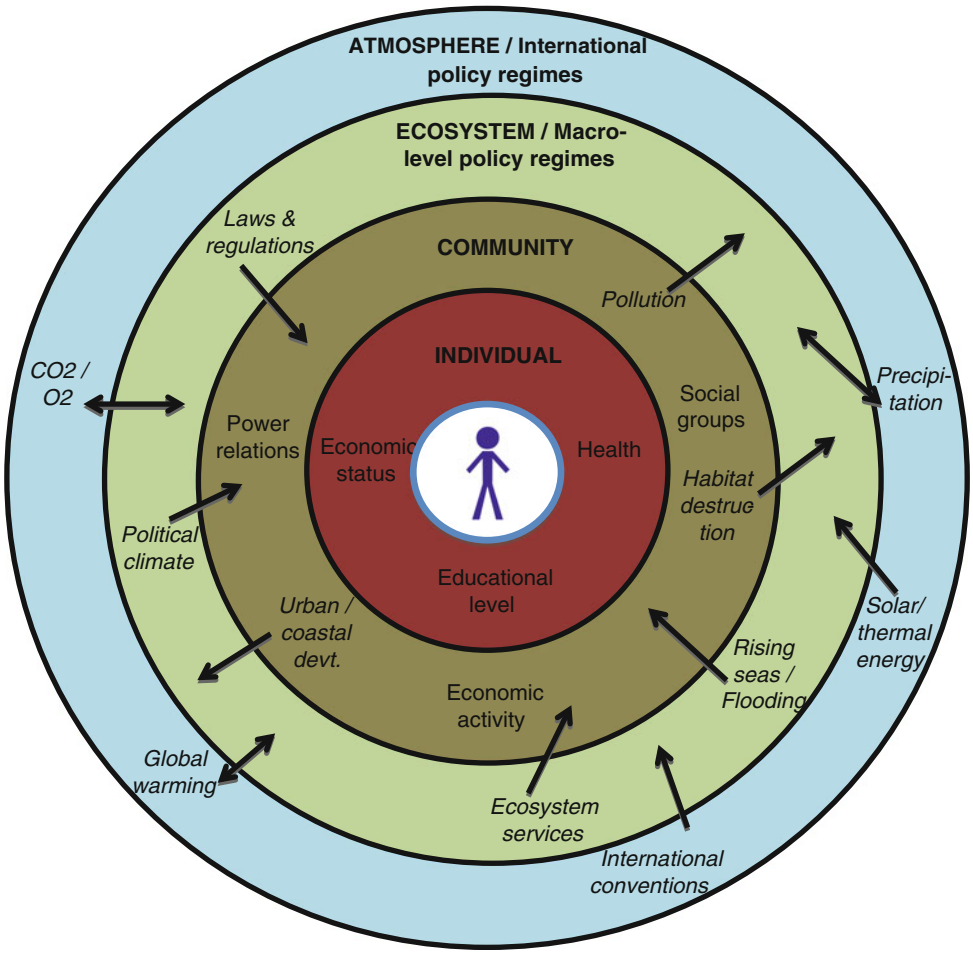

Fig. 1 Human–coastal and marine ecosystem interactions

The Importance of Networks in Governance for Conservation

Recent years have borne witness to the proliferation of various types of networked governance models and their application to a multitude of policy areas and economic activities (Borgatti and Foster 2003; Peter 2007). Traditional forms of governance organized around bureaucratic command-and-control hierarchies have ceded more ground to new forms of network governance (Lukas 2013). This is particularly true in policy arenas distinguished by a significant amount of fragmentation, where political authority over the policy problem is shared across many leaders.

These newer forms of governance gather both public and private stakeholders who generally share similar visions and values and agree to work in more or less formal arrangements to achieve their shared goals. At their most basic level, networks represent and are shaped by social ties and interactions, and at a broader level encompass group processes and systems involving a range of actors (Peter 2007). 'Such autonomous, self-organized systems, conceptualized as "polycentric governance", have been shown to enhance innovation, learning, adaptation, cooperation and trustworthiness, and can help achieve more effective, equitable and sustainable outcomes at multiple levels' (Jones 2011, p. 21).

Whether initiated from the top-down or emerging from the ground up, networks exhibit a variety of structures that span formal arrangements to the more informal where individual members possess a higher degree of information and autonomy. Regardless of the diversity of their arrangements, the horizontal nature of networks differs significantly from traditional governance hierarchies, which are characterized as vertical structures that hinder timely communication and decision making. The 'new multi-organizational forms arising from collaborative endeavour' create policy opportunities (Skelcher 2005, p. 5).

Decentralizing the formulation and implementation of policies is one way of empowering lower levels and smaller scales. And because '…there is too often a mismatch between the scale of what is known about the world and the level at which decisions are made and actions taken' (ibid. p. 22), the implementation of sustainable solutions must be coordinated across scales. Networked governance allows this to happen by taking advantage of the fact that '…the decentralized, fluid form of a network and the autonomy of

each member allows for decision making at the most appropriate level for the citizen' (Goldsmith and Eggers 2004, p. 38).

The move toward networked governance acknowledges the need to promote learning and cooperation at multiple and linked scales. Such loosely structured arrangements depend on collaboration and connect smaller governance systems and capable actors operating at the local level with actors who are capable of addressing macro-level, regional issues.

If the network functions well, individuals and local institutions are empowered to effectively join their efforts with those of national networks that interact with regional ones. Furthermore, knowledge sharing must be promoted between entities in flexible, non-hierarchical ways for the capacity of organizations to be enhanced. Dedeeurwaedere (2005) states that the function of networked governance 'is to create a synergy between different competences and sources of knowledge in order to deal with complex and interlinked problems' (p. 2). In all effective networks, the empowerment of local actors to effectively contribute to shared agendas is a major strength of governance. Thus, a commitment to capacity building and mutual learning is a necessary component of successful networked governance in the domain of conservation and natural resource management. Lastly, collaboration is ensured when all members buy-into and accept the polycentric institutional arrangements that are characteristic of networks, thus accepting shared power between many different decision-making units and scales. The networks that are highlighted in this chapter are generally organized to allow mutual learning and joint problem solving at local scales and experimentation with possible solutions at the regional level.

Case Study of Networked Governance in Practice in West African Mangrove Conservation Efforts

The networked governance approach is exemplified in the PRCM (in West Africa), which has for the last ten years acted as a network of networks that has empowered each participating organization to focus on its core conservation mission while multiplying the impact of individual actions (PRCM 2008, 2012a). Effective governance networks such as the PRCM bring together the combined might of organizations whose missions complement each other and simultaneously address different aspects of complex problems. This has allowed all stakeholders to work collectively toward the shared goal of the conservation and sustainable management of the West African region's natural resources and ecosystems.

This section demonstrates the pertinence of harnessing networked governance models, in particular the PRCM to confront the threats to West Africa's ecosystems. Figure 2 below summarizes how PRCM interventions in policy, capacity building, and investment in local areas are targeted at solving the complex multi-faceted problem of conservation in West Africa.

The PRCM: A Brief History

Before the PRCM was founded, coastal zone conservation efforts in West Africa were limited to a few marine protected areas (MPAs) and a small number of scattered projects (PRCM 2012a). In response to the need for a coordinated approach, a Regional Coastal Planning Network (RESOCOTAO) was set up in 1997. Designed as a network of expertise, the RESOCOTAO set out a number of guidelines, which foreshadowed the advent of the PRCM, most notably with respect to the need to address ecoregional issues.

It was with this in mind that a workshop on 'Priorities for coastal conservation in West Africa' was held in St. Louis, Senegal in 2000. The workshop's participants were struck by the strong similarities in the priorities stated by the representatives of the countries involved, with special emphasis being placed on the establishment of MPAs, sustainable management of fisheries resources, and mangrove biodiversity conservation. It was at this workshop that the principle of collaboration among the international organizations gained acceptance, a principle that was to become official soon thereafter when a Memorandum of Understanding and Partnership was signed by the International Union for Conservation of Nature (IUCN), the Worldwide Fund for Nature (WWF), the International Foundation for the Banc d'Arguin (FIBA), and Wetlands International.

The strategy emerging from the workshop embraced a shared vision and regional approach to conservation based on: an understanding of the central role played by local communities, a belief in the effectiveness of shared governance, an understanding that the cultural dimension is inextricably linked to the environment, the direct linkage to the issue of fisheries, and the need for strong institutions.

The project portfolio was subsequently presented at a regional workshop held in Dakar in 2003, which was the venue of the first meeting of the program's technical and financial partners and of the official launch of the PRCM. It was there that a Memorandum of Understanding was signed with the Permanent Secretariat of the Sub-regional Fisheries Commission (SRFC), whose geographical scope covers the same countries as the PRCM. This MOU affirmed the

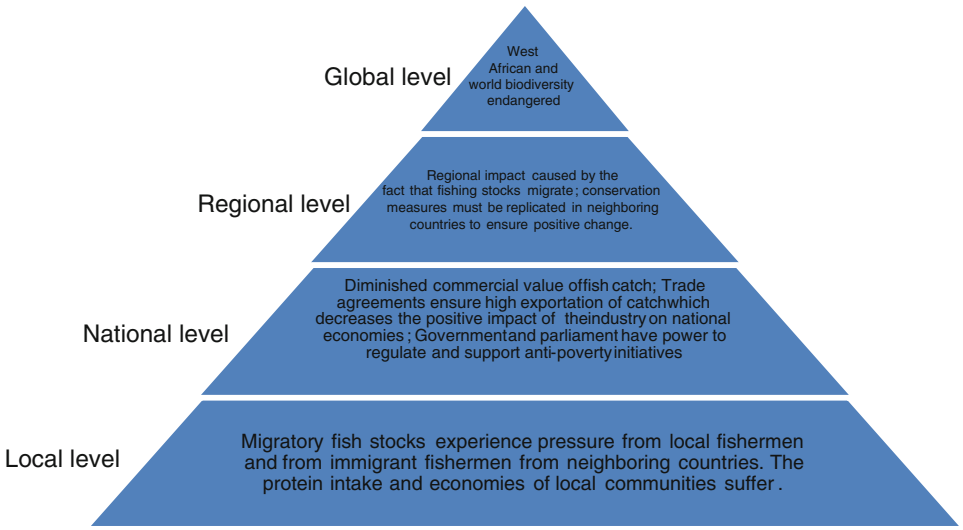

Fig. 2 PRCM impact on complex problems of conservation in West Africa

States' commitment to marine conservation, and for the PRCM, it represented a crucial linkage with government policies and their harmonization at the regional scale.

The coalition emerged as a result of the natural evolution of a process. Even its funding model evolved naturally within this historical process since the PRCM's two largest donors, the MAVA Foundation and the Embassy of the Netherlands in Dakar, had already been funding coastal zone conservation initiatives for many years and were involved in the planning process. And as a result of this evolution, the entire process was already deeply rooted and the prominent members of the coalition had long-standing relationships based on trust and friendship, thus conferring tremendous strength to the overall architecture of the initiative.

The initial grouping of some forty institutions from six countries in a regional program with one shared vision required considerable effort by all. Not only did new paradigms and changes of scale in approaching problems have to be adopted, but also new models for operating and managing relationships. This called for major effort and investment long before project-based work actually commenced.

The objective of the PRCM during its first two phases (2004–2012) was to promote, with other actors in the region, a shared vision of regional conservation priorities and to divide up the responsibilities for reaching this vision according to the specific competencies of each organization. The articulation and coordination of these activities were meant to create a coherent program of interventions that not only built synergy but also decisively influenced public policies relative to the development of the coastal zone and the exploitation of its resources.

The PRCM West African Mangrove Initiative

As a coalition, the PRCM is equipped with coordination and communication competences. It maintains a broad reach, which touches a large number of preservation and management problems occurring in the West African coastal and marine zone. Through this structure, the PRCM was able to combine programmatic activities with networking activities for maximum impact in its first two phases (PRCM 2012a). For example, projects falling under the conservation component helped to improve the management of MPAs. Project leaders then coordinated with efforts to protect specific species such as manatee or marine turtles (Duval-Diop 2012). Those initiatives were then supported by broader participative governance and management projects. All of these efforts then informed the advocacy and networking efforts undertaken in projects falling under the integrated governance component.

This combination of on-the-ground pilot experience and regional policy advocacy is evident in the West African Mangrove Initiative (WAMI) funded and coordinated by the PRCM from 2007 to 2010 (Duval-Diop 2012; PRCM 2012a, b). Using a participative approach grounded in local communities, the project helped to conserve and restore mangrove ecosystems in six countries (Fig. 3) and to improve the well-being of the local communities. With a budget of approximately 480,000 euros, the project was implemented in several phases including: the establishment of baseline data and reference studies; the transfer of knowledge on mangrove restoration and management to local communities; the implementation of pilot activities relating to restoration and alternative livelihoods best practices; and the identification of gaps and inconsistencies

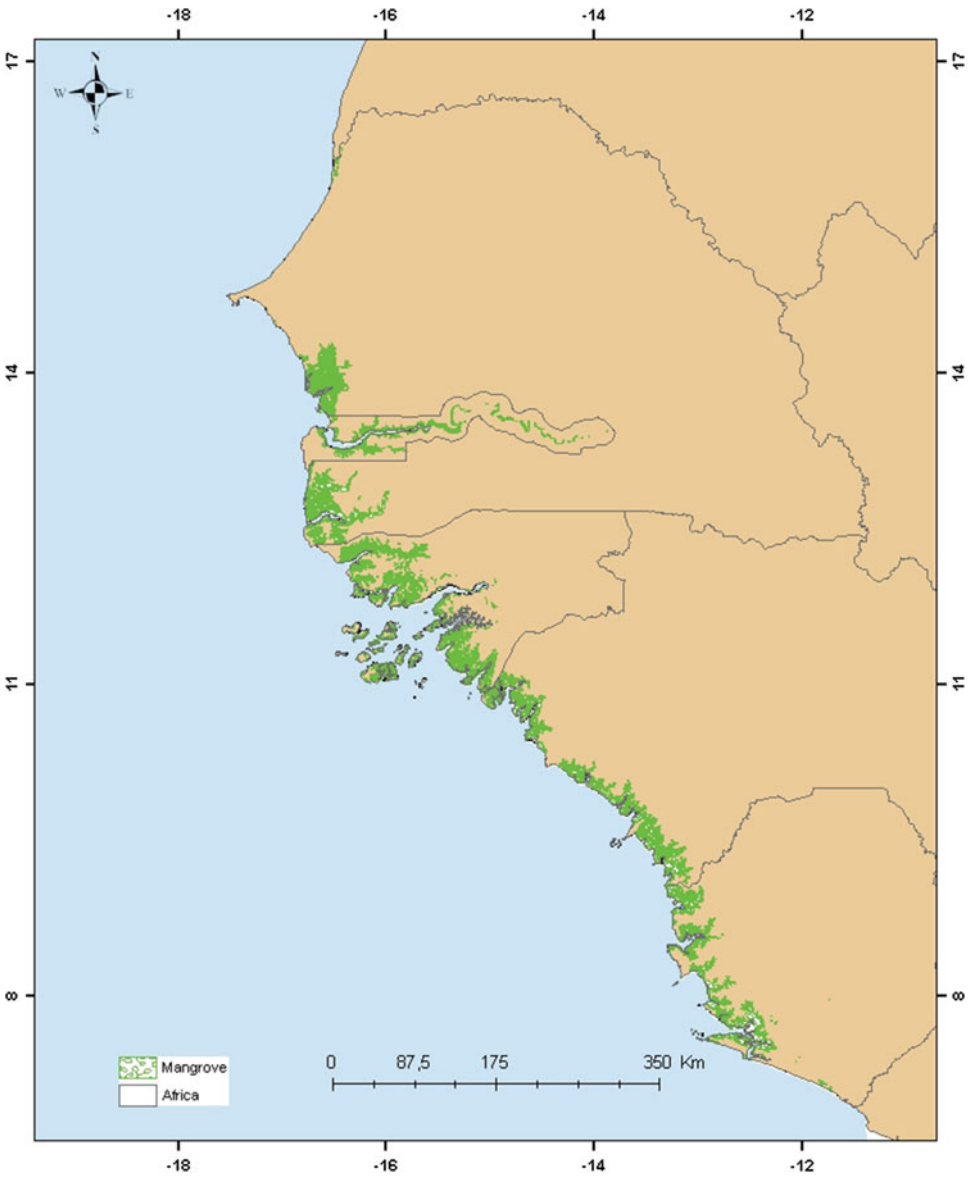

Fig. 3 Mangrove coverage (*Source* RAMPAO 2014)

in national policies, laws and management mechanisms for the conservation of mangrove habitats. These actions subsequently led to the signing of a regional charter on the conservation and sustainable reuse of mangroves by six countries in the region (Mauritania, Senegal, Gambia, Guinea, Guinea Bissau, and Sierra Leone). The common vision expressed in this charter focuses on a respect of joint principles while implementing nationally defined action plans that reflect to local realities (Mangrove Charter 2009).

The process by which this consensus was reached emphasized a respect of each country's national priorities and context (Duval-Diop 2012). For example, in Mauritania, mangroves are completely protected and cannot be exploited by local populations. However, in other countries such as Sierra Leone or Guinea Bissau, the ecosystem services provided by mangroves represent a significant amount of income for populations. Attempting to forbid the exploitation of mangroves would have failed. Instead in these countries, the pursuit of sustainable management practices that follow the general guidelines described in the regional charter is more practical and feasible.

The high level of engagement and motivation of coastal communities who now understand the need to conserve their resources and who have the ability to do so will ensure the sustainability of the successes described above. Without building the awareness of local population, this engagement and the sustainable adoption of conservation practices would remain insurmountable.

Huitema et al. (2009) assert that the effectiveness of collaboration in networked governance can be influenced by how activities are ordered. Therefore, tasking various collaborating partners with the simultaneous implementation

of actions was more effective than the sequential ordering of activities (Sproule-Jones 2002). An ambitious endeavor, implementation of this model yielded many positive results and changed the landscape of conservation and natural resource management in the region. The WAMI project, in particular, was relevant and strategic for the PRCM and contributed directly to better management and protection of the mangrove zone at the local and national levels (Borner and Guissé 2010). It also had an impact at the international level when a coalition of PRCM partners successfully lobbied parties to the Abidjan Convention in 2012 to adopt a motion to develop an additional protocol to the convention on the mangrove (PRCM 2012b).

Furthermore, the PRCM was able to effectively create other networks that impact specific thematic areas. The partnership then worked to build synergies between those networks and the actors within them to maintain its global, systematic approach.

From the relationships created over years of working shoulder to shoulder on the preservation of endangered sharks and rays, to the ties reinforced by mutual struggles to create MPAs, the PRCM has stimulated innovation and promoted learning, adaptation, and cooperation. All of these elements are essential to attaining more effective, equitable, and sustainable results across all scales and are appreciated by various actors throughout the region (Fig. 4).

The PRCM: A Force for Capacity Building

A critical role of governance networks is the promotion of learning and cooperation at multiple and linked scales. A collaborative system, that connects smaller governance systems and people operating at the local level with actors who are capable of addressing broader-scale, regional issues, depends on building the human capacity of local actors. They are most effective when generally organized to allow the knowledge acquired at local scales that emerges from experimentation with possible solutions to percolate to the national and regional levels. Decentralizing the formulation and implementation of policies is one way of empowering lower levels and smaller scales. This is particularly important when different aspects of a complex problem may be experienced at different scales, *and* where the potential for implementation of sustainable solutions should be coordinated across scales. But this cannot be accomplished without the meaningful engagement of local communities, which in turn depends on their ability to fully engage with the process.

Capacity building as a term is not easy to define precisely, because of the breadth of areas that it touches. However, at its most basic level, capacity building deals with people, organizations, communities, and the process of improving the effectiveness of what everyone does. Because people are one of the main culprits responsible for biodiversity and habitat loss and are more affected by the conservation of environmental resources, they must be the prime targets for ensuring its protection. Expanding and then channeling human capacity is therefore fundamental to preserving our environment and its diverse ecosystems. In the West African region and beyond, conservation that is effective in the long-term hinges on linking dedicated individuals and institutions that possess the ability and assets to confront the pressures facing our natural world (Duval-Diop and Meriaux 2012; PRCM 2012; FIBA 2012).

Strengthening capacity is also a way of levelling an often lopsided playing field and ensuring equity in the face of external actors who hold a wealth of resources and knowledge. The old adage holds true—'knowledge is power.' When local populations are empowered with knowledge that enables action, they can then take the lead in conservation efforts. While external interventions can be useful in the short term, particularly in helping to raise awareness of external pressures that are difficult to perceive at the local level, lasting conservation that is grounded in a new way of regarding the environment and that leads to changed behavior must come from local communities and institutions.

Therefore, a key function of governance networks is to connect different competencies and capacity gaps with sources of knowledge in order to truly enable the engagement of local stakeholders (Dedeeurwaedere 2005). In all effective networks, the empowerment of local actors to effectively contribute to shared agendas is a major strength of governance. Thus, a commitment to capacity building is also a necessary component of successful networked governance in the domain of conservation and natural resource management.

The PRCM invested a significant amount of resources (26 % of total resources in 2011 alone) to build the capacity of both local institutions and individuals to understand the nature of the problems affecting local ecosystems, to do data collection and monitoring, to contribute to the formulation of policy solutions as well as to implement local project solutions (Fig. 5). Experimentation on the ground through pilot projects allowed the collection of data and information on best practices, which informed the development of tools used in training and capacity building. Local actors were linked through networks with regional actors, thus enhancing their ability to advocate in the policy arena. This was often accomplished through facilitating dialogue and exchange among regional experts to share best practices. Through workshops and training, the PRCM also built the capacity of organizations by connecting regional technical expertise with people who needed that expertise on the ground.

This strategy truly levels the playing field between on-the-ground work and high-level policy making and balances

Fig. 4 Testimonies from PRCM actors

'Of all the environmental coalitions I have known, the PRCM is without a doubt one of the most innovative and the most effective and it can serve as a model for other marine and coastal zones in the world… The PRCM is mobilizing civil society to wield greater influence and has the ear of governments.'

Luc Hoffmann, Honorary President of the MAVA Foundation

'We are a global village… Whatever goes wrong in Senegal or Guinea-Bissau or Mauritania, it will surely affect Gambia. But if we are talking, we are networking, we are working together as unit, then we are sure that we are addressing the problems of common interest, as a country and as a subregion.'

Kebba N. Sonko, Permanent Secretary for the Ministry of Forestry and the Environment, Gambia

'The PRCM is probably one of the most powerful coordinating and partnership mechanisms to promote conservation anywhere in Africa, because it brings together governments, nongovernmental organizations, local institutions, international institutions all together in a partnership which doesn't have to have thick structures.'

Paul Siegel, Scientific Advisor, WWF Marine Program in Africa

the power between local and national/regional agents, something which local actors value. In the words of Augusta Henriques, Secretary General of the national NGO Tiniguena and winner of the Ramsar Award:

> The challenge is to invest in several stakeholders and institutions at every level. But above all, the importance of strengthening the grassroots level must not be overlooked, since it is the communities that anchor the process in the field. Indeed, the sum of the PRCM's field experience represents enough potential influence to propose solutions at the ecoregional level. In other words, solutions must spring from local and national situations and experiences pooled together in an ecoregional perspective.

The WAMI project invested in building the capacity of local communities in mangrove restoration and in alternative livelihoods to facilitate the conversion away from the economic activity of harvesting mangrove timber. A total of 30 individuals including 14 women received training in mangrove restoration, solar salt production and the use of improved fish smoking ovens (Borner and Guissé 2010). While the project planned to facilitate peer learning exchanges at the regional level, budget constraints and differences in language and climate allowed only exchanges between neighboring countries (Borner and Guissé 2010; WAMI 2010).

For example, reciprocal visits allowed the Gambian communities of Buram and Bali Mandinka to benefit from the expertise of the Senegalese community of Dasselamé Serer, where awareness for the conservation of mangroves is well established and where reforestation activities are part of a well-established annual program. Exchanges were also facilitated between Guinea and Senegal to demonstrate and share the experience of producing solar salt.

Challenges in the PRCM Networked Governance Model

However, networked governance is not without challenges. One of the greatest challenges to governing in networks includes the presence of differing and competing goals, since networks often gather stakeholders whose interests simultaneously overlap and clash. Because the Atlantic coast of Africa has a high concentration of population and industries, the need for mangrove habitat conservation is often in conflict with the need to encourage rapid growth. Competition is further exacerbated by the fact that short-term subsistence needs are best addressed by high-revenue generating activities such as mangrove cutting while conservation priorities and actions generate benefits in the long term (UNEP 2007). The fact that the PRCM partnership includes both non-governmental and governmental organizations means that even conservation goals do not always align. Unequal capacity and poor national and local

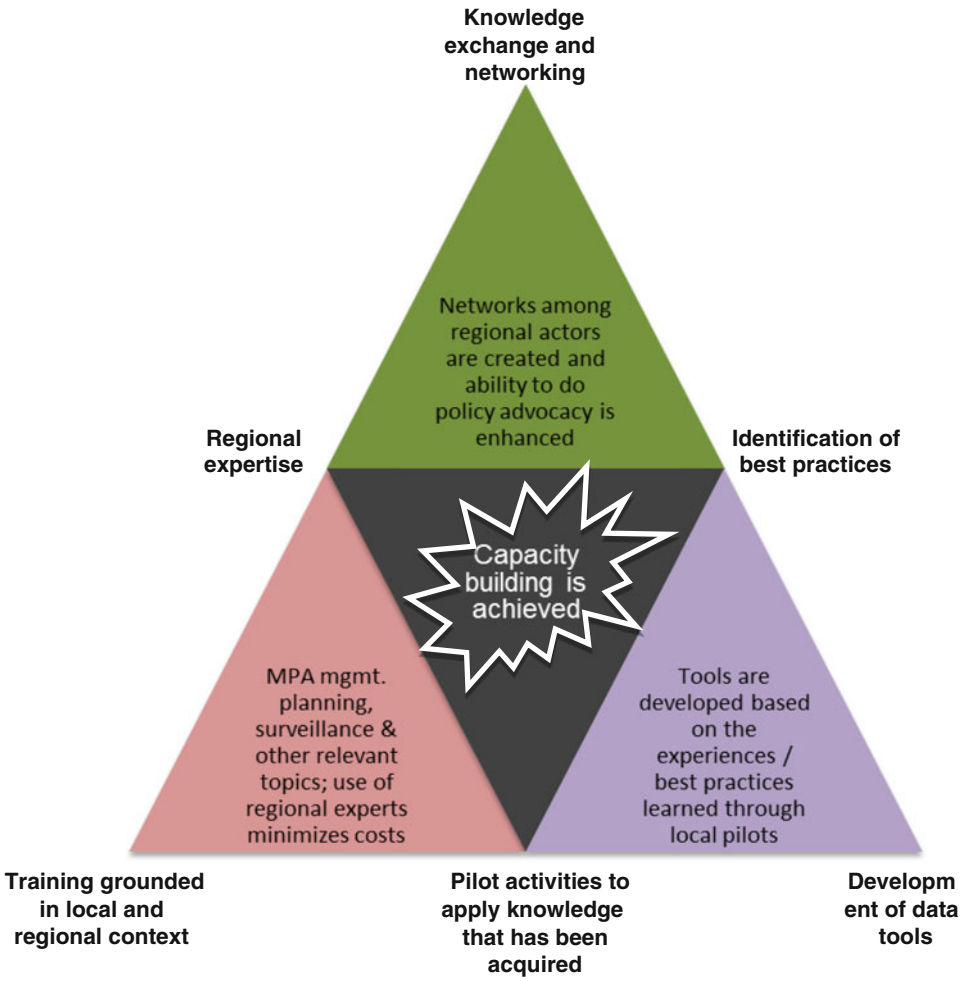

Fig. 5 PRCM regional capacity building model

governance mechanisms can cause local communities to cede to the agendas of well-funded international organizations or NGOs. Achieving a common vision is particularly difficult when organizations at all scales compete for funding and projects that reflect their priorities.

The tension between competition and collaboration can become high, when a group creates a network and then ends up competing with members of the same network. In this situation, distrust and a refusal to share information can result. Furthermore, in networked governance, the hierarchy of responsibility is replaced by a hierarchy of interactions, which sometimes allows certain institutions to avoid completing tasks and makes ensuring accountability difficult. The difficulty of coordinating activities can increase the transaction costs related to the extensive consultations needed to develop and enforce agreements. All of these problems are exacerbated when the network is particularly extensive and comprises a host of diverse actors and interests like the PRCM.

Additional obstacles to effective networked governance comprise communications failures, and data and capacity shortages. In networks, roles and responsibilities are often dispersed, which contributes to communication difficulties. Creating accessible meeting spaces, harnessing technology, and funding opportunities for exchanges are helpful but can sometimes be costly. In a region where there are multitudes of local languages, where the Internet connection can be unreliable in many areas, and where electricity outages are frequent, even the simplest communication efforts can be challenging. For example, language differences, cultural barriers, and sheer distance worked against greater communication among various regional actors in the WAMI project (Borner and Guissé 2010; WAMI 2010). Furthermore, diffuse and ill-defined authority makes democratic decision-making processes difficult particularly when power and capacity is unequally distributed spatially and organizationally (Skelker 2005).

Furthermore, ensuring the durability and financial sustainability of such partnerships is often a major obstacle to the long-lasting changes they hope to achieve. Like any program that depends on uncertain funding, the PRCM is not a permanent structure, particularly in times of economic crisis. However, the motivation for working together will only increase over time and will remain a necessity in the

long run. It is therefore necessary to design structures for consultation and collaboration for which the operating and transaction costs are kept low, while producing a set of services compelling enough to sustain the interest of their users.

Harnessing Thematic Networks: The Case of the West African Network of Marine Protected Areas

The sustainable collaboration of actors and the coordination of efforts within the regional area are enriched by the support of thematic networks, working on a voluntary basis and at reduced costs. Thematic networks can ensure a greater convergence of interests and goals can facilitate communication and permit an enhanced focus on specific issues. With this in mind, the PRCM has been responsible for the creation of several formal and informal thematic networks such as the Alliance of Parliamentarians and Local Officials for the Environment (APPEL) and the Regional Network of Marine Protected Areas in West Africa (RAMPAO). "The existence of these networks meets the need to structure consultation and collaboration in a way to promote the consistency of interventions and to strengthen capacities to lobby" (PRCM 2012b, p. 11).

The thematic network described below combines elements of self-organization and active steering to arrive at major successes in the West African marine and coastal region over the past several years. Essentially, its ultimate goal is to shape broad policies governing the conservation and management of natural resources and ecosystem services in the coastal and marine areas of the PRCM ecoregion. The RAMPAO network of MPAs presents a learning opportunity for all those engaged in conservation of ecosystems such as mangroves in the region and in the world.

RAMPAO: An Effective Tool for Mangrove Conservation

MPAs are dedicated to protecting sensitive areas such as seagrass beds, mudflats, mangroves, and coral formations that play a specific role in natural resource regeneration and biodiversity conservation. MPAs in West Africa are typified by the presence of human communities who are their traditional inhabitants. Having lived in close contact with their environment for generations, these communities possess valuable knowledge, which is a tremendous asset for environmental management. Far from being sealed-off units, MPAs are in fact areas that produce resources and knowledge that, in turn, maintain the vitality of other areas far beyond their boundaries. And 'if designed correctly and managed well, MPAs have an important role to play in protection of ecosystems and, in some cases, enhancing or restoring the productive potential of coastal and marine fisheries' (IUCN-WCPA 2008, p. 3).

In order to ensure careful management, MPAs have devised novel solutions to the problems they face in the fields of development, natural resource management, research, and surveillance. They have also proven to be testing grounds for sustainable development practices, which engender lessons learned and best practices that can benefit other processes outside their borders.

The networking of individual MPAs connects these areas based on ecological and/or sociopolitical factors. As defined in UNEP-WCMC (2008), an MPA network is a 'collection of individual MPAs or reserves operating cooperatively and synergistically, at various spatial scales and with a range of protection levels that are designed to meet objectives that a single reserve cannot achieve (p. 20).' Indeed, the connectedness of mangrove habitats, the flow of oceanographic currents that carry developing fish larvae from one estuary to another, or the migration routes of various turtle species provide the rationale for regional action to preserve these habitats. The replication of the number of MPAs that protect a particular habitat such as mangroves is an important criterion in the design of resilient ecological MPA networks.

Given that MPAs reflect well-defined thematic, spatial, and institutional realities and that they are an ideal terrain of action for international conservation organizations, it was only logical that they were granted a central place within the PRCM. The first manifestation of this was the development of a regional strategy based on a vision which is still relevant 12 years later: 'A coherent network of marine protected areas, managed by strong institutions using the participatory model, which value natural and cultural diversity to contribute to the sustainable development of the region.' With clearly stated political support for the strategy, its implementation has resulted in the expansion of MPAs in the region.

Between 2004 and 2011, nine MPAs were established within the PRCM ecoregion. The 15 MPAs already in existence in four countries at the time the strategy was adopted swelled to approximately thirty MPAs in six countries today (seven counting Sierra Leone, where the process to establish the Yawri Bay MPA is well underway). Most of these protected areas are members of a network created in 2007 by the PRCM and officially recognized by the States, the Regional Network of Marine Protected Areas of West Africa—RAMPAO (Fig. 6).

RAMPAO's mission is to preserve and strengthen the marine ecoregion of West Africa by maintaining and effectively managing an ecologically coherent set of critical habitats. Networking ecosystems and critical habitats is an

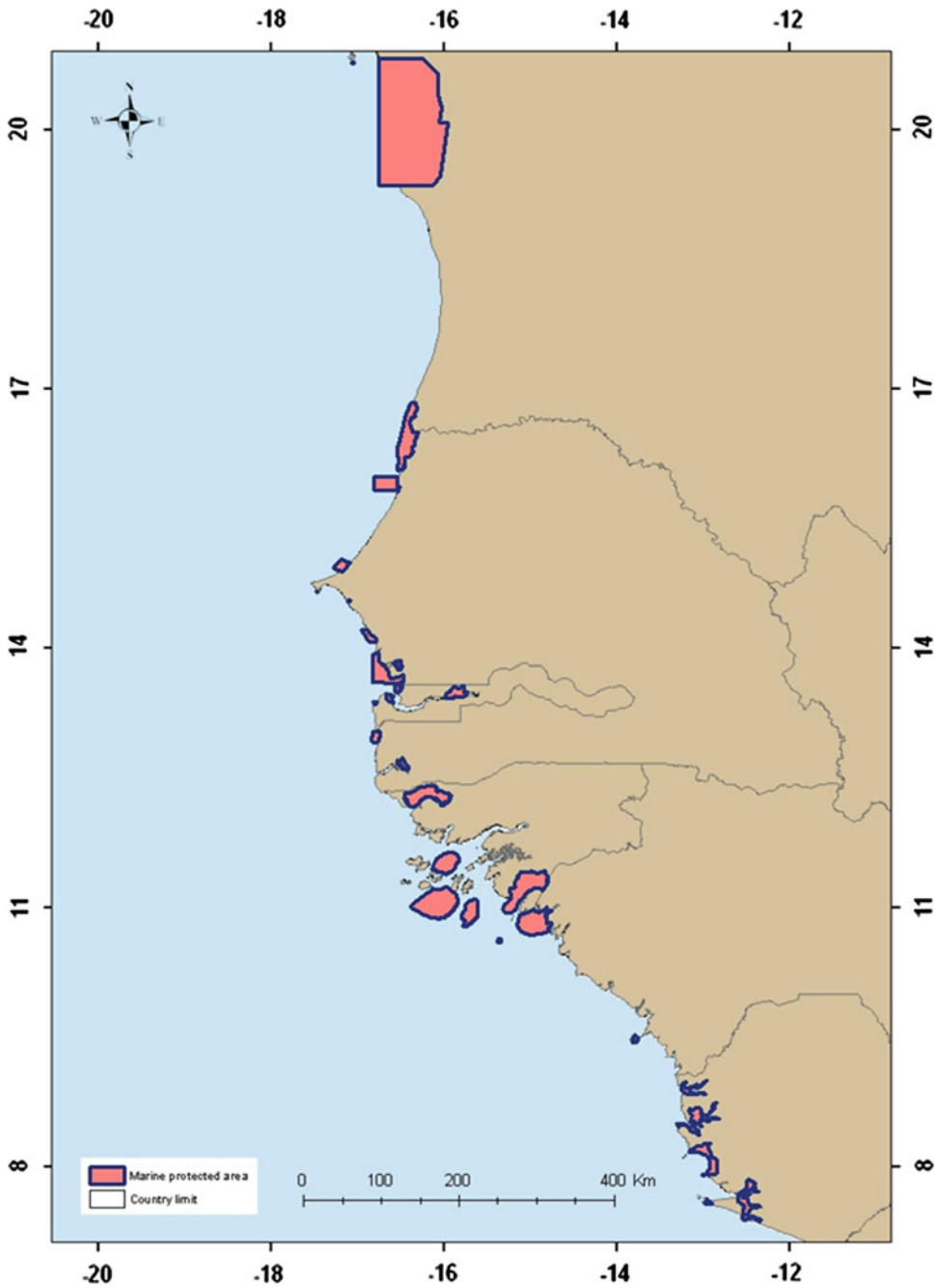

Fig. 6 Map of the RAMPAO MPA members

important strategy for tipping the balance in the degradation of our natural resources. An international review of regional and national MPA networks found that regional (multi-country) networks tend to progress best when operating under a coherent and robust coordinating framework and when national parties demonstrate commitment through treaties or other agreements (UNEP-WCMC 2008). In 2010, the RAMPAO gained the support of 15 national fisheries and environmental ministers, thus improving its legitimacy in negotiating and facilitating regional change. Because the RAMPAO encompasses both human and ecological concerns and touches the temporal and spatial scales of ecological systems, the network is better equipped to guarantee long-term sustainability than would a single MPA, which is particularly important for the contiguous mangrove habitat that spans the countries of Mauritania, Senegal, Gambia, Guinea, Guinea Bissau, and Sierra Leone.

According to the RAMPAO Secretariat, 24 MPAs in the network distributed in 5 countries (Mauritania, Senegal, Gambia, Guinea, and Guinea Bissau) identify mangroves as key habitats in their management plans. In a survey conducted by the Secretariat in 2009, 12 of these MPAs reported habitat degradation rates ranging between 10 and 30 % (RAMPAO 2010). Table 1 shows the proportion of

Table 1 Change in mangrove cover and protection levels in PRCM countries

Country	Number of mangrove species	% change in mangrove cover (1980–2006)	% mangroves located in protected areas
Mauritania	3	39, 3	62, 5
Senegal	7	−23, 8	42, 5
Gambia	7	−17, 5	3, 5
Guinea Bissau	6	8, 7	35, 5
Guinea Conakry	7	−31, 9	0, 26
Sierra Leone	6	−37, 3	14, 5

(*Sources* UNEP 2007; Tendeng et al. 2012)

mangroves under protection versus the rate of change in their coverage over approximately 25 years.

In the case of Mauritania and Guinea Bissau, the high amount of protection afforded these ecosystems corresponds to an increase in the size of this ecosystem prior to the establishment of the RAMPAO. In the case of Senegal, however, mangrove coverage decreased between 1980 and 2006 in spite of the high level of protection. To enhance the effectiveness of MPAs in general and to enhance their specific capacity to protect critical mangrove habitats, the PRCM funded 2 projects at over $2 million euros between 2008 and 2012. Key non-governmental PRCM partners, including the FIBA and the International Union, implemented these projects for IUCN that made concerted efforts to improve the management, participative governance mechanisms, and networking in several MPAs in the region.

End of project reports revealed an improvement in the management of MPAs and their natural resources through the implementation of activities such as the development and implementation of updated management plans, monitoring and evaluation of the effectiveness of management, ecological and species monitoring, capacity building in conservation and mangrove restoration, and the establishment of functional community governance structures and a pool of expertise (FIBA 2012a, b). The involvement of more stakeholders (communities, professionals especially fishermen, authorities, etc.) was a key factor in the success of these projects. The evaluation of the project to support the RAMPAO network showed that significant progress was made in the management in 6 MPAs in 4 countries (Bamboung, Niumi, Urok, Orango, Joao Vieira et Tristao) between 2008 and 2012 (FIBA 2012c).

While these effects cannot be entirely attributed to RAMPAO network, the evaluation found that the impact of the network in ensuring a sustainable management of critical and endangered habitats in these areas to be positive. Furthermore, surveys conducted during the evaluation revealed that 57 % of network members believed that the RAMPAO had a positive impact on building the management capacity of MPA staff, which directly impacts the ability to implement effective mangrove conservation measures.

Project leads also found that the inclusion of MPAs in a formal network was extremely beneficial for the MPA managers, especially at the beginning of the MPA management planning process. The RAMPAO facilitated technical exchanges between site managers and specialists, and networking at the human and ecological levels using sound science to develop coherent and effective action. At the same time, the network has nurtured the development of strong relationships between the human actors. It has organized events and activities that promote the exchange of information, leading to mutual learning that helps create synergies between MPAs. The network will continue to enhance the capacity of MPA actors through mutual learning and exchange to further the progress made by the two PRCM projects. It will also support additional efforts to ensure that all mangrove habitats benefit from consistent and coherent protection, effective management, and quality monitoring regardless of their home countries.

However, while the RAMPAO has proven that networked governance is an effective strategy for improving coastal resources management, it confronts many obstacles. Financial sustainability to support the costs of convening members and other network activities is a major concern. Attracting greater financial resources to support the continued improvement of individual member MPAs continues to be difficult. Furthermore, although the network strives to ensure ecological coherence, gaps exist in the representation of key habitats such as corals and seamounts, and the connectivity between MPAs is little understood and requires more scientific study (Tendeng et al. 2012). Political instability and shifting stakeholders makes continued training necessary in spite of the lack of resources. Yet, despite of these challenges, the commitment of myriad stakeholders at all scales ensures the network will continue to grow and increase its effectiveness.

Conclusion

The complexity of interconnected human and natural systems tests traditional natural resource management assumptions and practices. Moreover, the achievement of

management objectives depends on the extent to which these policies and practices account for the complexities inherent in these systems. This is especially true given the fact that management of mangrove ecosystems is complicated by the prevalence of indirect interactions between people and nature. All types of actors—government, civil society, non-governmental, youth and others—have important roles to play in the design and implementation of management and conservation solutions. The case studies presented in this chapter have revealed the successful application of the networked governance model to the conservation and natural resource management of the West African ecoregion. Acknowledging the scale of interactions and the tight connection between local economic decisions and the global decisions and actions that influence them has facilitated simultaneous action at multiple scales regarding mangrove conservation. The PRCM's multi-faceted approach combines the practice of funding projects on the ground with national policy-making and advocacy and regional collaboration. Incorporating various styles of networks into one structure and creating diverse contractual arrangements that join various levels of government agencies and other civic institutions have resulted in the dismantling of barriers such as country borders or hierarchical government lines and have effectively engaged a myriad number of stakeholders.

Lessons learned reveal the need for continued engagement and investment in this model. For example, a focus on both the ecological and human networks that exist between MPAs, as the RAMPAO does, can ensure a sustainable management of critical and endangered habitats such as the mangrove. Thematic networks that target a specific functional unit, such as the marine protected area, have greater success in developing strong relationships among actors who share knowledge about how to best preserve and manage similar habitats and thus take coherent and effective action. However, in other networks, opportunities to extend program impact and create synergy can be squandered. For example, the current structure of the PRCM that is based primarily on voluntary engagement has made ensuring accountability difficult and sometimes limited impact. Additionally, the transaction costs of communication and coordination are often high and have caused attempts to ensure accountability to suffer. The hierarchy of interactions that exists in networked governance has often made assigning tasks and responsibilities extremely challenging in many instances, particularly when the benefits accruing to individual actors are unclear. Furthermore, investing in science and knowledge creation in order to better understand the impact of human actions on natural cycles has sometimes been bypassed in favor of implementing immediate solutions.

Goal incongruence is especially problematic when the initiator of the network ends up competing against parts of the network for scarce resources. Thus, in the case of the PRCM, rules which cover matters such as the duty to share information proved difficult to implement. Moreover, the commitment to consensus and collaboration can mask the fact that 'stronger partners may be able to take advantage of weaker partners' (Agranoff 2003). In the PRCM network, conflicts of interest often arose when one of the large international NGOs dominated decision-making processes as opposed to building the capacity of local actors. The desire to participate and maintain a presence in dialogues and the many meetings that took place warred against the willingness of local stakeholders to participate when NGOs failed to prioritize the deep engagement of local actors. Networks that attempt to influence governance typically involve coordination between multiple layers of government, civil society, community-based organizations, non-profit organizations, and others. The differing constituencies that are served complicate such arrangements. Further, uneven power balance may exist. Because certain MPAs have successfully established bilateral arrangements with external funders as is the case with the Banc d'Arguin National Park, they have stronger management structures than newly established MPAs such as Tristao in Guinea Conakry. This persistent challenge of differing motivations and interests necessitates a constant dialogue and consensus building.

As many researchers have noted (Quill 2012), networks acting within and in connection to other networks have the potential to spread risks or to boost resilience and diminish vulnerability. In spite of the challenges presented in this chapter, networks such as the PRCM and the RAMPAO can effectively confront the challenges facing mangrove habitats in West Africa. If they continue to engage actors at all levels and foster on-going collaboration that is grounded in knowledge, achieving healthy coastal mangrove environments and resilient communities that protect these ecosystems remains an attainable goal.

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