



Adaptation and Learning in Coastal Management: The Experience of Five East African Initiatives

ELIN TORELL

Department of Environmental Studies
Antioch New England Graduate School
Keene, New Hampshire, USA
and
Coastal Resources Center
University of Rhode Island
Narragansett, Rhode Island, USA

This article explores principles of adaptive, learning-based resource management and their practical application in coastal management projects in East Africa. The principles of feedback and adjustment, experimentation, and carefully guided participatory processes that capture widespread knowledge are used to describe the experience of five projects in Kenya, Tanzania, and Mozambique. The findings are drawn from a variety of sources, including site visits and interviews. The main finding is that adaptive methods are a major feature of all projects, and the general approaches used in each case are similar.

Keywords adaptive management, East Africa, participation

Introduction

The regional process of coastal management is unique in East Africa in that it periodically gathers politicians and practitioners to take stock of the coastal management process. A significant milestone in this regional process, which started in the late 1980s, was the signing of the Arusha Resolution on Integrated Coastal Zone Management in 1993 (Ngoile & Lindén, 1997). This nonbinding resolution outlined coastal management needs and principles in East Africa. It set the stage for increased national support for, and efforts in, coastal management and successfully began a dialogue between the scientific community and high-level policy makers. Most countries, with Tanzania and South Africa in the forefront, are involved in preparing national plans or policies for coastal management. After a decade of experience, now is an appropriate time to review and assess the practice of incremental and adaptive learning in integrated coastal management in East Africa.

During 1998 and early 1999, an assessment of 14 coastal management initiatives in

Received 14 January 2000; accepted 1 May 2000.

Special thanks to Dr. James Tobey, Stephen Olsen, and Mark Amaral, University of Rhode Island's Coastal Resources Center, for providing many useful comments on earlier drafts of this paper. I am also grateful for the invaluable information given by coastal managers in East Africa.

Address correspondence to Elin Torell, Visiting Scholar, Coastal Resource Center, University of Rhode Island, Narragansett, RI 02882-1197, USA. E-mail: elin@gso.uri.edu

East Africa was conducted as part of an international project to apply and refine techniques for promoting and documenting learning-based approaches to coastal management.¹ The assessment explored progress in coastal management in East Africa, with a deeper analysis of five initiatives located in Kenya, Tanzania, and Mozambique. The present article will present part of the findings of this assessment, focusing on how the five projects adapted and learned, with respect to the following principles of adaptive, learning-based management that have been derived from the literature on adaptive natural resource management:

- adjusting actions and project strategies as new information is obtained;
- learning by doing and experimentation;
- active participation by relevant actors.

This assessment was conducted during two three-week trips to East Africa in 1998 and 1999. During the first trip, eleven coastal managers from Kenya, Tanzania, Mozambique, and South Africa were interviewed. Additional information was collected through articles, reports, and correspondence. Initial findings were reviewed and validated during the second trip. This research is part of an international effort on common methods for learning from coastal management experience. The research has been coordinated by the University of Rhode Island's Coastal Resources Center, with the support of donor agencies such as Sida, USAID, and UNDP.

Adaptive, Learning-Based Coastal Management

Coastal management is a continuous and dynamic process by which decisions are made for the sustainable use, development, and protection of coastal areas and resources. Coastal management requires both understanding complex, dynamic ecological systems and creating governance systems capable of addressing issues of concern to society. Imperial, Hennessey, and Robadue (1993) observed that "this is perhaps one of the most demanding challenges in the field of environmental management." Responses to coastal issues require an understanding of the interplay between social processes and ecosystem change (Dryzek, 1997). In developing countries, coastal governance systems address not only environmental and natural resource management, but also environmental justice, poverty alleviation, developing a working democracy, and strengthening of social capital.

In order to be successful in the face of significant complexity and uncertainty, management initiatives need to be flexible and adaptive and to have a built-in learning capacity. This is also the finding of a growing literature on adaptive natural resource management. Adaptive management can be a useful tool capable of overcoming some of the obstacles from which traditional management suffers (Gunderson, Holling, & Light, 1995; Hennessey, 1994; Holling & Sanderson 1996; Imperial, Hennessey, & Robadue, 1993). It is designed to cope with the uncertainty and complexity of ecosystems by creating spaces in which reflection and learning can occur and by allowing management processes to take action in light of new information (Berman, 1980). In short, adaptive management can be said to be a form of learning by doing (Hennessey, 1994; Walters, 1997).

Adaptive learning-based management has many dimensions. In this article three broad management principles are identified that summarize most of the features of adaptive management in the public policy and resource management literature. The first principle refers to adjustments of management processes and policy to the constraints of the situation and as new information is obtained. This principle is about assessing and learning from the effects of previous management actions and being able to respond in an effective and

timely manner to what is learned. Learning in this sense may be "single or double loop." Single loop learning occurs when existing project strategies are updated with information from monitoring and other learning activities (Gunderson, Holling, & Light, 1995). It resolves problems that can be found within the existing management theory. More difficult to detect are theory failures, which occur when the achievements of proximate goals do not lead to final desired outcomes (Weiss, 1998). Double loop learning involves rethinking of the purposes and fundamental assumptions behind a program. It resolves theory failures and takes place when a management plan is changed as a result of questioning fundamental program logic (Holling & Sanderson, 1996).

Error detection and learning are attained in coastal management through approaches such as monitoring management processes and self-assessments of concrete experience. These mechanisms address uncertainty by tracking changes in the human and natural environments as they evolve over time (Michael, 1995). Building coastal management initiatives around explicit project theories also facilitates purposeful learning by connecting project activities, interim outcomes, and contexts of the approach to coastal management.

Information sharing and spaces for reflection are other important elements of adaptive coastal management. Communicating coastal management activities and their results ensures that successful practices are mainstreamed into national as well as international planning (Moffat, Ngoile, & Lindèn, 1998). Making knowledge about both successes and failures accessible helps other projects to avoid reinventing the wheel.

A second principle of adaptive management is learning by doing and experimentation. Management is actively adaptive when programs are treated as experiments with implicit or explicit hypotheses and system responses are monitored. Demonstration activities are an approach to active experimentation. Coastal management has advanced techniques of demonstration activities through what are termed, e.g., special area management pilots and early implementation actions (Olsen, Lowry, & Tobey, 1999). These approaches give projects the opportunity to obtain hands-on experience from which tangible results can be measured. By testing management techniques, experiences gained can be incorporated into the management process or, if applicable, transferred to other contexts.

The third principle of adaptive management is participatory processes that actively engage significant stakeholders in management practice, collective inquiry, and decision making (Imperial, Hennessey, & Robadue, 1993; Lee, 1993). Promoting an open process in which disparate interests and views are considered provides more space for ideas and knowledge to be shared. "Political conflict can provide ways to recognize errors, complementing and reinforcing the self-conscious learning of adaptive management" (Lee, 1993, p. 87). Participation provides a framework in which to incorporate and utilize the best available information. It ensures that popular knowledge and experience is integrated into the planning and management processes, giving a better guarantee for the quality and reliability of the solution identified. Participation in management processes and decision making also promotes local "ownership" of solutions and further encourages experimentation and innovation.

The East African Experiments

The need for coastal management is acute in many areas along the East African coast. The combination of poverty, population growth, and unsustainable resource use has resulted in deteriorating conditions of critical coastal resources, such as mangrove forests, fish stocks, and coral reefs. Major proximate causes are inadequate infrastructure, uncontrolled tourism development, and lack of intersectoral management capacity. Struggling to balance the needs of both conservation and development, this situation characterizes

most of the coastal management initiatives found in East Africa, including the five initiatives reviewed for this study:

- Mafia Island Marine Park, Tanzania
- Tanga Coastal Zone Conservation and Development Program, Tanzania
- Mecufi Coastal Zone Management Project, Mozambique
- Nyali-Bamburi-Shanzu ICAM Initiative, Kenya
- Tanzania Coastal Management Partnership, Tanzania

These projects are characterized in Table 1.

Mafia Island Marine Park, the first Marine Park in Tanzania, was established in 1995. However, there have been management efforts on the island since 1968, when it was recommended that Mafia Island, together with some of the reefs along the Tanzanian coast, should be declared marine reserves (Anderson & Ngazi, 1995).

The Tanga project, initiated in 1994, aims to develop sustainable use of the resources of the Tanga region through improving institutional capacity and assisting coastal communities to use coastal resources in a sustainable manner. The project has initiated pilot activities in six villages.

The Mecufi project is the first integrated coastal management (ICM) initiative in Mozambique. At the time of start-up in 1993, the country had endured 16 years of civil war. The country's first multiparty elections were held in 1994. Much of the initial efforts of the project have necessarily revolved around strengthening infrastructure and building an institutional framework for management.

The Nyali-Bamburi-Shanzu initiative covers only 12 kilometers of the Kenyan coast in the Mombasa district, encompassing the Nyali-Bamburi-Shanzu shorefront areas and the estuarine waters of Tudor Creek. Despite the small area, the project provides critical experience in coastal management and is of significance as a pilot for the national ICM process.

A national coastal governance process was recently introduced in Tanzania. The Tanzania Coastal Management Partnership (TCMP) is working with agencies at the national level, and through the existing network of local ICM programs and practitioners, to promote the development of a national coastal management policy.

Adaptive, Learning-Based Management Practices in the Five Projects

The five projects are reviewed with respect to the application of the three principles of adaptive management. Results are summarized in Table 2.

Adjust Actions and Project Strategies as New Information Is Obtained

Project monitoring, self-assessment, and evaluation have been part of all projects, with the possible exception of Nyali-Bamburi-Shanzu. But it is difficult to determine if such potential adaptive learning exercises are responses to requirements from supporting international agencies or true learning activities. Project-monitoring frameworks are part of Tanga, TCMP, and Mafia. In Tanga a logical framework is treated as a living document that is periodically evaluated and refined. Thus, some components were changed during phase 1, as they were found to be inadequate for tracking progress toward project goals. This is a sign of a learning-based management strategy. Although project-monitoring frameworks guide and assess the short-term progress of the initiatives, they do

Table 1
Project summaries

Project features	Mecufi Coastal Zone Management Project	Nyali-Bamburi-Shanzu Area ICAM initiative	Tanga Coastal Zone Conservation and Development Program	Tanzania Coastal Management Partnership TCMP
Location	The rural Mecufi district is found in northern Mozambique	The Nyali-Bamburi-Shanzu is an area north of Mombasa	The Tanga region includes three coastal districts. It is situated close to the Kenyan border	The TCMP covers the 13 coastal districts of Tanzania
Nature of project	ICM*	ICM	ICM	ICM
Year started	1993	1994	1994	1997
Primary government agency involved	Ministry of Coordination Environmental Affairs	Coast Development Authority	Tanga Regional Authority	National Environmental Management Council
Outside support	NORAD	UNEP, FAO, USAID	IUCN, Irishaid	NORAD and WWF USAID

*Integrated coastal management.

Table 2
Examples of adaptive learning in the five coastal management projects

	Adjust actions and project strategies as new information is obtained	Learn by doing and experimentation	Active participation by relevant actors
Mecufi	<ul style="list-style-type: none"> • Project goal was modified after after 3 years • Unsustainable practices promoted in the first phase were detected and halted • Participates in regional lesson-sharing workshops 	<ul style="list-style-type: none"> • Community-based small-scale projects on agroforestry and mariculture established 	<ul style="list-style-type: none"> • Creation of a Village Management Nucleus • Implementation of a communications and awareness program • District and provincial information exchange on coastal management
Tanga	<ul style="list-style-type: none"> • Modifications initiated by staff because initial objective was too broad • Modifications of early implementation actions as they evolve • Participants in national and regional lesson-sharing workshops • Has been involved in reciprocal field visits (at least four study tours, to visit other sites) • Lessons learned from three pilot sites taken into consideration when expanding number of pilots 	<ul style="list-style-type: none"> • Experiences from three pilot villages feeds into the regional and national policy formulation • Mariculture and dynamite fishing (including Village Patrols) 	<ul style="list-style-type: none"> • Annual assessment of participation and support • Village feedback meetings and reports • Awareness raising, training, and education • Participation in planning and implementation
Mafia	<ul style="list-style-type: none"> • Revision from marine reserve to marine park • Participants in national and regional lesson-sharing workshops • Has been involved in reciprocal field visits 	<ul style="list-style-type: none"> • Seaweed farming and bee-keeping tested as alternative livelihoods • Community patrols and other measures to control dynamite fishing 	<ul style="list-style-type: none"> • Village holistic report • Village liaison committee formed • Involvement in park implementation • Stakeholder involvement in workshops
Nyali	<ul style="list-style-type: none"> • No formal modification, but there have been many informal changes to how the project moves forward • Participants in national and regional lesson-sharing workshops • Mooring buoy practice transferred to other sites • Involvement in reciprocal field visits 	<ul style="list-style-type: none"> • Mooring buoys • Beach management • Education and outreach 	<ul style="list-style-type: none"> • Stakeholders involved in initial preparations
TCMP	<ul style="list-style-type: none"> • Changes in the capacity-building component and in the design of the working groups • Feedback loops established between TCMP and pilot initiatives, also facilitating transfer of experience between pilot initiatives • Communications network established • Takes part in regional and international lessons sharing 	<ul style="list-style-type: none"> • Mariculture issue profile completed • Support to local programs 	<ul style="list-style-type: none"> • Working groups • Feedback meetings with stakeholders and pilot projects • Field trips • Capacity-building efforts

not provide insight into the validity of and progress toward the underlying logic and hypotheses.

There have been single loop learning adaptations to all projects. After only two years in operation, it has not been possible to detect any major needs to reform TCMP's overall strategies. However, some incremental changes have been initiated as a result of learning events such as the first self-assessment held in May 1998. Similarly, modifications to the Nyali-Bamburi-Shanzu strategies have been small, despite being in operation for a longer period of time. The lack of reflection and learning has, however, been recognized, and at present Nyali-Bamburi-Shanzu is in the process of initiating an assessment and redesign of project strategies.

The Mecufi project is the only project that has experienced major reconfigurations through modification of the project goal, but that is not to say that the other projects have failed in double loop learning. Double loop learning transformations are less important than openness toward them and establishment of mechanisms that can facilitate them. Where these conditions exist, the lack of paradigm shifts may only imply that underlying assumptions are working well and only minor reforms are necessary.

Prior to the establishment of the Marine Park, management of Mafia Island's coastal resources was inadequate to address emerging issues, such as dynamite fishing. Since the Mafia Island Marine Park was established, experimentation with education, patrolling, and a system of fishing permits has resulted in a reduction of dynamite fishing and other unsustainable fishing practices. Currently, the park is in the process of creating a general management plan, and efforts are taken to incorporate lessons generated through the long experience of local management staff and villagers.

There is a growing network of coastal managers and forums for feedback and reflection in East Africa. Ministerial meetings, regional conferences, workshops, and focused training events have increased the sense of a coastal management community. Learning is also facilitated between projects through communication networks like the E-Pwani (an e-mail discussion list) web-based information exchange, newsletters, and professional associations.

There have been two regional ministerial conferences on coastal management (1993, 1996). A third conference is scheduled for late 2000 in Maputo, Mozambique. In addition there are now numerous workshops and regional meetings each year on coastal management. Following the second ministerial conference, a regional coastal management secretariat was established: the Secretariat for Eastern African Coastal Area Management (SEACAM). This body organizes regional training, disseminates coastal management documents, and provides a web-based database on coastal management. The Western Indian Ocean Marine Science Association (WIOMSA), established in 1992, is another regional organization with a broad membership that promotes regional capacity building and awareness raising.

Most of the managers interviewed in this study had attended regional meetings and workshops and had visited at least one or two other coastal management projects in the region. In some cases they had also traveled to visit coastal management initiatives, meetings, and conferences outside the region. When initiating mariculture activities in the Mecufi project, experiences from other areas in East Africa were consciously sought through, e.g., field visits to Zanzibar. In Tanga, even people at the village level have had the opportunity to attend field trips, for instance, to Nyali-Bamburi-Shanzu, to get first-hand experience from other areas. The Mafia Island Marine Park also receives frequent visitors from other parts of East Africa. One of the explicit principles of the TCMP project is to build on existing experience, and hence, there are frequent national level-local level interactions in both the capital and the field. Based on the findings of this study, the two issues that have received the most attention through cross-project

learning in the region are seaweed culture and measures to control unsustainable fishing practices.

Learn by Doing and Experimentation

Experimentation and learning from early implementation actions is an element of all projects. There is a consensus among the managers interviewed that early implementation actions are beneficial and that it is better to start small with experimental applications than attempt to accomplish too much too fast. In Tanga, the experiences of demonstration projects to reduce dynamite fishing, adopt seaweed farming, and improve enforcement of regulations and bylaws were important elements of decisions to increase the number of pilot villages from three to six. Some activities, such as seaweed culture and control of dynamite fishing, have turned out to be successful and consequently spread to new sites, while other activities have been dropped or modified. Decisions on what demonstration activities are successful, and hence should be replicated, have been made in collaboration with villagers.

The Mecufi project has also learned and adopted strategies following pilot activities. Experiments with alternative income-generating activities, i.e., lime and charcoal production, were eventually identified as potentially environmentally damaging and were dropped. Other pilot activities within agroforestry and seaweed culture were identified as more promising, and subsequently maintained in phase 2.

Mariculture development has been identified as an early implementation action in Tanga, Mafia, TCMP, and Mecufi. In the case of TCMP, which is collaborating with Tanga on this issue, the work within mariculture is led by an intersectoral Mariculture Working Group (MWG). Opening up the issue identification and planning to groups with a stake in the process provided an effective forum for learning among participants and for developing political support. It is expected that the experience lessons learned from the efforts of the MWG will be transferrable to the future challenge of resolving other coastal issues that are similarly complex from both a governance and environmental perspective. The action strategy of the MWG, adopted by directors of government agencies, includes a learning report that documents and analyzes the experiences and lessons learned in the work of the group that can be applied to the ICM policy development process.

The Nyali-Bamburi-Shanzu initiative has also successfully completed a few early implementation actions. The most significant has been the construction of mooring buoys to protect the adjacent Marine Park's fragile and endangered coral reefs. The activity of installing mooring buoys contributed to building support for coastal management among the local constituencies. Together with stakeholders, the Coastal Management Steering Committee and the Kenya Wildlife Service learned how to install the mooring buoys and drafted a code of conduct as well as educational brochures about the Park and the moorings. Through this experiment, the Kenya Wildlife Service gained experience and knowledge that has now been transferred to other sites.

Active Participation by Relevant Actors

In the Tanga and TCMP initiatives, monitoring, self-assessments, and evaluations are frequently participatory, inviting stakeholders into the review of management schemes. Both external evaluations and input provided from local stakeholders have also been used to detect and make changes to the Mecufi project. Participation has encouraged views from diverse constituencies, thereby broadening the parameters of policy debate.

The Tanga project is often mentioned as an example of a successful community-

based participatory initiative. It has stimulated people to become active participants in their community's development by emphasizing individual knowledge and abilities, implementation of solutions with minimal outside help, and participation of all groups. Women are active participants, even in traditionally male-dominated program activities such as village committees and village patrols.

In the initial stages of the Nyali-Bamburi-Shanzu initiative, stakeholder forums and personal communications ensured that learning from all groups was incorporated into the governance process. However, the participatory elements have halted, and the present lack of transparency has resulted in disappointment and lack of ownership among many stakeholders. In Mafia the community development officers routinely discuss and brief the current status of the project to the communities. Also, as a response to the Marine Parks and Reserves Act, village liaison committees have been formed to articulate views and concerns of the villages.²

Since TCMP is a national program, the stakeholders have been identified as national-level decision makers, national-level technicians, and subnational technicians to the district level. Hence, these are the groups that TCMP is targeting for awareness raising, capacity building, and lesson sharing. Apart from consultations with individuals and institutions through meetings and involvement in the working groups, stakeholders have been invited to take part in the feedback process through high-level policy meetings.

Despite past upheavals, considerable efforts have been made to involve the communities in the governance process of the Mecufi project. The hope is to improve citizen involvement by encouraging the creation of Village Management Nuclei, i.e., local institutions responsible for coordinating and leading development and resource conservation measures at the village level.

Conclusions

While the adaptive management concept is not new, few efforts have systematically studied how the theory holds up in practice in different places and contexts. The findings presented above are an initial attempt to explore the key features of adaptive management as it is applied in five East African projects. It is found that with varying levels of emphasis, the adaptive management practices used in the projects are quite similar.

Further applied research and analysis would be required to understand exactly what impact adaptive management practices have had on the projects studied. Since adaptive attitudes about management are an inherent feature of the projects studied, it is difficult to isolate the adaptive elements from the projects as a whole. However, it is clear that periodic monitoring and self-assessments are providing constructive platforms from which to learn and make adjustments to project activities and strategies; early implementation experiments appear to be working well to quicken the pace of progress; and the participatory focus has enhanced problem solving, increased a sense of local ownership in the solutions, reduced conflicts, and built trust and credibility. A larger sample of projects and a larger diversity in project philosophy and approach (across a spectrum of conventional to adaptive attitudes about management) would help to more readily identify the differences that specific adaptive practices have on project success.

There are many questions for further, more detailed research on the topic of adaptive management in ICM projects and programs. For example, what are criteria for good demonstration activities? What is an appropriate balance among the various approaches to adaptive management: experimentation, feedback and adjustment, and participation? How much should a project invest in pilot activities? To what extent does adaptive coastal management contribute to active social learning? The more we can learn about

adaptive management in coastal management, the better we can design and implement efficient and effective interventions in the future.

Notes

1. Fourteen initiatives studied in the assessment were: Nyali-Bamburi-Shanzu Area ICAM initiative, Kenya; Kiunga Marine and Dodori National Reserves, Kenya; Tanzania Coastal Management Partnership, Tanzania; Mafia Island Marine Park, Tanzania; Tanga Coastal Zone Conservation and Development Program, Tanzania; Kunduchi Integrated Coastal Area Management Project, Tanzania; Misali Island Conservaton Area, Zanzibar; Chwaka Bay Pilot Site, Zanzibar; Menai Bay Conservation Area, Zanzibar; Xai-Xai District Coastal Area Management Strategy, Mozambique; Bazaruto Archipelago Conservation Project, Mozambique; Mecufi Coastal Zone Management Project, Mozambique; KEN project, Kosi Bay South Africa; Co-management for the Olifants River harder fishery, South Africa.

2. Village liaison committees are facilitating communication between the project and villages by disseminating information and managing equipment that is allocated to each village. The village liaison committees' responsibilities are also to keep records of meetings, provide information on resource issues, advise the warden, and to serve as community development assistants and monitoring assistants.

References

- Anderson, J. E. C., & Z. Ngazi. 1995. Marine resource use and the establishment of a marine park: Mafia Island, Tanzania. *Ambio* 25:475-481.
- Berman, P. 1980. Thinking about programmed and adaptive implementation: Matching strategies to situations. In *Why policies succeed or fail*, ed. H. Ingram & D. Mann. Beverly Hills, CA: Sage.
- Dryzek, J. 1997. *Politics of the North: Environmental discourses*. New York: Oxford University Press.
- Government of Finland. 1998. *Assessment of integrated coastal management in Africa*. Split, Croatia: United Nations Environment Program, Priority Actions Programme.
- Gunderson, L. H., C. S. Holling, & S. S. Light, eds. 1995. *Barriers and bridges to the renewal of ecosystems and institutions*. New York: Columbia University Press.
- Hennessey, T. M. 1994. Governance and adaptive management for estuarine ecosystems: The case of Chesapeake Bay. *Coastal Management* 22(2):119-145.
- Holling, C. S., & S. Sanderson. 1996. Dynamics of (dis)harmony in ecological and social systems. In *Rights to nature: Ecological, economic, cultural, and political principles of institutions for the environment*, ed. S. S. Hanna, C. Folke, and K.-G. Maler. Washington, DC: Island Press.
- Humphrey, S., & J. Francis. 1997. Sharing coastal management experience in the Western Indian Ocean. Paper read at Experts and Practitioners Workshop on Integrated Coastal Area Management for Eastern Africa and the Island States, Tanga, Tanzania.
- Imperial, M. T., T. Hennessey, & D. Robadue, Jr. 1993. The evolution of adaptive management for estuarine ecosystems: The National Estuary Program and its precursors. *Ocean and Coastal Management* 20(2):147-180.
- Lee, K. N. 1993. *Compass and gyroscope: Integrating science and politics for the environment*. Washington, DC: Island Press.
- Lindèn, O., & C. G. Lundin. 1996. The journey from Arusha to Seychelles, successes and failures of integrated coastal zone management in Eastern Africa and island states. Paper read at The Second Policy Conference on Integrated Coastal Zone Management in Eastern Africa and Island States, at Seychelles.
- Michael, D. N. 1995. Barriers and bridges to learning in a turbulent human ecology. In *Barriers and bridges to the renewal of ecosystems and institutions*, ed. by L. H. Gunderson, C. S. Holling, & S. S. Light. New York: Columbia University Press.
- Moffat, D., & M. Kyewalyanga. 1998. Local and community integrated coastal zone management, experiences from Eastern Africa. Paper read at Experiences in Local and Community Integrated Coastal Zone Management—Lessons to Date, at Zanzibar.
- Moffat, D., M. N. K. Ngoile, & O. Lindèn. 1998. The reality of the stomach: Coastal management at the local level in Eastern Africa. *Ambio* 27(8):590-598.
- Ngoile, M. A. K., & O. Lindèn. 1997. Lessons learned from Eastern Africa: The development of policy on ICZM at national and regional levels. *Ocean and Coastal Management* 37(3):295-318.

- Olsen, S. B., K. Lowry, & J. Tobey. 1999. A manual for assessing progress in coastal management. Narragansett: University of Rhode Island's Coastal Resources Center.
- Walters, C. 1997. Challenges in adaptive management of riparian and coastal ecosystems. *Conservation Ecology* 11(2).
- Weiss, C. H. 1998. *Evaluation: Methods for studying programs and policies*. 2nd ed: Prentice Hall.