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FOCUS ON: INDICATORS

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New UNDP Survey on Coastal Management Initiatives

By Stephen Olsen, Kem Lowry, James Tobey, Peter Burbridge and Sarah Humphrey

How are international donors evaluating their investments in coastal management initiatives in developing nations? A recently completed survey designed to answer this question was sponsored by the United Nations Development Programme's (UNDP) Strategic Initiative for Ocean and Coastal Management. It builds upon the interest in a common framework for learning from coastal management experience (CM) expressed at an informal meeting of 15 international donors that gathered in Paris at the Intergovernmental Oceanographic Commission in October of last year.

The survey was led by the University of Rhode Island's Coastal Resources Center, with contributions from experts at the University of Hawaii and University of Newcastle, England. The goals of the survey were to: 1) provide a brief synthesis of approaches to the evaluation of CM initiatives; 2) survey the experience of donors, development banks, and selected international and national coastal management programs with CM evaluation; and, 3) summarize the major questions that are being posed by those that fund coastal management activities.

The number of CM initiatives that have been the subject of formalized monitoring and evaluation is still small. In spite of this relative paucity of experience, the survey reaffirms a considerable interest among those donors questioned in the development of common frameworks for monitoring and evaluating CM initiatives in order to more efficiently promote the development of CM as a means for achieving sustainable forms of development.

Existing experience with CM evaluation on the part of donors focuses mainly on an internal process of project performance and accountability, and therefore focuses upon the degree to which a project achieved its stated goals. However, distinctions between different approaches to coastal management as grouped below are seldom made. The survey therefore includes initiatives of three types (see Box 1, page 2) and are referred to here and in the report by the generic term coastal management (CM).

The designs of CM projects that are nearing completion, or are underway in developing nations, typically call for a single mid-term and a final evaluation conducted by a single external reviewer or team selected and funded by the donor agency. Conceptual learning from CM practice among those responsible for implementing individual projects or the presumed beneficiaries and stakeholders involved is not a primary goal of these project evaluations. Conceptual learning emphasizes the identification of "lessons" of coastal management of more general applicability—advancing collective perceptions, understandings, intentions and actions shared by those active in the field of coastal management.

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Avoiding An ICM Nightmare

by Stephen Olsen and James Tobey

Imagine the following "nightmare." It is a major international conference sometime early in the next century, perhaps 2002. The topic is "Integrated Coastal Management: What Have We Accomplished?" and the conclusions are grim.

The conference documents that much money has been spent by national governments, the donor community and non-governmental organizations. It catalogues a proliferation of projects, programs and supporting initiatives that range across local, national, regional and global scales–all justified as integrated coastal management (ICM). But it becomes painfully clear at the conference that there has been an extraordinary amount of reinventing of the wheel, that efforts have been conceived and implemented in unnecessary isolation, and that despite all the activity and the many formally adopted plans and weighty compilations of informa-

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Nightmare

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tion, the measurable successes in reducing the problems that ICM programs individually and collectively have been designed to address are pitifully small. The conference finds that there has been great confusion over what to monitor and how to ascribe improvements to the efforts of ICM programs rather than other factors, and little coherent testing of hypotheses. The absence of a common language or explicit conceptual framework makes it difficult to compare across projects and draw conclusions with any analytical rigor. The conference concludes that the cost-benefit ratio of ICM is unacceptable. The ICM process is declared inefficient and needlessly complex. The consensus is that it's time to move on to something else.

For professionals in our field, this is indeed a nightmare, but perhaps one that may not be far-fetched. The fact is that despite a flowering of initiatives and support for the idea of ICM, both investments and successes are puny compared to the forces worldwide causing coastal transformation. Worse yet, ICM projects, particularly in developing nations, are proceeding as isolated efforts with little or no communication between one project and another. The lessons that are being learned from these efforts are generally undocumented and the efficiency and the effectiveness of learning from this rapidly growing body of experience is being needlessly compromised. There are few documents that analyze the strengths and weaknesses of projects and how differences in design and implementation are influencing outcomes. Most published descriptions of ICM experience are anecdotal. The hypotheses underlying ICM design and ICM practice are rarely explicitly stated and therefore remain untested across the diverse spectrum of contexts within which they are being implemented.

If we are to avoid the nightmare, the practitioners of coastal management must voluntarily apply the principles of adaptive management to their programs and projects. This requires explicitly stating the hypotheses upon which goals and strategies are based, gathering the data needed to evaluate results as they apply to those hypotheses, and committing to a sequence of periodic assessments and adjustments. If enough of us do this, the efficiency of learning and the effectiveness of our programs will increase and ICM may indeed fulfill its promise as a means for advancing towards more sustainable forms of development.

The theme of this issue of *Intercoast* is approaches and indicators for learning from ICM experience. The submissions fall into two groups. The first group, beginning on page three with the article from RIKZ in The Netherlands, discusses new developments in ICM monitoring and assessment. The second group, beginning on page 10, presents some examples of how ICM program monitoring and evaluation is being applied in on-the-ground practice. Both provide solid ideas on how to avoid that future nightmare.

UNDP Survey

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Criteria to assess the success of CM programs as a whole or specific program sub-components are typically not explicitly stated in the evaluations we reviewed. The conclusions – particularly when these are critical – are often considered proprietary. Evaluation documents are rarely published. They may, or may not, be shared with those implementing the program or the governments of the places where the project activities occur. If CM evaluations are to contribute to conceptual learning, the collective perceptions and understandings that constitute knowledge of coastal management, and the hypotheses that underlie program designs and program strategies, need to be made more explicit, and the lessons learned must be more widely shared.

Where assessment of impacts of projects is conducted, the methodology is in almost all cases grounded on expert judgment and interviews with key informants. Major problems in examining the outcomes – as opposed to the outputs – of CM initiatives are the time lags inherent in obtaining measurable results from a CM program, and the difficulties in establishing cause-effect linkages and relationships.

With a few exceptions, common evaluative instruments, indicators and parameters of indicators have not been applied across multiple CM initiatives. Work on common CM indicators in a pressure-state-response framework is only just beginning. In particular, there has been very little focus on the "response" dimension. At present, the information that can be obtained using indicators being developed for the UN Commission on Sustainable Development and national reporting systems is not adequate to measure progress and identify elements of good practice in coastal management initiatives or to meet the needs of donors and project implementors to learn from worldwide experience in integrated coastal

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Box 1. A Typology of Coastal Management

Enhanced Sectoral Management	Coastal Zone Management	Integrated Coastal Management
Focus on a single sector or topic but explicitly addresses impacts and interdependencies with other sectors, ecosystem processes and institutional capacity.	Multi-sectoral planning and regulation focused upon the characteristics and management issues within narrow, geographically delineated stretches of coastline.	Expands the cross sectoral feature of CZM to consideration of the closely coupled ecosystem processes within coastal watersheds and oceans.

Indicators for Environmental Issues in the European Coastal Zone

The publication of the Dobris report (*Stanners and Bourdeau*, 1995), under the auspices of the European Commission, marked the first attempt at a comprehensive, integrated assessment of the European environment and the human activities impacting it.

The Dobris report is intended as a base-line and reference document and will be updated every three years by the European Environmental Agency. The development of indicators for the environment in general and the coastal zones in particular will be a major focus of the next Dobris report. In this context, the National Institute for Coastal and Marine Management (RIKZ) as part of the European Topic Centre on Marine and Coastal Environment is currently developing a set of indicators for the European Coast. The results of this study will be available in the autumn of 1997.

The Dobris report describes and explains changes and effects caused by human activities, provides a comprehensive picture of the state of Europe's environment, assists decisionmaking and helps raise public awareness about environmental problems. The European Commission is concentrating on communication with European policy-makers, the European Council and the European Parliament. The choice of indicators for the coastal zone should be consistent with the aims of the Dobris report. Many different frameworks and sets of indicators have been reported in industrialized countries. The most thoroughly discussed system is the "pressure-state-response" (PSR) framework of the OECD (1993). This framework has been chosen as a starting point because of its simplicity and wide acceptance, and the fact that it can be applied on any scale. This

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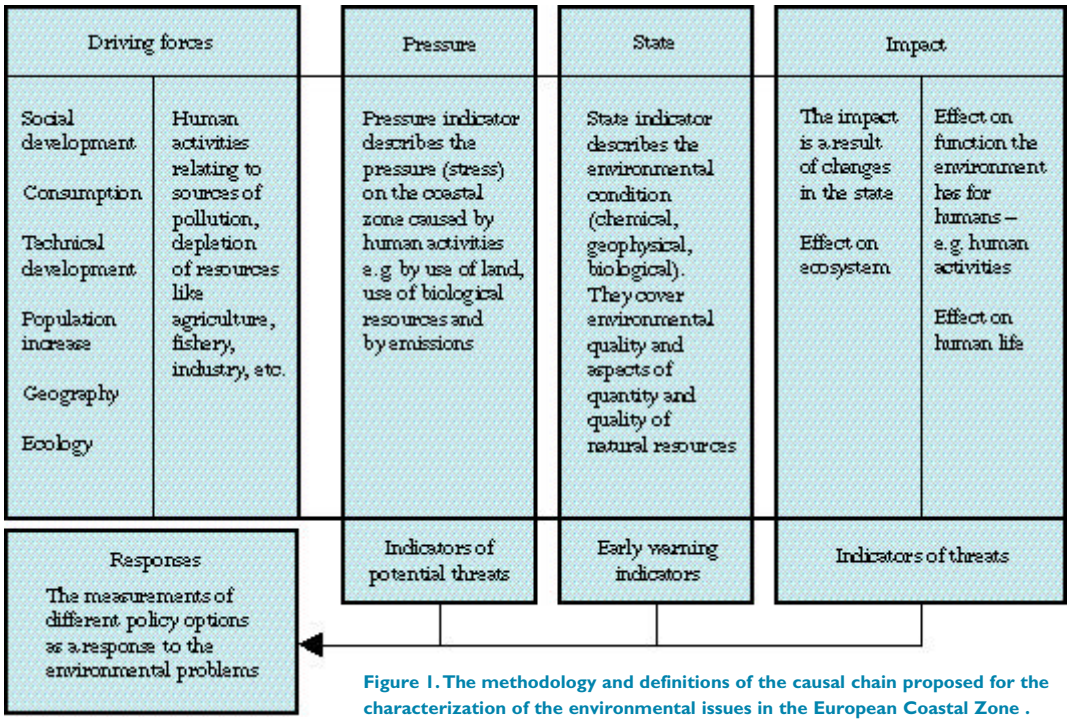

Figure 1. The methodology and definitions of the causal chain proposed for the characterization of the environmental issues in the European Coastal Zone .

UNDP Survey

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management.

The next step in formulating a common framework for learning from CM experience is being supported by the Swedish Foreign Assistance Program and U.S. Agency for International Development. The goal here is to develop a manual that characterizes each step in the process by which CM programs typically evolve and pose the questions associated with each step that are useful in promoting reflection, lesson drawing and adaptation. Initial versions of these methods have been recently applied by the Coastal Re-sources Center to the final evaluations of CM projects in Patagonia (Argentina) and Cuba sponsored by the Global Environmental Facility and overseen by UNDP.

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European Coastal Zone

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framework was further elaborated resulting in the scheme depicted in *Figure 1*.

The *impact* box is used to identify changes in the eco-system, human functions and human health. Due to the resilience of the ecosystem, changes in environmental pressures do not always result in changes to the ecosystem. Moreover, changes in the state of the environment are so gradual that changes in the system are difficult to identify, and there is a time lag before ecosystem changes become visible. The *state* box contains environmental (geo-physical, chemical and biological) variables which describe the characteristics and conditions of coastal zones. The *pressure* box lists stresses on the environment in the form of direct pressures, such as emissions. The *driving forces* box identifies the human activities and economic sectors which produce the pressures. Explanation of the contribution of a driving force to an environmental problem will be more understandable to policymakers than simply identifying the raw pressures. This information is also necessary to develop adequate policy measures, the *response*.

This framework can be combined with an environmental issue/thematic approach in order to identify environmental problems. This approach organizes and structures environmental indicators by theme or environmental issue.

This combined approach creates a structure that links human activities in a logical way to environmental issues in the coastal area. The logical chain operates in two directions: the possible pressures lead to possible impacts, and in the other direction, human activities identifiably contribute to existing problems or impacts.

For the actual application of the framework, a step-wise approach has been adopted.

Steps 1 to 4 result in a preliminary definition of data requirements to calculate the pressure and state indicators of selected issues. These issues indicate stress or problems to which the system is exposed and are directly related to human activities, the targets to which policy is directed. Steps 5 to 7 concern the assessment of the specific environmental conditions and vulnerability of

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Table 1: A step-wise approach to develop a set of environmental indicators and to assess the quality of and pressures on the European coastal zone.

Step	Activity
1.	Identification of possible environmental issues and a first selection of issues based on their relevance for European coastal zone policy
2.	Identification of cause and effect relations in terms of driving forces (human activities), pressure, state and impact for the selected issues; choice of pressure and state indicators.
3.	Specification of coastal spatial units (pre-aggregation step units) for the identified pressure and state indicators.
4.	Identification of pre-aggregation and aggregation methodologies per issue and indicators and data requirements.
5.	Assessment of the environmental conditions (state) and pressures.
6.	Vulnerability assessment of coastal zone types to environmental effects.
7.	Identification of threats and major pressures.

Table 2: Selection of environmental issues relevant for the European Coastal Zone

CRITERIA → / ISSUE ↓	General European coastal issue	Multiple source	Trans-boundary impact	Relevant issues	Data availability	Selection for the pilot study
Eutrophication/ saprobiation	Yes	Yes	Yes	Yes	Yes,1	Yes
Heavy metal pollution	Yes	Yes	Yes	Yes	Yes,1	Yes
Antibiotics	No	No	No	No	No	No
Persistent organic compound pollution	Yes	Yes	Yes	Yes	No	No
Oil pollution	Yes	Yes	Yes	Yes	No	No
Introduction of foreign species		Yes	Yes	Yes	No	No
Loss and degradation of habitats	Yes	No	Yes	Yes	Yes, 5	Yes
- Thermal pollution	Yes	No	No	No	No	No
-Resource depletion groundwater	Yes	No	No	Yes	Yes, 3	Yes
- Resource depletion gravel	No	No	No	Yes	No	No
- Coastal erosion	Yes	No	(Yes)	Yes	No	No
- Physical disturbance of coastal waters	No	No	No	No	No	No
- Climate change	Yes	Yes	Yes	Yes	Yes, 4	Yes
Waste	Yes	Yes	No	Yes	No	No
Overfishing	Yes	Yes	Yes	Yes	Yes, 2	Yes
Loss of biodiversity and genetic resources	Yes	Yes	Yes	Yes	No	No

Monitoring and Evaluating Coral Reef Management

by Richard B. Pollnac

Adequate monitoring and evaluation of the impacts of coastal zone management projects is essential as a means of providing the information necessary to both adjust ongoing projects and formulate new ones. Unfortunately, in most cases, by the time it is recognized that some sort of monitoring and evaluation is needed, it is too late to obtain the baseline data necessary for adequate comparisons. ReefBase, a global database on coral reefs developed by the International Center for Living Aquatic Resources Management (ICLARM), could serve to provide this important baseline information with respect to coral reefs.

In addition to information concerning physical and biological conditions of coral reefs, ReefBase also includes indicators of sociocultural aspects of human populations associated with the reefs. Indicators of coral reef-related human behaviors, as well as related political, socioeconomic and cultural variables can be useful in monitoring and evaluating the impacts of coastal management projects involving coral reefs. Adequate monitoring and evaluation requires appropriate, standardized indicators in order to make reliable assessments of changes associated with management efforts as well as to evaluate the relative importance of the multitude of variables thought to influence success of coastal management. The indicators were identified as a part of a project entitled Rapid Assessment of Management Parameters (RAMP) which was directed at providing sociocultural information to be integrated with ReefBase.

RAMP was designed specifically to develop a meaningful, standardized approach for social, cultural and economic surveys of reefs. RAMP involved the University of Rhode Island's Coastal Resources Center in collaboration with ICLARM in conceptualizing and field testing an efficient survey and database approach to assessing the human aspects of coral reef ecology and management. The purpose of RAMP was to provide a pared-down set of indicators covering the range of human factors potentially impacting coral reefs. Towards this end, available literature concerning aspects of human activities impacting and potentially impacting coral reefs was reviewed for the purpose of developing a guide for information acquisition and subsequent coding for inclusion in ReefBase. The review resulted in indicators that are organized according to proximity to the designated reef (e.g., national, regional and local), context (political, socioeconomic and cultural), reef uses (fishing, mining, tourism/recreation, etc.), and governance (institutional frameworks, knowledge bases, plans, implementation, monitoring and evaluation).

A brief description of some of the indicators included illustrates the types of information sought and RAMP's potential relationship to monitoring and evaluation of coral reef governance. For example, at the national level it is important to obtain information on variables such as population, population growth, significance of coral reef uses (e.g., products extracted, tourism), unemployment, literacy and balance of trade. High levels of unemployment combined with rapidly increasing population and pressures on

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Coastal Erosion in Negroes, Philippines. This erosion is due to ruined mangroves and destroyed coral reefs, both natural buffers.

Coral Reef Management

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land resources can result in movement by people into the fishing industry as employment of last resort, or affect people's inability to move out of the fishery due to lack of appropriate alternative occupations–all factors that contribute to overfishing with potentially negative impacts on reef ecosystems.

Literacy levels impact employment alternatives as well as ability to receive information concerning reef conservation issues. Low per capita Gross Domestic Product, political unrest and unfavorable balances of trade can result in environmentally inappropriate decisions regarding governance of reefs. Additionally, there is a clear conflict between poverty and sustainable development. Poverty results in a situation where immediate access to a resource such as a coral reef becomes more important than future declines in that resource.

Indicators from the regional context are also significant. The regional context is defined in RAMP as the watershed area impacting the reef. In this area it is important to determine land use practices (e.g., farming, industry, forestry), as well as population and employment. The employment indicators, along with regional population and land use, can be used to evaluate the potential for changes in occupation structure resulting from reef management initiatives. For example, one could estimate the regional potential for absorbing labor displaced from a specific sector. If the only sources of livelihood are farming and fishing, and if population pressure on the land is already high, then management initiatives resulting in displacement of fishers are unlikely to succeed.

The local context, as used here, includes the onshore area inhabited by reef users as well as the reef itself. Indicators include aspects of reef use (e.g., fishing, mining, tourism and species extracted or used for tourism), local demography and settlement patterns (including population structure, occupations, social and political organization, existing institutions, etc.). Information on population, occupations and their relationships with reef use are clearly related to management of the resource and should form part of any monitoring and evaluation effort.

Governance indicators (both traditional and statutory) include use rights and regulations governing all aspects of reef use, as well as aspects of user knowledge of reef resources which are important in understanding existing use patterns and potential reactions to management measures and user educational programs. Ecological knowledge of users is a factor increasingly recognized as both influencing receptivity to and providing information significant for governance, use rights and actual management efforts (traditional and/or official). National and local governance setting indicators are justified by the fact that they influence the development, implementation, monitoring and enforcement of management efforts. Descriptions of use rights are fundamental to evaluating existing or potential management efforts. Numerous researchers have related territoriality to success in management efforts. Finally, description and assessment of existing management efforts (both traditional and statutory) provide a benchmark for assessing the degree of control over the role humans play in the reef ecology, as well as information thought to be essential to development of appropriate management schemes.

In all cases, the ideal is to enter data at the most precise level of measurement appropriate to the variable under consideration to facilitate statistical analyses. It is understood, however, that the availability of information or funds to gather information may result in varying levels of precision. The database, therefore, accommodates different levels of measurement, and provides indicators of the methods used to facilitate appropriate interpretation of the data. For example, relative importance of a specific coral reef fish for fisher income could be based on landing statistics and initial selling price by species. The landing statistics and value could be analyzed to determine the percentage of income derived from a particular species. This value (percent contribution to fishery income) would be the most precise measure of relative importance of a certain species for fisher income.

Alternatively, where landing or marketing statistics are unavailable, the figure could be based on key informant interviews where fishers and/or fish sellers would be asked to list and rank the five highest income-generating types of fish they harvest. In this case the level of measurement would be relative rather than a precise metric measure. Nonetheless, the measurement can still be used in statistical analyses. Sometimes information sources will use concepts such as low, medium, high or some variant of these concepts to indicate a level of importance, use, etc. Despite the fact that these are evaluative concepts, not numbers, they can be converted to numbers signifying different levels of value. In some cases the source of information may only indicate several species as being important with no ranking. Here we have a simple dichotomy where a given species is either important or unimportant–a simple yes/no, limited choice. This type of information is better than none at all, and it can also be used in statistical analyses; hence, accommodation is made for it in the database. Each indicator, as appropriate, will have fields for different levels of measurement. Since information will be derived from different sources, using varying methods, it is important to have fields specifying information sources, dates and methods used so that users can decide whether or not the information is of sufficient timeliness, validity, reliability and/or precision for intended analyses.

The indicators and guide have

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Performance Monitoring– Something Old is New Again

by Ian M. Dutton

Performance monitoring is now high on the agenda of many public agencies–a change which many commentators suggest is both overdue and essential if increasingly scarce public sector resources are to be used efficiently and effectively. But, as with so many management questions, it is difficult to determine what is efficient or effective.

Historically, such judgments have been made intuitively or by relatively simple measurements of inputs and outputs. Such bean counting is, however, no longer sufficient to justify the often considerable investments of private and public funds or to enable decisionmakers to determine where to allocate resources among competing groups.

Decisionmakers, taxpayers and other stakeholders in public programs have, quite rightly, begun to demand an examination of evidence on which claims about program effectiveness are based. As a consequence, the misguided assumptions of causality between program inputs and impacts (or outcomes) are now being questioned in unprecedented ways. That process of questioning has led to widespread reexamination of concepts that coastal managers once thought they understood, or at least were addressing in an adequate manner.

The coastal management community, particularly those involved in programs which depend primarily on public funds, are now being challenged to account for performance in ways unheard of five years ago. Integrated coastal management literature offers little help to the coastal resource manager who now has to write a performance monitoring plan before even beginning the process of planning how to allocate coastal resources amongst competing users. The literature on performance assessment, monitoring methods and outcome tracking fills a very small portion of most coastal managers' bookshelves compared to the many books and articles on resource survey techniques, spatial planning, conflict resolution and public education.

Coastal managers are now reassessing their methods of performance monitoring.

The rapidity of this shift in emphasis of funding agencies has caught many coastal managers by surprise, but there is now a commendable promptness among many groups to become involved in several aspects of monitoring–from the comparatively simple act of determining intended outcomes to the more complex act of measuring progress towards attaining those outcomes. These are, as most newcomers to monitoring are finding, not independent or insubstantial exercises. The mere act of defining measures for monitoring is extremely enlightening to many organizations. When these groups must define desired outcomes and the appropriate benchmarks to measure those outcomes, their confusion about their goals is revealed and must then be addressed.

Performance monitoring is necessary, and it is productive even in its early stages. But can performance monitoring actually improve programs? Is it simply another fad in the cycles of public reform, or does it possess inherent value for managers and management organizations?

These are not new questions for private sector organizations, which have been grappling with similar information needs. There is a body of evidence that suggests that those organizations that actively pursue performance monitoring are likely to be more resilient than those that do not.

The coastal management community can learn much from that experience, particularly given the current high level of confusion in many agencies about techniques of monitoring, and miscon-

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Performance Monitoring

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ceptions about the costs and benefits. One such area is the perception of performance. Many companies experience difficulties in both developing adequate measures of consumer satisfaction with products and in linking measurement of performance with corrective action.

To assist in this situation, marketing researchers developed a technique known as Importance Performance Analysis (IPA). The technique asks consumers/clients to rate products on two scales – an importance scale and a performance scale. Overlaying these scales in grid fashion as shown in *Figure 1* below reveals the implications for producers/managers. The visual orientation of the Action Grid enables users to readily comprehend monitoring re-sults and to frame intervention options (for example, reallocation of effort from the "Overkill" quadrant to the "Concentrate Here" quadrant).

This relatively simple technique has been employed by resource use managers in recent years and appears to have considerable potential in integrated coastal management applications. For example, in studies of coastal protected areas in Australia, the perception of management performance by various groups of stakeholders was evaluated. In a study of a small rainforest reserve which has high conservation and recreational values, the six stakeholder groups surveyed included special interest groups (naturalists, volunteers, etc.), educators, adjacent landholders, recreational visitors, regional residents and coastal managers. Each was asked to assess the importance of various attribute/service variables in the reserve (views, access, crowding, litter, drinking water, etc.) and to rate management performance in relation to that attribute/service.

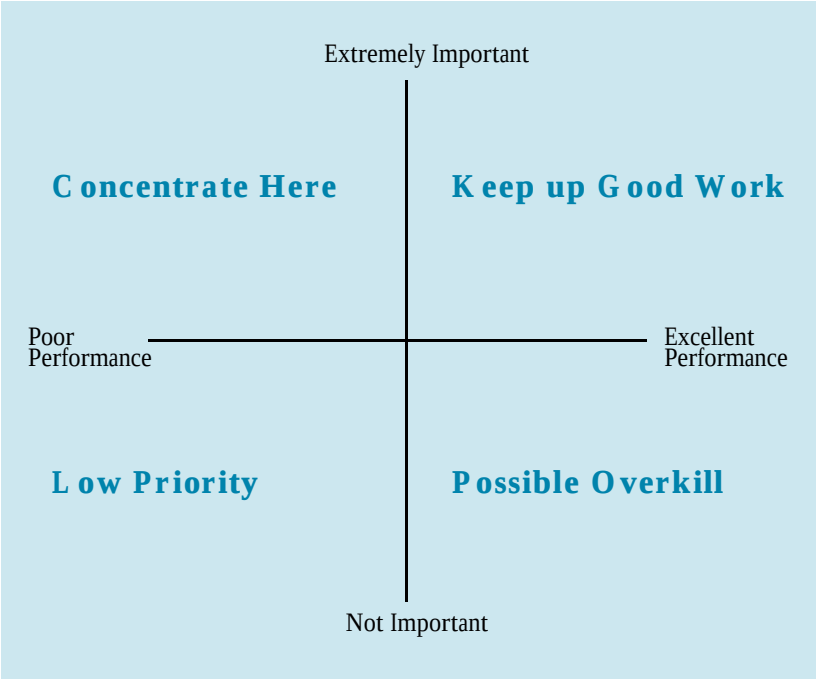

Figure 1: Importance Performance Action Grid

While the IPA ratings of the five client groups were relatively consistent on most attribute/service variables, they differed significantly from the ratings of the coastal manager group. This difference was explained by more critical assessment of performance by clients and consumers, but is also attributable to different perceptions of service or attribute importance. It has long been understood that the perceptions of coastal managers are not necessarily the same as resource users. However this was one of the first studies to quantitatively examine the significance of those differences. What is important from the example is not just that there were differences, but that the extent and nature of the differences (clearly visualized in the resultant Action Grid) offered benchmark ratings of management effectiveness and helped to define directions for improvement of effort.

Following that study, IPA has been extended to other types of applications, including a trial application of the technique in measurement of the performance of coastal management consultants relative to predefined terms of reference. The resultant IPA grid gave an unambiguous basis for comparing client and consultant perceptions, for defining areas for reallocation of effort and for measuring performance over time.

While there are limitations to techniques such as IPA, their potential deserves further examination, particularly as currently used suites of coastal resources management indicators are tested and refined. Experience in the private sector and in other non-resource-based areas of management activity suggest that performance monitoring is both worth the effort and will endure. Early indications from various coastal management programs that have implemented performance monitoring suggest that the effort to measure progress towards desired outcomes provides a considerable return on a modest investment. The purposes of monitoring, however, must be clearly defined and closely linked with the overall management cycle–otherwise, monitoring can be a costly and fruitless experience.

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Florida Assessment of Coastal Trends

by Nathaniel Emmert

Many governmental agencies operate programs for years and spend millions of dollars without ever attempting to assess the impacts or document the status and trends of the subject of their efforts. The result can be the loss of focus for the program, the inefficient use of financial and personnel resources, and the loss of public and political support. For the past several years, planning professionals at all levels of government, particularly environmental planners, have been aggressively working to redesign their policy planning processes and build an intergovernmental partnership to im-prove their joint public policy management skills by adding measurements of progress, increasing accountability and focusing on results.

A major area of importance is the development of environmental and growth management indicator systems. Indicators are useful tools for a wide variety of management purposes, and the capacity of individual public organizations to develop policy is greatly enhanced by the availability of good indicator systems.

The multiple uses of indicators and the pivotal role they play in any serious attempt to improve public management have focused much attention on procedural and technical issues concerning the development of indicator systems at all governmental levels. International, national and regional conferences, and a variety of publications on indicators and indicator systems development have increased interest, especially among state and regional agencies. In 1990, only a handful of states were using indicators in any direct sense, and only two, Florida and North Carolina, had made any explicit attempt to systematically develop and document a comprehensive environmental indicator system. Federal agencies were only beginning to develop explicit indicator systems.

That has radically changed. There is now so much indicator work going on that the situation is almost chaotic. Nearly 30 states have developed or are finishing initial work on environmental indicators or closely related state-of-the-environment documents, and virtually all states report they expect to undertake indicator development projects in the near future. At the federal level, a number of interagency and intra-agency organizations are at work to develop indicator systems and, perhaps more importantly, to begin the process of redesigning federal environmental monitoring systems. A movement is just now beginning at the local level, and even at the community level, to use indicators.

The Florida Coastal Management Program (FCMP) provided national leadership by becoming the first state coastal program to develop an explicit indicator system when they developed the Florida Assessment of Coastal Trends (FACT 1995). This tool provided a comprehensive perspective of the important environmental, economic and social values associated with the coast. It also provided a means of evaluating Florida's progress in protecting its coastal areas, a basis for making strategic decisions about programs and financial resources, and information for other decisionmakers and the general public about coastal issues and problems.

The FCMP contracted with the Florida Center for Public Management (FCPM) of Florida State University to assist in the design and development of this system. FCPM was charged with preparing a report containing a structured collection of environmental, growth management, economic and social indicators that collectively describe the status of Florida's coastal areas, portray the historic trends affecting coastal Florida, and project Florida's coastal future.

The original FACT 1995 document represented the product of these activities. Structured across its nine issue areas are 98 indicators that reflect important issues affecting Florida's coastal areas. These issues include: Impact of Growth in the Coastal Zone, Disruption of Coastal Physical Processes, Responding to Coastal Threats and Hazards, Degradation and Restoration of Coastal Ecosystems, Managing Fresh Water Allocation, Sustaining the Human Uses of the Coast, Balancing Public and Private Uses of Resources, Preservation of Cultural and Aesthetic Resources, and Encouraging Public Awareness and Involvement. In 1996, the trends and conditions outlined in FACT 1995 were used as the foundation for the development of the first Florida State of the Coast Report.

FCPM's current effort, the Florida Assessment of Coastal Trends (FACT 1997), is the first update and revision of FACT 1995 and represents a significant step forward in refining, refocusing and consolidating the original indicator system. The process that led to FACT 1997 included a number of improvements on the original indicator system. The entire system was comprehensively reviewed to identify strengths and weaknesses, and to assess its effectiveness in supporting issue and sub-issue areas. These assessments directed attention toward new or substitute indicators for some areas and suggested deletion of others. Each indicator was individually assessed to make a judgment regarding its contribution to the effectiveness of the system. Proposed indicators with no data, and indicators with weak data or technical flaws, were dropped as formal indicators and better sources of data were substituted whenever they were discovered. FACT 1997 reduced the system to 80 indicators, but included in that number were seven new ones.

A variety of trends become apparent when viewing FACT 1997. Over 60 percent of Floridians live within five miles of the coast, and Florida's coastal counties are experiencing a growth rate over

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River Histories

In the river's deep heart
a forked stick strains from the water
like the fingers of a Nile woman who,
last century,
touched them to her forehead,
then plunged them into rushing swiftness;
beads of sweat flying past her still,
stick folding under,
acquiescing.

On the river's still bank
footprints lead up the soil where
a family of ducks plodded last season,
perfect webbed fossils getting smaller,
smaller as water-droplets splash them,
muddy them, make them fall back,
get up again
and again.

On the river's sturdy log,
forming a bridge over water,
a friend
sits and shows me where
her father led horses.
Where she puts her feet in,
the currents curl her toes forward.
I look to her face–a smile of histories,
her eyes the color
of the river.

–National River of Words Poetry *Finalist Rebecca Givens, Grade 10, Atlanta, Georgia.*
This poem was printed in World Rivers Review, *Volume 12, Number 3, June 1997*

FACT

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twice that of the national average. This population pressure is responsible for increased demands on virtually all natural resources and ecosystems. Urban and cropland land cover are cat-egories that continue to increase, while marsh and forest lands decrease. Total freshwater withdrawals are steadily increasing. Manatee deaths more than doubled from 1995 to 1996.

FACT 1997 is not without success stories, however. Infestations of the exotic plants water hyacinth and hydrilla are decreasing. The southern bald eagle population is making a strong comeback, as are reddish egrets and wood storks. Seagrass acreage is increasing in most areas, as is the amount of land protected as conservation land.

As better sources of data become available, the maintenance of Florida's coast will be based on historic fact and informed projections. The ability to objectively view the conditions and trends occurring in coastal areas will give our leaders the tools necessary to plan and prepare Florida for a legacy that is a model for other areas.

For more information contact: Daniel Parker, Florida Center for Public Management. Tel: 904-644-2242. The Florida Assessment of Coastal Trends (FACT 1997) is available on the Internet at: http://www.fsu.edu/~cpm/FACT97/index.html. Written copies are available from the Florida Coastal Management Program at 850-922-5438.

Linking Project Design, Management and Monitoring in ICM Projects

by Richard Margoluis, Nick Salafsky and Meg Symington

Imagine you have just been hired to be the project manager of a newly created coastal and marine biosphere reserve. Your first challenge is to facilitate a process to design the reserve in a way that will help satisfy some of the immediate needs of the people who live in and around the reserve while ensuring its conservation for future generations. In recent years, the area encompassing the new reserve has been increasingly used for the expansion of family agricultural plots, shrimp farming, and extraction of mangroves for fuelwood, charcoal production, and construction. Likewise, foreign fishing vessels have been actively fishing in the waters inside and around the new reserve. As a responsible manager, you want to be able to target project activities as efficiently as possible to address the major threats to the new reserve and you want to be able to demonstrate just how effective your interventions have been.

So where do you begin? How can you be sure to facilitate the design of the project so that it has the greatest probability of having positive social and environmental impacts? How do you ensure that all relevant stakeholders are included in the project? How do you truly know if the project meets its objectives? How can you convince community members and the groups funding your project that your project has been successful? How can you be sure you will be able to learn from the results of project activities and modify and adapt them as needed? What type of information is most useful to you to make sure the project remains on target?

This situation and these types of questions are typical of the challenges encountered by integrated coastal management project managers. To answer these questions, an integrated coastal management project must set up a system for monitoring the impact of its activities. Monitoring is a vital tool that allows measurement of the impacts of a project and enables managers to make adjustments to their interventions so that objectives can be met–it is the key step in the process of adaptive management.

Constraints to Monitoring and One Solution – BSP's *Measures of Success* Approach

Despite the importance of monitoring there are often serious constraints that prevent projects from doing quality monitoring work. Project staff often are so involved with day-to-day operations that they may feel that they do not have the time or money to invest in monitoring. Likewise, field staff may believe that monitoring can only be done by experts or scientists and that they themselves are not qualified to do the job. Finally, and perhaps most importantly, some managers may simply feel that they do not know how to design comprehensive management and monitoring plans–that they are un-sure about what it is they actually want to be monitoring.

The Biodiversity Support Program (BSP) has found that these constraints stem from the fact that in many projects, monitoring is treated as a separate activity from project design and implementation, and can be "tacked on" at the end of the project. The BSP has learned, however, that monitoring is not a simple task of identifying a few indicators to be tracked over time. Instead, comprehensive monitoring strategies must be developed at the same time that thinking about developing project goals, objectives and activities occurs.

Work in this area has led the BSP to develop a forthcoming guide called *Measures of Success*. This book provides a simple, clear and systematic ap-proach to integrating project design, management and monitoring.

The basic steps in this approach are outlined in *Figure 1*. These steps are also described in

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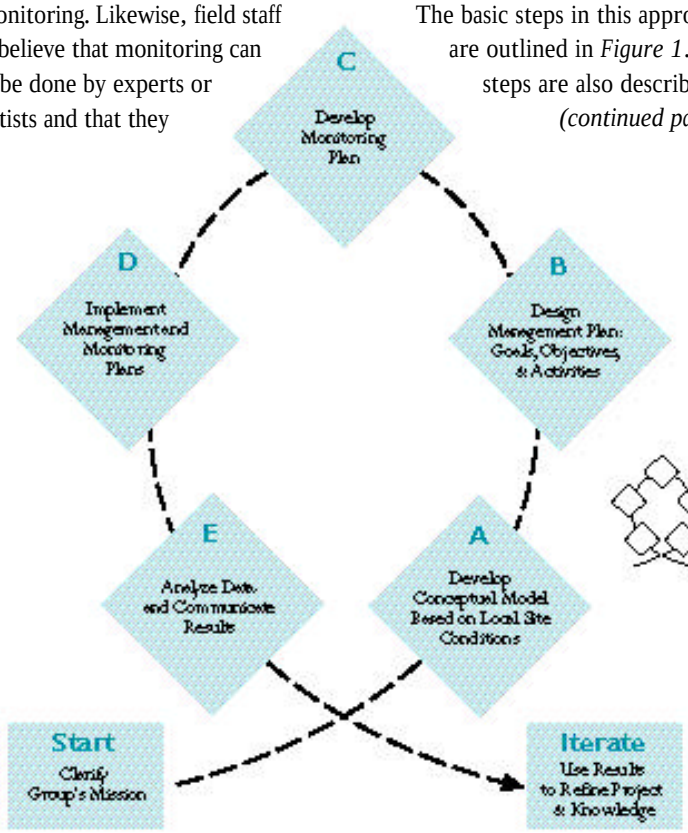

Figure 1: Project Cycle

Linking Project Design

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the following sections using work that BSP did for the Protected Areas of Central America, Coastal and Marine Component (PROARCA/Costas) project as examples. The steps are drawn from a series of workshops at the four PROARCA/Costas sites during which project staff, community members and non-governmental organization (NGO) and government agency personnel developed complete draft Project Plans – conceptual models, management plans and monitoring plans (products of the first three steps in *Figure 1*) – for their respective sites.

Start: Clarify Group's Mission

The first step in any project is to determine who will be designing and implementing the project. This step is crucial when beginning any new project or collaborative effort. Conservation efforts that give voice to the various stakeholders from the beginning are generally more likely to succeed and be sustainable. Expectations of participating institutions and individuals regarding what the collaborative project will accomplish must be clear from the beginning. Project partners must find common ground and be sure they understand common goals to avoid serious misunderstandings that undermine the project.

The strategic planning/monitoring workshop in the PROARCA/Costas project in Nicaragua represents a successful project initiation. Representatives from two local NGOs, government agencies, universities and four communities came to consensus on the overall purpose of the PROARCA/Costas project in Nicaragua.

Diamond A: Develop a Conceptual Model Based on Local Site Conditions

A conceptual model is a diagram of a set of relationships between certain factors that are believed to impact or lead to some target condition. It is critical to involve community members and include reliable site-specific data in the development of the conceptual model. The best way to develop a conceptual model is through a highly participatory activity where stakeholders discuss and negotiate the final diagram.

In the Gandoca/Bocas PROARCA/Costas site, for example, participants agreed that key factors included fishing, sea turtle hunting, pollution, sedimentation and tourism, which all influence the target condition defined as "the condition of aquatic resources in Gandoca/Bocas." The team wrote the key factors (32 in all) on sheets of paper and arranged them on the floor as they discussed each one and its relationship (represented by masking tape arrows) to the others. Using this approach, workshop participants were able to clearly identify priority factors that needed to be addressed in order to have maximum impact on the target condition.

Diamond B: Develop a Management Plan

The management plan describes what the team will do to influence the target condition identified in the conceptual model. The management plan includes three project components: goals, objectives and activities. *Goals* are general statements about the desired state that the project is working to achieve. *Objectives* are specific statements detailing the desired accomplishments or outcomes of the project. *Activities* are the specific tasks or actions designed to reach each of the project's objectives. *Measures of Success* makes use of criteria lists to help project managers distinguish and develop each of these components.

The following examples of goals, objectives and activities were developed by participants of the PROARCA/Costas workshops.

Goal
***(from Nicaragua's Miskito Coast)*:**

- To safeguard and sustainably manage the aquatic resources of our coastal lagoons for the future well-being of our communities.

Objective
***(from the Gulf of Fonseca)*:**

- After three years from the beginning of the project, there will be no new expansions of shrimp farms in the Chismuyo Bay Wildlife Reserve.

Activity
***(from the Gulf of Honduras)*:**

- Hold a competition among students in public schools to paint or draw pictures that promote the protection of the manatee.

Diamond C: Develop a Monitoring Plan

The monitoring plan provides the structure for stakeholders to make sure their project is on track; it describes how information will be collected over time to measure project success. In the monitoring plan, specific indicators are developed for all project goals and objectives, and the completion of project activities is recorded. The monitoring plan describes not only what data will be collected (indicators), but also how, when and by whom they will be collected.

The following example indicators were developed by workshop participants for the goal and objective described for Diamond B above.

Example indicators for goal
(from Nicaragua site for one fish species, snook):

- Total number of snook captured
- Size of snook captured
- Average weight of snook captured

Example indicator for objective
(from Gulf of Fonseca site):

- Area (in hectares) of active or abandoned shrimp farms
- Area (in hectares) that have been cleared for future shrimp farms

Diamond D: Implement Management and Monitoring Plans

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Evaluation of Coastal Zone Management Initiatives in the Mediterranean

by Ivica Trumbic

The Mediterranean Environmental Technical Assistance Programme (METAP) has entered its third phase, marked by increasing commitment to integrated coastal management (ICM). The Mediterranean Action Plan (MAP) is also very active in this field, and there are a large number of ICM initiatives in the region. As efforts to achieve sustainable development in the Mediterranean enter their third decade since the signing of the Barcelona Convention, it is essential to discover the best mode of investing new resources. To help guide the next round of investments in ICM proposed under METAP, a selective review of ICM initiatives was carried out.

The main objectives of the evaluation are:

- To identify those ICM initiatives which have been successful in meeting project objectives and to document the basis for success in each case.
- To identify constraints to establishing or advancing ICM initiatives in countries which have attempted to do so.
- At the regional level, to assess whether individual initiatives and the larger programs of which they are a part (particularly METAP and MAP) have created significant improvements in environmental conditions.
- To outline the lessons learned from these initiatives which may be applied in the region and elsewhere.
- To propose recommendations for replicating successes on a larger scale.
- To propose policy level recommendations regarding the place and importance of ICM to the parties of the Barcelona Convention.
- To inform METAP and MAP and sponsors of other pending initiatives in the region of the results of the study to help them focus resources on those activities which are most likely to have an impact.

The evaluation process took place in three phases. In the preparatory phase, the analysis of available documentation was performed, as well as a brief overview of all ICM interventions in the region, the evaluation methodology developed, case studies selected, and a questionnaire for the national focal points for MAP and METAP prepared and distributed. In the second phase, the evaluation was performed through site visits, filling out the questionnaires and on-site evaluations. Three team meetings were organized in which the methodology was coordinated, evaluations were made, and drafts of the case study reports and the joint report were prepared. During the third phase, the dissemination of results will occur at meetings and workshops attended by the main stakeholders. The documents will be presented to METAP and to the Contracting Parties to the Barcelona Convention in a meeting scheduled later this year in Tunisia.

The expert group began by identifying 30 programs, plans and projects that qualified as coastal management projects on the basis of project documents compiled from METAP, MAP or other sources. Those included only initiatives that, by their territorial elements and contents, clearly fell under the category of ICM. The next step in the group's work was the selection of a smaller group of projects to be considered as case studies. The criteria used were representation, policy focus and organization of intervention.

The team selected nine case studies that fell within the global category of ICM interventions. That number was deemed feasible, as the experts would be able to visit those areas, analyze them thoroughly, contact the relevant stakeholders, and fill out and evaluate the prepared questionnaires. The following case studies were selected (brackets indicate the program source):

- The Coast of Albania (CAMP and METAP);
- The islands of Cres and Losinj in Croatia (METAP);
- The Rhone River Basin - the coastal part of France (national);
- The Island of Rhodes in Greece (CAMP and METAP);
- The Coast of Israel (national);
- The Coast of the Liguria Region in Italy (national);
- The Area of Al-Hoceima in Morocco (METAP);
- The Tunisian Coastal Protection Agency (METAP); and
- The City and Bay of Izmir in Turkey (CAMP).

Using the evaluation procedure, the team attempted to determine, as systematically and objectively as possible, the relevance, effectiveness and impacts of program, plan or project activities in the light of their objectives. The evaluation framework contains a number of key dimensions. These are the boundary lines within which an evaluation procedure is being carried out. Three key factors in the evaluation process were performance, integration and sustainability.

The dimension of performance refers to the extent to which the intervention has successfully fulfilled its objectives. The extent of success or failure can be measured in multiple terms: in measurable outcomes (e.g., the number of water connections or kilometers of roads), and in non-measurable ones (e.g., changes in attitudes or awareness, or strengthening of the institutions). It is also important to distinguish between factors that are the result of the intervention itself (which might depend on the internal consistency of the goals and objectives of the initiative, or the scope of the project with regard to the problems in the area concerned) and those that originate in the wider context where

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Evaluation of Coastal Zone Management

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the program, plan or project operates, and which might affect the performance of the initiative (e.g., inadequate inter-ministerial coordination or lack of plan implementation mechanisms).

The dimension of integration refers to the level of horizontal or vertical inter-linkages achieved among sectors, planning interventions or administrative levels in the area concerned. Distinction is made between integration among sectors, the environment and the socio-economic context, the various levels of government, and the level of participation among government institutions, the private sector, nongovernmental organizations, and the general public.

Asea on the Mediterranean near Greece.

The sustainability dimension deals with the follow-up prospects of the initiative. It shows whether the initiative has the potential for continued effects after the life of the project, either in the form of a mechanism directly built into the initiative, or in the form of a context that will allow long-term implementation of the initiative's proposals, i.e. beyond the original life of project funding. A distinction can be made between the financial aspects (whether an adequate financial system has been put in place, or whether the linkages have been established with other policies, programs or investments beyond the immediate scope of the initiative), the institutional aspects (whether adequate institutional system exists to implement the initiative's proposals) and political aspects (whether there is enough political commitment for implementation).

Based on the above dimensions, the early findings show the following results:

Performance. More than half of the case studies were judged successful in that they fulfilled most of the stated objectives. In those which were considered partially successful, not all of the activities planned were performed. Another criterion in assessing the case studies' performance is the measure of positive effects they have produced. It is clear that the very fact that the projects were able to exist in certain areas was enough to produce some results, including improvement of the institutional capacity or environmental awareness.

Integration. This factor is perhaps the most representative of the success of ICM implementation in the region. It is an objective which is very difficult to achieve, since not all the methodological questions have yet been answered, and the most appropriate tools and techniques for integration have not yet been developed. More than half of the interventions have resulted in mediocre success in achieving integration between the various sectors. These are mainly projects comprised of a larger number of often unrelated or remotely related activities. In these, the sectoral integration achieved was lower than that of the projects covering a smaller number of sectors. The question of governance and participation is a weak point in all the projects, particularly with regard to participation of the general public. Many of the projects stated that participation was one of their objectives, but in practice participation has been limited to the representative bodies only, and sometimes not even those groups are involved.

Sustainability. This is the crucial point of the project's implementation. Most of the cases have poor financial prospects. In only a few cases could the commitment by the authorities to financially support the implementation of the project proposals be identified. Projects in more developed countries were more secure in this way. The prospect of an investment project to follow immediately after the completion of the documentation phase also indicated financial security–again this situation was more typical in developed countries. Overall, the financial sustainability could be assessed as average. Institutional and political support, however, indicated growth in the sense of ownership of the projects. This may be an encouraging sign, and if participation levels could be increased, potential investors could be attracted and the prospects for financing the follow-up proposals might improve. Improvements in the environmental situation and resource use practices (with increased environmental awareness and education) and other outcomes of ICM projects could follow.

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ICOMIS - A Modeling Tool for Better Decision Making on Coastal Zone Development

by Marc Staljanssens

ICOMIS is a geographic-based, policy modeling tool developed to assist decisionmakers in selecting the best coastal zone development alternatives from a number of feasible choices on the basis of pre-defined priorities. Sensitivity analysis capabilities of the decision support software allow for the simulation of "what if" scenarios. Basic research on the ICOMIS concept was carried out in Guinea and Thailand, and a successful pilot project took place in India.

ICOMIS can be applied at the national or local level. On a local level, or in the case of small island countries, the whole ICOMIS system can be PC-based. Requirements for use of the ICOMIS tool include:

- Data input, storage, retrieval and management utilities (database, spreadsheets);
- A remote sensing/geographic information system;
- Various expert systems and modeling utilities;
- A multi-objective decision support software;
- Data output and presentation utilities (map maker, graphs and chart drawing); and
- A user interface.

The logical steps in the application of ICOMIS are:

1. Problem definition. The nature of the problem typically is a conflict of interests such as the expansion of shrimp culture in an area of mangrove conservation. Since decisions in these matters are urgently required, ICOMIS is problem-oriented rather than comprehensive. An inventory of the problems will determine information needs.

2. Definition of the coastal zone. An important requirement for the setting of an effective ICOMIS is the clear definition of the extent of the coastal zone. From both management and scientific viewpoints, the extent of the coastal zone will vary according to the nature and extent of the problem and the resources considered, and be limited by administrative or political boundaries. In definition of the limits, it is important that all features and factors that influence the management and development of the coastal zone be included.

3. Assessment criteria. Assessment criteria specific to each policy objective are chosen to evaluate the degree of achievement of policy measures. They are chosen in roughly equal numbers in order to avoid introducing a bias in the multi-criteria analysis.

4. Sustainability analysis. Existing or planned activities are identified and formulated on the basis of the policy measures. Specific biophysical and social/economic requirements and limitations correspond to each activity and are matched to the resource qualities. Not only is the existing situation considered but also the impact of planned policy measures and activities is simulated, and the areas of conflict identified.

5. Formation of policy alternatives. Policy measures guide development toward the fulfillment of objectives related to integrated coastal management. To be realistic, the formulation of the various alternatives must take all relevant objectives and corresponding measures into account as these will determine a combination of activities for each alternative. Modeling is a useful means, for example, to include estimates of trends in autonomous developments in the alternatives, or a prognosis of the effects of a planned policy measure.

6. Policy schemes. Various policy schemes are formulated, each putting emphasis on a policy objective such as resource conservation or sustainable development. Criteria are given a priority ranking for the attribution of weights. Weight is attributed to the criteria by pairwise comparison (analytical hierarchy process) and weight sets are designed to illustrate policy objectives. This priority ranking is applied in various ways to account for the possible variability in priorities.

7. Comparison of alternatives. The comparison of policy alternatives is performed by multi-criteria analysis. A simple weighted sum often gives satisfactory results in handling both quantitative and qualitative criteria. The different weight sets offer the possibility of expressing the variability related to the different policy objectives and thus to compare alternatives on a realistic basis. Moreover, estimates of the potential effect of a policy measure, or suggestions for the design of new policy measures, can be gained from the outcome of the sensitivity analysis performed on a weight or effective interval. The final result is an ordinal ranking of the alternatives.

Thai fishermen.

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Assessing Sri Lanka's Special Area Management Projects

by Kem Lowry, Nirmalie Pallewatte and A.P. Dainis

In the early 1980s, Sri Lanka developed a national coastal management plan and began implementing a permit system in a 300-meter (m) coastal zone. The first generation management effort was designed primarily to reduce coastal erosion. More than 2,700 coastal permit applications, primarily for house construction and sand mining, were processed in the first 10 years of the coastal program. The combined effect of the regulatory program, an extensive program of public education and the construction of some coastal protection works, resulted in a substantial reduction in rates of coastal erosion.

Glass-bottom tourist boats and commercial fishing boats compete for space in Hikkaduwa.

In the early 1990s, Sri Lanka's Coast Conservation Department (CCD) undertook a review of the coastal management program. Working with the University of Rhode Island's Coastal Resources Center, the CCD developed a report, *Coastal 2000: A Resource Management Program for Sri Lanka's Coastal Region,* which outlined a broader approach to coastal management. One of the key recommendations of the report was a call for the design and implementation of Special Area Management (SAM) plans "to be implemented at specific geographic sites of ecological and economic significance."

SAM plans are conceived as a bottom-up strategy for managing coastal resources that complements the existing top-down regulatory approach in Sri Lanka. They allow for intensive, comprehensive management of coastal resources in a well-defined geographic setting (as contrasted with a use-by-use, regulation-by-permit approach). Participation by community residents and stakeholders in planning and management is central to the SAM concept. Most advocates of this concept see government agencies playing a variety of roles in SAM planning and management. Government agencies serve as catalysts, or facilitators, that help organize communities to engage in resource management and provide technical support, as mediators to help balance competing demands in resource management and as partners of communities engaging in co-management with community groups.

In 1991, the CCD designated two SAM sites to begin planning: Hikkaduwa and Rekawa Lagoon. Hikkaduwa is a tourist destination settlement about 100 kilometers (km) south of Colombo. Small and medium-sized hotels, restaurants, bars and shops line both sides of the 4-km coastal highway bordering the Hikkaduwa Marine Sanctuary. Urban runoff, untreated sewage discharge, sedimentation of the reef, wastes from boats, and near-shore conflicts among boats, swimmers and other activities threaten the popularity of the town as a tourist destination. Rekawa, on the other hand, is a rural lagoon environment in which coral mining, competition among fisherfolk, interference with natural flushing of the lagoon and other uses have degraded the reefs and the lagoon and threatened the livelihood of the fisherfolk living around the lagoon.

Beginning in 1992, CCD staff and representatives from the Coastal Resources Management Program (CRMP) began the process of SAM planning at both sites. Government officials in selected agencies at the national level were contacted, and their interest and support was solicited. At the same time, CCD and CRMP staff began to work with community organizations to identify groups with whom it might be possible to undertake identifying community perceptions of resource management problems and priorities. Over the next three years, government officials, community groups and interest group representatives identified priority resource management issues and technical questions. Special Area Coordinating Committees, composed of both community representatives and government officials, were established at both sites. Technical studies were commissioned and environmental profiles were developed for each site. Resource management issues and strategies and identified for both sites and compiled into SAM plans. These plans were both adopted by their respective coordinating committees in 1996.

In late 1996, the CCD, the CRMP and the Sri Lanka U.S. Agency for International Development office commissioned an evaluation of the SAM planning and management processes at the two SAM sites. An assessment team, composed of a government official and a university professor from Sri Lanka, and a foreign coastal management specialist, visited the sites. They interviewed government officials, user group representatives and residents and prepared an interim assessment of the two SAM programs.

A host of problems faced the coastal management project at Rekawa Lagoon.

While there are a variety of evaluative frameworks that might be used to assess the progress of the two Sri Lanka SAM programs, eight criteria devel-

oped by the Coastal Resources Center for assessing the governance of coastal management programs have been used to frame this brief summary:

- Strategic decisionmaking.
- Participation.
- Integrated approaches and methods.
- Learning and adaptation.
- The role of science.
- Capacity building.
- Matching objectives to the capability of the institutions responsible for their implementation.
- The policy cycle as a road map to the formulation of an ICM program.

Strategic decisionmaking, in the Coastal Resources Center framework, refers to the degree to which governments are able set priorities among coastal environmental problems, identify causal processes, and design effective and politically acceptable management interventions. In the case of the Hikkaduwa SAM plan, preventing the further degradation of the marine sanctuary was seen as the key problem. Oil wastes from fishing boats anchored in the sanctuary and an excessive number of glass bottom boats used to transport visitors to view the reef contribute to the degradation and depletion. Hence, the management emphasis has been on enlarging an existing fishing harbor to accommodate boats currently anchored in the sanctuary, and working with glass bottom boat operators to design a cooperative agreement limiting the number of boats viewing the reef at any one time. These initiatives are viewed as the most strategic interventions for SAM success.

At Rekawa, a misdesigned causeway blocking circulation in the lagoon, deterioration of the reef due to coral mining and over-fishing in the lagoon were viewed as key problems contributing to the larger problems of resource degradation and community poverty. Improving lagoon circulation, developing fishing management agreements among lagoon fisherfolk and prohibiting coral mining were viewed as important–and feasible–first steps in organizing the community and improving the state of community resources as initial efforts in improving the living conditions of Rekawa residents.

The degree and quality of participation among those affected by the development and implementation of SAM projects is a second criterion for assessing governance arrangements. Participation is a key element of the SAM process design. In the SAM processes in Sri Lanka, one purpose of involving local residents was to insure that important time and place information was identified. Time and place information–detailed data about site conditions–was needed regarding the willingness of glass-bottom boat owners to organize at Hikkaduwa. At Rekawa, identifying which families were engaged in coral mining and how willing lagoon fisherfolk were to organize was critical. A second major purpose of participation is to organize agreement regarding the nature, extent and causes of resource degradation problems, and to help create consensus regarding proposed interventions. Community meetings, workshops and other organizational activities were undertaken at both sites to help mobilize interest and support. These efforts resulted in general community agreement about the resource problems and proposed interventions at both sites.

Integrated approaches and methods focus attention on the degree to which coastal management efforts integrate multiple agencies and programs, levels of government and technical analysis. The SAM programs at Hikkaduwa and Rekawa are integrative by design. The plans for both sites were developed by multi-disciplinary teams working with community groups and national, provincial and local government officials. The plans are based on regulatory activities, coastal development projects, research, monitoring and organizational efforts undertaken by both government agencies and community groups. Implementation of the two plans requires the collaborative efforts of many agencies at all three levels of government. Coordinating committees at both sites are working to maintain a comprehensive approach to improving resource conditions.

Mechanisms for learning and adaptation have been identified by the Coastal Resources Center as fundamental to coastal management efforts. The two pilot SAM projects at Hikkaduwa and Rekawa are examples of a learning strategy. They were undertaken to test the feasibility of community coastal management and, in particular, to assess the issues associated with the design and implementation of community-level management approaches. Within the projects, information for learning and adaptation is based on government monitoring of resource conditions, research undertaken by university scholars and private researchers, and detailed information provided by user groups, such as fisherfolk and boat operators.

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Coastal erosion is a major threat to poorly planned development in Hikkaduwa

The Wadden Sea: Shared Nature and Common Management

By Folkert de Jong

The Wadden Sea is a shallow sea extending along the North Sea coasts of The Netherlands, Germany and Denmark. It is a highly dynamic ecosystem with tidal channels, sands, mudflats, salt marshes, beaches, dunes, river mouths and a transition zone to the North Sea, the offshore zone. The area of the trilateral cooperation of The Netherlands, Germany and Denmark is 13,500 km^2 large.

The present form of the Wadden Sea is the result of both natural forces and human action. The daily tides have the greatest influence on the shape and functioning of the sea. Twice a day, 15 cubic kilometers of seawater enter the Wadden Sea. This doubles the volume to some 30 km^3. With the water from the North Sea, large amounts of sand and silt are imported and settle in places with little water movement. During low tides, the so-called tidal flats of the Wadden Sea emerge. These cover about two-thirds of the tidal area and are one of its most characteristic features. They account for 60 percent of all tidal areas in Europe and North Africa.

The Biological Importance of the Wadden Sea

The Wadden Sea is vital for about 50 bird species from around the northern hemisphere, including many rare and threatened species. Every year an average of 10 to 12 million birds pass through this area on their migration route from the breeding grounds in Siberia, Iceland, Greenland and northeast Canada to their wintering grounds in Europe and Africa. They feed on the tidal flats, which are the most nutritious areas of the Wadden Sea. For more than 30 species of birds, the Wadden Sea is an indispensable reproduction area. The Wadden Sea is also home to the common or harbor seal, which, with some 10,000 individuals, is the most numerous native marine mammal species in the Wadden Sea.

Human Impact

The effects of human activities can be classified into three categories: pollution, disturbance and habitat destruction.

Pollution

The relatively high level of contamination of the Wadden Sea is caused by three main factors:

1. A number of rivers, the catchment areas of which are highly industrialized and agronomized, flow into the Wadden Sea.

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Coral Reef Management

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been subjected to two field tests to determine their applicability to "real-world" information-acquisition situations. Locations included a coral reef area in the Philippines with growing fishing pressure and budding tourism, and an overfished area in Jamaica with extensive and growing tourist, industrial and population pressures. Lessons learned in these applications were used to modify the original drafts on indicators and guidelines for data acquisition. These guidelines will be published by the University of Rhode Island's Coastal Resources Center and ICLARM as a handbook to accompany those used for the biological and oceanographic data acquisition and coding methods.

RAMP and ReefBase, together, provide a baseline for monitoring changes in coral reef ecosystems as well as a standardized database for exploring interrelationships between the variables included. The importance of defining and recording a standardized set of indicators cannot be overemphasized. At present the coastal zone and fisheries management literature is characterized by case studies conducted by many different individuals with unknown biases and varying research methodologies and disciplinary perspectives. When sufficient cases have been entered into these data sets, with data collected and coded using the standardized techniques developed, ReefBase with RAMP indicators will enable multivariate, quantitative analysis. Independent variables can be related to important dependent variables such as reef health or management institution status to determine the amount of variance connected to the independent variables. Results of these analyses will provide decision makers with information that can be used to select alternative courses of action which will be based on more than the currently available unsystematic, anecdotal information. In individual cases, ReefBase with RAMP indicators will provide a baseline that will facilitate monitoring of the total coral reef ecosystem, including humans, to determine the impacts of specific management actions and other changes. By providing this type of essential information, ReefBase/RAMP is expected to play a major role in promoting informed management of coral reefs worldwide.

For more information on ReefBase contact: The ReefBase Project, c/o ICLARM, MCPO Box 2631, 0718 Makati City, Philippines. FAX: 632-816-3183. E-mail: ReefBase@cgnet.com.

For more information on RAMP indicators contact: Coastal Resources Center, University of Rhode Island, Narragansett Bay Campus, Narragansett RI 02882. Tel: 401-874-6224. FAX: 401-789-4670. Request "Rapid Assessment of Management Parameters for Coral Reefs, RAMP Final Report," by Richard B. Pollnac.

Wadden Sea

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2. The Wadden Sea is a system which imports more sediments than it exports. The sediments originate almost completely from the North Sea and are carriers of heavy metals and other contaminants. Due to the current, a substantial part of North Sea sediments–and consequently polluting substances–is deposited into the Wadden Sea.

3. Contamination is also caused by rain and dust which originate from the highly industrialized northwest and central European countries.

Disturbance

Disturbance is any activity which, by means of mechanical, visual or acoustical action, interferes with or influences natural behavior or processes. Disturbance of animals can lead to lower breeding success and lower survival rates. When comparing the different causes of disturbance, some types of recreation, hunting and commercial fisheries, are regarded as having the most impact.

Habitat Destruction

Since the Middle Ages, humanity has changed the Wadden Sea landscape: dikes were built and land reclaimed. The natural wandering of the islands as a result of accretion and erosion has been considerably reduced during the last century through the construction of dikes and groins and through beach nourishment. This construction has resulted in the loss of natural habitats of the Wadden Sea. In the past 50 years some 160 km^2 of saltmarsh was embanked, 43 km^2 of which occurred between 1963 and 1990. To date, 346 km^2 of salt marsh remain. One of the consequences of the construction of dikes and dams along and in rivers and river mouths has been the disappearance of natural transition zones between salt and fresh water, the brackish water zones.

Protection of the Wadden Sea

Since the early 1970s, it has been recognized that the Wadden Sea is one biological system and cannot be divided according to national boundaries. Politicians from the three Wadden Sea countries were called upon to work together in the conservation of the area. The first trilateral governmental conference on the protection of the Wadden Sea was held in 1978 in The Hague, The Netherlands. In the Joint Declaration (1982), the Wadden Sea countries declared their intention to coordinate their activities to implement legal instruments to protect the natural environment. Six more Gov-ernmental Wadden Sea Conferences have been held and the trilateral cooperation has been strengthened.

The Main Elements of Trilateral Policy and Management

At the sixth trilateral conference in Esbjerg in 1991, the trilateral policy was arranged into three components: a guiding principle, a number of management principles and a set of common objectives for human use. The guiding principle of the trilateral Wadden Sea policy is to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way. It was also decided that to implement this, common ecological targets needed to be developed, together with measures to reach those targets. It was acknowledged that the best guarantee for a natural ecosystem is to achieve the full scale of habitat types which belong to a natural and dynamic Wadden Sea.

For common management, six habitat types are distinguished:

- Offshore zone
- Beaches and dunes
- Tidal area
- Salt marshes
- Estuaries
- Rural areas

For the first five of these habitats, ecological targets have been adopted. For the rural areas on the islands and the mainland, the target is to improve conditions for the birds. In addition, supplementary targets on marine mammals, birds and mussel beds have been agreed upon, because these are important indicators of the biological quality of the ecosystem. Targets on the chemical quality of the Wadden Sea ecosystem, which aim to eliminate discharges of non-natural substances and keep concentrations of naturally occurring substances at natural levels, also have been adopted.

The Ecotarget concept coordinates different lines of thinking, resulting in what is now deemed maximally practical for management, ecological credibility and political needs. Ecotargets make clear that an increase of natural and undisturbed habitats all over the Wadden Sea is a necessary condition for the restoration of the ecosystem. At the same time, the targets have been formulated in an open-ended way, so that in each tri-annual period there is room for negotiation, both from user and nature protection perspectives.

A comprehensive survey studied the present status of each of the six habitat types. Information on the state of naturalness, human use, protection regime and anticipated policies was compiled and provided the basis for additional proposals for implementation. National consultations are being held in the three Wadden Sea countries about these proposals. These are intended to promote discussion on actions to implement the habitat targets. On the basis of the national proposals, a trilateral management report will be written which will be discussed at the 8th Governmental Wadden Sea Conference.

(Reprinted from the Wadden Sea *newsletter, 1996. Volume2.)*

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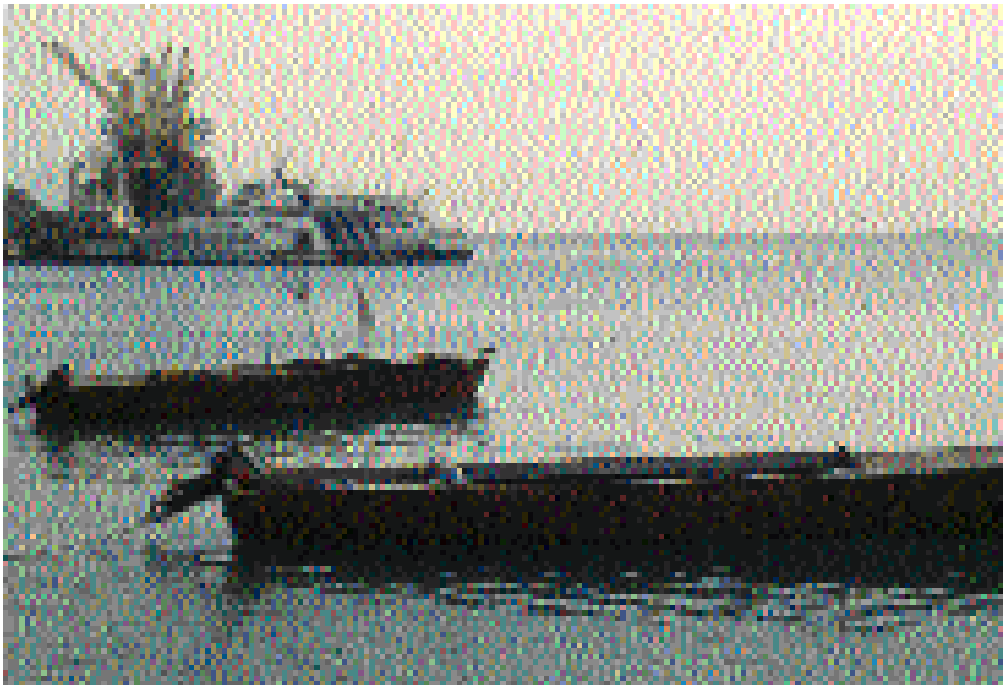
Women Seaweed Farmers in the Zanzibar Islands, Tanzania

by Flower E. Msuya

Tanzania's Zanzibar Islands began a successful seaweed industry in 1989 when the seaweed *Eucheuma* was imported from the Philippines and planted on the East Coast of Unguja Island. Its growth rate was remarkable and soon commercial seaweed farm-ing flourished on the island. Seaweed farming has begun in mainland Tanzania as well.

Many villagers, both men and women, initially joined in the venture. Slowly, men left the industry, and now more than 90 percent of the farmers on Unguja Island are women.

Because so many of the farmers are women, farming seaweed has changed life in the villages. The number of children suffering from malnutrition has decreased, which indicates that the health of their mothers has improved. Women also have economic power now. This has enabled them to take greater part in the decision making at home. Men, who are mostly employed in fishing, have accepted women's making significant economic contributions in the household. Since fish catches in Zanzibar have been decreasing over the years, contributions from women in the family have been important. Seaweed farming has also fostered self-employment, bringing youths who migrated to towns back to the villages to work for themselves, thus increasing the population of the villages.



The port of Zanzibar on Unguja Island off the Tanzanian mainland.

Women seaweed farmers are able to buy necessary household items. Each woman in Paje village, for example, has been able to purchase about 30 pairs of "Khanga," a clothing common to East African women. Most of the women could not afford even five pairs before seaweed farming. Women seaweed farmers can now buy school uniforms for their children and improve old homes. Some have even built new houses.

Before seaweed farming, families were forced to camp at land-based farm sites and work in the fields to earn enough money to support themselves, doing everything from ploughing the land to harvesting. During these seasons, children missed their classes. Now, camping at farm sites is unnecessary, so children are able to attend schools regularly.

Women in the villages used to earn very little money. Rope making, which involves burying coconut husks at the beach for six months before removing them to make rope, earned them a meager income. A meter of rope sold for US$0.01. Women also made capes, which took up to eight months to make. These sold for about US$2. Other activities done by women included octopus hunting and net fishing to catch small pelagics. All these activities are still being done by women, but now products of such activities are more for home consumption than for sale. Petty trade and small businesses have been replaced by seaweed farming as a major income generating activity.

Women in the villages are enjoying the economic benefits of seaweed farming. "I also buy clothes for my husband," some women have said. Others state proudly that their children dress better than those living in town. One woman in Paje village said, "Now I do not have to wait for my husband to bring home everything."

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Mangrove Management Project Launched in Ghana

by Chris Gordon

The purpose of the Lower Volta Mangrove Project is to develop landowner and community-based management approaches for the rehabilitation and sustainable use and management of the degraded mangrove ecosystems in areas adjacent to the Volta River estuary. The current project preparation phase (*Phase I*) is acquiring and analyzing data on the ecological, social and economic significance of the mangrove ecosystems in a core area, to aid in the design of an implementation plan for a wider project area (*Phase II*).

Ghana's coastal zone, which extends over 550 kilometers, is the most densely populated part of the country with high concentrations in urban and in-dustrial centers. Development has had an impact on the coastal wetlands, which provide unique ecological conditions and habitats for large populations of migratory waterfowl. Yields of fish stocks in the lagoon areas have declined as a result of human activities.

The majority of people in the area derive their livelihoods directly or indirectly from the lagoons and the coastal resources. Fishing and fish processing, agriculture and salt production employ many people. Mangroves were targeted for management after preliminary analysis of Landsat™ satellite imagery of the area indicated that the extent of the remaining mangrove resource was sufficient to justify the project. After launching an event to introduce the project to the local people, consultants in the areas of hydrology, mangrove ecology, aquatic ecology, fisheries, remote sensing, soils and land use, environmental economics and socio-anthropology started intensive field work. It soon became clear that the major threats to mangroves were cutting of mangroves as fuel, and to a lesser extent, conversion of mangroves to agricultural land. Within the core area, about 67 percent of the mangrove has been lost between 1973 and 1991. Arresting environmental degradation will require an approach sensitive to the need to protect existing livelihoods. Alternatives must be developed to provide sufficient incentives to gain co-operation from the wide range of stakeholders involved.

A key aspect of the environmental economic study is to seek sustainable management activities to ensure the long-term viability of local economies.

Issues being addressed under the project include:

- What is the extent and rate of decline in mangrove and fisheries resources?
- Has this resulted solely from over-exploitation or are there other reasons?
- What is the social and economic significance of the mangrove ecosystem to the local population?
- What is the nature of past and present local property and resources in management regimes, and what opportunities and constraints exist for their adaptation to sustaining local livelihoods from the mangrove ecosystem?
- Can the decline in area of the mangrove forests be reversed by means of replanting and sustainable management?

Project activities include:

- Assessment of the degradation of mangrove forests using remote sensing techniques.
- Assessment of the current benefits and uses of mangrove products in the project area.
- Assessment of the role of mangroves in maintaining lagoon and marine fisheries.
- Projection of future requirements for mangrove forest products.
- Initiation of field trials for the restoration of the mangroves by replanting, through local community involvement.

Project activities also include the training of staff of the Ghana Wildlife Department as well as community leaders in these fields and the provision of support for institutional development.

In November a dissemination workshop to educate policy level managers will be held which will be followed early next year with a participatory workshop involving the local communities and stakeholders who will define the form and content of Phase II of the project.

The Lower Volta Mangrove Project is being funded by the Department of International Development, UK and is housed in the Ghana Wildlife Department. The Project Steering Committee is chaired by the Environmental Protection Agency of Ghana. The Lower Volta Mangrove Project has been recognized as an associated research activity by the LOICZ (Land-Water Interactions in the Coastal Zone) project of the International Geosphere-Biosphere Programme (IGBP). It is also affiliated with the Lower Volta Environmental Impact Study being implemented by the Volta Basin Research Project of the University of Ghana.

Young boys and their fish catch from mangroves.

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Special Area Management Projects

(continued from page 17)

This information is reviewed by coordinating committees at both sites and, on occasion, new management priorities are identified.

A specific role for science in the Coastal Resources Center's evaluative framework emphasizes the importance of good technical analysis in coastal planning and management. The availability of international donor funding made it possible to supplement Sri Lankan government funding for a variety of technical studies at the two SAM sites. At Hikkaduwa, analysis of the health of the reef, a tourism study, water quality sampling and an analysis of sources of pollution were among the studies conducted. In addition, both the National Water Supply and Drainage Board and World Health Organization completed wastewater disposal feasibility studies. The Ministry of Fisheries and Aquatic Resources is facilitating analysis of coastal engineering, credit facilities and social infrastructure as part of a larger regional analysis funded by the Asian Development Bank. At Rekawa, an analysis of coral lime production was one of several social and economic studies conducted. Other studies included a socioeconomic profile, a health and sanitation survey and surveys of women's status and of volunteer organizations. Studies of the hydrology of the lagoon, the feasibility of aquaculture operations, shrimp recruitment and turtle conservation were also undertaken. The availability of international donor funding for technical studies at the two pilot projects in Sri Lanka obscures the issue of what constitutes minimal technical analysis when resources that work are greatly limited, as they are likely to be at other SAM sites in Sri Lanka.

Management capacity is often considered narrowly to refer to the technical skills and knowledge needed by management staff to sustain a coastal management program. Hence, capacity building refers to the training and educational efforts needed to develop specific management capacities. A broader conception of management capacity incorporates knowledge, technical skills and the ability to make strategic choices that result in increased management resources and continuing commitment to the program on the part of both government officials and coastal residents.

The two SAM projects in Sri Lanka are at critical points in their evolution. Plans grounded in broad-based community consensus have been developed at both sites. More than 100 specific projects or activities are identified in the Hikkaduwa SAM plan, and just over 70 have been recommended for Rekawa. The continuing dedication of community residents to the plans and the willingness of user groups such as the lagoon fisherfolk to engage in restrictive self-management will depend, in part, on the management capacity of the coordinating committees at both sites to make key choices and to provide incentives for continued collaboration between community and government. Those incentives include government funding for key coastal projects, regulatory practices that are regarded as fair and just, and opportunities for community participation in plan review and revision.

Matching objectives to capacity refers to the ability to set management objectives that are matched by both the financial resources available for management and the capacities of staff to carry them out. Ambitious five-year plans have been developed for both of the two Sri Lanka SAM sites. The feasibility of the many implementing activities proposed for both sites is obviously based in part on the resources available for implementation. Some of the proposed implementing activities are very modest in terms of resource requirements. Lagoon fishermen can develop rules to govern fishing gear and practices without funding from government agencies. The Department of Wildlife Conservation can cooperate with members of the Glass Bottom Boat Association to design reef access rules without major funding. However, a few of the major management initiatives at both sites–the causeway at Rekawa Lagoon and the boat harbor and waste treatment plant at Hikkaduwa–are capital-intensive projects of uncertain priority within the responsible ministries.

A second aspect of feasibility is the cost of coordination. Several of the proposed activities are the responsibility of a single department or ministry. Others require the cooperation of several ministries. The proposed coastal environmental center at Rekawa and the growth management program in Hikkaduwa are examples of initiatives that require a substantial amount of inter-ministry coordination. In general, the higher the coordination costs, the less likely an initiative is to be implemented. Overcoming coordination costs requires a lead agency willing to devote a substantial portion of its resources to coordination and implementation.

Both of the SAM project plans are based on detailed environmental assessments and other technical analyses which document resource problems. Both are based on extensive consultation with affected governmental, nongovernmental and community stakeholders. Both plans are consistent with national coastal management objectives. Both plans outline comprehensive coastal resource management strategies for the two sites. In general, the interventions are based on valid technical theories. However, the availability of resources for implementation, the political priority assigned to specific activities and the feasibility of specific interventions are difficult to assess.

In the Coastal Resources Center framework, using the policy cycle as the road map to program formulation refers to the process of identifying the problem and the potential problem amelioration strategies, evaluating and choosing a management strategy, implementing a strategy, and subse-

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REPORTS FROM THE FIELD

ASIA
INDONESIA

Coastal Management Project Begins in Indonesia

The Indonesian National Planning Board and the United States Agency for International Development/ Indonesia have signed an agreement to initiate a natural resources management project which contains a strong integrated coastal management element.

A view from Jakarta.

The Natural Resources Management II (NRM II) Program, which began in 1996 and will continue through 2003, is designed to decentralize and strengthen natural resources management in Indonesia. The NRM II Program envisions three key outcomes:

- Greater stakeholder participation in decisions about the planning, management, use and monitoring of natural resources.
- Improved NRM policy development and implementation.
- Strengthened institutional capacity for biodiversity conservation.

One of the major components of NRM II is the Indonesian Coastal Resources Management Project (CRMP), formally begun in January 1997 and implemented by the Coastal Resources Center of the University of Rhode Island (CRC/URI). The CRMP will involve a two-track approach (similar to those developed by CRC in other countries) to achieve the NRM II strategic objective. At the local level (track two), the CRMP will test coastal resource management models that emphasize stakeholder involvement in decisionmaking.

The CRMP's first track requires establishment of a close working relationship with counterpart agencies within central government. The primary national partner agency will be the Directorate General of Regional Development, within the Ministry of Home Affairs, which has coordinating responsibility for coastal planning in Indonesia. Lessons drawn from CRMP field sites will be applied to other locations and contribute to national policy formulation. The primary research, training and policy analysis partner will be the newly established Center for Coastal and Marine Resources Studies of Bogor Agricultural University (IPB). IPB will act as a key reference center for compilation and dissemination of project outputs, which include a World Wide Web site and a journal. An editorial panel for the journal is currently being formed and the first issue will be launched at the Indonesian National Coastal Conference in February, 1998.

Work has already begun in two of the three selected areas in North Sulawesi, the initial primary field site. Up to two other provinces will be selected for initiation of field programs in the coming year. CRMP will also be assisting various other Indonesian and foreign donor projects with the development of field-based ICM programs in other provinces.

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ASIA
CHINA

Protecting Mangroves and Coral Reefs in China

Nearly 200 species of reef corals line China's tropical zones. The vibrant colors and the different varieties of coral attract many kinds of fish, making the reefs an important tourism resource. Mangrove ecosystems provide the habitat and hatchery for over 2,000 species of marine life. China's coral reef and mangrove eco-systems are being damaged by excessive and non-planned development and the overuse of marine resources. The decline of these two resources has caused the extinction or near extinction of some species, coastal erosion and a reduction of disaster resistance ability.

The Chinese government, through the State Oceanic Administration (SOA), is concentrating on the protection and management of coral reef and mangrove ecosystems. Some of China's goals include increasing biodiversity, improving managing mechanisms, training managers, and monitoring the status of mangrove and coral ecosystems. After many years of effort, some achievements have been realized:

1) From the end of 1970s to the mid-1990s, SOA twice organized an integrated marine investigation on a large scale, looking into the distribution of mangrove and coral reef resources, environmental changes, population framework and marine biodiversity.

2) SOA has established marine nature reserves, and about 50 percent of the mangrove population has been protected. SOA has also established three natural coral reef reserves.

3) SOA scientists and others have successfully experimented in the artificial transplanting of coral reefs and mangroves.

4) Laws and regulations regarding the protection of coral reefs and mangroves have been created.

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AFRICA

KENYA

Mooring Training: Building a constituency

A mooring buoy project at the Mombasa Marine Park in Kenya has played a vital role in increasing public participation and shared decision making among government agencies and local stakeholders, while continuing to build upon a two-year-old coastal management project in Nyali-Bamburi-Shanzu funded by USAID's Regional Economic Development Service Office for Eastern and South Africa (REDSO-ESA).

Preparing moorings for Mombasa Marine Park.

Kenya has taken several small but significant steps towards initiating an integrated coastal management (ICM) process. Recently, a Coastal Management Steering Committee (CMSC) was formed to oversee the implementation of the Nyali-Bamburi-Shanzu Action Strategy. This comes at the conclusion of a two year issue identification and strategic planning process. One of the immediate implementation projects the CMSC recommended was installing mooring buoys in the Mombasa Marine Park. This action will reduce the direct physical harm caused by human activities such as anchor damage, grounding of boats and trampling of corals by tourists. The Kenya Wildlife Service (KWS) was assigned the responsibility for implementing this activity.

KWS is known nationally and internationally for its anti-poaching success which required a para-military, authoritative approach to park management. This was necessary in the terrestrial parks when poaching was extensive. This often impedes KWS's ability to work effectively with ICM stakeholder groups. Today, KWS is trying to use new approaches to park management that include community participation.

The mooring buoy project provided a way for KWS to improve their relationship with stakeholders. Installing a mooring buoy could have been done easily by the KWS, which possesses the necessary technical skills, equipment and mandate. It would have been a simple and inexpensive proposition for the KWS to install several moorings in the marine park using their boats, their experts and their material. However, the KWS and the CMSC recognized the virtue of using this activity to build support for marine park management among their local constituencies (boat operators, hoteliers, and dive shop), instead of simply installing moorings in isolation. KWS teamed with the CMSC to implement a mooring buoy training program and stakeholder meetings. There were two major objectives for this effort. The first was to provide technical training to the KWS so they could design and install more efficient moorings, building on their own experience and incorporating lessons learned from other Marine Protected Areas. The second objective was to work with the local constituency to begin creating a mooring management program.

An external consultant played an important role in introducing KWS to park management through mooring buoys and expanding their knowledge about marine park management. The discussion covered everything from the installation of mooring buoys to issues of enforcement, education and community involvement.

In several parts of the workshop, KWS was joined by local boat operators and hoteliers, who shared their opinions and ideas openly. Boat operators helped select the new mooring sites, and construct and install the moorings. By working together, everyone's interests were considered and incorporated into the decisions.

Stakeholders also worked with KWS to draft a code of conduct pertaining to the use of the newly installed moorings and an educational brochure about the park and the moorings. Several suggestions offered at the final review meeting supported rules stricter than KWS would have proposed for fear of being seen as heavy-handed. By the end of the meeting the stakeholders approved revised editions of both products. This cooperative process created the necessary stakeholder support for the rules and, as a result, will reduce the level of formal enforcement necessary to implement them.

At the conclusion of the workshop, KWS expressed a strong desire and commitment to implement the mooring management plans designed at the workshop. Stakeholders publicly supported the new mooring management plans, putting positive pressure on KWS to follow through with implementation.

The facilitators who joined from KWS's training center will work with marine park and reserve staff to conduct a mini-workshop and training on moorings. The purpose of each mini-

workshop is to develop a mooring map and a brochure for each place, and to bring local stake-holders into the management process.

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AFRICA
NIGERIA

Niger Delta Environmental Survey Effort Underway

Euroconsult has recently completed the first phase of a Niger Delta Environmental Survey. This project will conduct a series of surveys of the major resource sectors to measure the resource base of the Niger Delta and ascertain the factors related to natural resource use and impacts from overexploitation. The project will also carry out Participatory Rural Assessments to identify community perspectives and solutions to re-source use problems and conflicts with industrial developments. One product of the project will be an Indicative Niger Delta Management Plan designed to mitigate these problems.

The Niger Delta contains a rich resource base in its mangrove zone. The Niger Delta sits astride a large network of river deltas, which constitute one of the world's largest contiguous mangrove forest ecosystems, covering an area between 5400 to 6000 km^2 in southeastern Nigeria. A vast interface between land and water systems, the delta is ecologically very complex, due largely to the hydrology of the region as well as the elevation of the land.

The Niger Delta can be roughly categorized into seven ecological zones. The following provides an overview of the key environmental features of the mangrove zone.

The Delta's mangrove zone forms a vegetative band 15 to 45 km wide, parallel to the coast. It is traversed by numerous creeks, navigable throughout the year. There are only three mangrove families present: *Rhizophoraceae*, *Avicenniaceae* and *Combrataceae*. An important recent component of the mangrove vegetation is the Nypa palm (*Nypa fruticans*), which is now spreading quickly across the delta.

Most areas under mangrove forest have little agricultural value due to the high inherent salinity and acid-sulphate soils, which make even aquaculture difficult. The critical land-use issues in this zone are that the supra-tidal land area for settlements is in short supply and that freshwater forest within the mangrove is limited to isolated blocks. These blocks are the only areas where freshwater wells are possible, so they control the distribution of towns and villages. Sometimes these freshwater areas have a basin-like form and so are in particular danger from saltwater incursion through canals.

The mangrove zone, exclusive of the freshwater swamp within it, is one of the most robust ecosystems in the Niger Delta, and one that up until now has been the least influenced by human activity. Nevertheless, the impacts of industrial developments, while limited, are very damaging to the local environment, destroying mangrove forest and fish and aquatic/plant life, causing water and land pollution, and exacerbating social tensions.

In addition to studying the impacts of human activity on the mangroves themselves, the survey examines the effect on the fauna living in the ecosystem. During the present study, hunters widely reported clawless otters and unidentified genets as regular mangrove inhabitants in addition to the common mammals of the mangrove zone. The pockets of fresh-water forest in the mangrove zone need investigation, both for their own fauna and also for the role they play in supporting the mammal fauna of the surrounding mangrove forest.

The Niger Delta resource users can be divided into two broad categories. There are the farmers, who inhabit the drier land north of the delta, and the fishermen of the riverine areas of the delta.

In addition to their agricultural activities, farmers also process palm fruits and rubber, hunt and do some incidental fishing. The economic mainstays of the riverine communities in the Niger Delta are fishing and salt making. Canoe building is an important industry along with crafts like pottery, basket weaving and mat making. The levees which line the sides of the distributaries of the Niger, aside from providing sites for settlements, are also cultivated with a variety of crops. Fishermen who live near the sea travel extensively along the creeks and the sea for fishing. Trading also is important for some groups.

The delta ecosystem is vulnerable to human-induced stress, particularly since industrial activities were introduced to the area, and to date, the data that has been collected on the resource problems suggests a progression of increased negative environmental impacts. The main goal of the study is to build upon available data and to produce the first comprehensive, com-munity-based, integrated sustainable resource management plan for the Niger Delta region.

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AFRICA
TANZANIA

Regional Experts and Practitioners Distill Coastal Management Issues

The Experts and Practitioners Workshop on Integrated Coastal Area Management for Eastern Africa and the Island States (*Tanga, August 12–16,*

1996) provided a forum for exchange of information, ideas and expertise among the growing number of coastal management professionals who are at-tempting to implement field programs in the Western Indian Ocean region. The workshop was hosted by the World Conservation Union-advised Tanga Coastal Zone Conservation and Development Programme and was organized in response to requests from around the region to visit similar areas where Integrated Coastal Management (ICM) is being implemented.

The goal of the workshop was to enhance the implementation of ICM in the East Africa region. Through a series of presentations, discussions and exercises, the workshop developed recommendations designed to overcome obstacles to ICM implementation at the local, national or regional level.

The workshop, which attracted 50 participants from nine countries in the West Indian Ocean region, was one of the first opportunities for extensive inter-regional exchange between ICM practitioners, drawing on experience from initiatives and pilot projects in the Island States, Mombasa (Nyali-Bamburi-Shanzu), Tanga, Chwake Bay, Kunduchi and Mafia Island Marine Park in Tanzania; Mecufli and Xai-Xai Districts in Mozambique; and the Olifants Estuary in South Africa.

The Tanga workshop also provided an opportunity for participants to critically analyze the progress of coastal management in the West Indian Ocean Region since 1993, when ministers of the region met in Arusha for the Workshop and Policy Conference on ICM in East Africa, including the Island States.

The participants identified a number of approaches to enhance the success of coastal management in the region. These included multisectoral collaboration to clarify roles and resolve conflicts; complimentary land- and sea-use planning using precautionary measures; practical demonstration and learning through pilot projects; participatory processes that involve shareholders (including donors) from the outset; environmental awareness raising and communication of technical information; capacity building to strengthen institutions, communities, and individuals; and a multidisciplinary approach to better understand and safeguard the functioning of ecosystems.

The workshop recommendations addressed a number of key ways of facilitating such approaches, including coordinating mechanisms, participation, capacity building, exchange of information and expertise, mulitidisciplinary approaches, awareness and education, and building political commitment. The recommendations were submitted to the special technical meeting which preceded the second ministerial meeting in Seychelles in October 1996.

The Tanga Workshop was just one in a series of workshops on integrated coastal management which have been convened in the region since 1993. The recently published Resolution from the Seychelles National Workshop and Statement of Action for Tanzania, demonstrates the increasing recognition of the need for integrated approaches to the complex issues inherent in the planning and management of coastal areas.

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NORTH AMERICA

UNITED STATES

US Reefs in Crisis

A National Oceanographic and Atmospheric Administration official recently testified before Congress that U.S. coral reefs are facing a crisis that can hurt coastal economies dependent on them for jobs and income.

"The degradation and loss of coral reefs is a serious economic and environmental crisis," testified NOAA official Terry Garcia before the House Sub-committee on Fisheries Conservation. "The contributions that healthy coral reef ecosystems can make to coastal and regional economies are incredible. Tourism is a major industry in coral reef communities such as the Florida Keys, Puerto Rico, U.S. Virgin Islands and Hawaii."

Coral reefs are also vital because they protect the coast from storms and wave damage. The thousands of plant and animal species that inhabit the reefs also have biomedical applications that have produced promising leads in the search for anticancer compounds, anti-biotics, pain suppressers, sun screens and other products.

Many of the same scientists, academics, managers and government participants supporting the International Year of the Reef helped put together the International Coral Reef Initiative (ICRI) which, in 1995, issued a call to action. Directed at governments, the initiative encourages countries and other partners to develop national and local initiatives to reverse the decline of reef ecosystems and thereby enhance the well-being of the communities that depend on them. The United States has followed suit.

NOAA is the primary federal agency within the United States charged with the stewardship of domestic coral reefs. In keeping with the ICRI's call to action, NOAA has developed an action plan to build on existing activities and help fill the gaps in the overall U.S. effort to protect and wisely use coral reefs. NOAA's contributions address three priority areas of the U.S. Coral Reef Initiative: science for improved management, solutions for conservation and sustainable development, and im-proved information and outreach.

NOAA has also published a brochure entitled 25 Things You Can do to Save Coral Reefs." It can be found on the World Wide Web at: http://www.noaa.gov/public-

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affairs/coral-reef.html.

Contact: NOAA. FAX: 202-501-2953. E-mail: constaff@www.rdc.noaa.gov. Website: http://www.noaa.gov/public-affairs.

EUROPE

UNITED KINGDOM

St. Mary's Island VMNR

St. Mary's Island Voluntary Marine Nature Reserve is an area popular with divers, researchers, crab, lobster and salmon fishermen, and recreational users. This reserve is one of the United Kingdom's prime examples of the voluntary principle applied to marine conservation, and proves that voluntary efforts do indeed aid conservation. St. Mary's is the first VMNR in northern England, and was designated a reserve after it was decided that a site frequented by 100,000 visitors yearly required some form of protective management.

A local authority, the North Tyneside Council, oversees the area, while an advisory group of representatives of conservation and research organizations convenes regularly to recommend projects and advise on practices. Fishermen, anglers, divers and others attend user group meetings to discuss common concerns. Codes of conduct are voluntarily drawn up, and the majority of local people support the aims of the reserve.

Education is an important objective of the reserve. A year-round warden service, classroom facilities and a wide catchment area for group visits are utilized by approximately 200 school groups every year. These groups place considerable pressure on the rocky shore. To counter this, groups accompanied by wardens use only parts of the shore for brief periods. Efforts are being made to increase visits at off-peak times, and alternative ways of teaching groups using audio-visual facilities and viewing tanks are planned.

The major achievements of the VMNR have been the user group forum, the augmentation of the on-site warden with a new volunteer warden team, and the creation of a management plan for the whole site, including a terrestrial reserve. An educational booklet, underwater nature trail and other new projects have also begun.

In the future, site conservation will be improved by more firmly discouraging all damaging practices and raising understanding and appreciation of the site's value among users.

For more information contact: Richard Harrington, St. Mary's VMNR, St. Mary's Lighthouse, St. Mary's Island Whitley Bay, Tyne and Wear, NE26 4RS. Tel: 0191 200 8650. FAX: 0191 200 8654.

Linking Project Design

(continued from page 12)

The project conceptual model, management plan and monitoring plan together comprise a complete project plan. Once these three components are completed, the plans are put into action. For each of the PROARCA/Costas sites, workshop participants detailed how they would implement their plans over the coming months.

Diamond E: Analyze Data and Communicate Results

Once data are collected according to the monitoring plan, they must be analyzed and produced in a way that is useful to project managers and other audiences. Although the project plans for the four PROARCA/Costas sites have only recently been developed and implemented, plans have already been made for analyzing and communicating the results.

Iteration: Use Results to Refine Project and Knowledge

Iteration is the key step in adaptive management. The project team can use the monitoring results to determine whether they have succeeded in reaching their objectives. This information is vital to make any needed adjustments to project objectives. It is also essential to document project successes and failures and share the results with other interested audiences so that they may learn from others' experiences.

Conclusions

Based on the BSP's experience with the PROARCA/Costas program, many of the questions facing the integrated coastal management project manger described at the beginning of this article can be answered through the development of a monitoring system that is linked with project design and management. In particular, the approach illustrated here overcomes many of the traditional constraints to developing sound monitoring efforts. Although this approach is not a cookbook solution to all project problems, it provides a foundation on which project teams can experiment, learn and ultimately develop their own answers to the challenges of integrated coastal management.

For more information contact: Richard Margoluis, Nick Salafsky and Meg Symington, Biodiversity Support Program, c/o WWF, 1250 24th Street NW, Washington, DC 20037, USA. The Biodiversity Support Program (BSP) is a consortium of World Wildlife Fund, The Nature Conservancy, and World Resources Institute, funded by the United States Agency for International Development (USAID).

For more information on Measures of Success, contact: Jill Cheek at BSP. Tel: 202-778-9776. E-mail: jill.cheek@wwfus.org.

INTERCOAST SIDER FORMATION

Publications

Biodiversity in the Seas: Implementing the Convention on Biological Diversity in Marine and Coastal Habitats. 1996. A. C. De Fontaubert, D. R. Downes and T. S. Agardy. IUCN, Gland and Cambridge. Contact: IUCN Publications Service Unit, 219c Huntingdon Road, Cambridge CB3 0DL, UK. Tel: +44 1223 277 894. FAX: +44 1223 277 175. E-mail: iucn-psu@wcmc.org.uk. £10.

Comparison of Mediterranean and Atlantic Fishery Management. 1997. P. Salz (Coordinator). The Hague, Agricultural Economics Research Institute (LEI-DLO), Onderzoekverslag 155. 100 pages. Contact: Agricultural Economics Research Institute (LEI-DLO), P.O. Box 29703, 2502 LS The Hague, The Netherlands. Tel: 070-3308330. FAX: 070-3615624.

Contaminated Sediments in Ports and Waterways: Cleanup Strategies and Technologies. 1997. Committee on Contaminated Marine Sediments, National Research Council. 320 pages. Contact: The National Academy Press, 2101 Constitution Avenue, N.W., Lockbox 285, Washington, D.C. 20055. FAX: 202-334-2451. Website: http://www.nap.edu/bookstore/. $42.95 US Price; $51.75 Int'l US Dollar Price; £ &&34.95 Int'l Pound Sterling Price.

Final Report of the Canadian Ocean Assessment: A Review of Canadian Ocean Policy and Practice. 1996. 205 pages. Produced by the Canadian Operational Centre of the International Ocean Institute (IOI) in Halifax, Nova Scotia, on behalf of the Geneva-based Independent World Commission on the Oceans. Contact: IOI Operational Centre. FAX +1 902 494-2034. E-mail: ioihfx@dal.ca.

Learning to Predict Climate Variations Associated with El Nino and the Southern Oscillation: Accomplishments and Legacies of the TOGA Program. 1996. 192 pages. Advisory Panel for the Tropical Oceans and Global Atmosphere Program (TOGA Panel), National Research Council. Contact: The National Academy Press, 2101 Constitution Avenue, N.W., Lockbox 285, Washington, D.C. 20055. FAX: 202-334-2451. Website: http://www.nap.edu/bookstore. $29.00 US Price; $35.00 International US Dollar Price; £23.95 International Pound Sterling Price.

Our National Wetland Heritage: A Protection Guide - 2nd edition. 1997. J. Kusler and T. Opheim. This book is a primer for local governments, land trusts, conservationists, landowners, students, and others who are interested in protecting and restoring wetlands through citizen and local government action. Contact: Environmental Law Institute. E-mail: orders@eli.org or topheim@ecity.net. $29.95.

Participatory Action Research and Social Change. 1997. D. Selener. The Cornell Participatory Action Research Network. Participatory Action Research approaches have been developed and applied in four main areas: Participatory Research in Community Development, Action Research in Organizations, Action Research in Education, Farmer Participatory Research. Contact: GLOBAL ACTION PUBLICATIONS, Apartado Postal 17-08-8494, Quito, Ecuador. 384 pages. US$ 25. Make checks payable to GLOBAL ACTION PUBLICATIONS.

Protecting Wetlands: Tools for Local Governments in the Chesapeake Bay. This Environmental Law Institute/Environmental Protection Agency publication is designed to assist local governmental officials, landowners, community activists, and others in identifying and using variety of tools available to protect, conserve, and restore wetlands. Contact: The Chesapeake Bay Program office of the Environmental Protection Agency. Tel: 800-968-7229. Available on-line at: http://www.eli.org under "Recent News."

Taking Ownership: Property Rights and Fishery Management on the Atlantic Coast. 1997. B. L. Crowley (ed.). Atlantic Institute for Market Studies. Contact: AIMS President Brian Lee Crowley. Tel: 902-429-1143. FAX: 902-423-1576. E-mail: aims@ fox.nstn.ns.ca. Website: http://www.stmarys.ca/partners/aims/index.html.

Wetlands, Fisheries and Economics. 1997. NOAA's National Marine Fisheries Service, Office of Habitat Conservation. Each booklet in this five-part series contains a national overview of the connections between wetlands, fish, and fishing economics, as well as a state-by-state summary of that information. Booklets are available for the Pacific coastal states, the Gulf of Mexico coastal states, the south Atlantic coastal states, the mid-Atlantic coastal states, and the New England coastal states. Contact: E-mail: Susan.Stedman@noaa.gov. or NMFS, F/HC, 1315 East-West Highway, Silver Spring, MD 20910, ATTN: Habitat Connections. Please specify which regional booklet is requested.

Conferences

November 20–22. **Natural Resources and Social Institutions: Cultural Management of Biodiversity**. University of Turku, Finland. Contact: Markku Oksanen, University of Turku, Department of Philosophy, 20014 Turku, Finland. Tel: +358-(0)2-333 6336. FAX: +358-(0)2-333 6270. E-mail: majuok@utu.fi.

November 25–27. **Limnology and Waterfowl: Monitoring, Modeling and Management**. Contact: J. A. Herrera-Silveira, CINVESTAV-IPN, Unidad Merida, Yucatan, Mexico. Tel: 52 99 812 903. FAX: 52 99 812 923.

November 25–28. **1st Session of the Aquaculture and Inland Fisheries Committee (AIFIC) of APFIC**. FAO Regional Office, Bangkok. Contact: P. Choudhury, FAO/RAP, Bangkok 10200. FAX: +662-280-0445. E-mail: Prabhas.Choudhury@field.fao.org.

December 5–18. **World Ecotourism 1997**. Rio de Janeiro, Brazil. Tel: 55 21 221 0155.

December 8–11. **International Congress on Modeling and Simulation**. Hobart, Tasmania. Contact: International Congress Secretariat (MODSIM 97), c/o CSIRO PO Box 1538, Hobart, Tasmania 7001 Australia. FAX: 61 3 62 325 000 or 61 3 62 325 199. E-mail: MODSIM97@ml.csiro.au. Website: http://www.ml.csiro.au/modsim97.

December 16-18. **APEC Workshop on the impact of destructive fishing practices on the marine environment**. Hong Kong. Contact: Mr. Sham Chun-hung,

Agriculture and Fisheries Department, Canton Road Government Offices, 393 Canton Road, 12th Floor, Kowloon, Hong Kong. FAX: +852-2814-0018.

December 18–21. **International Congress on Sustainable Development of Environment and Wildlife**. Ujjain, India. Contact: International Congress on Sustainable Development of Environment and Wildlife, 19-20, Mahashweta Nagar, Dewas Road, UJJAIN-456010 (M.P.) India. Tel: 91-0734-556978. 551366. FAX: 91-0734-556978.

Training

May 25–29, 1998. **Education and Training in Integrated Coastal Area Management: The Mediterranean Prospect**. Genoa, Italy. Contact: Stefano Belfiore International Centre for Coastal and Ocean Policy Studies–ICCOPS, c/o The University of Genoa, Department POLIS, Stradone di S.Agostino 37, 16123 Genoa, Italy. Tel./FAX: 39-10- 209-5840. E-mail: iccops@polis.unige.it.

Global Environment Institute '98 Summer Session. GEI's 10-week graduate-level summer program group will be facing the international problems of pollu- [redacted] eat Lakes, particular. local industry d fields, regional t: Global x 610361, 17-325- il: / ~smaes/ ning delling. stitute of artmouth, NB B2Y 4A2, Canada. FAX: (+1-902)-426-9388. E-mail: tplatt@ac.dal.ca.

March 20–April 10, 1998. **Seventh International Training Workshop on Integrated Coastal Zone Management (ICZM) 1998**. Prince of Songkla University, Hat Yai, Songkhla, Thailand. The course focuses on management framework, method and tools of analysis of impacts from development projects in the coastal zone. Contact: Coastal Resources Institute (CORIN) Prince of Songkla University, Hat Yai, Songkhla 90112, THAILAND. Tel: 66 74 212800, 212752. Fax: 66 74 212782. E-mail: corin@ratree.psu.ac.th. Website: http://ratree.psu.ac.th/~corin.

Periodicals

Atlantic CoastWatch. Upcoming bi-monthly publication of the Sustainable Development Institute, designed to link grassroots protection, advocacy and research efforts along the coast from the Gulf of Maine to the eastern Caribbean. Contact: Sustainable Development Institute, 3403 O Street, N.W. Washington, D.C. 20007. Tel: 202-338-1017. FAX: 202-342-0751. E-mail: SUSDEV@igc.apc.org. Website: http://www.susdev.org.

Current Topics in Wetland Biogeochemistry. Current Topics is a review journal published by Wetland Biogeochemistry Institute, Louisiana State University. Contact: Karen Gros, Subscription Editor, Wetland Biogeochemistry Institute, Louisiana State University, Baton Rouge, LA 70803-7511. E-mail: cowgro@lsuvm.sncc.lsu.edu.

ET Worldwide #14. This is a periodical compendium on environmental training opportunities around the world. Contact: EETU, UNEP, P.O. Box 30552, Nairobi, Kenya. FAX: 254-2-623917. E-mail: ulf.carlsson@unep.org.

Habitat Debate. Special issue on capacity building for better cities. Contact: Tomasz Sudra, Chief, Training and Capacity Building Section, RDD, United Nations Centre for Human Settlements (Habitat), P.O. Box 30030, Nairobi, Kenya. Tel: 254-2-623034 FAX: 254-2-624265. E-mail: tomasz.sudra@unchs.org. Web site: http://www.unchs.org/unon/unchs/habrdd/traincap.htm.

Marine Resource Economics. A quarterly journal published by the Marine Resources Foundation and the University of Rhode Island's Department of Environmental and Natural Resource Economics. This journal covers economic and policy analysis of such issues as fisheries conservation and management, coastal land use and watershed management and estuarine development and management. Contents, ordering information and instructions for authors now available on the Web. Contact: Marine Resource Economics, AAEA Business Office, 1110 Buckeye Ave., Ames, Iowa 50010-8063, USA. FAX: 1-515-233-3101. Website: http://www.uri.edu/crd/enre/mre/.

Two if by Sea. The Woods Hole Oceanographic Institute and MIT Sea Grant programs are joining forces to create a new quarterly publication that will feature research, education, and advisory programs supported by Sea Grant in Massachusetts. Regular features will include listings of upcoming conferences and lectures, recent publications, pertinent Websites, a question and answer section and more. To receive a free subscription, contact WHOI Sea Grant. Tel: 508-289-2398. E-mail: seagrant@whoi.edu.´

Electronic Resources

Aerial Photography and Remote Sensing. This site contains information on satellite imaging, MSS, thermal and hyperspectral scanning, digital image processing and more. Address: http://wwwhost.cc.utexas.edu/ftp/pub/grg/gcraft/notes/remote/contents.html.

AQUALEX Multimedia Corporation (AMC) Ltd. This charitable company was formed to further educational advances in the aquatic sciences by using and developing multimedia and other digital electronic tools. AQUALEX has a new website, with products, education, training and edulink sections, at http://www.aqualex.org.

Atlantic Coastal Cooperative Statistics Program. The ACCSP is a cooperative state-federal marine and coastal fisheries data collection program. Website: http://www.safmc.nmfs.gov/ACCSP.html.

Atlantic Coastal Zone Information Steering Committee Database. ACZISC has announced the availability of Version 3 of the Atlantic Coastal Zone Database Directory on the World Wide Web. The directory lists and describes 608 databases of relevance to the integrated management of the coastal zone of Atlantic Canada. It is available, in a searchable format, via the ACZISC homepage, located at: http://is.dal.ca/aczisc/aczisc.

Australian Coastal Vulnerability Assessment Case Studies. Contact: Community Information Unit, DEST, PO Box 787, Canberra ACT 2601, Australia. Tel: 1-800-803-772. FAX: 06-274-1970. Website: http://www.erin.gov.au.

BALLERINA. Baltic sea region on-line environmental information resources for internet access. This effort is designed to bring information from and about the Baltic Sea region to Internet, in particular to support the development of a Baltic Sea region Agenda 21 Program. Website: http://www.grida.no/ballerina/about/.

Canada Department of Fisheries and Oceans. Includes aquaculture information, publications. Address: http://www.ncr.dfo.ca.

The Caribbean Sustainable Development Page. Sponsored by the United Nations Economic Commission for Latin America and the Caribbean/Caribbean Development and Cooperation Committee, this site contains information on Caribbean projects, programs, documents and news. Address:http://community.wow.net/eclac/home.htm.

Caribb_Study. An open, unmoderated discussion group that is open to anyone who is interested, from a scholarly perspective, in Caribbean Studies. Send an e-mail message to: <Majordomo@listserv.bc.edu> with only <Subscribe Caribb_Study> in the body of the message. If you have any problems, contact the list manager at: Malec@bcvms.bc.edu.

Coastal Marsh Project. The purpose of this project is to analyze the surface condition (health) of coastal marshes and detect areas that are at risk for rapid loss of land area. The project is sponsored by the Department of Geography, University of Maryland and NASA's Mission to Planet Earth. Website: http://www.geog.umd.edu/wetlands/Marsh.html.

ELI-Wetlands. ELI-Wetlands is an electronic forum for the discussion of all aspects of the law, policy science, and management of wetlands, floodplains, and coastal water resources. To subscribe: Send a message to majordomo@igc.org with subscribe eli-wetlands <your e-mail address> as the body of the message.

EnviroLink is a non-profit organization that maintains an online environmental information resource at http://www.envirolink.org.

The Estuarine Research Federation. ERF is an international organization promoting research in estuarine and coastal waters, and communication between members of affiliated societies. It also acts as a resource in estuarine and coastal matters. Website: http://cbl.cees.edu/erf/.

HydroWire. This online weekly newsletter for the aquatic sciences is available at: http://www.hydrowire.org.

Independent World Commission on the Oceans (IWCO). This Website includes information on the organization, its program, members and archives. Address: http://www.world-oceans.org/.

Inter-Americas Biodiversity Information Network. The Inter-American Biodiversity Information Network (IABIN) is an intergovernmental initiative intended to promote greater coordination among Western Hemisphere countries in collection, sharing, and use of environmental information. Website: http://biology.usgs.gov/nbii/iabin/.

National Institutes for Water Resources (NIWR). Website: http://wrri.eng.clemson.edu/NIWR.html.

Natural Resources Development Centre. Some of the Centre's projects, described on their website, include: watershed management and the development of protocols and tools for data collection and the development of new methodologies, an ecological assessment of Irish lakes, and remote sensing. Website: http://www.tcd.ie/Natural_Resources/research.htm.

NetCoast. The Coastal Zone Management Centre has a new, searchable website at http://www.minvenw.nl/projects/netcoast/index.htm.

Ocean and Coastal Management Archives. OCMA is an electronic information and documentation service on integrated coastal zone management, with an emphasis on the Mediterranean. The site includes specialized databases, on-line documentation, research and training tools, communication support and software. The address is: http://www.polis.unige.it/ocma/. Contact: Stefano Belfiore. E-mail: belfiore@polis.unige.it.

Ramsar Forum. The Bureau of the Ramsar Convention on Wetlands has launched an e-mail list devoted to the conservation and sustainable use of wetland resources in general and the Ramsar Convention in particular. Messages are welcome in any of the Convention's three official languages (English, French, and Spanish). To join, send an e-mail message to: ramsar-mgr@indaba.iucn.org. with <join ramsar-forum> as the body of the message. Website: http://iucn.org/themes/ramsar/.

The Satellite Imagery FAQ. This site deals with imagery of earth from space. It combines introductory material with a guide to the numerous resources available both on and off the Internet. Address: http://www.geog.nottingham.ac.uk/remote/satfaq.html.

SeaWeb. SeaWeb is a project designed to raise awareness of the world ocean and the life within it. Website includes on-line copy of Ocean Update Newsletter, as well as background articles by SeaWeb staff. Address: http://www.seaweb.org.

Wildlife Ecology Digest. This is a free, weekly e-mail digest for research, job opportunities, issues and general postings concerning wildlife ecology. To subscribe, send e-mail to: kingfshr@northcoast.com with the message: <Subscribe to WED> followed by your e-mail address. WED also has a homepage at: http://home.aol.com/wedigest.

Window on the Oceans. The Independent World Commission on the Oceans page provides a selection of ocean-related websites as well as a list of major multilateral agreements and programs relevant to the protection and use of the marine environment. The address is http://world-oceans.org; select "Window on the Oceans."

World Conservation Monitoring Centre. The WCMC's pages provide global data, including maps and statistics, on biodiversity and information related to WCMC's activities in this field. Address: http://www.wcmc.org.uk/.

Special Area Management Projects

(continued from page 22)

quently evaluating and refining the management strategy. Sri Lanka's national strategy has followed this policy cycle. An initial coastal management planning process resulted in a plan which was implemented throughout the 1980s. The management strategy, which relies heavily on the regulation of coastal uses in the 300-m coastal zone was reviewed and a new management strategy was developed which is outlined in the second national plan created in 1996. One component of that revised strategy is the SAM project initiative. The SAM process has also been based on the same policy logic of design, implementation, evaluation and refinement.

Overall, Sri Lanka's two SAM programs appear to be successful, at least in terms of the eight criteria identified by the Coastal Resources Center. But judgments about what determines success are necessarily provisional, both because implementation of the programs is just beginning and because any framework necessarily draws attention to certain governance issues and minimizes others. The richness and complexity of conditions at the two SAM sites are also a reminder of the difficulties associated with making judgments about how general governance attributes interact to create the conditions for successful sustained management efforts.

For more information contact: Kem Lowry. Tel: 880-956-6868. FAX: 808-956-6870. E-mail: lowry@hawaii.edu.

European Coastal Zone

(continued from page 4)

the coastal zone to environmental effects. The incidence of threats to the coastal zone depends on local environmental conditions and local morphological and hydrological characteristics.

The general definition of the European coastal zone was formulated in 1996 as follows:

- 12 miles seaward of the coastline (the territorial waters).
- 10 kilometers (km) landward of the land side of coastal structures or areas, or (if coastal structures or areas are not present) 10 km landward of the coastline.
- Coastal structures include coastal water bodies such as estuaries and lagoons up to tidal propagation and terrestrial structures such as dunes.
- Coastal areas include the area below sea level.

For the description of quality status of European Coast, the set of indicators should determine the state and pressure for this entire area and integrate sea and landward aspects as much as possible.

A list of possible issues was developed during a workshop in Lisbon in 1996 and this list has been used as a starting point for the first selection of issues (*see Table 2*).

Since the issues selected should be relevant for a significant number of European countries, a first criterion for selection is the occurrence on a European scale. Furthermore, the environmental issues should have a "transboundary" character. Transboundary impact considers the geographical extent of the effects of the problem in the coastal zone; effects can be found in the same coastal unit where the pressure occurs, but also can have indirect consequences in other parts of the coastal zone. Using these criteria, a number of issues have been identified which are considered to be relevant for the next Dobris report. Given the time constraints of this pilot project, a screening has been carried out to identify those selected issues for which data could be made available on short notice. This has been crucial in choosing the six issues that will be used to illustrate the proposed methodology: pollution, eutrophication/saprobiation, fisheries, groundwater depletion, climate change and loss and degradation of habitats. Though not extensive, this list is considered to be representative of the possible outcome of a further elaborated framework of indicators. For most of the issues, the pilot study will be based on a dataset that will not cover the whole of the European coastal zone, because a complete European dataset is not yet available. However, the results of the pilot should give guidance on how to apply the proposed methodology to a dataset on a European scale.

The first phase of the pilot project, which focused on six issues, made clear that in the process of developing and applying indicators, the preliminary results using real data can give new insights that should be taken into account in the further elaboration of the proposed indicators. In this respect, the development of an indicator system can be seen as an recurring process.

For a future assessment of the European coast, the collection of a full set of data on all the European countries will be a huge challenge. The European Environmental Agency could play an important role. The methodological work described here gives guidance by indicating the most relevant information and defining the data requirements.

For more information contact: Janneke Lourens, Carien van Zwol and Jan Kuperus, National Institute for Coastal and Marine Management / RIKZ, P.O.Box 20907, 2500, EX The Hague, The Netherlands.

Next Issue of Intercoast

From July 20-25, the **Coastal Zone '97** (CZ97) conference was held in Boston, Massachusetts in the northeast United States. More than 1,000 international coastal managers, government officials, non-governmental organization representatives, members of the business community and concerned citizens gathered for five days of work sessions, presentations, educational seminars, plenary sessions and networking revolving around the theme of ***The Next 25 Years: Charting the Future of Coastal Zone Management***. Issue # 30 of *Intercoast Network* will report on the ideas, opinions and breaking news that emerged at CZ97, and give a sense of the direction the coastal management movement is taking as it faces the 21st century. Contributions to the CZ97 issue of Intercoast from conference participants and attendees are encouraged and welcome, as are the usual topical feature stories on global coastal issues; "*Reports from the Field*" on projects taking place all around the world; and information on conferences, publications, videos, World Wide Web sites and anything else of interest to the coastal management community. If you are interested in submitting an article, news feature or photos to *Intercoast* #30, contact Chip Young, Managing Editor, Intercoast Network, Coastal Resources Center, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882. Tel: (401) 874-6630. FAX: (401) 789-4670. E-mail: cyoung@gsosun1.gso.uri.edu. Website: http://brooktrout.gso.uri.edu.

Thanks for your interest.

Visit Intercoast on the World Wide Web

If you've missed any recent issues of Intercoast Network, you can catch up on back information and opinions by visiting the University of Rhode Island's Coastal Resources Center home page on the World Wide Web at <http://brooktrout.gso.uri.edu>. Past issues of Intercoast are available under CRC's information services, along with other resources and publications, including:

We welcome suggestions or comments on CRC's World Wide Web page that will help improve dissemination of information and news on coastal management. Contact: Chip Young, Managing Editor, Intercoast Network, Coastal Resources Center, University of Rhode Island, South Ferry Road, Narragansett, RI, 02882 USA. Phone: (401) 874-6630; FAX: (401) 789-4670; E-mail: <cyoung@gsosun l.gso.uri.edu>.

Intercoast Network

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The objective of Intercoast Network is to facilitate the exchange of information, experience, and ideas on coastal management. Readers are encouraged to write to the Coastal Resources Center with comments on the newsletter and its effectiveness as a source of information for coastal managers.

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