

Integrated Management of Coastal Fisheries: Lessons from Initiatives in San Miguel Bay, Philippines

GERONIMO T. SILVESTRE



IICLARM

International Center for Living
Aquatic Resources Management



Department of Agriculture-
Fisheries Sector Program

ICLARM ORGANIZATIONAL STATEMENT

"For those who use and depend on fish and aquatic life in the developing world"

ICLARM's VISION

Our Goal: To enhance the well-being of present and future generations of poor people in the developing world through production, management and conservation of living aquatic resources.

Our Objectives: Through international research and related activities, and in partnership with national research and other institutions, to:

1. Improve the biological, socioeconomic and institutional management mechanisms for sustainable use of aquatic resource systems.
2. Devise and improve production systems that will provide increasing yet sustainable yields.
3. Help develop the capacity of national programs to ensure sustainable development of aquatic resources.

The Functions of ICLARM are to:

- Conduct and catalyze multidisciplinary strategic research and policy analysis of an international public goods nature on all aspects of aquatic resource management, conservation and use;
- Undertake research, training and information activities in partnership with others in national organizations in the developing and developed world;
- Develop global knowledge bases for living aquatic resources;
- Undertake global reviews and assessments of the status of aquatic resource and those who depend on them;
- Publish and disseminate widely research findings;
- Hold conferences, meetings and workshops to discuss current and future issues related to aquatic resources and to formulate advice for users and decisionmakers;
- Participate fully as a Center in the Consultative Group on International Agricultural Research (CGIAR) and in appropriate international intergovernmental activities.

The Guiding Principles for our Work Program are:

- Sustainability;
- Equity;
- Gender role in development;
- Participation;
- Systems approach; and
- Anticipatory research.

Library



1000019774

Our Values:

In our work, we are committed to:

- Excellence in achievement;
- Relevance to our beneficiaries' needs;
- Partnerships;
- Centerwide teamwork;
- Communication;
- Efficiency and flexibility in program delivery;
- Continual growth in our knowledge and understanding.

SP
207
M5S54
1996
c.2

**Integrated Management of Coastal Fisheries:
Lessons from Initiatives in San Miguel Bay, Philippines**

G.T. SILVESTRE

1996



International Center for Living
Aquatic Resources Management



Department of Agriculture -
Fisheries Sector Program

Integrated Management of Coastal Fisheries: Lessons from Initiatives in San Miguel Bay, Philippines

G.T. SILVESTRE

1996

Published by the International Center for Living Aquatic Resources Management, MCPO Box 2631, 0718 Makati City, Philippines, with funding assistance from the Department of Agriculture - Fisheries Sector Program through the Bureau of Agricultural Research, Quezon City, Philippines

Printed in Manila, Philippines

Silvestre, G.T. 1996. Integrated management of coastal fisheries: Lessons from Initiatives in San Miguel Bay, Philippines. International Center for Living Aquatic Resources Management, Manila, Philippines. 13 p.

Cover: Catch landed from San Miguel Bay, Philippines.

ICLARM Contribution No. 1304

Integrated Management of Coastal Fisheries: Lessons from Initiatives in San Miguel Bay, Philippines*

GERONIMO T. SILVESTRE

*International Center for Living Aquatic
Resources Management
MCPO Box 2631, 0718 Makati City
Philippines*

Abstract

Coastal fisheries occur in a variety of natural and human settings. In terms of coastal use intensity, fisheries may be viewed to operate in a spectrum ranging from essentially single sector (i.e., fisheries) situations to intense, multisector use of the coastal area (and its relevant terrestrial and marine zones). Issues impacting fisheries multiply through this range requiring increasingly comprehensive and integrated analytic frames and scope of action to sustain fisheries benefits. Coastal fisheries in many parts of the world are moving to more developed stages of the coastal use spectrum, highlighting the need for wider adoption of integrated coastal fisheries management efforts.

This case study illustrates one integrated coastal fisheries management effort in the Philippines. San Miguel Bay is a shallow, estuarine water body spanning 1 115 km² with twelve river systems (with a catchment of 3 320 km²) draining into it. Albeit in a largely rural development setting, the multigear-multispecies fisheries in the bay and the environment that sustains them are impacted by a host of issues. These range from conventional fisheries management concerns (e.g., overfishing, distributional inequity) to impacts from various coastal and land-based sectors. Following its initial work in the bay in the early 1980s, ICLARM was asked by the Government of the Philippines to spearhead further research and planning activities in support of integrated fisheries management efforts in the area. The research and planning process spanned a two-year period (March 1992 - February 1994) and produced: (1) a coastal environmental profile, (2) a technical report (composed of 38 papers) detailing the status of the fisheries, and (3) an integrated fisheries management plan. The plan is currently being executed over a 5-year period by the newly-established San Miguel Bay Fisheries Management Council.

A number of lessons may be drawn from the San Miguel Bay experience to spur more effective management of coastal fisheries. Those highlighted include: (1) the critical role of appropriate human perception or "cognitive maps" of the situation (i.e., the analytic framework) to fully elaborate the problems and interventions at hand, (2) the importance of stakeholder participation at key stages of the research, planning and management process, (3) the usefulness of decision methods in structuring research, planning and associated debates, and (4) the efficacy of research cum planning efforts in ensuring research utilization and relevance, on the one hand, and the scientific basis of management planning, on the other. Constraints to similar efforts which were emphasized pertain to disciplinary and sectoral "blindness" which need to be overcome before conventional management constraints (e.g., financial and human resources) can be addressed.

*Paper presented at the FAO 50th Anniversary Symposium, 12 October 1995, Canada.

Introduction

ICLARM spearheaded research and planning activities in San Miguel Bay, Philippines during two time periods. The first was in 1979-1982 and the second (ten years later) in 1992-1994. Our main partners in 1979-1982 were the Institute for Fisheries Development and Research and the United Nations University. Our principal partner in 1992-1994 was the Fisheries Sector Program of the Philippine Department of Agriculture. Our collective efforts produced a wealth of information about the fisheries in the bay, and the human and natural contexts within which they operate. These, together with the resulting positive outcomes, make San Miguel Bay a good case study in integrated coastal fisheries management.

This paper provides an overview of key lessons and outcomes from the San Miguel Bay experience. In sharing this experience, the paper is structured into three main parts (Box 1). The first part provides an overview of the approach used; outlining the research and planning process after giving some background information about the site. The second part provides an overview of the main results of the work in the area — highlighting research and management planning outcomes. The third part by way of conclusion outlines key lessons (and constraints) of consequence to similar integrated fisheries management efforts.

Box 1. Main elements of the report describing integrated coastal fisheries management efforts in San Miguel Bay, Philippines. See text.

- **Approach/Methods**
 - Site Information
 - Research/Planning Process

- **Main Results/Outcomes**
 - Research Highlights
 - Management/Planning Highlights

- **Key Lessons/Constraints**
 - Process - Related Lessons
 - Cognitive and Institutional Constraints

Approach and Methods

San Miguel Bay (Fig. 1) is located on the Pacific coast of the Philippines at around 14°N latitude and 123°E longitude. It is a shallow, estuarine body of water with an area of 1 115 km². Depth and salinity increase northward (along a line) from the outfall of the Bicol River (near Cabusao) to the mouth of the bay facing the Pacific Ocean. Roughly 95% of the bay has muddy/sandy substrate, and reef areas are concentrated in the northern part where marine conditions prevail.

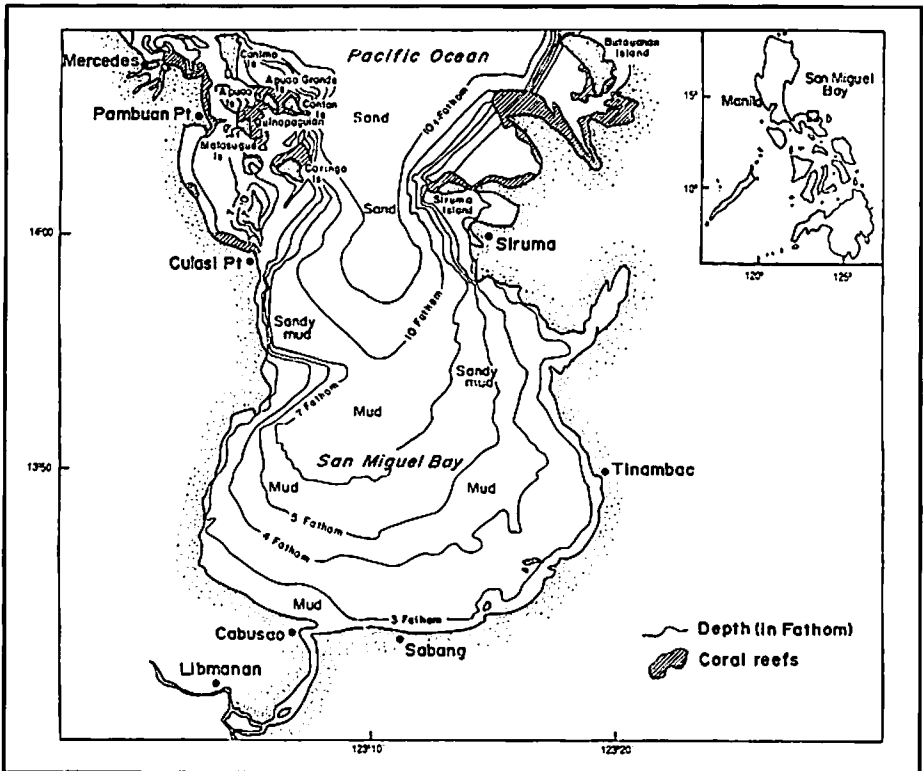


Fig. 1. Map of San Miguel Bay, Philippines. The bay encompasses an area of 1 115 km² dominated by soft (sandy/muddy) substrate.

A total of 12 river systems drain into the bay (Fig. 2). These rivers have a combined catchment area of 3 320 km², of which 70% is accounted for by the Bicol River Basin. The catchments consist mostly of agricultural lands, but also encompass the main population centers of Daet, Naga and Iriga City. Seventy-four coastal villages border the bay with a combined population of 93 000. These villages are characterized by depressed socioeconomic conditions. Poverty incidence is above the national average and underemployment is at a high 35%. Fishing is a

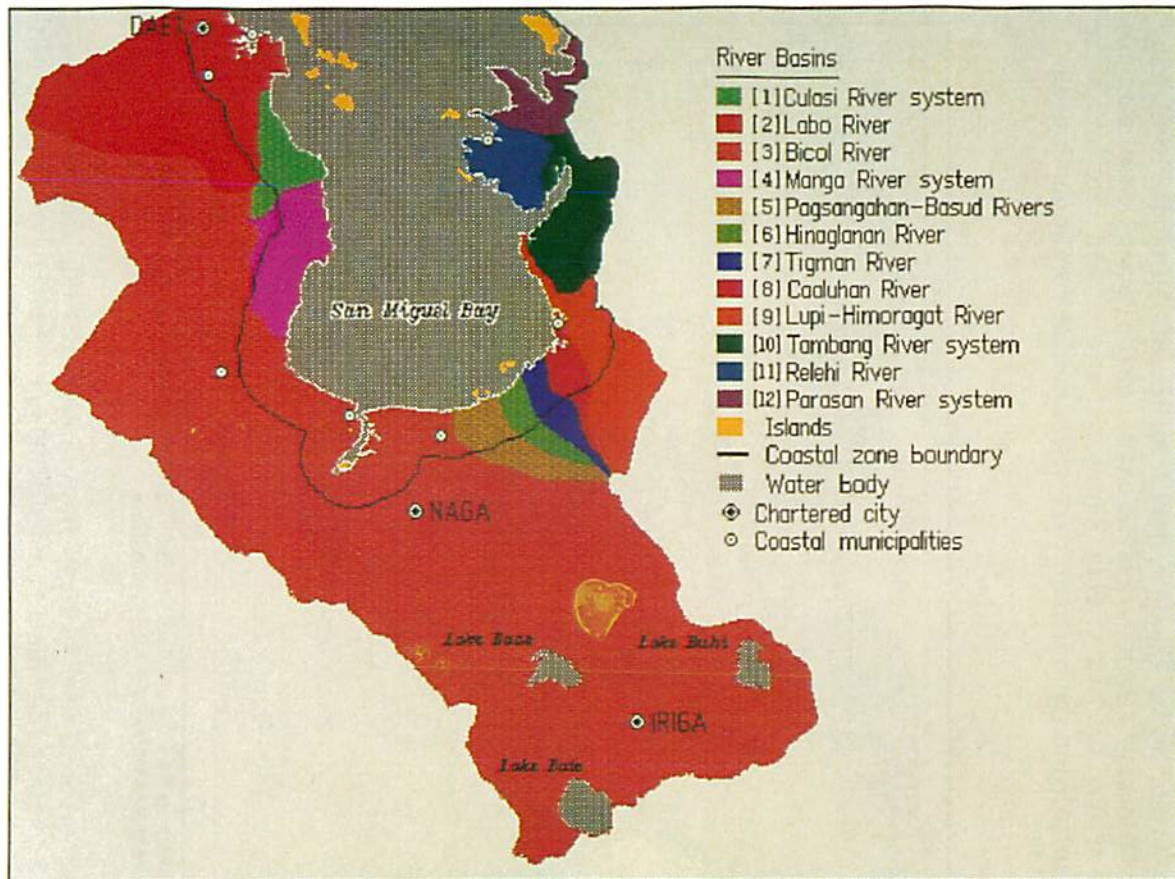


Fig. 2. Catchment of rivers draining into San Miguel Bay, Philippines. A total of 12 river systems with a combined catchment area of 3 320 km² drain into the bay.

major source of livelihood for residents of the 74 coastal villages. The fisheries in the bay, however, are impacted by a host of issues which exacerbate the condition of the coastal communities. To help improve the situation in the bay, ICLARM and collaborating institutions conducted the research and planning activities.

Our initial work in 1979-1982 consisted of four multidisciplinary research components (Fig. 3). Three components (on resource assessment, economics/marketing, and social aspects of the fisheries) provided inputs to a component on assessment of management and research implications. These efforts produced excellent assessments of the fisheries situation, pointing to overfishing, distributional inequity and limited economic opportunities as key issues. Very little, however, in terms of management actions resulted from our first effort in 1979-1982.

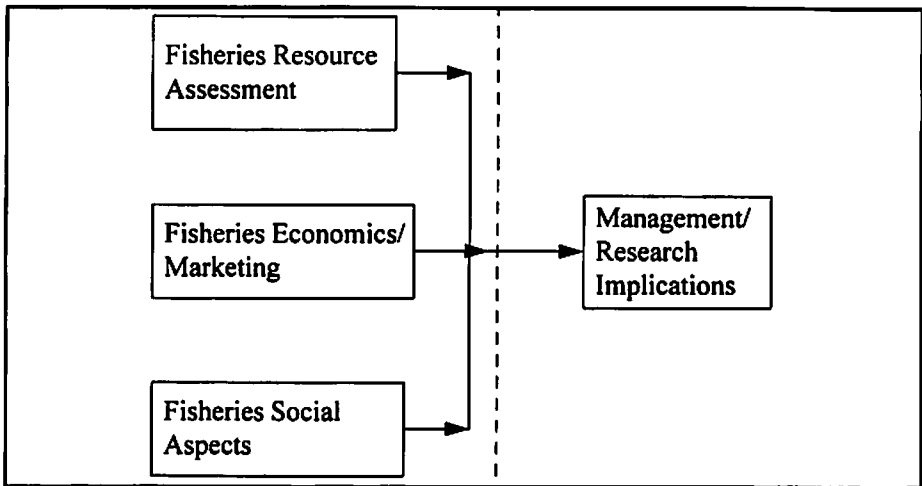


Fig. 3. Major components of the multidisciplinary research in San Miguel Bay (1979-1992).

The opportunity to revisit San Miguel Bay then came in 1992-1994. Building upon the strengths and limitations of our initial work, we adopted an expanded framework which was issue-based, multisectoral and multidisciplinary (Fig. 4). We concentrated on issues which impact the fisheries and the resources they exploit; and the coastal habitats (such as mangroves, coral reefs) and habitat characteristics (such as water quality) which sustain the fisheries. We looked at the other economic activities which impact the land and coastal habitats, and the socioeconomic and policy framework within which these activities occur. Our efforts focused on information relevant to the decisions and trade-offs that the issues entailed.

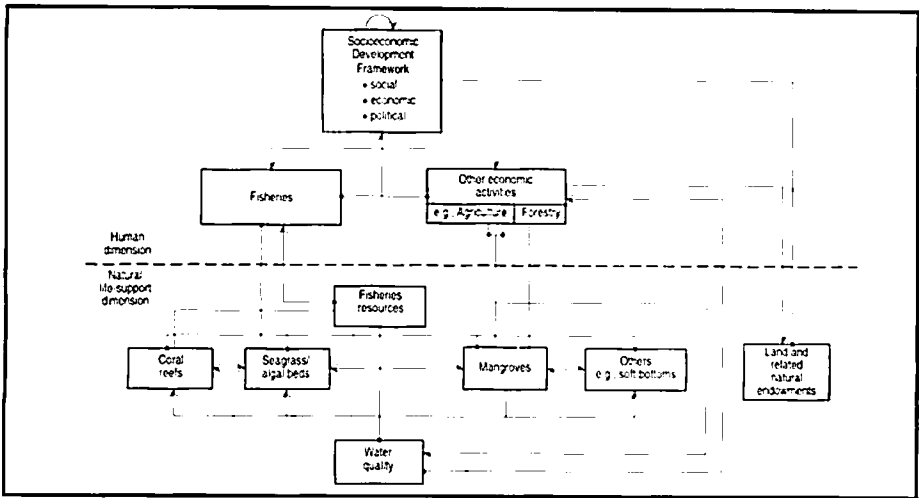


Fig. 4. Schematic representation of an expanded framework for fisheries management.

This conceptual framework was operationalized via a number of component activities (Fig. 5). A 3-month situational analysis summarized existing issues based on secondary data and synoptic surveys. This component produced a coastal environmental profile of San Miguel Bay, which was considered by a consultative workshop with multisector and multi-agency representation. A preliminary decision structure and focused research agenda emerged at this stage, which guided the subsequent detailed research activities, on fisheries, ecology/habitats, and socioeconomics/policy. Results of these components are given in a technical monograph (comprising 38 papers) which detail the fisheries situation and other elements of the conceptual framework. The component on management implications summarized key issues and measures for their resolution or mitigation. Draft management plan elements and the decision analysis structure emerged at this stage, which guided the planning sessions where the key decisions and trade-offs were made. An integrated coastal fisheries management plan was the final product of the entire process which covered a period of 24 months (from March 1992 to February 1994).

Key Research and Management Planning Outcomes

A host of ecological, economic, social, political and administrative issues were elaborated and integrated during the process. Fig. 6 illustrates land use in the catchments - which is dominated by coconut plantations (green), rice farms (yellow and orange), and secondary forests and shrublands (light blue). Soil erosion and siltation of the bay are the main issues, with its average depth decreasing at 2 cm/year due to a silt load of 15.5 million m³/year. This results mainly from deforestation

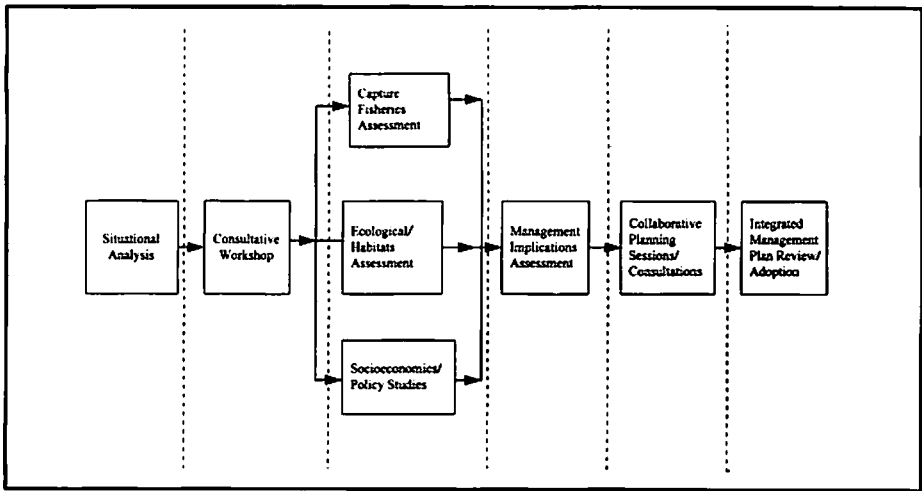


Fig. 5. Major components of the multidisciplinary research and planning activities in San Miguel Bay (1992-1994).

and farming in high slope areas. Water quality parameters (such as coliform levels, nutrients, pesticides and trace metals) were generally within national standards, except for high fecal coliform levels in localized areas off Mercedes and the Bicol River.

Reef areas (Fig. 7) total 38 km² which are mostly in fair to good condition (i.e., 36-68% living coral cover). The reefs are impacted by siltation and destructive fishing methods (such as the use of dynamite and cyanide), as well as excessive fishing and gleaning in the tidal flats. The mangrove cover is currently 14 km², mostly around the outfall of the Bicol River and the eastern part of the bay. The mangrove area is only 50% of the cover in the late 1950s, and the present stands are under heavy pressure from harvesting for firewood and conversion to other land uses such as fishponds. Destruction of the mangroves exacerbates the siltation problem and impacts on adjacent reefs.

Total catch in the bay was about 16 860 t in 1992-1993, down by 12% from the catch in 1980-1981 of 19 130 t (Table 1). A total of 46 types of fishing gear are used in the bay, but over 75% of the catch is landed by trawls and gillnets. About 25% of the 1992-1993 catch was accounted for by large-scale or commercial trawlers (which use boats of 3 GT or above), and the rest by the small-scale or municipal fisheries. The data indicate some progress in the commercial-municipal conflict in favor of the municipal fishing sector, with the decline in share of total catch by the commercial trawlers from 36.1 to 24.8%. Some progress is also apparent in the conflict among municipal gears, with the increased

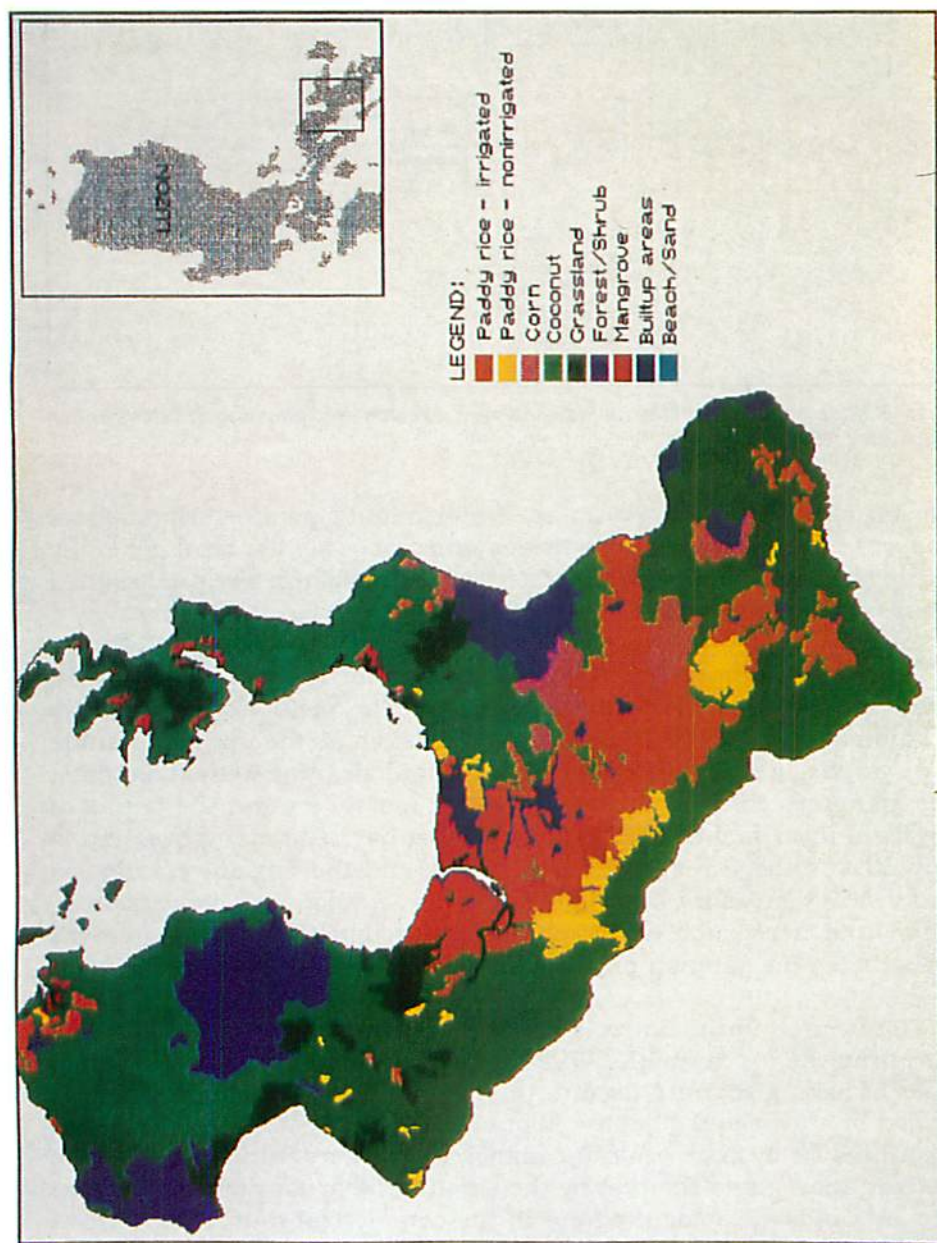


Fig. 6. Land use in the catchment area of San Miguel Bay.

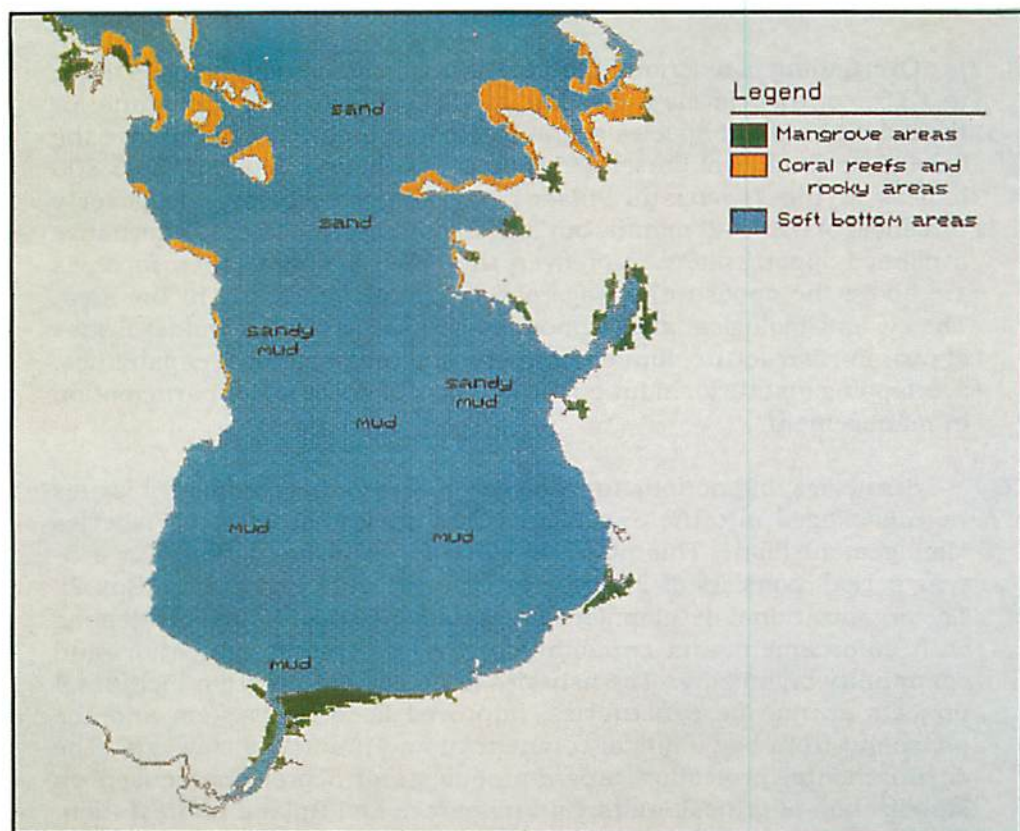


Fig. 7. Location of critical habitats and types of substrate in San Miguel Bay.

Table 1. Landings by sector in San Miguel Bay, Philippines during the period 1980-1981 and 1992-1993 based on the results of multidisciplinary studies in the area.

Sector/gear	% of catch	
	1980-1981	1992-1993
Commercial		
Trawl	36.1	24.8
Municipal		
Mini trawl	25.0	10.7
Gillnets	25.4	41.2
Other gears	13.5	23.3
Total catch (t)	19,128	16,856

share in total catch of gillnets and other gears compared to the decline experienced by mini trawls. Moreover, the share in pure profit from the fisheries by the commercial sector has gone down from a high of 85% in

1980-1981 to 27% in 1992-1993. The gear conflicts persist, however, and require attention.

Overfishing is a serious problem, with the demersal biomass down to 18.5% of their levels in the late 1940s. Mean exploitation ratio for the most abundant species in the bay is at a high 0.68, well above the 0.3-0.5 optimal level prescribed by current theory. Most of the 5 300 fishers in the 74 coastal villages have incomes below the poverty threshold of US\$142/month, but stay in fishing given limited alternative livelihood opportunities. Moreover, they keep fishing as their incomes are above the opportunity wage of \$38/month prevailing in the area. The evident biological and economic overfishing persist amidst issues of poor infrastructure, limited financial and organizational capabilities, overlapping institutional functions and lack of stakeholder participation in management.

Strategies and actions to resolve or mitigate this complex of issues were packaged into the San Miguel Bay Integrated Coastal Fisheries Management Plan. This plan, designed for implementation over a 5-year period, consists of 27 projects grouped into 5 programs (Box 2). The organizational development program consists of 6 projects dealing with enforcement and capability upgrading, public education and community organizing. The fisheries management program includes 4 projects on marine sanctuaries, improved licensing system and the phase-out from bay limits of commercial and municipal trawlers. The environmental protection program consists of 3 projects focused on stabilization of critical lands, and mangrove and upland reforestation. The program on alternative livelihoods include 10 projects to spur animal husbandry, mariculture, fish processing and the raising of cash crops for fishers that will be displaced. Lastly, the support infrastructure program consists of 4 projects for road construction, ice plant rehabilitation and the improvement of silted ports and jetties. The management plan includes financing and monitoring schemes, and is designed for implementation at various levels of the institutional set-up in a highly participatory mode.

Box 2. Proposed programs included in the San Miguel Bay Integrated Coastal Fisheries Management Plan.

- **Organizational Development Program (6 projects)**
- **Fisheries Management Program (4 projects)**
- **Environmental Protection Program (3 projects)**
- **Alternative Livelihood Program (10 projects)**
- **Support Infrastructure Program (4 projects)**

Key Lessons and Constraints

A number of lessons may be drawn from the San Miguel Bay experience for the benefit of integrated fisheries management efforts in other parts of the world. We have chosen to highlight four of these lessons (Box 3), which by no means are new, but which require wider reiteration given the failure of many initiatives around us.

Box 3. Key lessons from integrated coastal fisheries management efforts in San Miguel Bay, Philippines.

- **Critical role of system framework or human “cognitive maps”**
 - **Efficacy of research cum planning approach**
 - **Utility of decision tools in structuring research, planning and associated debates**
 - **Essential nature of stakeholder participation**
-
- The first pertains to the critical role of human perception or “cognitive maps” of the situation at hand. Problems must first be perceived and diagnosed as one before solutions to them may be prescribed. The systems view or framework utilized is thus a key element in resolving coastal fisheries problems. The framework we used is sufficiently comprehensive to identify the host of issues impacting fisheries, on the one hand, and the array of interventions for their resolution, on the other.
 - The second lesson pertains to the efficacy of research cum planning approaches in applied research. The process we used helped ensure the relevance and utilization of research, on the one hand, and the sound scientific basis of planning and management, on the other. Through the research cum planning process we used, we tried to prevent the research from just ending up in the shelves.
 - The third lesson points to the utility of decision tools in structuring research, planning and the associated debates - particularly the difficult choices and trade-offs necessary given the multiplicity of issues, stakeholders and objectives we faced. The decision analysis tool we used (called Multiattribute Utility Analysis) guided the entire process. Thus, it focused research on information with utility to the ultimate decisions and trade-offs which had to be made.
 - The fourth lesson pertains to the essential nature of stakeholder participation at key points of the research, planning and management effort. The process we used in 1992-94 was highly consultative and collaborative, and its implementation scheme highly participatory. We tried to build, thus, a constituency for

the plan - which was quickly adopted and is now being implemented by the newly-established San Miguel Bay Management Council.

A host of constraints stands in the way of successful integrated fisheries management efforts. We encountered many during our work in San Miguel Bay varying from political factors to institutional constraints. We were fortunate in 1992-1994 that the Philippines was in the midst of a devolution experiment in governance, which provided the "governance space" that our efforts required. We believe, however, that a key constraint pertains to sectoral and disciplinary "blindness" (Fig. 8). Successful management requires good communication and agreement among three groups - the managers, the resource users or stakeholders, and the scientists. The (human) perception of the situation at hand must tally with "reality" but is usually conditioned by sectoral interests and disciplinary background. Thus, we frequently see parts rather than the relevant whole. We must first overcome these "blindness" so we can research the right questions, achieve consensus and sustain the benefits from our coastal fisheries. The rest of the constraints will be far easier to handle once we have overcome these human "blindness".

Coastal fisheries occur in a variety of natural and human contexts. In terms of coastal use intensity, these fisheries operate in a spectrum ranging from essentially single sector (i.e., fisheries) situations to intense, multisector use of the coastal area (and its relevant terrestrial and marine

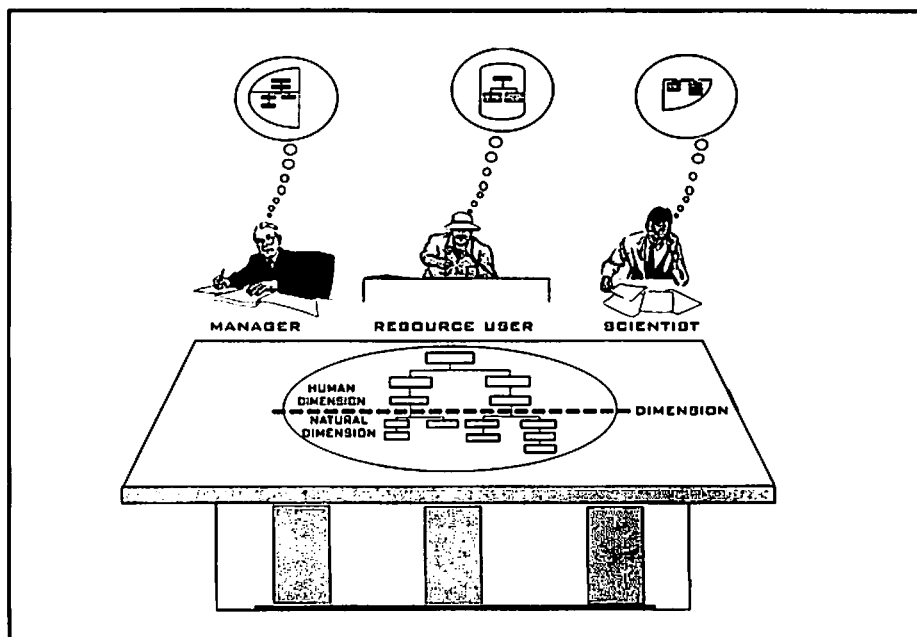


Fig. 8. Sectoral and disciplinary "blindness" are key constraints requiring attention in integrated fisheries management efforts. These condition perceptions of situational realities, often leading to stakeholders seeing parts rather than the relevant whole.

zones). Issues impacting fisheries multiply through this range requiring increasingly comprehensive and integrated analytic frames and scope of action for sustained fisheries benefits. Coastal fisheries in many parts of the world are moving to more advanced stages of this coastal use spectrum, highlighting the need for wider adoption of integrated coastal fisheries management efforts. Our experience in San Miguel Bay offers a host of insights and lessons for such endeavors. For those interested, the materials pertaining to San Miguel Bay (i.e., all data, reports, the management plan) are available in CD-ROM being distributed by ICLARM at minimal cost.

Further Reading

- Bailey, C., Editor. 1982. Small-scale fisheries of San Miguel Bay, Philippines: social aspects of production and marketing. ICLARM Tech. Rep. 9, 57 p.
- Bailey, C., Editor. 1982. Small-scale fisheries of San Miguel Bay, Philippines: occupational and geographic mobility. ICLARM Tech. Rep. 10, 57 p.
- Pauly, D. and A.N. Mines, Editors. 1982. Small-scale fisheries of San Miguel Bay, Philippines: biology and stock assessment. ICLARM Tech. Rep. 7, 124 p.
- PMO-FSP-DA/SMBMC/ICLARM. 1995. The San Miguel Bay Integrated Coastal Fisheries Management Plan. ICLARM Tech. Rep. 51. Program Management Office, Fisheries Sector Program, Department of Agriculture, Quezon City, Philippines; San Miguel Bay Management Council, Calabanga, Camarines Sur; International Center for Living Aquatic Resources Management, Makati City, Philippines.
- Silvestre, G.T., C.Z. Luna and H. Montalvo, Editors. 1992. The coastal environmental profile of San Miguel Bay, Philippines. ICLARM Tech. Rep. 50.
- Silvestre G.T., C.Z. Luna and J. Padilla, Editors. 1995. Multidisciplinary assessment of the fisheries in San Miguel Bay, Philippines. ICLARM Tech. Rep. 47 (CD-ROM).
- Smith, I.R. and A.N. Mines, Editors. 1982. Small-scale fisheries of San Miguel Bay, Philippines: economics of production and marketing. ICLARM Tech. Rep. 8, 143 p.
- Smith, I.R., D. Pauly and A.N. Mines. 1983. Small-scale fisheries of San Miguel Bay, Philippines: options for management and research. ICLARM Tech. Rep. 11, 80 p.

Integrated management of coastal fisheries: lessons from initiatives in San Miguel Bay, Philippines.

**G T. Silvestre. 1996. ICLARM,
Manila, Philippines. 13 p. Free upon request.**

Also available:

**The San Miguel Bay story. ICLARM,
BFAR and FSP. 1995.**

**The San Miguel Bay story.
CD-ROM. ICLARM, Manila; Bureau
of Fisheries and Aquatic Resources
and Fisheries Sector Program,
Quezon City. US\$10 by airmail.**

A presentation of fisheries research and management reports on San Miguel Bay, Philippines, in CD-ROM. Produced by ICLARM, the Philippine Bureau of Fisheries and Aquatic Resources, and the Fisheries Sector Program of the Philippine Department of Agriculture. It contains about 85 papers and technical reports including four overviews.

Address orders and payment (payable to ICLARM) in US\$ by international money order, bankdraft or UNESCO coupons to:
The Editor, ICLARM, MCPO Box 2631, 0718 Makati City, Philippines.
We can accept US\$ checks only if from a US-based bank due to high clearance fees of other banks.