



Building up a training base for integrated coastal management through partnerships in Xiamen

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Abstract

The Integrated Coastal Management (ICM) project in Xiamen, which started in the mid-1990s, is considered a successful example of ICM implementation. Now on its second cycle, the project has achieved significant results and received positive feedback from various international organizations.

ICM, in general, has proven to be a workable environmental management scheme, and it has been replicated elsewhere in China and in other countries. However, it should be noted that ICM programs need to employ strategies aimed at strengthening human resources and institutional capacities. This paper discusses the establishment of the International Training Center for Coastal Sustainable Development and its role in disseminating the experiences and expertise of the Xiamen ICM site, the advancement of public education on ICM with the implementation of the Community-Based Conservation Management Cooperative Program of the Canadian International Development Agency; and the expansion of professional education in ICM through a Joint Masters Program in Environmental Management with the University of San Francisco. These three programs have been highly successful in developing ICM capacities at different levels (i.e. awareness of policymakers, public awareness and professional education), and they contribute to the formulation, design and implementation of successful ICM initiatives. As such, the formulation and implementation of partnerships in education programs are deemed crucial for Xiamen's success and in its role as one of the training bases for ICM in East Asia.

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1. Introduction

The majority of the world's population lives in coastal zones or combined terrestrial-aquatic areas revolving around a land–sea interface (Chapter 17, Agenda 21). Alleviating environmental threats in a coastal zone can be particularly challenging because of the complexity of land–sea interactions and the coast's vulnerability to both human and natural influences. In China, because of rapid economic development and urbanization, the threat of pollution and ecosystem degradation increased in the coastal zone. Integrated coastal management (ICM) has been used as a governance mechanism for promoting sustainable development.

Xiamen, located on the southeast coast of China (Fig. 1), has been an important international trading port since the 17th century. It was one of the five ports designated for international trade after the First Opium War in 1842 [1]. In 1979, Xiamen was designated as a “special economic zone” and was granted the right to manage its own economic affairs, thereby offering preferential investment opportunities to foreign enterprises. Since 1980, Xiamen has developed rapidly, with an annual growth rate of more than 20% in both Gross Domestic Product (GDP) and total population.

In 1994, Xiamen was selected as one of the national demonstration sites for the implementation of an ICM program under the Global Environment Facility (GEF)/United Nations Development Programme (UNDP)/International Maritime Organization (IMO) Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas (1994–1998), which sought to use ICM to avoid the old, costly “pollution first, management second” model by tackling economic development and environmental protection simultaneously. Since then, Xiamen has made significant achievements in the integrated management of marine and coastal resources. As the Joint

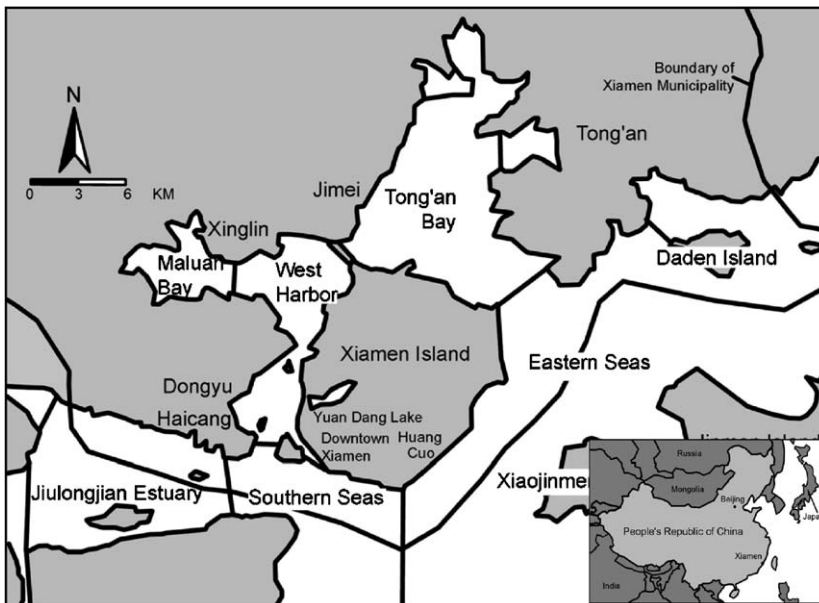


Fig. 1. Location and detailed maps of Xiamen, PR China.

Group of Experts on the Scientific Aspects of Marine Environmental Protection or GESAMP [2] notes: “Improved environmental quality in the River Thames in England, Boston Harbour in the United States, and Xiamen in China show that determined, co-ordinated action can produce benefits even in large urban areas, where development and population pressures are concentrated.”

Xiamen University has the advantage of having an interdisciplinary science curricula and a strong coastal and marine environmental studies program (as seen through its Environmental Science Research Centre). Because of its academic merits and human resources, Xiamen University has played a key role in enhancing both the sustainable development awareness of policymakers and the ICM skills of managers. In fact, a number of its faculty have been involved in the Xiamen ICM process, taking the lead in establishing the scientific and technological basis for Xiamen’s ICM plan.

Due to the implementation of the Community-Based Conservation Management (CBCM) cooperative program, training capacity and public participation have been enhanced in Xiamen. New education programs also continue to be developed through partnerships and cooperation. In this paper, Xiamen’s experience in developing a training base for ICM through partnerships will be introduced.

2. The Xiamen International Training Center for Coastal Sustainable Development and the dissemination of the Xiamen ICM experience

To meet local demand for improving sustainable development awareness and the skills of coastal environmental managers and implementers, the Coastal Sustainable Development Training Center, Xiamen, co-sponsored by the Xiamen Municipal Government and Xiamen University, was founded on 25 January 1997. The Center, with assistance from well-known scholars and experts in coastal sustainable development and management, developed a series of training courses and curricula (e.g. Ocean Laws and Management, and Marine Environmental Protection and Sustainable Development). The training modules significantly advanced the awareness of environmental policymakers and managers regarding sustainable development, thus facilitating successful ICM implementation in the Xiamen Demonstration Site. In addition, the Center cooperated with the GEF/UNDP/IMO Regional Programme on Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) in providing training to marine management officials from East Asia.

In July 2001, a memorandum of agreement regarding the development of the International Training Center for Coastal Sustainable Development (ITC-CSD) in Xiamen was signed by the State Oceanic Administration (SOA), Xiamen Municipal Government and Xiamen University. Since its establishment, the ITC-CSD (designated as a PEMSEA Regional ICM Training Center) has facilitated the sharing of experiences at both the national and regional levels through study tours, workshops and annual regional training courses in collaboration with PEMSEA. The training courses have been designed to provide participants with the opportunity to analyze practical issues and problems arising from multiple resource-use conflicts and the resulting environmental impacts and to learn about the process of integrated management planning and implementation for marine environmental protection and management as applied in Xiamen (Table 1). Among the experiences shared are the: creation of an interagency multi-sectoral coordinating mechanism; legislation of an ICM framework; development and enforcement of a marine

Table 1
 Organization and implementation of workshops, trainings and study tours carried out by the ITC-CSD, 2001–2003

Objectives	Implementation	Activities organized	Feedback from Participants
(1) To explain the basic concepts, principles, methodologies and guidelines of ICM.	(1) ICM Concept and Framework. (2) ICM Approaches and Applications. (3) Data Gathering, Environmental Profiling/Rapid Appraisal Methods. (4) Coastal Strategy Development.	(1) Lectures delivered by well-known scholars and experts (both domestic and international) on sustainable coastal development and management. (2) Exercises (3) Group work and presentations. (4) Debriefing and evaluation. (5) Field visits to ICM demonstration sites.	Key Information obtained from trainers' evaluations: (1) The training objectives were successfully achieved. (2) The various training program modules complemented each other. (3) Lectures and exercises offer insights on the theoretical knowledge of ICM and an overview of Xiamen's ICM program. (4) Field visits offered exposure to environmental improvements and socioeconomic benefits from the ICM implementation in Xiamen and an opportunity to exchange experiences on ICM, as well as other issues concerning coastal and marine management. (5) The knowledge and skills learned will be of great value to work and respective project sites. (6) Training aids, such as lecture notes, training manuals and other training facilities were adequate on the whole. (7) Organization and coordination were highly satisfactory.
(2) To explain the policy and technical requirements for implementing ICM.	(5) Institutional Arrangement and Legislation for ICM. (6) Implementation of International Conventions. (7) Communication Strategies, Public Awareness and Participation. (8) Environmental Quality Standards/Monitoring. (9) Integrated Information Management System and GIS Application to ICM.		
(3) To apply the techniques in conducting stakeholder consultation, as well as preparing and presenting a coastal strategy.	(10) Risk Assessment and Risk Management. (11) Resource Valuation and Natural Resources Damage Appraisal. (12) Integrated Environmental Impact Assessment. (13) Sustainable Financing Mechanisms and Environmental Investments. (14) Marine Functional Zonation. (15) Capacity Building for ICM.		
(4) To enhance the awareness of sustainable development and ICM skills, as well as training requirements for capacity building in coastal management at home and abroad.			

zonation scheme; and establishment of a formal structure for scientific support and advisory board.

More than 100 domestic ocean and coastal management officials and practitioners from Xiamen City, the provinces of Liaoning, Hebei and Shangdong, and the municipalities of Tianjin and Dalian have been trained at the ITC-CSD. Nearly 200 personnel from various ICM projects, environmental management officials from East Asia, Australia, Canada, Germany and the United States, senior officials from the GEF, UN Environment Programme, IMO and the World Bank, as well as chief executive officers from the private sector and multilateral funding institutions, have participated in training and study tours conducted by the ITC-CSD in collaboration with PEMSEA.

3. Integration of the Canadian International Development Agency CBCM Cooperative Program and the ICM Public Education Programme

The CBCM program, an international cooperation program (1998–2003) between Canada, China and Vietnam was sponsored by the Canadian International Development Agency (CIDA) and managed by the Environmental Science Research Centre of Xiamen University, with a view to increasing institutional capacity for training and applied research in conservation management at three partner universities in China and Vietnam (with an emphasis on community-based initiatives, increasing public understanding of sustainable use of natural resources) and on integrating the community into environmental management decision making processes.

The main components of this program were the Xiamen CBCM pilot project and capacity building. The pilot project and the Strategic Environmental Assessment (SEA) of the development planning for the Southeast Coastal Area of Xiamen Island (1999–2001) aimed to promote such core concepts as public involvement in decision making, conservation and ecosystem health [3]. A series of workshops and applied joint research activities contributed to increased capacity in relation to interdisciplinary skills required for conducting research and providing training and education in community-based conservation and environmental management issues. Other activities were: training and study tours participated in by relevant Xiamen University faculty; workshops delivered in Xiamen University by a Canadian facilitator; a Ph.D. and Master's exchange program; youth education initiatives; public environmental education; and efficient communication and education networking with involved communities.

At the beginning of the initiative, ICM principles were integrated into the CBCM project design. The restoration and resource conservation of the Gold Coast in the southeast coast of Xiamen Island (Fig. 1), where beach conservation needed to be reconciled with tourism development (accelerated by economic development and the expansion of the coastal road), was identified as a pilot project, with objectives:

- To predict and assess the integrated environmental impact of existing regional development planning using SEA, the environmental impact assessment for policies, plans and programs (Fig. 2);
- To provide the predictive information on the environmental impacts of the development planning to decision makers;
- To develop methods and mechanisms of public involvement in the SEA process; and
- To promote capacity building in CBCM and ICM (Fig. 3).

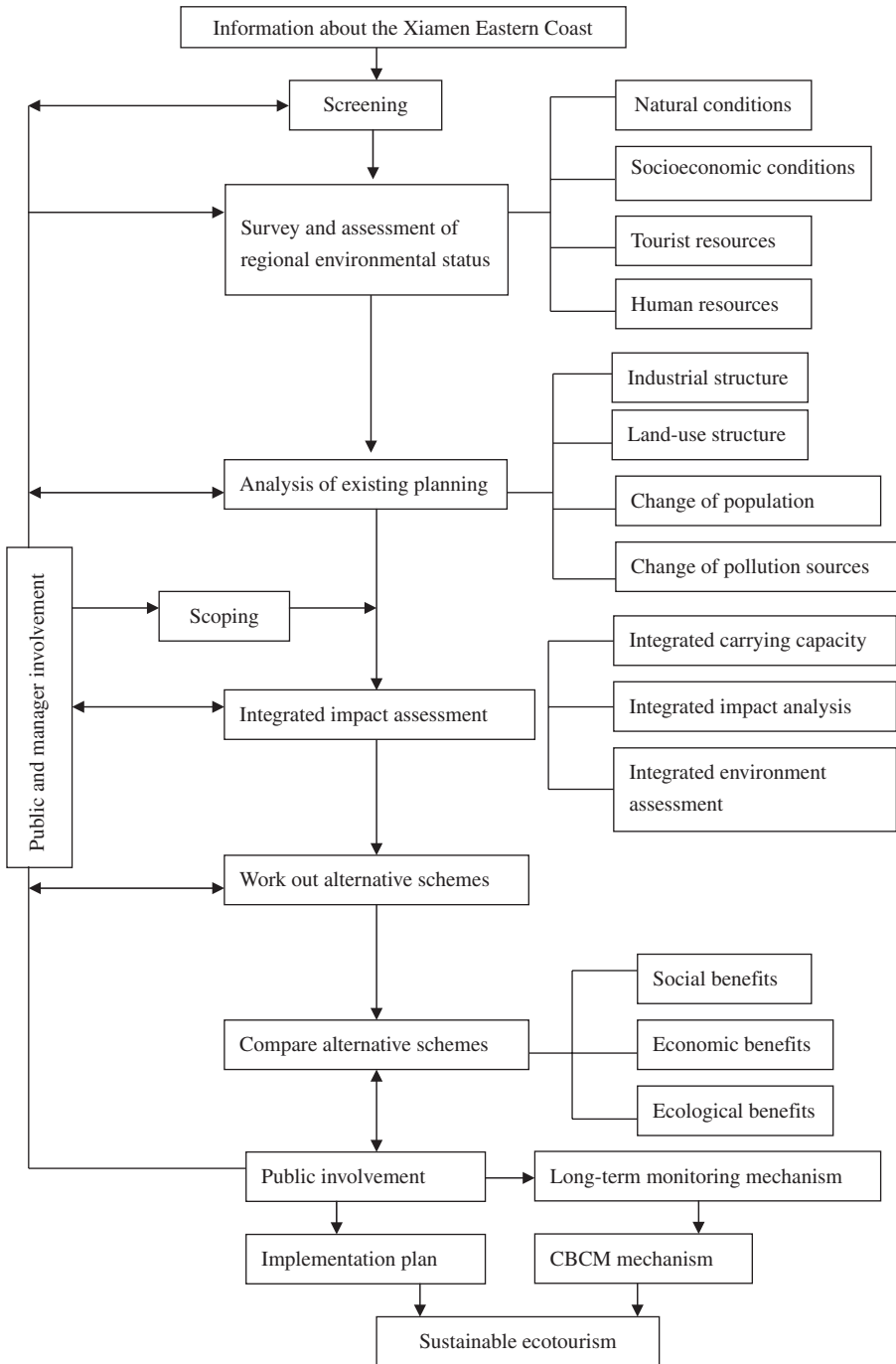


Fig. 2. The SEA framework for the Xiamen CBCM pilot project.

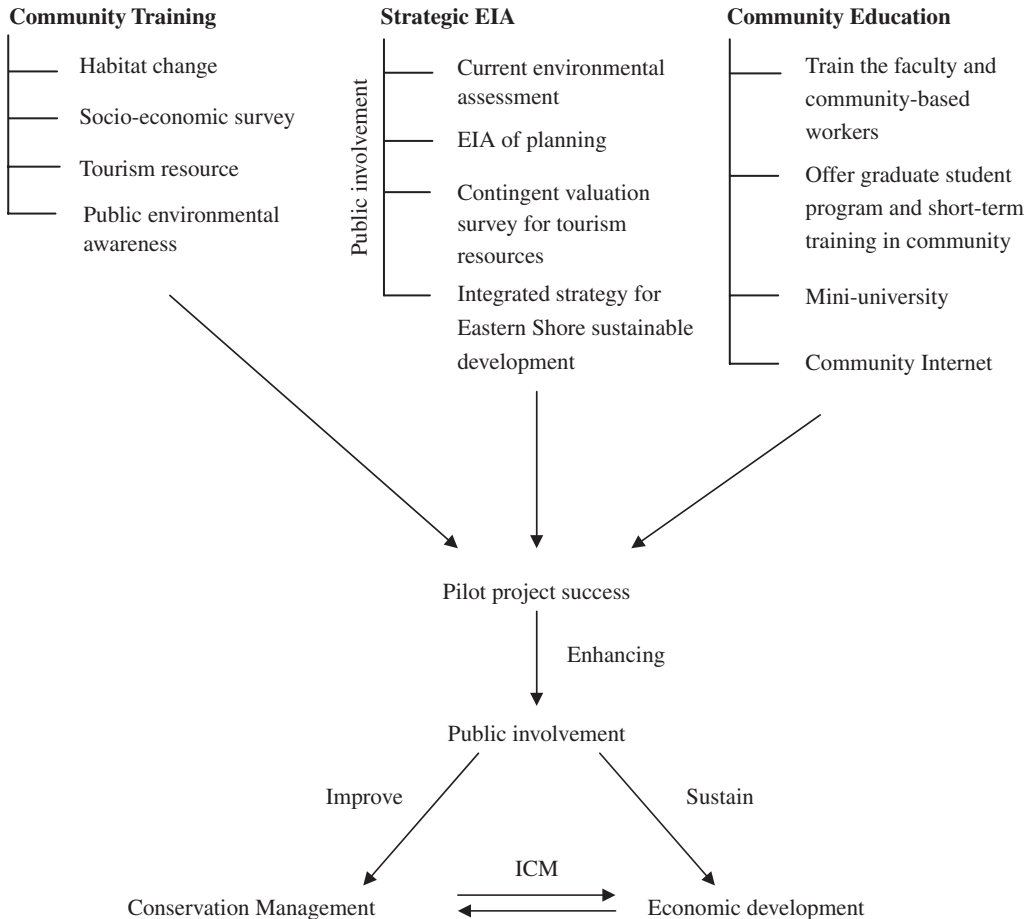


Fig. 3. The CBCM Xiamen pilot project framework.

Overall, the project was successful in achieving its goals, resulting in the:

a. *Improvement of decision making*: The project built a bridge between scientists and decision makers and allowed them to communicate and share information. It also laid the foundation for the building of trust and cooperation between scientists, the Xiamen Municipality and the local people.

Decision making has progressed towards CBCM in order to protect the environment of the Southeast Coast, recover the destroyed ecosystem and conserve the undeveloped areas. Evidence for this includes:

- The greenbelt along the coastal road was re-planned and the shelterbelt was rebuilt to recover the capacity of a windbreak and sand settlement during storms.
- Some buildings and drainage pipes built on the beach, which caused sand beach erosion, were removed or renovated.
- Plans for the new coastal road were altered to move it further inland to conserve the sand beach and shelterbelt.

- Some regulations, e.g., the Marine Management Regulations of Xiamen and the Marine Functional Zonation of Xiamen, which were formulated to improve the awareness of decision makers were enforced. The Regulations of Construction Control Line for Xiamen East Coast are also being formulated to protect the resources therein.
 - The development planning for the East Coast of Xiamen Island will be amended as a result of this SEA process (Figs. 2 and 3).
- b. *Enhancement of public participation and public awareness*: Individual interviews, questionnaires, telephone hotlines, public meetings, announcement boards and CBCM activities were used to gain public involvement from tourists, locals, students, non-governmental organizations, companies, scientists and government officers throughout the pilot project in order to create a community-based mechanism. Communication channels between citizens and the government were set up by scientists, including:
- Dialogues between the vice mayor and high school students, officers and the locals;
 - Employment opportunities in tourism services and facilities for the locals by the government;
 - Release of the Urban Plan of Xiamen City and some development plans for public review; and
 - The Citizens and Urban Management TV program, which focused on the East Coast.
- As a result, more people now pay attention to development planning, construction and the environment of the East Coast of Xiamen Island. They have realized that the natural ecosystem is more active and effective than the anthropogenic ecosystem in the urban or coastal region, that a natural landscape is more beautiful than an artificial one, and that humans should maintain the natural environment and keep the ecosystem healthy.
- c. *Capacity building in CBCM*: The members of the CBCM Team in Xiamen have used the new concepts—such as CBCM gender issues, ecological footprint [4], ecosystem health, and eco-tourism—in scientific research and curriculum development. They have also introduced these concepts to decision makers, government officers, company leaders, students and the locals in order to promote decision making and management, public participation and conservation management.

Some new courses (e.g. Environmental Assessment, Environment Planning, Environmental Management, Application of Geographic Information Systems (GIS) in Environmental Management, ICM, and Environmental Economics and Environmental Engineering) are now being offered to graduate and undergraduate students at Xiamen University (Table 2). Various new concepts such as CBCM, ecological footprint and ecosystem health have also been introduced into courses like Environmental Management and Introduction to Sustainable Development.

Additionally, through a Mini-University (a short but intensive experience on or near a university campus with input from university students, university and public school teachers, and other members of the community) and through the practice of environmental protection and other CBCM activities, awareness of high school and university students, particularly those from the Association of Environmental Protection of Xiamen University, has become broader and more proactive. These students have turned into promoters of CBCM, environmental protection and sustainable development.

Table 2
List of curricula developed from the CBCM project

Course	Level	Start of Course
Introduction to Sustainable Development	Graduate	September 2001
Environmental Impact Assessment	Graduate	September 2000
Environmental Planning	Graduate	September 2001
Environmental Management	Graduate	September 2001
Environmental Economics	Graduate	March 2001
Introduction of Environmental Economics	Undergraduate	September 2002
Integrated Coastal Management	Graduate	September 2002
Coastal Sustainable Development	Undergraduate	September 2003
Biodiversity	Graduate	September 2002
Environmental Accounting/Auditing	Graduate	March 2001
Environmental Sociology	Graduate	February 2003
GIS Application in Environmental Management	Graduate	September 2000
Gender and Development	Graduate and undergraduate	September 2002

The ideas and conceptions of decision makers and government officers have also evolved from focusing on man-made construction to natural ecosystem protection, from industrial city to eco-city, and from unitary management to integrated management. Residents and company leaders are now more concerned about public involvement and resource conservation—not just on income. They realize that natural resources will bring benefits, and that the public should be involved in decision making.

As seen above, the Xiamen CBCM program has achieved significant outcomes after five years of implementation. Institutions have increased capacity in research, education and training in CBCM. Also, a multi-country network of individuals and institutions, specializing in applied research and training in CBCM, has continued to build on the existing skills of all partner institutions to find solutions to local environmental problems.

4. Expansion of the ITC-CSD's role in ICM education

A Joint Master Program in Environmental Management between Xiamen University and the University of San Francisco (i.e. Master of Science in Environmental Management) was approved by the State Ministry of Education in September 2003 and initiated in 2004. As China's first joint graduate program with a foreign university, it is beneficial for the development of environmental science education, the promotion of the internationalization of environmental education, as well as the further improvement of training capacity in coastal sustainable development both in China and abroad.

Offered by the Department of Environmental Science at the University of San Francisco and the Environmental Science Research Center of Xiamen University, the program is designed for graduate students and working professionals who seek or hold careers in the environmental field (Table 3). It provides the necessary background, with emphasis on coastal environment, to analyze, assess and manage a wide range of environmental issues, including practical applications to particular problems. Courses cover scientific, technical, management, economic, social and ethical, laws and public policy knowledge related to environmental decisions.

Table 3

Courses of the Joint Program between Xiamen University and the University of San Francisco

Core Courses	Electives
<i>Science and Engineering</i>	Contaminated Transport: Groundwater
Introduction to Sustainable Development	Environmental Toxicology
Applied Ecology	Sustainability and Human Activities
Contaminated Transport: Surface Water and Air	Environmental Monitoring
GIS Applications in Environmental Management	Hazardous Waste Treatment and Management
	Integrated Coastal Management
<i>Environmental Management</i>	Eco-science
Environmental Management	Urban and Community Environmental Planning
Environmental Risk Assessment and Management	Environmental Chemistry
Environmental Economics	Environmental Assessment
Environmental Sociology and Law	Environmental Planning
	Environmental Accounting and Auditing
<i>Foundation</i>	Environmental Engineering
Philosophy	Special Topics
English	
Masters Project	

Table 4

Examples of Xiamen ICM activities

- Ecological and Socioeconomic Impact Assessment of Xiamen Coastal Economic Development.
- Xiamen Coastal Waste Management and Pollution Prevention.
- Xiamen ICM Case Study.
- Building the Capacity of Xiamen International Training Center for Coastal Sustainable Development regarding National ICM Training Programs.

Since Xiamen ICM activities (Table 4) have served as a laboratory for courses on marine environmental management for the past decade, modules and programs developed by the ITC-CSD have served as the basis for the curriculum of the Joint Master Program in Environmental Management. The short training courses on environmental management have also been expanded to include environmental science education for university students. Knowledge management has also been strengthened to ensure the utilization of relevant and an up-to-date curriculum through the compilation, packaging and enhancement of training and learning resource materials.

The ITC-CSD continues to play an important role in regional training and degree programs on coastal sustainable development. The implementation of the Joint Master Program increased its capability to carry out ICM through lectures or courses conducted by well-known local and foreign experts and scholars, as well as through the sharing of experiences and good practices.

5. Conclusion

Clearly, the successful integrated management of the coastal zone requires strong human resources and enhanced capacity building at different levels (policymakers, managers, public and professional educators). Past experience and practice also prove that the

establishment and implementation of a partnership education mechanism is an efficient and effective way to build up the training base of ICM.

The ITC-CSD has thus far played a key role in promoting ICM and sustainable development awareness, as well as in further developing human capabilities for ICM implementation. The accomplishments of the Xiamen ICM Project serve as a “training laboratory” for ICM training at the national and regional levels through study tours, workshops, and annual regional training courses in collaboration with PEMSEA. Additionally, the faculty of Xiamen University is a leading source of ICM knowledge sharing and training, providing a scientific and technological service for Xiamen ICM and developing the new ICM educational program through international cooperation. The ITC-CSD will strive to maintain and improve the above mechanisms to achieve more successes in the future.

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