Sida Evaluation 99/23

Sida/SAREC Marine Science Programs in East Africa

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Executive Summary

This evaluation focuses upon the most recent three years of the three Sida/SAREC marine science programs in East Africa. These are the Bilateral Program for Mozambique (initiated in 1985), the Bilateral Program for Tanzania (initiated in 1990) and the Regional Program (initiated in 1993). This evaluation assesses these initiatives in terms of the current maturity of coastal governance in the region and capacity in the marine sciences.

The three programs are closely interrelated, particularly in Tanzania, and their combined impact has produced significant advances towards the goal of a diversified resident capacity in the marine sciences that can contribute towards advancement in effective management of coastal ecosystems. Investments in the natural sciences have greatly increased and diversified resident capabilities. Investments in the social sciences have been more modest but here, too, notable progress has been achieved. Activities designed to promote coastal governance have been directed primarily at high level policy-makers and have successfully catalyzed a rapidly growing number of integrated coastal management initiatives at the regional, national and local scale.

Capacity Building in the Marine Sciences

During the 1990s, the central strategy of both the Bilateral and the Regional Programs has been to fund the graduate degrees of East African scientists. While only four graduate degrees had been completed by 1996 in the Sida/SAREC marine science programs, today 26 M.Sc. candidates and three Ph.D. candidates have earned their degrees. Twice this number of M.Sc. candidates and 18 Ph.D. candidates are "in the pipeline." Nearly all the students supported by the Regional Program expect to graduate in the year 2000. It may be concluded that a critical mass of well-trained marine scientists are now present in the region. In some cases, their home laboratories are sufficiently equipped to support sustained research activities but others still require institutional support.

While the emphasis on thesis research is achieving the central goal of building resident research capability, this approach has several limitations. Research topics are being selected primarily to meet academic criteria and reflect the individual interests of major professors and their students. The links to priority resource management questions are weak and little has been achieved in terms of interdisciplinary research explicitly structured to address urgent societal and resource management issues. However, the short courses and workshops sponsored by the Regional Program have done much to encourage exchange among scientists and discussion on how to link science to resource management issues, and assess initial local experiments in the practice of integrated coastal management. Many of the East African scientists whose graduate training was supported by this program are actively engaged in coastal management initiatives that are now being supported by a diversity of institutions.

Institution Building

The program's most notable achievement is the transformation of the Tanzania Institute of Marine Sciences (IMS) of the University of Dar es Salaam into an internationally recognized institution with a permanent staff of 17 researchers of which 10 have Ph.D.s. IMS is attracting funds from a diversity of sources, hosts visiting scholars from many nations and is making significant contributions to public policy and resource management in Zanzibar, Tanzania and the region. Similarly, the smaller but important Inhaca Research Station has been refurbished and equipped and is supporting the research activities of both national and foreign scientists. The Departments of

Botany and Zoology/Marine Biology as well as the Department of Sociology and Anthropology of the University of Dar es Salaam (UDSM) and the Institute of African Studies a the University of Nairobi have also benefited from the program and been strengthened. In Mozambique, the Bilateral Program has nurtured a dedicated group in the Biology Department at the University of Eduardo Mondlane (UEM).

Significant benefits have also flowed to the participating Swedish university departments and institutes, many of which now have well-established partnerships with their counterparts in East Africa. The marine science programs have brought to collaborating Swedish institutions a flow of graduate students, new research opportunities, salary support and encouraged frequent travel in the region. These opportunities are complemented by the Swedish Applications Program and the Minor Studies Program that encourage both established researchers and undergraduate students to pursue their interests in developing nations. Together these programs amplify the research capacity that is now available to support coastal management initiatives.

Instigating Integrated Coastal Management in the Region

In the early 1990s, the Regional Program sponsored pioneering work to instigate a dialogue among high level policy-makers on the societal issues posed by rapidly mounting pressures on coastal ecosystems and the need for national coastal management initiatives. The 1993 Arusha Conference catalyzed the first high level political commitments to integrated coastal management. The formulation and progress of coastal management initiatives sponsored by various institutions as well as the results of scientific research have been thoroughly documented and widely disseminated through an outstanding series of documents and in articles published in the international journal *Ambio*. Recognizing the growing number of research and coastal management initiatives in the region, Sida/SAREC investments need to be carefully targeted on approaches that capitalize upon its dedication to long term capacity-building. Future activities designed to encourage good management practices in the region should draw from the conceptual frameworks emerging from worldwide experience in coastal management.

Recommendations for Future Investments in the Marine Sciences

In the judgment of the evaluation team, the Sida/SAREC marine science programs have reached an important point of articulation. While the central capacity-building goal should be maintained, we recommend making adjustments to the program's implementing strategies in order to take full advantage of the major achievements gained in the past decade. We therefore recommend that the next phase of the marine science programs be viewed as a transition to a second generation effort in which resource management and quality of life issues will be addressed more directly and the local ownership of governance initiatives sponsored by the Regional Program will be enhanced.

Specifically, we recommend that a clearer differentiation be made between building strategies and the research activities sponsored by the Regional and Bilateral Program. The Bilateral Programs should continue to give priority to the support of graduate studies while the Regional Program should harness the capabilities now in place by sponsoring interdisciplinary research projects on priority coastal management topics. In the future, graduate studies in the marine sciences supported by the Bilateral Programs should be guided by:

- A needs assessment that would guide setting priorities for support to graduate students in specialization in the social and natural sciences. Such priorities should account for the projected employment opportunities for professionals with M.Sc. and Ph.D. degrees in their home countries.

- Priority should be given to thesis research that is conducted as an element of interdisciplinary projects in pilot coastal management sites or on socially and environmentally important topics.
- Consideration should be given to sponsoring an Honors Program in coastal management that would introduce the next generation of natural and social scientists to the principles of coastal management and interdisciplinary research.

A new administrative structure should be developed for the Regional Program. We recommend that future activities include:

- A competitive grants program organized as a two or three-year funding cycle designed to generate the information and knowledge required by the formulation of coastal management initiatives.
- A coastal ecosystem forecasting and monitoring program directed at a few carefully selected indicators of anthropogenically induced coastal ecosystem change.
- Regional networking activities designed to address a few carefully targeted priorities that link public education and extension activities to the research activities sponsored by the program.

Abbreviations

CRC	Coastal Resources Center
ICM	Integrated Coastal Management
IMS	Institute of Marine Sciences
MICOA	Ministry for the Coordination of Environmental Affairs, Mozambique
IOC	Intergovernmental Oceanographic Commission
NEMC	National Environment Management Council, Tanzania
PACSICOM	Pan African Conference on Sustainable Integrated Coastal Management
RCU	Regional Coordinating Unit of the Nairobi Convention
RECOSCIX	Regional Cooperation in Scientific Information Exchange in the Western Indian Ocean Region.
SEACAM	Secretariat for Eastern African Coastal Area Management
UDSM	University of Dar es Salaam
UEM	University of Eduardo Mondlane
WIOMSA	Western Indian Ocean Marine Science Association

1. Program Context

1.1 The Context: The Implications of Coastal Ecosystem Change in East Africa

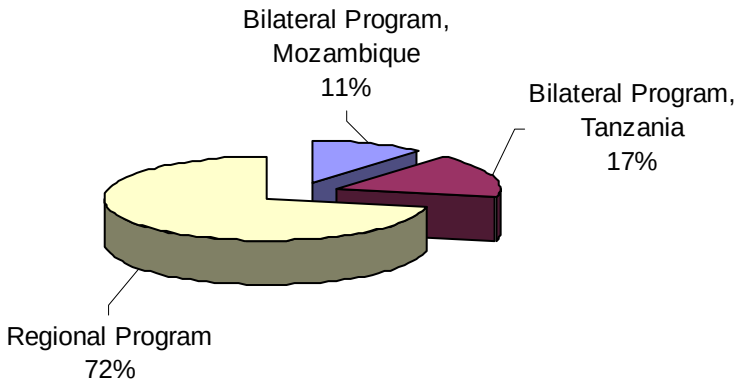
Several documents produced by the Program describe the rapid social and environmental change that is occurring in coastal East Africa. The region's coast extends over 11,000 kilometers. The coastal population is currently about 20 million but is expected to double by 2020 due to a combination of migration and population growth. There is growing competition among user groups. The major resource management issues include:

- Declining fisheries catch; catch per effort is estimated to have declined by about 60 percent in the past 15 years
- Environmental degradation threatens the economic sustainability of tourism.
- Flows of organic wastes are increasing; in most cases 20 percent or less of urban sewage is treated
- Soil erosion in many watersheds is high at 25–40 tons per hectare
- Degradation and destruction of such critical habitats as coral reefs and mangrove wetlands is increasing.

1.2 The Evolution of Sida/SAREC Programs in Marine Science

The Program has three components: the Bilateral Program with Mozambique, the Bilateral Program with Tanzania and the Regional Marine Science Program. The programs were initiated by SAREC and became Sida/SAREC initiatives in 1997 when Sweden's foreign assistance programs merged. The 1998 budget was approximately 16.9 million SEK for the three elements. Figure 1 shows the relative budget allocation for the three components in that year.

Figure 1. Sida/SAREC Marine Science Program (1998 budget allocation)



The goals of the Program are phrased somewhat differently in the many documents that describe the Program as a whole and each component. It is clear, however, that the fundamental purpose of the Program has been to build research capacity in the marine sciences. It appears that the hypothesis underlying the design of both the Bilateral Programs and Regional Marine Science Program is that a sustained investment to build capacity in the marine sciences will contribute to improved management and sustainable use of the goods and services provided by East Africa's coastal ecosystems. It is important to recognize, however, that the programs were initiated a decade ago. Following the Rio Conference on Environment and Development in 1992, and consideration of the emerging global experience from responses to accelerating coastal change, the programs have evolved to greater emphasis to linking research to coastal management. Thus the goals of these programs are now usually phrased as research on topics "concerning" or "relevant to" sustainable uses and coastal management.

The Regional Program adds additional dimensions to this capacity building agenda by featuring activities designed to promote a coastal management policy process at regional and national scales. This form of capacity building is present only in the Regional Program.

There are many similarities between the research and training component of the Regional Program and the two Bilateral Programs. All three have directed research funds to Ph.D. and M.Sc. thesis projects and have linked department or research institutions in East Africa with Swedish universities with similar interests. In most cases, graduate students sponsored by the programs have both East African and Swedish advisors and many have completed portions of their course work in Sweden. All three programs require that thesis research is conducted in the student's home country and provide funds for Swedish faculty to make frequent visits to the collaborating East Africa faculty departments and research sites. In some cases, substantial funds have been expended to equip laboratories and provide support services in the collaborating East African institution.

The Regional Program is able to draw people together from the East Africa region in workshops and conferences, and supports a political process designed to instigate the advancement of coastal management in the region. The Regional Program has greater autonomy in operation. It is administered by a Swedish and East African Coordinator and advised by an international Reference Group. The Bilateral Programs are designed and implemented as partnerships in which the selected East African institution has a major role in the administrative and priority-setting process. Each Bilateral Program also has East African and Swedish coordinators.

1.2.1 The Bilateral Programs

The Bilateral Program with Mozambique was the first SAREC Marine Science Program in the region. It got underway in 1985 when the University of Eduardo Mondlane (UEM) reopened its doors after ten years of guerilla warfare that followed independence in 1975. Civil strife continued during the initial seven years of this program often making it difficult and dangerous to sustain activities. The Swedish coordinator of the program is based at the Kristineberg Marine Biological Station. From the beginning, the program has been divided into two distinct components. The first is dedicated to building research capacity in marine biology at the Faculty of Biology in UEM. This has been accomplished by supporting a core group of dedicated Mozambican students first through their five-year Licenciatura degree and then onto M.Sc. and Ph.D degrees. The strategy of supporting students on their own home ground and working with them to develop the skills and infrastructure required to support a viable research program has been implemented with unusual dedication under often difficult circumstances. The six students that have continued with the program from its inception are now all completing their Ph.D. They are also the core faculty and administrators at the UEM Department of Biology.

The second component has been directed at refurbishing and reactivating the Marine Research Station on the island of Inhaca. The program has succeeded in making the Research Station a platform of basic field and laboratory equipment supported by a reliable electrical system, adequate boats and housing for researchers. The research activities of the students supported by the program make use of this facility as do increasing numbers of students and senior researchers drawn from other institutions in Mozambique and internationally. Since 1992, the Station is led by one of the students supported by the Bilateral Program.

The Bilateral Program with Tanzania was initiated in 1990. In this program, the Institute of Marine Sciences and the Departments of Botany and Zoology and Marine Biology of the University of Dar es Salaam collaborate with the Department of Zoology and Department of Botany from the University of Stockholm, Sweden. The Tanzania Bilateral Program is led by two Tanzanian coordinators from IMS and the two Swedish counterparts from the participating Departments at the University of Stockholm.

At the onset of the program a major emphasis was to install the equipment and infrastructure required to conduct research in a range of subject areas. Among the equipment and facilities were computing equipment, a vehicle, boats, essential laboratory equipment, air conditioners, a water purification system, and an auxiliary generator. Initially, because IMS was the only center dedicated to marine research in Tanzania, the bulk of the initial equipment provided by the program was housed at the Institute. Over time, more emphasis has been placed on providing equipment and facilities for research in the Botany Department and, most recently, the Zoology Department on the mainland campus.

1.2.2 The Regional Program

The Regional Marine Science Program in East Africa was initiated through a workshop organized by SAREC at the University of Dar es Salaam in 1989. The Regional Program started formally in 1992 and was expected to operate for ten years with a tentative budget of SEK 100 million. In 1997, SAREC, an institution dedicated to cooperation with developing nations in research, merged with Sida, Sweden's development assistance program. The Regional Program was then retitled the Sida/SAREC Regional Program.

According to the 1995 booklet describing this program, "the aim of the program is to carry out research concerning the sustainable use of coastal and marine resources, and the environmental management of the coastal zone." The same booklet goes on to identify as objectives:

- Strengthen national capacity for research
- Encourage multidisciplinary approaches
- Strengthen regional collaboration
- Initiate collaboration with SAREC's bilateral activities
- Encourage collaboration between donors
- Make the research results known

The Regional Program's activities in East Africa have progressed through two phases, the second of which will be completed at the end of 1999.

Phase I: 1990–1996

The period 1990–1993 was one of stage setting. Beginning in 1994, and extending through 1996, the program's activities in East Africa were grouped into four components:

(1) Courses, Workshops and Seminars. These featured a M.Sc./Ph.D. program in physical oceanography at Göteborg University, a number of short courses in the natural sciences and national workshops on ICM.

(2) Regional Research and Monitoring Projects. Subject areas were selected that have regional significance and an ambitious research program was outlined.

(3) Information and Networking. This element featured a guide to the fauna and flora of East African shores and support to WIOMSA in its efforts to promote exchange and information sharing among the community of marine scientists in the region.

(4) Minor Studies, to support initial investigations of topics believed to be of potential regional importance.

In 1993, a Ministerial Conference on Integrated Coastal Zone Management was held in Arusha, Tanzania. This set the stage for coastal management initiatives at the local and national levels in East Africa and successfully began a dialogue between the scientific community and high-level policy-makers. During this initial phase, the program also helped launch the Western Indian Ocean Marine Sciences Association (WIOMSA) as a networking organization and sponsor of research in the region.

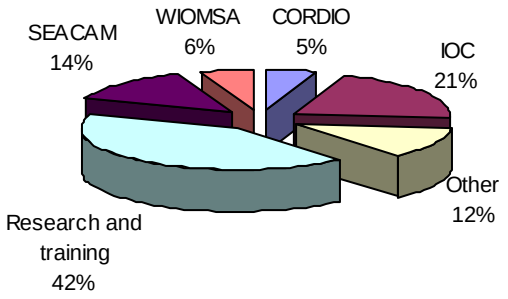
During this initial period the program expanded its support of networking activities, East African regional cooperation, and information and awareness building. Collaboration with the Intergovernmental Oceanographic Commission of UNESCO and the Environment Division of the World Bank were strengthened. Training activities and awareness building focused on the needs identified at the Arusha Conference. National workshops addressed important management issues and discussed ways to improve collaboration among stakeholders and agencies and discussed action plans.

Phase II: 1997–1999

After an external evaluation released in 1996, the Regional Program continued its core activities in research, short courses and information dissemination. A second Ministerial Conference, held in the Seychelles in 1996, concluded that progress on the agenda set two years before in Arusha had not met expectations. In order to strengthen the implementation process, an interim Secretariat (SEACAM) was created in 1997 with an office in Maputo, Mozambique. The purpose of the Secretariat is to enhance coordination and implementation of coastal management activities in the Region. This phase was expected to culminate in early 1999 with a third ministerial conference to be held in Mozambique. During this second phase, elements of the research program were added including a program designed to monitor coral bleaching in the Indian Ocean (CORDIO). Support to WIOMSA and the public education elements have continued.

The allocation of Regional Program funds in 1998 is shown in Figure 2.

Figure 2. Regional Program (1998 budget allocation; 12.1 million SEK)



2. Evaluation Methodology

As outlined by the Terms of Reference, this evaluation briefly describes the program in each country and region (Section 1) and then addresses five basic questions. These questions, and the sections containing our attempts to address them, are as follows:

(1) Does the Program produce relevant and tangible results?

- What are the outputs in terms of numbers of Ph.D. and M.Sc. students, published scientific articles, workshops, seminars and conferences?

  See Sections 3.1 through 3.4 and Section 4.

(2) How has the research been implemented?

- What are the differences among applied and basic sciences?
- What are the links between science and management issues?
- What degree of interdisciplinary integration has been achieved?

See Section 3.5 and Section 4.

(3) How well are the supported institutions and universities functioning?

- Are they fulfilling their respective administrative, supporting and funding roles?
- Do incentives exist to continue institutional collaboration between the North and South?

  See Sections 3.5 and Section 5.

(4) Has the program been cost effective in its implementation?

  See Section 6.2.

(5) Has the program followed the recommendations of the 1996 evaluation?

  See Section 6.1.

In addition, the Terms of Reference states that a new framework agreement governing the program will be prepared in 2000 and calls for recommendations to guide the next phase of the program. "Lessons learned" are embedded throughout the text and drawn together in the form of recommendations for a future phase of the program in Section 7.

Before the evaluation team began its interviews in East Africa and Sweden, a list of more specific questions was drawn up for topics enumerated by the TOR. The original list proved too extensive. The shorter version used to guide the discussions is provided as Appendix 2. They build upon the two framework reports: (1) "A Manual for Assessing Progress in Coastal Management," (Olsen, Lowry and Tobey 1999) and (2) "The Contributions of Science to Integrated Coastal Management," (GESAMP 1996). The questions probe the topics that the evaluation team was asked to examine, but most are not only relevant to the Sida/SAREC Marine Science Program. We hope that they advance methods for evaluating donor funded marine science programs.

The evaluation team was comprised of Stephen B. Olsen, Director of the Coastal Resources Center (CRC) at the University of Rhode Island and Dr. James Tobey, Coordinator of the Research and Learning Unit at CRC. Two weeks were spent in Tanzania and Mozambique in late May 1999. In-depth discussions were held with Dr. Magnus Ngoile, Dr. Julius Francis and Dr. Olof Lindén. Dr. Per Brinck joined the team for the Swedish leg of the evaluation, reviewed the research outputs of the program, and has made major contributions to the preparation of this report.

3. Building Capacity in the Marine Sciences as a Basis for Improved Management

3.1 Overview

The primary feature of the Marine Science Programs has been research capacity building. This has been achieved through the Bilateral Programs in Tanzania and Mozambique, the research and training element of the East Africa Regional Program, and through the training courses and workshops sponsored by WIOMSA and the IOC. The capacity-building activities of WIOMSA and the IOC are described in Sections 5.3 and 4.3.

When the Sida/SAREC Marine Science Program got underway in the late 1980's the very few marine scientists in East Africa had been trained primarily in fisheries research. According to Magnus Ngoile and Olof Lindén, at that time there were no more than 20 researchers in the region, most of which were at a junior level. Ten years later, the number of marine scientists with advanced degrees has increased severalfold and the disciplines in which they have earned their degrees cover a wide spectrum across the social and natural sciences.

The outputs of the capacity-building programs can be quantified in terms of graduate degrees awarded and in progress and the publications produced. These are summarized in Table 1.

Table 1. Summary of Program Outputs 1992–1999: Regional and Bilateral Programs

Indicator	Regional Program[1]	Tanzania Bilateral Program	Mozambique Bilateral Program
Students in the Program (since initiation)	26 M.Sc. (6) 7 Ph.D. (2)	14 M.Sc. 5 Ph.D.	2 M.Sc. 4 Ph.D.
Graduate degrees earned prior to 1996	2 (?) 1 Ph.D.	1 M.Sc.	2 M.Sc.
Graduate degrees earned 1996–1999	9 M.Sc. (9) 1 Ph.D.	6 M.Sc. 2 Ph.D.	2 M.Sc.
Refereed journal publications 1996–1999	17	12	9
Other reports, papers and posters 1996–1999	39	12	2

[1]Numbers in parentheses represent students partially supported by the program.

Both the Bilateral and Regional Programs have a policy of requiring that all thesis-related research be conducted in the home country of the recipient. Both programs also require that degrees be awarded by the in-country university unless no suitable academic program exists. The mechanisms for the supervision of thesis research are also similar. Both the Bilateral and Regional Programs select a long-term partner institution in Sweden (and sometimes elsewhere) that works with local counterparts to identify a suitable topic and advise the student as he or she progresses through their course work and their thesis. Students from both programs typically go to Sweden for courses not available in-country and to complete some of the work related to their thesis research.

Table 2 shows the relative distribution of program costs to Swedish and African institutions. The Regional Program has not been as effective in transferring resources to African institutions as the Bilateral Programs. The expectation is that about half of the Regional Program budget should be spent in the region to build local institutions. This has been achieved in some of the Regional

Program components, but not overall. In the Bilateral programs, travel funds are included in the budgets for the Swedish and East Africa institutions. In the Regional Program, non-student travel is 13 percent of the total. This has been placed in the Swedish allocation since we assume that a small proportion of the non-student travel is for East African participants. Table 2 also shows the relative costs per student in the three programs. These cost ratios include all costs. Therefore, programs that incur high costs for equipment and other indirect costs to build research capability (such as support of the Inhaca Marine Station) will show higher per student costs.

Table 2. Budget Allocation by Activity, 1998

Program	Total Debited (million SEK)	Allocation of Budget (percent)		Cost per Student SEK/Student
		Swedish Institution	African Institution	
Bilateral Program Tanzania	2.9	34	66	207,143
Bilateral Program Mozambique	1.9	30–40	60–70	316,663[1]
Regional Program	5.05	62[2]	38	123,169[3]

[1]The costs for Mozambique include support to the Inhaca Marine Station. Costs per student, not including Inhaca Marine Station costs are 205,825 SEK. Per student costs are relatively high in Mozambique because all students complete their coursework abroad.
[2]Includes non-student travel costs, some of which is for East African participants.
[3]Most students in the socio-cultural and coral reefs projects are only partially supported. The figure understates actual cost per student because it includes students that received support for only some elements of their graduate education.

3.2 Bilateral Marine Science Program – Tanzania

3.2.1 Program Description

Graduate training through the Tanzania Bilateral Program was initiated in 1992 following the introduction of scholarships in the Bilateral Program. Due to the lack of higher level expertise in virtually all areas of marine science, support was given to thesis research in a diversity of subject areas. The Scholarship program supports training whereby students spend the majority of their time in his/her country working on a locally derived research problem. In 1992, three Ph.D. and four M.Sc. students were recruited into the program. The Ph.D. students were registered at Stockholm University and Uppsala University while the M.Sc. students were registered at the University of Dar es Salaam. One of the Ph.D. students successfully completed his program in 1996 and the remaining two finished in 1998. Table 3 shows all graduate students that have received graduate degrees through the Bilateral Program.

Table 3. Students that have graduated in the Bilateral Program: University of Dar es Salaam, Tanzania

Name	Year Commenced	Year Completed	Degree	Thesis Topic
Mtolera, Matern	1992	1996	Ph.D.	Photosynthesis, growth and light-induced stress responses in red alga.
Lyimo, Thomas	1993	1995	M.Sc.	Role played by phytoplanctonic cyanobacteria in increasing the nitrogen level in near shore waters of Tanzania.
Mhitu, Hazan	1993	1996	M.Sc.	Reproductive biology of squid.
Mgimwa, Flower	1993	1996	M.Sc.	Characteristics and dynamics of *dem*a traps catch in Zanzibar waters.
Lugomela, Charles	1994	1996	M.Sc.	Spatial and temporal variations of phytoplankton in Zanzibar near shore waters.
Ndaro, Simon G.M.	1992	1998	Ph.D.	Ecology of meiobethos in tropical intertidal lagoons.
Mohammed, Salim	1992	1998	Ph.D.	Role of mangroves in nutrient dynamics of nearshore tropical ecosystems.
Kangwe, Juma	1995	1998	M.Sc.	Effects of pollution on reef building calcareous algae in Zanzibar.
Mohammed, Suleiman	1993	1999	M.Sc.	Coral reef mollusks (gastropods).

Table 4 list students currently in graduate training and conducting thesis research in the Bilateral Program.

Table 4. Students Currently Supported by the Bilateral Program – Tanzania

Name	Year Commenced	Expected Completion	Degree	Thesis Topic
Lugendo, Blandina	1995	1999	M.Sc.	The impact of nutrient input on seagrass ecosystems along the Dar es Salaam coast.
Mlay, Angela	1995	1999	M.Sc.	The ecology of the intertidal zone in the Dar es Salaam area.
Buriyo, Amelia	1995	1999	M.Sc.	Effects of seasons on yield and quality of agar and karrageenan.
Mbije, Nsejigwi	1997	2000	M.Sc.	Mapping of marine habitats and resources around Bawi, Murogo and Ponge Island in Zanzibar.
Teikwa, E	1997	2000	M.Sc.	The biology of penaid prawns of Wami and Ruva River, Bagamoyo.
Baraka, B.L. communities.	1997	2000	M.Sc.	Re-establishment and growth of scleractinian coral
Mwandya, Augustine	1997	2000	M.Sc.	The use of macroalgae for removal of nutrients from polluted water.
Mamboya, Florence A.	1997	2000	M.Sc.	Heavy metals in macroalgae along the Tanzanian coast.
Akwilapo, F.	1997	2000	M.Sc.	Ecology of the sea cucumber.
Kyaruzi, Jaasund	1997	2000	M.Sc.	Nitrogen-fixation by cyanobacteria.
Lugomela, Charles	1997	2001	Ph.D.	Spatial and temporal variations of phytoplankton in Zanzibar shore waters.
Kamakuru, Abogoust T.	1997	2001	Ph.D.	Coral reef fish distribution in protected and non-protected areas.
Kangwe, Juma	1999	2003	Ph.D.	Distribution and productivity of the sand producing green alga *Halimeda*
Nur, Mohammed	1999	2001	M.Sc.	

The 1998–2001 Proposal for Continuation for the Bilateral Program reaffirms that the program is directed at capacity building and production of environmental and scientific information relevant for more effective environmental management at the national and local level.

Pollution and nutrient dynamics studies have been a major research area in the Bilateral Program. Research has addressed nutrient dynamics, the potential carrying capacity of mangrove sediments and community metabolism of seagrass communities. Phytoplankton has been investigated for its contribution to the nitrogen budget of open waters. The responses of seagrass communities to pollution have been investigated. The status of pollution sensitive coral reef building algae has been studied and helps provide a baseline against which to monitor future developments around heavily populated coastal areas.

Fisheries research has addressed the biology of the squid and characteristics of dema trap catches.

The Bilateral Program has also addressed seaweed farming that is important to the Zanzibar economy and welfare of coastal communities. Research has addressed the problems associated with diseases and productivity of cultured seaweeds and the impact of open water seaweed farming on benthic communities, benthic nutrient dynamics, and lagoon fish populations.

The annual plan for research and activities of the Bilateral Program is prepared by the program coordinators on the Tanzanian side, presented to the University of Dar es Salaam through the

Directorate for Post Graduate Studies (acting as Secretariat for Sida/SAREC Bilateral Programs with the University), and then sent to the Swedish Bilateral Program coordinators in Sweden.

During calendar year 1998 the major activities undertaken were as follows:

- Graduate training: 15 graduate students (3 Ph.D. and 12 M.Sc.)
- Training of technicians and support staff: 8 individuals received short-term training (e.g., word processing and document preparation) and 5 were supported in long-term training (e.g., in accounting)
- Research funding for senior scientists: support to both research staff at IMS and the Botany Department and to Swedish scientists
- Improvements to the research infrastructure: upgrading of physical facilities and new library acquisitions

The 1.9 million SEK of the 2.9 million SEK in the Bilateral Program that comes to IMS was distributed in 1998 as follows:

Table 5. Bilateral Program Budget, Tanzania Institutions, 1998

Budget Item	SEK	Percent of Total
Fieldwork	1,291,591	66
Equipment	169,000	9
International travel	163,000	8
Literature	110,000	6
Contingency and maintenance	125,000	6
Consumable	105,000	5
Total	1,963,591	100

The funds shown for fieldwork are all related to the thesis driven research of students and their collaborating Swedish supervisors.

3.3 Bilateral Marine Science Program – Mozambique

The six students who have been supported by this program since 1985 are all in the process of completing their Ph.D. with Universities in Sweden, Portugal and South Africa. The students do not receive scholarships or stipends in this Bilateral Program and are all working approximately 70 percent of their time in teaching and Department administration. The Department now has about 120 undergraduate students, a remarkable achievement considering that the University was reopened in 1985 and has operated for much of this period in conditions of great civil unrest. A Strategic Plan for the University proposes that the Biology Department begin to offer M.Sc. courses in Marine Biology. The four Ph.D. candidates have been with the Department for many years, and they intend to continue working in the Department of Biology once they have completed their degrees.

Table 6. Students Currently Supported by the Bilateral Program – Mozambique

Name	University	Degree	Expected Completion Date	M.Sc. Completed
Salomão Bandeira	Göteborg University	Ph.D.	2000/2001	M.Sc. 1994 (Göteborg University)
Almeida Guissamulo	University of South Africa	M.Sc.	1999/2000	
Domingos Gove	University of Lisbon	Ph.D.	2001/2002	M.Sc. 1998 (Göteborg University)
Adriano Macia	Stockholm University	Ph.D.	2002	M.Sc. 1995 (Göteborg University)
Aidate Mussagy	Lund University	Ph.D.		M.Sc. 1998 (University of Lund)
Filomena Barbosa	University of Natal	M.Sc.	2000	

Most of the research is being conducted with the equipment supported by the Bilateral Program at the Inhaca Marine Research Station. The six areas of research are:

- Ecology of marine shrimp – the ecological role of mangroves as nurseries for commercial juvenile shrimp at Maputo Bay
- Biology of inter-tidal crabs with emphasis on reproductive aspects
- Limnology – population dynamics of cyanobacteria
- Ecology of dolphins in Maputo Bay
- Ethnobotany – the distribution of swamp forests of Southern Mozambique and their economic importance to local populations
- Marine botany – taxonomy and ecology of seagrasses and seaweeds on Inhaca Island and Mecúfi

The budget for the Bilateral Program with the Department of Biology for the three-year period 1998–2000 is 6.7 million SEK. This includes support to the Inhaca Marine Station. Agreements with Sida/SAREC are made every three years. Disbursements are made to the University once a year and it is passed on to the Department in two disbursements each year. This system seems to be functioning smoothly.

The Mozambique Bilateral Marine Science Program has made a very important and hard-earned contribution to improving research capability in the marine sciences in Mozambique. The graduate students in the Bilateral Program will play an important role in the future of coastal management in Mozambique. Already there are visible impacts of the Program. For example, the Coastal Zone Unit of MICOA has a Technical Committee that provides scientific and technical input to the Coastal Zone Unit. Bilateral Program graduate students serve on that Committee. The scale of effort in coastal management is rapidly increasing in Mozambique, as is the parallel need for scientific input. There is the threat that the few local trained experts in marine sciences will be drawn away from the University to take competing and well-paid, jobs or to carry out consultant work on a part-time basis. So far, this has been avoided by making every effort to facilitate the research and travel of graduate students in the Bilateral Program and to provide them with positions of leadership and responsibility within the Department and the Research Station.

3.4 Regional Marine Science Program

The Regional Program, as described in SAREC's 1995 booklet, set forth an ambitious research agenda in the natural and social sciences. Successfully tackling this research agenda would have been a challenge for an established, well-staffed and well-equipped institution, or network of institutions. The Regional Program has followed the same strategy as the Bilateral Programs. This is to utilize the majority of the research funds to conduct thesis research that would eventually produce the research scientists required to conduct an integrated research agenda.

By the time of this evaluation the research agenda of the Regional Program had evolved to include the following elements:

(1) Physical Oceanography
(2) Marine Geology
(3) Distribution and Status of Coral Reefs in Eastern Africa
(4) Environmental Economics and Coastal Management
(5) Social and Cultural Aspects of Integrated Coastal Zone Management
(6) Pesticides
(7) Marine Mammals

There has been a Swedish coordinator from Stockholm University's Zoology Department since the program's inception. For each research topic there is a Swedish project leader associated with a Swedish University or research institute.

The strategy of funding thesis research and building a core of research scientists was necessary, but it has had two consequences. The first is that research topics had to be sized and defined as suitable for an M.Sc. or Ph.D. thesis that reflect the interests of the major professors and meet the academic standards of the degree granting institution. The second is that the purposeful execution of a well-integrated regional research agenda had to be delayed until the researchers had completed their academic studies. By 1999, this watershed had been largely achieved. At IMS, for example, the resident staff now comprises 10 Ph.D. and 7 M.Sc. marine scientists (several of which are working toward a Ph.D.). IMS is adequately equipped and its staff has wide-ranging experience in the practical issues of conducting coastal research in East Africa.

Graduate degrees awarded by topic and institution are shown in Table 7 below. Student composition over the life of the program has been approximately 60 percent Tanzanian, 20 percent from Mozambique, and 20 percent Kenyan.

Table 7. Graduate Students Supported by the Regional Program

Program Theme (started)	Students (country)*	Degree		University Granting Degree	Year of Completion
		MSc	PhD		
Physical Oceanography (1992)	O. Mwaipopo (TZ)	✓		Göteborg University	1997
	S. Mahongo (TZ)	✓		Göteborg University	1997
	M. Mgendi (TZ)	✓		Göteborg University	1997
	M. Odido (KE)	✓	✓	UDSM	1995 M.Sc. (2000) Ph.D.
	M. Nguli (KE)	✓	✓	UDSM	1995 M.Sc. (2000) Ph.D.
	D. Kirugara (KE)	✓		Göteborg University	1998
	C. Magori (KE)	✓		Göteborg University	1998
	F. Saide (MZ)	✓		Göteborg University	(1999)
	A. Mavume (MZ)	✓		Göteborg University	(2000)
	A. Manhique (MZ)	✓		Göteborg University	(2000)
	C. Angwenyi (KE)	✓		Göteborg University	(2000)
	J. Kitheka (KE)	✓		Göteborg University	(2000)
Coral Reefs (1993)	S. Mohammed (TZ)	✓		UDSM	1999
	L. Nzali* (TZ)	✓		UDSM	1998
	R. Mdodo* (KE)	✓			
	J. Tunde* (KE)	✓			
	C. Muhando (TZ)		✓	UDSM	(2000)
	M. Nsajigwi* (TZ)	✓		UDSM	1999
	B. Kuguru* (TZ)	✓		UDSM	1999
	A. Kamukuru* (TZ)		✓	UDSM	(2002)
	M. Nur* (TZ)	✓		UDSM	(2001)
Marine Geology (1993)	Y. Shaghude (TZ)		✓	University of Stockholm	(1999)
	J. Machiwa (TZ)		✓	University of Stockholm	1999
	M. Achimo (MZ)	✓	✓	University of Stockholm	1999 M.Sc. (2001) Ph.D.
Social/Cultural (1993)	S. Juma* (KE)	✓		University of Nairobi	1999
	D. Shilabukha* (KE)	✓		University of Nairobi	1999
	G. Ricardo* (MZ)	✓		UEM	1999
	D. Rakotonavalona* (MD)	✓		Antananarivo	1999
	R. Mwaipopo* (TZ)		✓	Cape Town	(2000)
	M. Mukhwana* (KE)	✓		University of Nairobi	(1999)
	G. Soko (TZ)	✓		UDSM	1999
Environmental Chemistry (1996)	A. Mmochi (TZ)		✓	UDSM	(2000)
	H. Mwevura (TZ)	✓		UDSM	(1999)
Environmental Economics (1995)	Z. Ngazy (TZ)	✓		UDSM	1997
	A. Mkenda (TZ)		✓	Göteborg University	1999
	D. Prosper (TZ)	✓		UDSM	1998
	I. Ngugi (KE)	✓		University of Nairobi	1998
	F. Wangwe (KE)	✓		University of Nairobi	(1999)
	C. Nhabinde (KE)	✓		University of Nairobi	(2000)
	B. Razak (TZ)	✓		UDSM	1997

TZ=Tanzania; KE=Kenya; MZ=Mozambique; MD=Madagascar
Years in parentheses refer to degrees not yet completed.
*Students partially supported by the Regional Program

Table 8 shows outputs of the Regional Program in terms of the number of graduate degrees awarded and publications, and shows when program components were initiated and number of graduate being supervised.

Table 8. Summary of Program Outputs, 1996–99: Regional Program

Program Theme (started)	Students in the Program	Graduate Degrees Earned	Short Courses	Refereed Journal Publications	Other Reports, Papers and Posters
Physical Oceanography (1992)	12 M.Sc. 2 Ph.D.	7 M.Sc.	0	2	2
Coral Reefs (1993)	7 M.Sc. 2 Ph.D.	6 M.Sc.	4	10	27
Marine Geology (1993)	1 M.Sc. 2 Ph.D.	0	2	7	13
Social/Cultural (1993)	6 M.Sc. 1 Ph.D.	4	3	2	5
Environmental Economics (1995)	6 M.Sc. 1 Ph.D.	4 M.Sc. 1 Ph.D.	0	3	1
Pesticides (1996) 1 Ph.D.	1 M.Sc.		0	1	6
Marine Mammals (1998)	1 M.Sc.	0	0	0	0

Table 9 shows the breakdown of program costs for 1998. The distribution of program funds to Swedish and African institutions varies considerably by project area. Projects with high Swedish salary costs relative to the total budget have a lower percentage of the total budget allocated to African institutions (some project leaders are fully supported, others partially). For example, the Swedish marine geologist has received his full salary from the program since its inception but has overseen only three students in this latest period. The program also provides one and a half salary equivalents to the physical oceanography program but this is shared by two Swedish scientists who offer a special curriculum that draws in students from Sri Lanka and Latin America as well as the seven East African students shown in Table 8. Travel requirements also varies considerably, from 6–22 percent of total project costs (travel costs refer non-student travel; student travel is included in the African institution column). The ratio of total project costs per graduate student varies from 100–300 thousand SEK per year. Projects with relatively high costs for equipment and infrastructure, salary, and travel have higher per student costs. The themes of coral reefs, pesticides and physical oceanography incurred the greatest equipment costs in 1998. Finally some students in the social and cultural project are partially funded by the Sida/ SAREC Marine Science Program. The figures for these projects therefore understate actual cost per student.

Table 9. Regional Program Budget Allocation by Activity, 1998

Program	Total Debited (million SEK)	Swedish Institution	Allocation of budget (percent)[1]			Cost
			Swedish Salary[2]	African Institution	Travel	Per Student SEK
Regional Program	**5.05**	**49**	**41**	**38**	**13**	**123,169**
Oceanography		59	51	32	9	83,333
Coral Reefs	0.90	46	38	32	22	100,002
Marine Geology	0.90	58	48	33	9	299,998
Social/Cultural[3]	0.70	34	28	52	14	100,002
Pesticides	0.40	27	23	67	6	199,996
Economics	0.70	47	28	38	15	100,002

1. Percent of total debited
2. Percent of Swedish Institution budget allocation
3. Some students in the social/cultural program are partially funded by the Sida/SAREC Marine Science Program. The figure therefore understates the actual cost per student.

An Overview of the Sponsored Research

While the Bilateral Programs are explicitly designed and implemented as capacity-building programs, the goals and objectives of the Regional Program calls for a distinct problem-solving orientation. Thus, for the Regional Program capacity building through the sponsoring of graduate students became a temporary means to the end rather than the end itself. During the first and second phase of the Regional Program by far the largest allocation of funds has been in the form of thesis-driven research conducted in a manner indistinguishable from the Bilateral Programs. While new research themes have been added during Phase II, the yearly allocation of funds to the research elements initiated in Phase I remained unchanged despite obvious differences in their productivity and the potential relevance of the research results to improved ecosystem management in East Africa. The evaluation team was provided with detailed descriptions of the research activities undertaken through the Regional Program. Comparable information summarizing the objectives and strategies of research activities in the Bilateral Programs was not provided to the evaluators.

Distribution and Status of Coral Reefs in Eastern Africa. Research on this topic was initiated in 1993. The topics identified at the Arusha Conference as priorities were the distribution of coral reefs, their relative health, and the potential for reef rehabilitation. The initial objectives of the research program were therefore to:

- Map the extent of coral reefs along the East African coast
- Identify the location and extent of critical areas
- Characterize large-scale biodiversity
- Identify reefs already significantly altered by human activity and under major anthropogenic pressures.

It soon became apparent that the size of the region precluded a detailed assessment of all reefs. It was therefore decided to prepare a digitized map based on existing information and to focus the research on conditions in Tanzania. The survey methods selected were those being applied in the Pacific and Southeast Asia. The methods were discussed with IUCN and UNDP and common methodologies have been adopted so that data sets will be comparable. A major strategy is to rely upon Tanzanian scientists to train colleagues in Mozambique and Kenya.

A review of the thesis topics and papers produced in the initial stages of this program element show a major emphasis on fauna. More recently the emphasis has shifted to consideration of the impacts of anthropogenic pressures on the condition and functioning of reefs. Despite the large numbers of people involved in this program, the thesis topics and papers do not appear to reflect an overall research strategy or an attempt to build an integrated team of researchers. It has been argued that this was due to the large differences in the participating countries research capacity and priorities at the start of the programme but that the overall goal was to build a research strategy at a later stage as the involved institutions and countries evolved.

Marine Geology. Research in marine geology addresses sediment dynamics and sediment distribution in Maputo Bay and the Zanzibar channel. The biogeochemical research concentrates on the impacts of waste dumping in a mangrove forest in Zanzibar. The work on sedimentation in Muputo Bay is being conducted in collaboration with the National Institute of Hydrographics and Navigation (INAHINA). A second Tanzanian student will finish a Ph.D. later this year. A student from Mozambique completed a M.Sc. in 1999 and anticipates completing a Ph.D. in the year 2001. Despite the limited number of graduate students in the marine geology program, the program supports the full salary of the Swedish coordinator for this research theme. While sedimentation in Maputo Bay is a major navigational issue, it is unclear how much of a contribution the project will make to resolving how the shipping channel can be maintained in a cost effective manner. The study of sand waves in the Zanzibar channel does not have implications for navigation but is about sediment composition, distribution and transportation. It is likely to contribute only indirectly to better understanding the severe coastal erosion problems on Zanzibar. Research on nutrient cycling in a heavily stressed mangrove in Zanzibar appears to have been directed largely at resolving methodological problems. *Physical Oceanography*. The design of the physical oceanography component is distinctly different from other elements of the Research Program. When the Regional Program got underway, it was found that there were no physical oceanographers in the region and that there were no existing university departments in the region offering courses or degrees in physical oceanography. This element of the program was designed to fill the void by creating a new program at Göteborg University specifically designed to meet the needs of graduate students from developing countries. The educational goal is to offer a program that combines a solid basis of hydrodynamics with applications of special interest to coastal management in the home countries of the students. The intention is to provide the necessary tools for conducting hydrodynamic studies of coastal areas such as lagoons, tidal creeks, mangroves, seagrass beds and coral reefs. Therefore great emphasis is put upon oceanographic instruments, data analysis techniques, computer work and related topics.

The physical oceanography program has attracted several students from Sri Lanka and two from Chile as well as a sizable contingent from East Africa. Funds have been expended on equipping the home institutions of the students so that they can address near shore water circulation issues.

Pesticides. This element was initiated in 1994 with student training courses in Sweden. Research activities in Tanzania got underway in 1996 The cooperating institution in Sweden is the Department of Environmental Assessment, Swedish University of Agricultural Sciences. The objective of the research in Tanzania is to "trace pesticides in areas where they may effect the biodiversity and productivity of the sea." However, discussions with the Ph.D. candidate at IMS and the Swedish Coordinator suggests that the current use of agricultural pesticides on Zanzibar is not at a sufficient scale to make impacts on marine ecosystems more than a remote possibility. This research should therefore be viewed as the generation of a baseline against which to assess future change and an opportunity to solve the significant methodological challenges posed by conducting sampling and analysis at IMS. A pesticides laboratory, which includes a gas chromatograph has been set up at

IMS and one M.Sc. and one Ph.D. student are close to obtaining their degrees. Sampling has been performed in tidal creeks and in the groundwater on Zanzibar in locations where a number of other environmental variables are being studied. One control site is included. The M.Sc. student is conducting sampling along the mainland coast. Data is being compiled at eight sites in Dar es Salaam and in estuaries where the highest concentrations of pesticides are most likely.

Marine Mammals. This element of the program was initiated in 1998 in response to the emergence of a dolphin-observing program as a new tourist attraction in Zanzibar. The program combines research with educational activities. The program currently supports a Swedish Ph.D. student and a Tanzanian M.Sc. candidate. The Ph.D. thesis is on dolphin behavior while the M.Sc. thesis is on marine mammal and fisheries interactions. A photo identification catalogue of local dolphin is being assembled at Stockholm University. The program plans to develop guidelines and regulations for tour operators and educational materials such as coloring books.

Social and Cultural Aspects of Integrated Coastal Management. This element was initiated late in 1993, and became fully operational in 1995. The Swedish coordinators of this element have experienced difficulties in successfully engaging with the relevant department in UDSM and other universities in the region. Part of the problem is that the importance of the social dimensions of development are widely recognized within the donor community. Rural sociologists and anthropologists are therefore in considerable demand and there is often strong competition for their services. Two interesting workshops have been sponsored but it remains difficult to engage East African University faculty in field research in coastal areas. The most workable strategy has been to use the financial resources made available by the Regional Program to fund the field work of selected graduate students. In this manner, some progress towards the goals and objectives of this element have been made.

This is the only research element that has consistently expended only a portion of its annual financial allocation. Only one student involved in this element of the program has received full support from the program.

Environmental Economics and Coastal Management. This element got underway in 1995. Activities are divided into three areas: student training, research, and workshops/networking. A five-year activity plan (1995–1999) was formulated for each of the three activity areas. Although it has only been fully operational during Phase II of the program, it has succeeded in attracting six M.Sc. students and one Ph.D. student from the region; instigated research on environmental and resource economics; and, strengthened the regional network of scientists trained in economics and focusing on coastal and marine resource issues.

The two project coordinators identified a critical shortage of expertise in marine environment economics in all of the African countries represented in the region when the project commenced. Regional research needs and information gaps were identified in the first year of the activity. The strategy was to build marine research into institutions with existing training facilities in economics. Important progress was achieved but the discipline of environmental economics is still poorly developed.

Research has targeted fisheries and marine resource economics and economic valuation. Specific topics include:

- Trade liberalization and the exploitation of crustacean resources in Tanzania
- Economic valuation of marine resource conservation and sustainable use: the case of Menai Bay, Zanzibar

- Non-market values of mangroves and policy instruments for conservation: Pangani district, Tanzania
- The cost of establishing marine protected areas: Mobasa Marine Reserve
- Economic valuation of mangrove forests: Bagamoyo District, Tanzania
- Fishery economics in Tanzania

3.5 Evaluative Topics

3.5.1 Applied Research and Research for Management

Scientists trained through the Program have actively participated in the Arusha and Seychelles Policy Conferences for Eastern Africa, the Pan-African Integrated Coastal Management Conference (PACSICOM), and the Planned Partnership Conference. The greatest impact comes from their participation in the technical workshops and pre-conference planning process that shapes the agenda and thereby has a major influence on what is discussed and endorsed during the more formal conference proceedings.

It is clear to the staff of senior researchers at IMS that in the future their work must strike a balance between curiosity driven "basic" research and research that is conceived to address important, or potentially important societal and resource management issues. An urgent priority is create the mechanisms by which national and regional research agendas can be formulated that respond to clearly specified management needs (see Section 7).

At present, the incentives for responding to management needs are not especially strong. The evaluation team was told that a "culture of information" is not present in government decision making. One of the challenges facing marine scientists in Tanzania and Mozambique is to demonstrate the value and uses of existing knowledge in better resource management, and to develop mechanisms to the transfer knowledge and skills to government staff. The University reward system also provides few incentives for responding to specific management needs.

Nonetheless, marine scientists from IMS and the Departments of Botany and Zoology at UDSM have contributed to the formulation of environmental legislation for Zanzibar, the 1995 Marine Parks and Reserves Act, and are currently playing a major role in the development of a national coastal management program through the facilitation of the Tanzania Coastal Management Partnership. The capacity in marine sciences in Tanzania formed by the Marine Science Program has also been important in the development of the Mafia Island Marine Park, Menai Bay Conservation Area, Misali Island Conservation Area, and proposed Mnazi Bay Marine Park. The IMS is also a member of various Committees and Boards.

In Mozambique, the marine scientists supported by the program have excellent relationships with a number of government agencies and with the rapidly growing donor-sponsored programs addressing coastal management topics. The Resident biologist of the Inhaca Station, for example, is also in charge of marine reserves. Other members of the team represent Mozambique at international meetings and respond to requests to assist their nation by advising and actively participating in a diversity of programs and projects.

3.5.2 Interdisciplinary Research

The importance of interdisciplinary research is emphasized in the mid-term evaluation. IMS has adopted a strategy of focusing research activities funded by various sources on geographically defined areas like Chwaka Bay. This is encouraging exchange and collaboration among researchers in different disciplines. The next step would be to formulate area-specific research programs de-

signed to address carefully selected management-relevant questions and seek funding for such explicitly interdisciplinary initiatives. At a personal level, interactions among researchers from different disciplines with a research institute like IMS are fluid. So far, however, there are few, if any examples of interdisciplinary research projects initiated and funded by the Sida/SAREC marine science programs.

To encourage interdisciplinary research three actions are needed:

- Adjust the academic reward structure: at present, senior researchers are promoted on the basis of the number and the quality of their publications. Yet co-authored papers, such as those resulting for interdisciplinary activities count less than single authored papers at UDSM.
- Funding mechanisms and rating criteria for research proposals must be reviewed to accommodate research-for-management and sustained, often big budget projects.
- One or more seminal interdisciplinary research projects should be identified that address the complexity of issues that surround a given area, or topic, of high significance from an ecosystem management point of view. Such topics may focus on the combined forces of anthropogenic change on a selected estuary or reef system.

3.5.3 Program Ownership and Administrative Issues

One of the biggest challenges for all foreign assistance programs that are working to build institutional capacity in a recipient nation lies in creating decision-making and administrative systems that can sustain the program's activities on into the future. Such institution building is widely recognized as the biggest challenge in foreign assistance and there are many failures. Those that control the funds of a program usually have the power to control the agenda. This leads to the crucial issue of "program ownership." It is widely recognized that the sustained success of programs initiated by international donors, particularly when the goal is to instigate a complex societal process like improved resource management, lies in the degree to which such initiatives are "country driven." A popular strategy is to frame such initiatives from the outset as a partnership between donor and recipient institutions. This model is a prominent feature of the three Sida/SAREC Marine Science Programs. In this section, we consider the current administrative and financial issues within the three programs in the context of the broader implications that they have for program ownership and therefore the eventual sustainability of these important initiatives.

The Tanzania Bilateral Program. Sida/SAREC have been investing heavily in Tanzania for more than a decade. The Bilateral Program with the University of Dar es Salaam currently totals some $37 million SEK per year. Approximately 8 percent of these funds are dedicated to the Marine Science Program. Efforts to reform the administrative and strategic planning process for research at UDSM were initiated in 1993. The University has conducted an academic audit, a new University Bill is being considered by Parliament and a Strategic Plan for the University has been formulated. A number of donors are funding various programs at UDSM and there has been a parallel effort to coordinate these activities around a common institution-building agenda. All of these efforts have consumed much time and energy across the University particularly within IMS since it is a major beneficiary of Sida/SAREC funding. It is essential to place current administrative and financial issues affecting the Marine Science Programs at UDSM in this broader context. IMS is viewed by Sida/SAREC as an exemplary example of a successful partnership. IMS is widely perceived as a well-managed organization that skillfully utilizes its resources.

One of the elements of attempts to build a research management system at UDSM has been to channel all Sida/SAREC funds to a single University Support Program. Before 1998, Bilateral Program funds were channeled directly to individual departments and institutes. The work plans

that govern how funds for individual elements of the program will be allocated were developed by each program's coordinators at UDSM and their partner Swedish institutions. The new system, however, has created a number of problems that have not yet been resolved. The most pressing issue is that there have been lengthy delays in the transfer of funds with the University. This has been a major disruption to activities at IMS. Graduate students interviewed by the evaluation team, both at IMS and on the main campus, were highly concerned by the delays that they were experiencing in receiving financial support. Much effort is being put into the preparation of semi-annual progress reports, financial reports and proposed work plans. The detail and complexity of these documents is a very major burden on the IMS Director and his small administrative staff. There is an urgent need to simplify UDSM internal reporting requirements and to place greater emphasis on assessing and rewarding performance. Since the Sida/SAREC funding is administered through a three-year cycle, such simplification should be readily achievable.

One very positive result of the ongoing institutional transformation program is that the Bilateral Program has funded a Faculty Core Support Program that provides small research grants to faculty staff. Each participating department or institute allocates its annual allotment through its Research and Publications Committee. In 1998, the IMS Research Publications Committee approved $30,000 in research grants. This was distributed in the form of one-year grants of up to $6,000 each. The Faculty Core Support Program is extremely important to the resident staff of researchers at IMS since it is the only source of funds that can be directed at the Institute's own research agenda. The modest size of individual grants limits the scale and significance of the research that can be undertaken.

The Mozambique Bilateral Program. The Swedish Coordinator of the marine science element of the Mozambique program has been managing this initiative since 1983. It is clear that this program is characterized by a very close relationship between the Coordinator and the group of faculty supported by the program at the UEM Biology Department. The program has been sustained through a vicious civil war and is succeeding in creating a dedicated core of researchers in the department and a viable research station on Inhaca Island. The efforts of the Swedish coordinator for this program have been remarkable and much of this program's success can be attributed to the skill and tenacity of his leadership. The administrative and financial issues identified as a major concern in the 1996 evaluation have apparently all been resolved.

The Regional Program. In contrast to the Tanzania Bilateral Program, Regional Program funds continue to flow directly to IMS that in turn administers their distribution within the Institute and collaborating departments on the mainland. An exception is the environmental economics component in which funds are channeled directly to the department. By all accounts, the IMS administrative procedures are efficient and highly professional. Financial records are audited annually. Both East African and Swedish participants in the program appreciate the flexibility with which funds are allocated and disbursed. Other differences between the Bilateral and Regional Program include the ability of the Regional Program to make expenditures in any country. This, for example, permits IMS researchers to analyze samples outside of Tanzania, a flexibility that is not permitted under the guidelines of the Bilateral Program. The major difficulties examined in the 1996 evaluation concerning the disbursement of the MARG funds administered through IOC have been resolved by channeling these funds to WIOMSA through SWEDMAR.

According to some Swedish participants in the Regional and Bilateral Programs, coordination between the two is less than optimal. At IMS, considerable efforts are being made to make decisions as a team and there is a clear desire to encourage interdisciplinary research. It would appear that the administrative arrangements for this program were fully appropriate at the start of capacity-

building initiatives that focused on supporting graduate studies. In our judgment, these arrangements need to be revised to take full advantage of research capabilities that now exist in the region.

3.5.4 Government Counterpart Support

The team was told that in Tanzania the general level of government support is improving. This is supported by Table 3.9a in the IMS Five-Year Strategic and Operation Plan, which shows a steady increase in government support to IMS from 47,936,000 Tshs. in 1991/92 to 172,601,000 Tshs. in 1996/97 (in current Tshs.). Beginning in academic year 1998, the University of Dar es Salaam began to receive quarterly installments of support (previously monthly) and a "warrant of expenditure" indicating committed funding support for the remainder of the year. This has been a very big improvement for institutional management and planning.

3.5.5 Cooperation between East African and Swedish Universities

The three Marine Science Programs have succeeded in creating a number of close relationships between East African and Swedish universities. There are several instances of close professional relationships between Swedish and East African scientists that have made the transition from one of senior professor and student to collaborating colleagues. Sida/SAREC's investments have clearly benefited both parties. An impressive number of East Africans have earned advanced degrees and their home institutions have been greatly strengthened through the funding of equipment and investments not only in academic degrees but in the administrative and technical services that are essential to the success of a research program. The international standing that IMS now enjoys as reflected by the funds it receives from a variety of donors and the growing number of visiting scientists that it hosts is a testament to Sida/SAREC's investments in institution building. Similarly the Inhaca Research Station in Mozambique is well on the way to becoming a smaller, but viable institution. Major logistical and technical difficulties have been overcome and the station is now supporting the research activities of both Mozambican and a growing number of international researchers.

From the perspective of Swedish researchers, the Marine Science Programs have provided new research opportunities that have resulted in numerous publications and a sustained flow of graduate students. It has generously funded their time and their travel to participating countries. In the case of the Regional Program, some of the Swedish research coordinators have had all, or major portions of their salaries funded by the program for almost a decade.

Participants in the programs in both East Africa and Sweden have noted the importance of the relationships that have developed among young Swedish and East African student researchers. The Swedish Minor Field Study Program has introduced many Swedish undergraduates to tropical settings and in a number of instances this has had a major influence on their subsequent careers. The Swedish "Applications Program" provides another source of funds for established researchers wishing to work in the tropics. The numbers of both Swedish and East African researchers now operating in the region make it clear that more could be done to instigate interdisciplinary research. It is also clear that there is an urgent need to provide additional mechanisms for funding the research activities of the East African scientists who have completed their graduate degrees and are now eager to address the issues that are so important to the future of their home countries.

4. Instigating Integrated Coastal Management at the Regional Scale

4.1 Science as the Foundation for Improved Coastal Governance

One of the major features of the Regional Program is a sustained effort to develop capabilities in the marine sciences and reliable scientific information as the basis for improved management and sustainable development. In this chapter, we examine efforts to instigate improved governance by applying a conceptual framework laid out in the Sida-supported document, *A Manual for Assessing Progress in Coastal Management* (Olsen et al. 1999). This conceptual framework initially put forward by GESAMP (1996) distills out from worldwide experience in the practice of integrated coastal management (ICM) the sequence of steps or phases that characterize the learning process of institutions and the societies they serve.

The Sida/SAREC Regional Program has chosen to focus its efforts at instigating progress towards more effective coastal management at the regional scale. Three strategies have been pursued:

(1) To sponsor workshops at which marine scientists can identify major resource management issues that are being produced by the accelerating process of anthropogenically driven ecosystem change. These workshops are designed to produce "initial national agendas" for integrated coastal management.

(2) To sponsor a sequence of ministerial conferences at which the concerns and insights of the scientific community can be discussed with high level policy-makers and, it is hoped, the political will and commitment is generated to advance coastal management initiatives throughout the region.

(3) To invest in public education, awareness building, information exchange, and training activities that will support strategy (1) and (2).

The ministerial conferences have been scheduled to occur at three-year intervals with the Arusha Conference in 1993, the Seychelles Conference in 1996 and a final conference in Maputo in 1999. The ministerial conferences have been envisioned as the milestones at which progress at the national and regional scale will be assessed and agendas for the subsequent three years will be formulated. A feature of these strategies is that investments in ICM itself have been made primarily at the regional scale through the conferences and supporting workshops. Smaller investments, in the form of training and workshops, have addressed ICM at the national scale. No investments have been made to support ICM initiatives at the local scale where a number of other donors are investing in community-based coastal management.

Securing High Level Statements In Support of Integrated Coastal Management. The 1993 Regional Workshop and Ministerial Conference was held in Arusha, Tanzania. The timing of the first regional conference was propitious since many of the ministers who attended had participated the previous year in the Rio Conference on the Environment and Development (UNCED). The ministers saw the Arusha Resolution as a means for responding to UNCED's Agenda 21 that calls for coastal states to "commit themselves to integrated management and sustainable development of coastal areas in the marine environment under their national jurisdiction."

The Arusha Resolution was endorsed in a spirit of optimism and high expectations. It sets forth 16 principles that reflect the priorities for reforms to how coastal areas are utilized and administered called for by Agenda 21. If they were to be made operational in any nation, the result would be

policy reform on a major scale. The Resolution does not attempt to offer guidance on how to sequence progress toward such ambitious goals nor does it suggest specific strategies or targets that could be used as a basis for evaluating progress. In terms of the ICM cycle, the Arusha Resolution can be considered as an example of Step 1 (issue identification and assessment) at the regional scale.

Progress Between the First and Second Ministerial Conference. Between the first and second Ministerial Conference, the Regional Program also provided funding for a series of national workshops that were designed to produce initial national ICM agendas. The results of these workshops are contained in a number of documents and are elegantly summarized in an attractive series of booklets entitled, Integrated Coastal Zone Management in…. These can be considered the "coastal profiles" and an initial basis for national "action plans." They integrate existing information on trends in the condition and use of the coastlines of each nation and contain case studies of geographically defined areas of particular concern.

These documents can be considered as examples of Step 1 at the national scale. They identify issues – but seldom stakeholders – and in varying degrees select the issues and/or the geographic sites where a program of research and planning might be initiated. This is the threshold for Step 2.

The Second Regional Workshop and Ministerial Conference. The technical workshop that preceded the Second Ministerial Conference was held in Tanga early in 1996. The workshop participants examined the progress and the lessons that were emerging from a number of coastal management initiatives at the community level in several nations. At this scale, considerable progress was being made. The workshop participants also assessed progress in ICM at the national scale. Here, there was as yet little progress. This, however, was hardly surprising since follow up among the ministers since Arusha had not occurred and no funding for ICM initiatives at the national scale had been available by national governments or donors.

As reported in the volume *The Journey from Arusha to Seychelles* (Lindén and Lundin, 1996) and summarized in an article featured in the June 1997 issue of *Ambio*, the conference focused upon progress at the national scale as called for by the 16-point Arusha Resolution. Progress on each point was rated on a 10-point scale that translated into ratings of "poor," "needs improvement" or "adequate." With very few exceptions, progress on each resolution was rated as "poor" or as "needs improvement." This analysis created the impression that those who had attempted to respond to the Arusha Resolution had failed to achieve any meaningful progress. The problem with this approach is that it presumes that progress on the targets set by the Resolution is feasible at a national scale within a three-year period. Worldwide experience suggests that such expectations are unrealistic.

Activities Following the Second Ministerial Conference. This period coincides with Phase II of the Regional Program. New strategies were adopted for this period that were designed to avoid repeating what had been judged as less than satisfactory progress in the period between the first two ministerial conferences. The heart of the new strategy has been to establish and fund an independent secretariat associated with the Minister of MICOA of Mozambique who agreed to be responsible for bridging activities at the ministerial level between the second and third conferences. The goal of the Secretariat for Eastern African Coastal Area Management (SEACAM) is:

> *To assist Eastern African coastal countries to implement and coordinate coastal management activities in the region following up on the Arusha Resolution and the Seychelles Statement on integrated coastal zone management.*

An initial work plan was developed at a workshop in October 1997. Capacity building and information dissemination were identified as priority needs. Within capacity building, four themes were selected:

(1) Environmental assessment and planning techniques for tourism and mariculture

(2) Public sector strategic planning and intersectoral management

(3) NGO capacity building

(4) Sustainable financing.

Draft and final drafts of technical documents on environmental assessment of tourism and mariculture have subsequently been prepared, and a manual has been published on NGO management of local level projects. Activities in the areas of public sector management and sustainable financing will begin later this year. The quality of the SEACAM work in terms of technical reports, publications, and information dissemination is widely viewed as very good. Sida/SAREC has supported the Secretariat's core operating costs. In 1998 and 1999, this amounted to $122,000 and $164,700, respectively. Sida/SAREC also provides funding for specific activities – about $70,000 in 1998 and $31,000 in 1999.

The Secretariat has been successful in raising additional donor support for its activities. This is a catalytic effect of Sida/SAREC core support. In 1998, the World Bank approved a grant of $396,000 to support SEACAM's capacity-building activities and the East African Coastal Management Database. Most of this will have been spent in project activities by the end of this year. SEACAM also receives funding from Danida (through Danida's grant to the Coastal Zone Unit of MICOA), IUCN, the Indian Ocean Commission, GTZ, UNESCO/IOC, and the British High Commission, Pretoria.

It must be recognized that the regional context for ICM is today very different from the situation in 1993. The Rio Conference marked the beginning of a surge of interest in ICM. Many donors are now investing in coastal management initiatives and there is a growing proliferation of conferences, workshops and training courses. The Arusha Conference was the first of its kind in East Africa but subsequent Sida/SAREC-sponsored ministerial meetings are being eclipsed by a number of similar events often with seemingly identical objectives. The Nairobi Convention was ratified in 1996 and provided for the formal adoption of the East Africa Action Plan that had been developed a decade before. The Action Plan triggers a number of projects administered by the UNEP Regional Seas Program that may be funded and implemented by a diversity of donors. Since the Nairobi Convention is a legally binding document, it constitutes a formal commitment to ICM (Step 3).

The third and final meeting in the Arusha sequence has been postponed and is now tentatively scheduled for May 2000. A SEACAM Planning Team is holding meetings with Mr. Alfredo Massinga of the Coastal Zone Unit of MICOA, the Ministry headed by Minister Farash. It is anticipated that a technical workshop will once again precede the Ministerial Conference. Specific objectives and agendas for these events are yet to be developed. Given the large number of similar events that have taken place since the Seychelles meeting and are expected to continue over the next several years, it will be a challenge to design an event that will significantly enhance the exchanges and resolutions that have already been made.

4.2 Regional Activities of the Intergovernmental Oceanographic Commission

According to the IOC 1997–1999 Work Plan, "the ultimate goal of the IOC/SAREC marine science program is the development of sufficient capacity to ensure the sustainable management of the coastal zone in the West Indian Ocean region." The IOC intergovernmental regional subsidiary body establishes regional priorities and needs through meetings that are held every three to four years. The most recent was in 1997 and the next will be in 2000. The 1997 meeting was held in Mombassa and was attended by 70 national representatives. Together they developed a detailed five-year work plan (1997-2001) that would require $3 million to implement.

This element of the program has evolved through a sequence of phases that parallel, but are somewhat different from, those of the Sida/SAREC Regional Program described in Section 1.2. Phase I featured needs assessments – the first of which was conducted in 1977 – and an Action Plan that was formulated in 1989. Phase II was devoted to capacity building in the marine sciences, communications and information dissemination. This second phase was implemented between 1990 and 1995. During this second phase, the IOC program trained over 100 young scientists in such topics as marine pollution, sea level change, nutrient analysis, remote sensing, bathymetry, aquaculture, coastal erosion, biochemistry, data management and information management. The third phase of the IOC component (1997–99) also continues to support human capacity building, information dissemination, and public awareness.

The IOC's program for 1997 through 1999 is divided into five main components:

(1) Training, including both short-term training courses, seminars, workshops and study grants
(2) Science Programs, that provide equipment, operational support and information services
(3) Marine Research Grants that are awarded to individuals through WIOMSA (This element was transferred to SWEDMAR in 1998.)
(4) Regional and international collaboration
(5) Communication, data, information and awareness

The Sida/SAREC Regional Program has contributed $300,000 annually to these programs.

Much of the IOC-SAREC Marine Science Program is implemented through regional workshops, seminars and training courses. These are listed below for 1997 and 1998.

Event	Description
National Seminar on Coastal Erosion, Mobasa, Kenya, June 1997	Review of existing knowledge on the problem of coastal erosion and consideration of mitigation actions.
International Seminar on "Man and Coral Reefs," Madagascar, October 1997	Awareness raising seminar on the ecological, economic, and social role played by reefs.
Workshop on Land-Ocean Interaction on the Coastal Zone (LOICZ) of the East African Region, Mobasa, Kenya, March 1997	Workshop to draft a five-year Marine Science Plan for the Eastern Africa region to contribute to the coastal zone module of the Global Ocean Observing System (GOOS) and the implementation of LOICZ activities in Africa.
Regional Workshop on Data Management, Mombasa, Kenya, December 1997	Workshop on oceanographic data collection and storage. Attended by 19 participants.
Second Regional Workshop/Training Course on Ocean and Marine Data Management, Cape Town, South Africa, 1998	Workshop on ocean data management and display.
Workshop on Potentially Harmful Marine Mircoalgae in East African Waters, Zanzibar, February 1999	Workshop on the practical aspects of algal identification.
Regional Workshop on Guidelines for Assessment, Monitoring and Management of Physical Shoreline Changes of the West Indian Ocean Region, Maputo, Mozambique, December 1998	The workshop developed practical guidelines that are to be published for studying shoreline change.
Regional Training Course on Seagrass Mapping using Remote Sensing, Zanzibar, November 1997	Use of satellite imagery for identification of seagrass beds in shallow marine waters. Attended by 8 scientists.
Training Course on the Global Sea Level Observing System, Cape Town, 1998	Two-week training course on sea level science and the relation of sea level to climate change and oceanography. Attended by 19 participants from 11 African countries.
Postgraduate Course in Tropical Coastal Ecology, Management and Conservation, Mombasa, Kenya, 6 July–20 August 1999	Organized by the University of Nairobi and the Kenya Marine and Fisheries Research Institute. There were nine students from 5 East African countries.
Training Course in Integrated Coastal Area Management, Mombasa, Kenya, 1–12 March 1999	The IOC-SAREC Marine Science Program supported 5 participants in the intensive course for practitioners, implemented by the Coastal Resources Center of the University of Rhode Island.

From the perspective of those interviewed for this evaluation in Tanzania, the IOC's activities are regarded as useful. The regional meetings are important gatherings of marine scientists that permit the development of an agenda in support of the marine sciences that reflects the views of scientists who attend as representatives of their countries. Many of the IOC's publications and training courses are considered to be of good quality and useful. On the other hand, the IOC's administrative procedures have proved to be very complex. This has been a major issue for WIOMSA which, from 1994 through 1997 received its support from the Regional Program through the IOC.

4.3 Public Education

At the initiation of the Regional Program, the absence of a field guide to the seashores of Eastern Africa was identified as a significant impediment to both research and public interests in the coastal environment. Work towards the production of *A Guide to the Seashores of Eastern Africa* was initiated as a special project in 1993. Arrangements were made for an English graduate student to lead the project as a member of the UDSM faculty. The project took considerably longer than anticipated and the volume was not published until late 1997. The result is a world class volume with beautifully prepared color plates and almost 450 pages of text. It was produced at a total cost of approximately 200,000 English pounds. The volume is selling well and should be a reference document for many years to come.

Following completion of the Guide, a Marine Education Awareness and Biodiversity (MEAB) Programme that was initiated in 1997 was reactivated. The MEAB Programme is funded primarily by the Regional Program and is conducting a number of educational activities and socioeconomic research in Tanzania. The educational activities include a number of activities for school children on Zanzibar and the renovation of the IMS Museum. The evaluation team noted that there is apparently little effort to combine MEAB activities with the Marine Education, Extension and Development (MEED) Unit sponsored by IMS. Both MEED and MEAB are engaged in activities for school children, the production of educational videos and extension activities.

4.4 Dissemination of Program Learnings and Results

The Regional Program has produced an outstanding record of the scientific research and the political process that it has catalyzed. A series of well-written and attractively produced documents have been widely disseminated, both in the region and internationally, that present and analyze the events that culminated in the Arusha and Seychelles Ministerial Conferences. These books have been summarized in lead articles in the journal *Ambio*. They are supplemented by country profiles of coastal management issues and initial thinking on how they should be addressed. The major findings of the research undertaken through student thesis projects have been presented in special issues of *Ambio*. Editing and producing all these documents has been a major undertaking led by the program's Swedish coordinator and has brought international recognition to the program.

5. Strengthening Institutions in the East African Region

5.1 University of Dar es Salaam

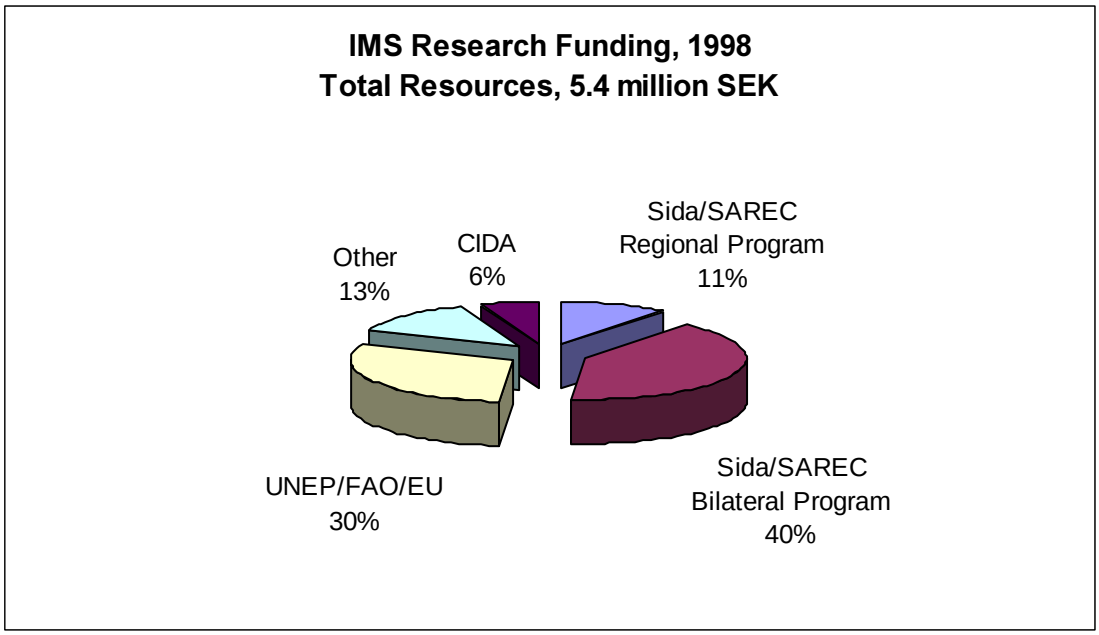
5.1.1 Institute for Marine Sciences

The principal target for institution building in Tanzania is IMS. As an institute, IMS is devoted to research rather than teaching. When the Bilateral and Regional Programs got underway a decade ago, IMS had suffered a serious decline from an earlier period when it was recognized as a fisheries institute of international significance. A primary initial goal of the SAREC program was to diversify research interests and capabilities from fisheries to the full range of natural and social sciences required to address important coastal and marine issues. IMS is viewed as a regional Center of Excellence. It is attracting postgraduate students from other nations in the region as well as Sweden and its senior researchers are being invited to teach at regional universities. IMS staff participate and present papers at important regional gatherings such as the 1998 Pan African Conference on Sustainable Integrated Coastal Management. Staff and their area of specialty are listed below:

Living Marine Resources and Ecology: Three Ph.D. and three M.Sc. researchers specialized in fisheries biology and management, marine chemistry, marine botany, marine ecology and plant physiology.

Chemical and Environmental Marine Sciences: One Ph.D. and two Ph.D. researchers specialized in nutrient dynamics, marine pollution and marine chemistry.

Physical and Applied Marine Sciences: Five Ph.D. and two M.Sc. researchers specialized in marine civil engineering, physical oceanography, geochemistry, ocean circulation and sediment dynamics.



The figure above shows research funding at IMS in 1998. By far the largest share comes from the Sida/SAREC Bilateral Program that is devoted primarily to thesis related research. Only 11 percent comes from the Regional Program. A large element is comprised of funds from UNEP, FAO and the European Union totaling 30 percent that is directed at projects investigating land based sources of pollution to coastal waters. Another major project, funded by UNEP has been for the preparation of a strategic action plan for the coastal and marine environment of the Western Indian

Ocean. This was a complex project that involved two meetings at the ministerial level to agree upon an approach to a regional initiative to be submitted to the GEF fund for international waters.

In a given year IMS hosts approximately six Swedish undergraduate students through the "minors program" and two to four senior scientists typically spend several weeks or months at IMS.

Besides working in cramped, rudimentary quarters the IMS resident staff have considerable difficulty in accessing funds to support their own research interests. The current sources of institutional or core support are as follows:

(1) In both 1998 and 1999 IMS has received $30,000 in University faculty support (also termed core support) from a fund provided by the Bilateral Program. This fund is distributed by the University's Publications and Research Committee. Funds are allocated in proportion to the number of Ph.D. staff in a unit. Within each department or institute a P and R Committee solicits proposals and selects those it judges to be most deserving.

(2) The Bilateral Program has an annual line item of $5,000 that is also for "core support to senior researchers" (not students). These funds are very useful because they can be spent outside Tanzania, for example for sample analysis in another country.

(3) The Regional Program also provides for a Marine Research Grant Program (MARG) administered by WIOMSA. These are for up to $6,000 per year and can be renewed for a second year. Both students and senior researchers compete for these funds. In 1998 $34,000 in MARG grants were awarded.

The senior staff at IMS has developed a research program that is directed at what they perceive to be important topics. This research was presented to the evaluation team on May 21. These activities demonstrate the IMS commitment to conducting research on significant social and environmental topics. Some elements of this program are supported by Sida/SAREC funds.

Living Marine Resources and Ecology. Three projects are underway that address:

- Seaweed farming
- Pilot experiments in pond mariculture
- Artisanal fisheries

Research on the seaweed growing industry is supported by bilateral Sida/SAREC funds. The cultivation of a species of red seaweed as a source of karrageenan has become the second most important contributor to Zanzibar's GDP. In 1998 5,700 tons of dried seaweed worth 550 million Tsch were exported. The industry involves some 30,000 people, primarily women, and has become a very important source of income to poor families. The project's objectives are to minimize societal conflicts arising from seaweed farming and provide technical support that can contribute to a sustainable industry.

IMS researchers have been involved in the diagnosis of disease problems and in advising prospective growers on the mainland on suitable sites. Researchers are very knowledgeable about the factors that affect seaweed production and hopes to explore the potential for cultivating other species.

The second initiative is developing a pilot mariculture project that features a cascade system of fish-shellfish- algae in small ponds. A major feature of this pilot is to develop mariculture techniques that are environmentally friendly and minimize the potential for nutrient loadings to adjacent waters. Major strides have been made in raising rabbit fish but there are unresolved problems with

the algae and shellfish components of the system. This project is being conducted in collaboration with Israeli researchers.

The third initiative in the Living Resources component is being funded by Canadian Cida through the linkage program with the Memorial University of Newfoundland. It is generating detailed baselines for a three year period of the fisheries of villages on the east and west coasts of Zanzibar. Coastal fisheries in Tanzania have seen a dramatic decline in catch per unit of effort in recent years and this is viewed as one of the most urgent issues that a research program should address. On Zanzibar the annual landings have declined from an estimated 600 tons in 1993 to 93 tons in 1998. Last year's poor catch is believed to be strongly influenced by El Nino conditions that exaggerated the long-term decline.

Chemical and Environmental Studies. This program is supported largely by projects related to land based sources of pollution funded by UNEP, the European Union and FAO but also relates directly to the mariculture activities described above. Dr. Mohammed's Ph.D. thesis addressed nutrient dynamics in a mangrove creek adjacent to Chwaka Bay on Zanzibar. Subsequent studies are establishing baselines for the concentrations of nutrients in waters off Zanzibar town that may help estimate the impact of investments in an improved sewer system. Other work is investigating nutrient levels and pesticides in groundwater and their potential impacts on the marine environment.

Physical and Applied Sciences. This program is addressing the distribution of pollutants from outfalls and potential oil spills, hydrodynamics and sedimentation processes in estuaries as well as coastal erosion processes. This program is poorly funded and this is a source of considerable frustration to the large team of physical oceanographers now present at IMS.

Marine Affairs. The program's major undertaking thus far has been the formulation of the Marine Education and Extension Development Unit (MEED) that has been funded primarily through the linkage program with Memorial University of Newfoundland. It has produced a series of 35 videos on marine and coastal topics. These have been used in school programs and aired on Tanzanian television. The unit has also produced educational materials for use in Zanzibar schools and provides editorial and document production services to all IMS staff.

5.1.2 The Department of Botany and the Department of Zoology and Marine Biology

The Marine Science Programs have also strengthened the Botany and the Zoology and Marine Biology Departments on the main campus of UDSM in Dar es Salaam. The initial priority was to build up the staff and improve facilities in the Botany Department. The Botany Department suffered severe losses in its faculty beginning in the mid 1980s when governmental funds to the University were sharply reduced. Initially, the students supported by the Marine Sciences Programs were placed administratively within the Department of Zoology and Marine Biology. In the early years, students focused their research on Chwaka Bay and its environs on Zanzibar. More recently, students enrolled in both departments have worked on projects on the mainland coast as well.

5.2 University Eduardo Mondlane and the Inhaca Marine Research Station

The Marine Science Program has rebuilt both the Biology Department at UED and the Inhaca Marine Research Station in the face of the disastrous consequences of a prolonged civil war. When the Bilateral Program got underway in 1985, there were no students enrolled in the Biology Program. Today, the Department has a dedicated faculty and a student body of over 150. This faculty has been supported through both its undergraduate and graduate studies by the Program and they today maintain a diversified and active research program as well as a heavy teaching load. The

Inhaca Marine Station had suffered an even more dramatic decline than IMS when the SAREC program got underway. It is now once again a viable facility that supports a diversity of research activities conducted by both Mozambican and foreign researchers.

5.3 Western Indian Ocean Marine Science Association (WIOMSA)

The Western Indian Ocean Marine Science Association (WIOMSA) is a non-governmental and non-profit organization dedicated to promoting the educational, scientific and technological development of all aspects of marine sciences throughout the Western Indian Ocean region with a view to sustaining the use and conservation of its marine resources. It was established in 1992. WIOMSA membership has grown from about 200 by the end of 1995 to about 500 at the end of 1998.

The Secretariat of WIOMSA is housed in a cramped office at IMS. The Secretariat is comprised of three part-time individuals. At the outset there were problems in the timely delivery of funds provided by the Regional Program that were administered by the IOC. These problems have been resolved since 1998 when funding was channeled through SWEDMAR.

The major activities of WIOMSA are its Marine Research Grant Program (MARG) and Scientific Bulletin, the organization of workshops and training courses, and networking among members and other regional partners. The costs for carrying out these activities are shown in Table X below:

Year	MARG Grants ($US)	Secretariat Costs ($US)
1996	No figure available (administered by IOC)	$15,000
1997	No figure available (administered by IOC)	$24,000
1998	$34,000	$46,000 (includes $11,000 for Scientific Bulletin)
1999	$22,829	$43,436

There are three kinds of MARG grants:

MARG-I These grants are given to individual scientists to carry out research activities in their national institutions.

MARG-II These grants are awarded to individual scientists to carry out research activities in other institutions within the WIO region for the purpose of sharing or gaining technical experience as well as data processing and manuscript write-up.

MARG-III These grants provide travel support to individual scientists to attend scientific meetings and conferences.

In the period 1997 to present, 22 MARG grants were approved (9 MARG-I, 1 MARG-II, and 12 MARG-III). Individuals and topics for the research grants (MARG-I and II) are listed below:

Individual and Institution	Topic
Ms. A. Khatib, Department of Environment, Zanzibar	Sea turtle research on Unguja Island, Zanzibar
Mr. O. Ogola, Kenya Marine and Fisheries Research Institute, Kenya	Nitrogen fixation in tropical mangrove sediments
Mr. B. Mwashote, Kenya Marine and Fisheries Research Institute, Kenya	Analysis of cadmium and lead in sediments
Dr. A. Muzuka, IMS	Stable isotope composition of sedimentary organic matter in Tanzania coastal waters
Dr. Y. Mgaya, Department of Zoology and Marine Biology, UDSM	Experimental spat collection and growing of the oyster *saccostrea cucullata*
Dr. J. Ranaivoson, Centre National de Recherches sur l'Environment, Madagascar	Research on Madagascar mangrove sites
Mr. H. Motongwa, Kenya Marine and Fisheries Research Institute, Kenya	Impact of bottom shrimp trawling in Mlindi
Mr. S. Mwachireya, Kenya Marine and Fisheries Research Institute, Kenya	Effect of oyster farming on the meiobenthos of Gazi Creek, Kenya
Mr. C. Magori, Kenya Marine and Fisheries Research Institute, Kenya	The hydrodynamics of a mangrove dominated estuary, Mtwapa Creek, Kenya
Dr. A. Dubi, IMS	The experience of Mautitius in coastal protection and monitoring of sea state parameters

MARG grants are competitive. Research proposals are reviewed and approved by the WIOMSA Board of Trustees.

WIOMSA has played a lead role in convening many of the most significant workshops on marine science and management in the region. In May 1997, WIOMSA held a Scientific Symposium in Mombasa, Kenya, with the theme "Advances in Marine Science in Eastern Africa: Application of Scientific Knowledge to Coastal Management." Connecting marine science to management has always been a focus of the Association. WIOMSA helped to prepare for the Seychelles Conference and was responsible for the Tanga Expert's Workshop that provided the assessments of progress in coastal management that were the primary topics discussed at the Conference.

In March 1998, WIOMSA in collaboration with SEACAM organized a Workshop in Zanzibar on "Local and Community Based Integrated Coastal Management: Lessons to Date." This event led to the conclusions presented in a lead article in *Ambio* in December 1998 entitled, "The Reality of the Stomach: Coastal Management at the Local Level in Eastern Africa." In March 1999, WIOMSA with the Coastal Resources Center of the University of Rhode Island and other regional partners delivered an intensive two-week training course in integrated coastal management for practitioners. The course was held in Mombasa and was attended by 28 practitioners from five countries.

Information dissemination and communications are a major part of what WIOMSA does. Since 1996, twelve issues of the WIOMSA Newsbrief have been produced and distributed, workshop proceedings and AMBIO articles are prepared, and WIOMSA material is displayed at major conferences. IOC and UNEP funds have also been channeled through WIOMSA to prepare reports on specific topics.

Now seven years old, and with a growing membership, WIOMSA is a relatively mature and well-respected regional science association. Like SEACAM, WIOMSA is attracting the interest of other donors seeking to support progress towards the more effective management of coastal resources in the region. For example, USAID has circulated a proposal to the WIOMSA trustees that would enhance core support and initiate a program designed to provide specialized training and an exchange program for coastal managers in the region. The proposal has been accepted by the Trustees and will likely more than double WIOMSA funding over the next several years.

6. Conclusions

6.1 Responses to the Recommendations of the 1995 Evaluation

6.1.1 Strengths of the Program in 1995

Both the bilateral and regional Sida/SAREC programs in the marine sciences were evaluated in December 1995. This mid-term evaluation was released in 1996. It concluded that the fundamental goals of the programs were being achieved and that the manner in which the programs were being implemented was sound. The evaluation found that major strides had been made in developing core groups of marine scientists in both Mozambique and Tanzania. The evaluators felt, however, that "a critical mass has not yet been established." They also found that the objective of promoting exchange and networking among scientists in the region had greatly improved. The programs were commended for the number and levels of training achieved and concluded that capacity building should continue to be the main priority in the subsequent phase.

The mid-term evaluation noted the flexibility and non-bureaucratic approach provided by the design of the Regional Program. The evaluators felt that this was a strength of the program during the initial years of implementation when adaptability to many challenges was required.

6.1.2 Responses to the Recommendations

The evaluators also made seven major recommendations for adjustments that they felt were needed during the next phase of the program. In this section, we assess the responses to these recommendations in Phase II of the Regional Program and within the continuing Bilateral Programs.

Recommendation 1: Design the second phase of the Regional Program through a logical framework analysis. The evaluation team was concerned by the absence of specific management objectives in the Regional Program. They recommended that a revised approach to program management and priority setting built around a logical framework analysis.

Response: In mid 1996, the coordinators of the Regional Program, including the national coordinators, met for a workshop in Sweden that investigated the usefulness of using computer-aided methods for the preparation of a logical framework. A brief report on this workshop suggests that the emphasis upon a computer-based methodology constrained a discussion of priority areas for research, specific objectives and the indicators by which future progress could be assessed. The workshop did not produce a management tool and had a negligible effect on the program's design and management.

Recommendation 2: Local financial management needs to be strengthened and decentralized. Administrative improvements called for by the evaluation included: providing greater control over research projects by those involved and strengthening and decentralizing financial management mechanisms in the East African institutions that benefit from the program's activities. The evaluation stresses the importance of developing an incentive system in the East African institutions that are being strengthened so that trained staff will remain working on important research topics. The evaluators noted "serious financial management problems at UEM in Mozambique."

Response: As discussed in Section 5.1, the Tanzania Bilateral Program has made a major effort to instill greater control and ownership of research funds within the University of Dar es Salaam. This is an important feature of the "university transformation" initiative. However, these efforts have created some new problems that at the time of this 1999 evaluation are being addressed but have not been solved. In both Tanzania and Mozambique, program resources have been used to train

administrative and technical personnel with apparently good results. In Mozambique, the problems that concerned the 1996-evaluation team have been successfully addressed and the disbursement of funds is proceeding smoothly. There has been no move to decentralize control over the financial resources of the Regional Program. The research funds are allocated to the various disciplinary groups by a predetermined formula that is constant from year to year. Some funds contribute to the operation of IMS, including the purchase of library materials. New elements have been added to the Regional Program when additional sources of funds have been secured by the Swedish Coordinator.

Recommendation 3: A greater emphasis must be placed on interdisciplinary research on priority resource management topics. The strongest recommendation of the 1996 evaluation was to improve the linkages between science and management. The evaluators called for harnessing the scientific capacity that had been created in the region to identify the priority management issues and the actions required to address them. Mechanisms were needed for research priority setting.

Response: As summarized in the University of Dar es Salaam's Proposal for Continuation (1998 – 2001), the evaluation's major recommendations for Tanzania all point to a recognition of the need for stronger linkages between science – society – and management. Specifically:

- An increased emphasis on interdisciplinary research
- A greater orientation towards strategic and applied research that will assist in solving coastal management issues
- Strengthening the linkages between the institutions supported by this program (IMS and the Botany Dept) and other institutions in Tanzania working on environmental issues
- Placing a greater emphasis on the capacity of the institutions involved to administer research programs and maintain the infrastructure that now exists.

It is clear that research areas that are guiding the activities of the core staff at IMS, as described in Section 5.1, are fostering interdisciplinary approaches to societally important issues. Thus, there is strong evidence of a desire to respond to this recommendation within the participating institutions in Tanzania.

In Mozambique, the scientists supported by the Bilateral Program are active participants in the growing number of donor-sponsored projects that are bringing together disciplinary teams to address important environmental management issues.

Recommendation 4: Capacity building should continue to be a major feature of the programs but with more emphasis on the social sciences. A concern for greater involvement of the social sciences in the two programs has been repeated since the workshop on coastal lagoons held in Mozambique in 1991. This point was also reinforced by Dr. Chua in his keynote address at the Arusha Conference.

Response: While the resource economics component of the Regional Program has made excellent progress in selecting a number of socially relevant thesis topics, the interdisciplinary dimension to such work remains lacking. The social anthropology component of the Regional Program has assisted a larger number of students during Phase II than Phase I. The social science that is perhaps most urgently required, however, is in the realm of institutional analysis, policy analysis, the preparation of model legislation and regulatory frameworks.

Recommendation 5: Mechanisms should be found for involving coastal stakeholders and responding more effectively to the needs of stakeholders in the resource management process.

Response: This recommendation can only be acted upon when the activities of the Marine Science Programs are directed at nationally and locally significant management issues within a problem-solving context. The IMS Research Program is attempting to make such links but these efforts receive very little financial or technical support from the Sida/SAREC programs. In Mozambique, the researchers supported by the Bilateral Program have excellent relationships with several governmental agencies. As this evaluation drew to a close the initiation of the Kunduchi Integrated Coastal Area Management Programme in Tanzania was approved by Sida. This area specific initiative had been designed with the participation of local and national stakeholders between 1994 and 1996. This initiative can provide a focal point for some future research activities.

Recommendation 6: Mechanisms for regional collaboration need to be carefully analyzed. The evaluators recommended a network of networks in the form of a "super WIOMSA" with a clear, research for management agenda that could attract support from the donor community and capitalize on the progress in capacity building that has been made. The evaluation proposes an expanded WIOMSA with related programs in research on ICM issues, policy and public awareness. This regional organization would mentor linked clusters of similar activities in each nation.

Response: There has been no major change in the Regional Program's support to WIOMSA during Phase II. The creation of SEACAM could be considered a response to this recommendation. There is, however, a real possibility that SEACAM and WIOMSA are or will be competing for the same sources of donor funding.

Recommendation 7: A new framework for the management of the program is needed that addresses mechanisms for instigating collaboration among Swedish and East African institutions and strengthens the linkages between science and management. Although the term "program ownership" was not used in the 1996 evaluation, it appears that the evaluators were concerned about this issue.

Response: While, as noted above, the Tanzania Bilateral Program has been working to address these issues directly, control over the Regional Program during Phase II appears to have become more centralized in the Program Coordinator. Relationships between Swedish and Mozambican collaborators through the Bilateral Program are excellent and have all the features of a true partnership.

6.2 Observations on the Cost-Effectiveness of the Program

Table 2 illustrates that program cost per student varies between the bilateral and Regional Programs. This, however, only provides comparative information and not information on specific program costs relative to "least" cost. As with any large project, there is always some room for improved cost efficiency that achieves the same results at a lower cost. A cost effectiveness analysis would require a separate study. Nonetheless, it is the impression of the evaluation team that overall program cost effectiveness is within normal bounds of good performance. It is perhaps within the research activities of the Regional Program where the greatest potential for enhanced cost effectiveness could be uncovered. In particular, the Marine Geology Regional Program stands out as the least cost effective when the evaluation criterion is the number of students trained in the program.

Cost effectiveness analysis must consider not only costs for immediate results, but also indirect program impacts. Indirect impacts include the role of Sida/SAREC investments in "leveraging" other donors into making investments in the region, and the societal benefits of the practical application of the knowledge gained and technology developed though the Sida/SAREC program.

The program has been highly successful in attracting other donors into the region to address coastal and marine topics. The ministerial meetings, the outstanding publication series and development of well-staffed and well-equipped research stations in Tanzania and Mozambique have drawn in investments from the World Bank, United Nations organizations, the EU and other bilateral donors. All coastal management initiatives in the East Africa region draw upon the Sida/SAREC foundation built by this Sida/SAREC program.

It is difficult to correlate with precision the contribution of the Sida/SAREC program to the development and adoption of new technologies, innovations and knowledge that improve societal well being. However, such benefits clearly exist. They may include, for example, improved productivity of coastal resources and local income and employment generation, reduced risk from natural hazards and loss of coastal property, improved coastal navigation, and reduced risk to human health from coastal contaminants. One of the most visible and immediate applications of capacity developed by the Sida/SAREC program is to the seaweed farming industry. The knowledge gained through the Sida/SAREC program is contributing to the success of this small but locally very important new form of mariculture.

7. Recommendations for the Next Phase

7.1 A Point of Articulation

The Sida/SAREC marine science programs in East Africa were initiated a decade ago. Their fundamental strategy has been to make a long-term commitment to capacity building to both individual scientists – by supporting them as they earn M.Sc. and Ph.D. degrees – and to selected institutions. This approach has succeeded in laying a foundation for the more effective management of coastal ecosystems. The Regional Program has also catalyzed high-level political commitments to integrated coastal management and promoted a much-needed dialogue between policy-makers and the scientific community. The accomplishments of these programs are drawing other donors into the region and there are now a growing number of initiatives at the regional, national and local scales working to promote the effective management of coastal resources as human activities intensify. The maturity of the program and its successes make the context very different today in 1999 from what it was when a marine science program was first discussed at the 1989 Dar es Salaam Workshop.

We recommend that the next phase of the Sida/SAREC marine science programs be framed as a transition to a new ten-year strategy. The emphasis should continue to be upon capacity building. In our judgment, however, the program has matured sufficiently to warrant a careful re-examination of the specific objectives of the Bilateral and Regional Program and adjustments to strategies by which objectives will be achieved. Such adjustments should (1) capitalize on the capacity and the experience that now exists in the region and (2) target Sida/SAREC investments so as to maximize their impacts within the growing number of research and coastal management-related initiatives in the region.

We recommend that future Sida/SAREC activities build upon the conceptual frameworks and experience that is emerging from worldwide experience. In its first decade of activities in East Africa, Sida/SAREC's investments were directed primarily at creating the capacity required to produce the reliable science-based knowledge. However, since capacity-building strategy has been directed at funding M.Sc. and Ph.D. students, the linkages between scientific disciplines and between science and the governance process have been weak. This may have been unavoidable in the initial phases of the program but should not continue in the future. In our judgment, the next generation of the Sida/SAREC marine science programs should be based on the following principles:

- The application of the principles of integrated coastal management to the design, implementation and analysis of governance initiatives at the regional, national and local scales. Practical experience around the world is producing valuable lessons on how integrative principles can be translated into effective actions.
- Where possible, future thesis research should contribute to interdisciplinary research programs designed to address clusters of resource management issues that have been defined with governmental agencies and community leaders.
- The initiative should be designed so that both scientific knowledge and emerging management practices can be nested across geographic scales.

7.2 Science for Improved Coastal Management

When a program in the marine sciences was first discussed at the Dar es Salaam Workshop in 1989, nearly all the few marine scientists present in the region had been trained in fisheries. The capabilities did not exist to conduct research on the many problems brought by rapidly mounting human pressures on coastal ecosystems. The situation in 1999 is dramatically different. Thanks to the marine science program, 29 East African scientists have earned degrees in disciplines that range across the natural and social sciences. Many more are expected to complete their studies in the next year. All thesis research has been conducted in the region. An urgent priority for the next phase of these programs should be to harness the capacity that has been created and support the interdisciplinary research that responds to such priorities as those outlined in the 1995 booklet on the Regional Program. The first step should be to formulate updated research agendas that are directed at priority management issues. Priority coastal management issues and the goals and strategies for addressing them should be developed through a consultation process involving governmental agencies, the research community, private sector interests and leaders of the ongoing local-level ICM initiatives. In Tanzania, a research agenda that responds to such management issues is being formulated with an interdisciplinary group of scientists many of who are based at IMS. Similar processes should occur in other countries in the region over the next several years.

The Regional Program. A critical mass of marine scientists has now been created in the region, at least in some of the natural science subjects Coastal management initiatives are underway at local, national and regional scales. Rather than continuing to support the studies of individual students we therefore recommend that the research funds in this element of the program be redirected to the support of interdisciplinary research teams that will address strategic elements of the coastal management agendas that are now emerging. This approach will require a new administrative structure based in the region that would oversee two types of activities:

(1) A competitive grants program. This would be organized on a two or three-year funding cycle and respond to the needs for new information and new knowledge required by the formulation of coastal management initiatives. Research projects would address a range of topics at different geographic scales. The program would retain the capacity-building theme that has characterized earlier phases of the Regional Program but would in the future emphasize interdisciplinary approaches and stronger linkages to priority, societal and environmental issues.

(2) A coastal ecosystem forecasting and monitoring program. This should be designed to document and analyze (1) long-term trends in ecosystem and societal change and (2) emerging coastal governance processes. Rather than a traditional monitoring effort, the first element should be designed to feature a forecasting capability that identifies, as hypotheses, the likely expressions and consequences of anthropogenic change and then gathers the information necessary to verify, reject or adjust such forecasts. This element is likely to entail modeling. It will be essential to target this element of the research program at a few priority management issues and avoid an overly complex, all-inclusive approach. One element of such a region-wide effort that is already underway is the CORDIO Coral Reef Monitoring Program that was launched in 1998 in response to reports of severe coral bleaching. If a larger effort was to be undertaken, the CORDIO Program would need to be integrated into an internally consistent approach that links to both management initiatives and assesses the impacts of such expressions of ecosystem change of coastal societies. The second feature of this program, the documentation and analysis of the unfolding governance process in the region should emphasize the analysis of experience in the practice of coastal management at different scales. This would encourage the efficient exchanges within the region and promote the replication of successful approaches to coastal management practice.

(3) Regional networking. In 1989, there was an urgent need for short courses, workshops and public education activities designed to create a climate for better resource management. A decade later, many donors are sponsoring such activities. The Regional Program should therefore focus its efforts on a few carefully targeted priorities that take advantage of Sida/SAREC's ability to make a long-term commitment to achieving an objective. Consideration should be given to linking public education and extension activities to the research and coastal management initiatives sponsored by the program. A "minor studies" program for selected East African undergraduates should be considered as a means for recruiting promising East African students into the program.

The Bilateral Programs. We recommend that these resources continue to direct at strengthening selected university units and funding candidates for advanced degrees. Here, too, however, some adjustments are in order. We are concerned about the absorptive capacity of the region for professionals trained in the marine sciences and recommend that Sida/SAREC conduct a needs assessment to estimate the future employment options for young professionals with M.Sc. and Ph.D. degrees. While the leaders of the disciplinary programs in Swedish universities would like to see a greater emphasis on Ph.D. candidates and fewer higher quality M.Sc. candidates, this may not reflect national and regional needs. If, for example, local governments take on significant responsibilities for coastal management, this could create a need for significant numbers of well-prepared professionals at the M.Sc. level. Where interdisciplinary research teams are mobilized with funds from the Regional Program, students sponsored by the Bilateral Program should, where possible, contribute to these initiatives. The capacity building goals of the Bilateral Program will be furthered if students have conducted their thesis research as an element of such interdisciplinary problem-solving initiatives. According to the Coordinator of the Mozambique Bilateral Program, the expectation is that program funds will be utilized primarily to support the research of the team of Ph.D. faculty members at EMU. This complements the approach we recommend.

7.3 Promoting Effective and Equitable Coastal Governance

The Regional Program has been highly successful in placing the urgent need for improved coastal management on the agendas of high-level policy-makers in East Africa. Following the Arusha Conference, the Nairobi Convention has entered into force and a number of donors and international organizations are sponsoring conferences, workshops and other events on coastal management. In this new context, we recommend rethinking the Sida/SAREC strategy for promoting high-level political commitments to ICM and a useful dialogue between scientists, managers and policy-makers.

Governance at the regional scale will be most effective if it creates a "forward pull" that guides and inspires action at the national and local levels. This will occur when specific goals for improved coastal management and coastal ecosystem qualities are agreed to and the milestones identified by which progress can be assessed. This requires making the transition from the endorsement of principles and statements of intent to commitments to measurable time-bounded objectives. For example, targets could be set within five to ten-year timeframes that address such specific topics as coastal erosion, nutrient loadings, nearshore fisheries, mariculture and coastal tourism.

We recommend that the discussion, and if possible, the endorsement of specific management targets at different geographic scales be made a central theme of the final Sida/SAREC-sponsored conference now scheduled to be held in Maputo in 2000.

Appendix 1: Terms of Reference

Evaluation of SAREC'S Marine Science Programs

(SAREC Marine Regional Programme in East Africa and SAREC Bilateral Marine Science Programme with Tanzania and Mozambique, Phase II 1997–1999)

1 Background

In 1989 SAREC launched a special initiative for marine research, in East Africa, South East Asia and the Caribbean. About 80% of the program activities are in East Africa. The purpose of this initiative was to increase the overall understanding of the coastal areas through increasing the marine research capacity in the area. The program has had two principal goals that are:

1) To strengthen the marine research capacity, and
2) To increase the understanding of integrated coastal zone management among policy and decision-makers through focused regional and international ministerial meetings.

Phase I of this program was completed in December 1996 and was evaluated in 1996. Phase II commenced in 1997 and will continue until December 1999.

The total disbursements for Phase II are 58 million SEK allocated according to the research council proposals 1995/96:8 point 3 and 1997:6 point 9. The three major administrating agencies are; Swedmar, for the East Africa component; IOC, for the Caribbean component; and the Coastal Management Center, for the South East Asia program. In addition to these, approximately 15 institutions in the South and 10 institutions in Sweden are, or have been, involved in the research co-operation.

The three major activities within the program are:

1) Research co-operation, including Ph.D. and M.Sc. training,
2) Strengthening and building of networks and course activities, and
3) Increasing the understanding among policy makers of the importance of integrated coastal zone management for the sustainable development of the region.

2 Purpose and Scope of the Evaluation

A new framework agreement, starting from January 2000, will be discussed by Sida and cooperating institutions and networks during 1999. It is therefore anticipated that an external evaluation of phase II of the Marine Science Program will serve as a foundation for the discussion and planning of the new program through giving ideas and recommendations for its scope and focus. As 80% of the program activities are implemented in East Africa through the Regional Marine Science Program and through the Bilateral Marine Science program in Tanzania and Mozambique, the evaluation will focus on this region.

3. The Assignment

Expected out-puts of the evaluation

It is anticipated that the evaluation will assess the effects and the relevance of the program in the East Africa region as well as in Sweden. The report is expected to contain the following:

- A brief description of the SAREC Marine Science Program in each country and region.
- An evaluation of all the projects included in the program with a summary of "lessons learnt"

· Recommendations regarding the specific program and project components that can serve as indicators for the design and composition of a future Marine Science Program for the period 2000–2002.

Issues to be covered

The primary focus of the evaluation shall be on the impacts of the program in terms of increased capacity at research- and policy-maker level. The evaluating team shall attempt to answer the following questions:

1) Does the program produce relevant and tangible results?

   A) What impact has the program had on;

   · The resource base in the region, i.e. the number of persons with marine research capacity compared with at the start of the program?

   · The general attitude of the marine science community in both the region and in Sweden, the policy makers that form the target group for the scientific results and the local communities affected by the changing conditions of the marine ecosystems (hereinafter referred to as the stakeholders) as well as at Government level in the targeted regions?

   B) What has the outputs of the program been with regards to;

   · The number of Ph.D. and M.Sc. students,

   · The number of published scientific articles,

   · Workshops, seminars, conferences.

2) How has the research been implemented? Look at:

   A) The difference between the applied sciences and the basic sciences.

   B) Links between science and management issues.

   C) The integration between all relevant fields of research (biology, resource management, economy, social sciences etc.)

3) How well are the supported institutions and Universities functioning?

   A) Are they fulfilling their role as administrative, supporting and funding agencies?

   B) Is there incentive to continue the co-operation between institutions in the South and in the North?

4) Has the program been cost effective in its implementation?

5) Has the program projects followed the recommendations that were put forward in Sida Evaluation 96/35 of the SAREC Marine Science Program?

It would also be of interest to draw attention to any linkages made with other Departments within Sida as well as with other donors for the purpose of the Sida marine and coastal initiative.

4 Methodology, Evaluation Team and Time Schedule

Dr. Stephen Olsen and Dr. Jim Tobey from the Coastal Resources Centre (CRC) at the University of Rhode Island are in charge of the evaluation. Their work will be supplemented by; Elin Torell from CRC who will assist the team with translations and logistics for their visit to Sweden and a local associate in Tanzania. Dr. Olof Lindén, the scientific coordinator of the regional marine program, will provide the evaluation team with all relevant documents that are to be reviewed by the evaluation team. These documents will be handed over to the evaluation team in February.

Name	Total time	Task
Dr. Olsen	6 weeks	Preparation, document review, visit to Tanzania and Sweden, reporting
Dr. Tobey	6 weeks	Preparation, document review, visit to Mozambique and Sweden, reporting
Elin Torell	10 days	Document reviews, translation, logistics for team visit to Sweden
Local Associate	5 days	Facilitator during discussions in Tanzania

The evaluation team shall try to visit as many of the involved institutions and researchers as possible, and reasonable, during May 1999. Researchers, involved stakeholders and administrative staff shall be given opportunity to contribute to the evaluation through interviews and meetings. The team shall attempt to visit the following institutions and secretariats:

- Institute of Marine Science and the Department of Botany at the University of Dar es Salaam,
- Faculty of Science and the Department of Biology at the University of Mondlane,
- Department of Zoology and the Department of Botany at the University of Stockholm,
- Dr. Lars Hernroth at "Havsfiskelaboratoriet" in Lysekil
- Swedmar in Göteborg
- SEACAM in Maputo
- WIOMSA on Zanzibar

5 Reporting

In conjunction with the evaluation team's visit to Sweden in June, an oral presentation of the findings will be given at Sida.

The evaluation report shall be written in English and shall not exceed 50 pages, excluding annexes. Format and outline of the report shall follow the guidelines in Sida Evaluation Report – a Standardized Format (see Annex 1). A complete list of documents that were reviewed, as well as a list of the persons interviewed shall be submitted as an annex to the report. Copies of the draft report shall be submitted to Sida no later than June 18, 1999. Within 2 weeks after receiving Sida's comments on the draft report, a final version in 5 copies and on diskette shall be submitted to Sida. Subject to decision by Sida, the report will be published and distributed as a publication within the Sida Evaluations series. The evaluation report shall be written in Word 6.0 for Windows (or in a compatible format) and shall be presented in a way that enables publication without further editing.

The evaluation assignment includes the production of a Newsletter summary following the guidelines in Sida Evaluations Newsletter – Guidelines for Evaluation Managers and Consultants (Annex 2) and also the completion of Sida Evaluations Data Work Sheet (Annex 3). The separate summary and a completed Data Work Sheet shall be submitted to Sida along with the (final) draft report.

Appendix 2: Evaluation Questions

1. Research Output	
Number of Ph.D. and M.Sc. students and degrees?	
Number of published scientific articles?	
Number of workshops, seminars, and conferences?	
What impact has the program had on the general attitude of the marine science community in both the region and in Sweden?	
Are research results recognized by other institutions? Examples?	
How do the students assess the quality of the educational program?	
What are the major successes of the Marine Science Program?	
What are the major disappointments?	
2. The Balance of Applied and Basic Research	
What is the balance between the two?	
How are priorities for research on applied topics selected?	
Is research linked with geographic needs such as "hot spots" at the local level?	
Does the reward structure discriminate against applied research?	
3. Interdisciplinary Research	
What are the best examples and evidence of success in terms of an interdisciplinary approach to research problems?	
Are workshops multidisciplinary?	
Do academic departments in the social and natural sciences interact and conduct joint research?	
What are the priority needs for interdisciplinary work?	
What are the incentives for conducting interdisciplinary teaching and research?	
4. Research for Management	
What are the priority coastal management needs?	
How are needs identified?	
What are the incentives for responding to such management needs?	

Are the objectives of research written and recorded in clear and unambiguous terms? Objectives are the questions or hypotheses of research to address management issues that at a minimum specify what is to be done and why.	
What are examples of research results that have influenced the regional ministerial conferences?	
What are examples of research that has informed local and national ICM initiatives?	
Do faculty and students involved in the program receive requests from government and national and regional initiatives for advice, information, or participation?	
What impact has the program had on policy actions affecting institutional, planning, and legal frameworks and resource allocation to ICM at the national and local level?	
By what mechanisms could research be made more directly useful to management initiatives?	
Does the program encourage national and local level stakeholders to become involved in research activities? What are some examples?	
How is research communicated to the general public and other stakeholders?	
What are the major impediments to greater contributions of marine science to management?	
What are the appropriate roles for the program at the regional scale versus the national and site specific scales?	
5. Instigating Research Cooperation	
5a. North-South	
What are the incentives for Swedish institutions and individual researchers to continue cooperation with the South?	
Which are most important? Why?	
What are the incentives for institutions and researchers in the region to cooperate?	
By what mechanisms are collaborative relationships to exchange information, ideas, or resources encouraged and sustained? Are these collaborative relationships beneficial?	
What are the major frustrations from the two perspectives? Does research cooperation respond to the needs, interests, and capabilities of participants? How could they be mitigated? What has been done?	
To what degree are north and south institutions equal partners? Why?	
What are the major costs and benefits of cooperation from the perspectives of North and South institutions?	

Is there evidence that cooperation would continue in the absence of, or with reduced Sida funding?	
5b. National Networking	
Has coordination between research and other key institutions improved (e.g. TAFIRI, NEMC, IMS and UDS)?	
What are the mechanisms for coordination?	
5c. Regional and International Meetings	
What is the "niche" of the Sida regional events?	
Is this niche changing? How?	
The impression conveyed by the Ambio article in 1997 is that progress between the first two conferences badly failed to meet expectations. Is this your view?	
What are your expectations for the outcome of the next regional Conference?	
5d. Regional Coordinating Institutions	
How do WIOMSA and SEACAM relate to the program?	
What forms of support have they received?	
What are their respective roles and responsibilities? Are there gaps or overlaps?	
How do these institutions relate to other regional bodies?	
How do you see the roles and responsibilities of these two institutions changing in the future?	
How have the activities of the two institutions benefited from the research program? From capacity building activities?	
What linkages have been made with other donors?	
Has the program been a catalyst for expanded donor support?	
6. Administrative and Funding Issues	
Are program objectives stated and is progress toward them monitored?	
Are the supported institutions and Universities fulfilling their role as administrative, supporting and funding agencies?	
By what mechanisms are funds transferred and administered at each institution?	
Who handles financial administration?	
Are financial reports prepared for managers, funders?	
What has been done about the problems identified in the last evaluation (e.g. financial management, accounting)?	
What are the current issues?	

How are the facilities and equipment, like computers? Are they adequate, in good condition?	
Has the Sida program catalyzed expanded government support to marine sciences (counterpart funds)?	
7. Cost-Effectiveness of the Program	
Provide examples on how research has resulted in new techniques and information that has resulted in economic benefits in terms of resource use, coastal protection, saving of lives and property, and economic development (growth in marine industries)?	
8. Responses to the 1996 Program Evaluation	
Has the program increased emphasis on national networking and institutional coordination (such as between TAFIRI and the University)?	
Has the program increased emphasis on applied work?	
Has the program increased emphasis on continued support for policy conferences like Arusha Conference?	
Has the program increased emphasis on interdisciplinary work?	
Has the program increased emphasis on clarity of program objectives and monitoring progress toward objectives and results?	
9. Recommendations for the Next Phase What should the defining features of the next phase be? What are the priorities?	

Appendix 3: Persons Interviewed

Tanzania

IMS

Dr. Julius Francis, Director
Dr. Marten Mtolera, Assistant Director
Dr. Salim Mzee Mohammed
Mr. Avita Mmochi
Dr. Alfonse Dubi, Head of Physical and Applied Sciences Section
Dr. Narriman Jiddawi
Dr. Desidius Masalu

IMS Students

Mr. Juma Kangwe
Mr. C. Lugomela
Mr. Mohammed Suleiman

University of Dar es Salaam

Professor Matthew L. Luhanga, Vice Chancellor
Professor Nkunya, Dean, Faculty of Science
Dr. Yunus D. Mgaya, Head of Marine Biology Section, Department of Zoology and Marine Biology
Dr. F. Elia, Head of Botany Department
Dr. M. Muruke, Botany Department

UDS Students

Ms. Rose Mwaipopo

Mozambique

University of Eduardo Mondlane

Mr. Adriano Macia, Head of Department of Biology
Mr. Salomão Bandeira
Mr. Almeida Guissamulo
Mr. Domingos Gove

MICOA

Mr. Alfredo Victor Massinga, Ministry for Environmental Co-ordination, Unit for Coastal Zone Management

Dutch Embassy

Mr. Jan Huesken, Natural Resource Manager

World Bank

Mr. Rod de Vletter, Operations Officer, Environment and Natural Resources

National Institute of Hydrography and Navigation (INAHINA)

Mr. Albano Gove, Director
Mr. David Filipe Chemane, Chief of Oceanography

Sweden

Petra Lundgren, Sida
Jan-Olof Lundberg, Sida
Anders Granlund, Sida
Johan Sundberg, Sida
Tomas Kjellquist, SAREC
Kattri Pohjolainen-Yap, SAREC
Michael Ståhl, SAREC
Per Bratten, SWEDMAR

Professor Olof Lindén, Department of Zoology Stockholm University
Dr. Mats Björk, Department of Physiological Botany, Stockholm University
Professor Lars Hernroth, Royal Swedish Academy of Sciences, Göteborg University
Dr. Marcus Öhman, Department of Zoology, Stockholm University
Dr. Emil Olafsson, Department of Zoology, Stockholm University
Professor Birgitta Bergman, Department of Botany, Stockholm University
Dr. Lars Rydberg, Göteborg University
Dr. Ulf Cederlöf, Göteborg University
Jessica Andersson, Beijer Institute
Dr. Kjell Wannäs, Department of Geology, Stockholm University
Dr. Malin Åkerblom, Uppsala University
Dr. Eva Tobisson, Stockholm University
Dr. Ron Johnstone, Department of Zoology, Stockholm University, presently in Australia (contacted by mail)
Professor Per Brinck

IOC

Mr. Peter Pissierssens, Assistant Secretary, Ocean Services Unit

WIOMSA

Dr. Julius Francis
Dr. Matthew Richmond

SEACAM

Custódio C. Voabil, Coordinator
David Moffat, Senior Advisor
Sten Engdahl, Associate Expert
Jerónimo R. Tamele, Institutional Specialist
Jorge Banze, Communications Officer

Reference Group

Dr. Magnus Ngoile, Director National Environment Management Council, Dar es Salaam

Appendix 4: Documents Reviewed

Group A – Marine Science Program Proposals and Progress Reports Received in February 1999

A1. Project Proposal for the Marine Biology Program Between Mozambique and Sweden – 1998 – 2000
Faculty of Biology, Eduardo Mondlane University (EMU)
Kristineberg Marine Biological Station

A2. Sida/SAREC Regional Program in Marine Science – Program Plan for the Period 1997–1999
Olof Linden

A3. Sida/SAREC Marine Science Programme for Eastern Africa 1997–1999: Project Social and Cultural Aspects of Integrated Coastal Zone Management
Stockholm University, Dept of Social Anthropology, Development Studies Unit

A4. The Marine and Coastal Zone Initiative for the Western Indian Ocean – Draft Proposal – Nov 1998
M. Ngoile and A. Dubi

A5. Progress Report on Sida/SAREC/CMC Regional Programme on Marine Science In South-east Asia and Sida/SAREC/CMC/IMO/MOSTE Bilateral Cooperative Programme on Developing Institutional Capability to manage Marine Pollution in Vietnam – Aug 1997 to Nov 1998
Coastal Management Center

A6. Summary of First Year Activities – August 1997 to August 1998
The Secretariat for Eastern African Coastal Area Management (SEACAM)

A7. Marine Coastal Zone Initiative – 1997
Sida

A8. Work Program – 1997
SEACAM

A9. Proposal for Continuation – 1997
Institute of Marine Sciences & Dept. of Botany, University of Dar es Salaam, Tanzania
Dept of Botany and Dept of Zoology, University of Stockholm, Sweden

A10. IOC – Sida (SAREC) Marine Science Programme – Report of Activities 1997 – East Africa, Caribbean, Western Pacific
IOC-UNESCO

A11. Progress Report – June 1995 to February 1997
Universidade Eduardo Mondlane
Faculdade de Ciencias
Departamento de Ciencias Biologicas

A12. Sida/SARECs Marine Science Programs – Sida Evaluation – 1996
Department for Research Cooperation, SAREC

A13. Progress Report – CMC – Aug 1 '96, Mar 31 '97

A14. Coastal Management Center (CMC) Proposal – Oct 1 '96

A15. Application for Environmental Economics in the Regional Marine Project for East Africa – August 1996
Dept. of Economics, Environmental Economics Unit, University of Gothenburg

Group B – Binders of Technical Papers on Program Elements

Physical Ocean Program
Socio-cultural Program
Environmental Economics Program
Marine Geology Program
Coral Reefs Research Program
Environmental Chemistry Program
Short-term Courses, Workshops and Seminars
Information and Net-working
Political Awareness Building

Group C – Articles, Books, CD Rom

C1. Global Coral Reef Monitoring Network: Status of Coral Reefs of the World: 1998
Sida, Australian Institute of Marine Science, ICLARM

C2. *Ambio* – Vol XXVII No. 8 – Dec 1998
Royal Swedish Academy of Sciences, Sida

C3. Coastal Management in Eastern Africa: Status and Future
In: Ambio June 1997

C4. Lessons Learned from Eastern Africa: The Development of Policy on ICZM at National and Regional Levels
M.A.K. Ngoile and O. Linden – In: Ocean & Coastal Mgmt – 1997

C5. IOC-World Bank-Sida/sAREC-ONE Workshop on Integrated Coastal Areas Management – Oct 1996
Banque Mondiale, Sida, Sarec, office National Environment

C6. Integrated Coastal Zone Management in Mozambique – May '96
Government of Mozambique, University Eduardo Mondlane, Sida, The World Bank

C7. The Journey from Arusha to Seychelles – 1996
Olof Linden and C.G. Lundin

C8. Integrated Coastal Zone Management in the Seychelles – Feb '95
Government of Seychelles, Sida, The World Bank

C9. Integrated Coastal Zone Management in Tanzania– May '95
Government of Tanzania, Institute of marine Sciences, University of Dar es Salaam, Sida, The World Bank

C10. Ambio – Vol XXIV No. 7–8 Dec 1995
Royal Swedish Academy of Sciences

C11. SAREC Regional Marine Science Program – 1995

C12. Proceedings of the Workshop and Policy Conference on Integrated Coastal Zone Management in Eastern Africa including the Island States – April '93
University of Dar es Salaam, Ministry of Tourism, Natural Resources and Environment, Tanzania, SAREC

C13. Technical Recommendations of the Workshop on Integrated Coastal Zone Management In Eastern Africa including the Island States 21–11 April 1993, Arusha, Tanzania
University of Dar es Salaam, Ministry of Tourism Natural Resources/Env Tanzania and Swedish Agency for Research Cooperation with Developing Countries (SAREC)

C14. Corals of the Indian Ocean – CD Rom

C15 Mangroves and Seagrasses of the Indian Ocean – CD Rom

C16. Enhancing the Success of Integrated Coastal Management
Sida, UNDP (also in Portuguese and French)

Group D: Other Documents Reviewed

Government of Finland (1998), Assessment of Integrated Coastal Management in Africa." Prepared with the support of the Government of Finland by the UNEP Priority Actions Programme Regional Activity Center of the Mediterranean Action Plan for the Pan African Conference on Sustainable Integrated Coastal Management (PACSICOM).

Institute for Marine Sciences (1998), "Our Waters, Our Peoples," Strategic Action Programme for the Marine and Coastal Environment of the Western Indian Ocean Region. Prepared for the United Nations Environment Programme for submission to the Intergovernmental Meeting of the Ministers of the Environment of the Western Indian Ocean Region, Maputo, July 1998, 37 pp.

Mmochi, A. (1998), "Pesticide Occurrence and Fate in the Coastal Environment: Report on a Project within Sida/SAREC Regional Marine Science Program," Malin Åkerblom, pp. 12–26.

Mmochi, A., A. Dubi, F. Msuya, N. Jiddawi, N. Mozes, H. Gordin and A. Bhai (1997), "Economic

and Environmental Impact Assessments for Development of Semi-Intensive Integrated Mariculture Ponds at Makoba Bay, Zanzibar," Institute for Marine Sciences, April 1997, 54 pp.

Richmond, M. (1996), "Marine Coastal Biodiversity, Education and Awareness Programme: Proposal for Phase II," November 1996, 3 pp.

Swedish International Development Cooperation Agency (1999), "Experiences from the First Annual Review Meeting for the Research Cooperation 1998–2000 Between Sida and UDSM/MUCHS, Dar es Salaam, Tanzania, 10–19 March 1999, Draft, 19 pp.

Tobisson, E. and Woodford-Berger, P. (1998), "SAREC Marine Science Programme for Eastern Africa: Project Social and Cultural Aspects of Integrated Coastal Zone Management," Stockholm University, Department of Social Anthropology, Development Studies Unit, 9 pp.

UNEP/Institute of Marine Sciences, University of Dar es Salaam/FAO/SIDA (1998), "Overview of Land-based Sources and Activities Affecting the Marine, Coastal and Associated Freshwater Environment in the Eastern African Region," UNEP Regional Seas Reports and Studies No. 167, UNEP, 31 pp.

University of Dar es Salaam, Institute of Marine Sciences (1999), "UDSM 2000, Institutional Transformation Programme: The Five Year Strategic and Operation Plans," 54 pp.

University of Dar es Salaam (1999), "Report on the 1998 UDSM Academic Audit: Executive Summary," March 1999, 57 pp.

University of Dar es Salaam (1999), "Draft Report of the Senate Team to Study the Institute of Marine Sciences Space and Related Problems," February 1999, 53 pp. [Not yet for circulation]

University of Dar es Salaam – Sida/SAREC Cooperation (1999), "Marine Science Program Between Tanzania and Sweden. 1998 Annual Progress Report and Financial Report and Workplan for 1999. Annex 1: Individual Programme/Project Reports," February 1999.

University of Eduardo Mondlane (1999), "The Development of Research Capacity at the Department of Biological Sciences: Progress Report, 1998–1999," 12 pp.

WIOMSA (1999), "WIOMSA Activities 1996–1998: An Overview," prepared for the evaluation team by the WIOMSA Secretariat, 13 pp.

World Bank (1996), "Africa: A Framework for Integrated Coastal Zone Management," Land, Water and Natural Habitats Division, Africa Environmentally Sustainable Development Division, Washington, D.C., 150 pp.

Group E: IOC Documents Received

E1. WIOBASE: Data and Information – CD Rom – 1998

E2. Ocean Data and Information Network for Eastern Africa – Capetown, South Africa – CD Rom – December 1998

E3. Ocean Data and Information Network for Eastern Africa – Mobasa, Kenya – CD Rom – December 1997

E4. Understanding the Indian Ocean – 1998
T.S.S. Rao and Ray C. Griffiths – UNESCO

E5. Marine Science Country Profiles – Seychelles – In Press
Nirmal Jivan Shah – WIOMSA

E6. Marine Science Country Profiles – Mauritius – In Press
Pierre de Boucherville Baissac – WIOMSA

E7. Marine Science Country Profiles – Comores – In Press
Faouzia M. Abdoulhalik – WIOMSA

E8. Marine Science Country Profiles – Madagascar – In Press
Josephine Ranaivoson – WIOMSA

E9. Marine Science Country Profiles – Mozambique – In Press
António Mubango Hoguane – WIOMSA

E10. Marine Science Country Profiles – Kenya – In Press
Mika Odido – WIOMSA

E11. Marine Science Country Profiles – Tanzania – In Press
Julius Francis – WIOMSA

E12. IOC-Sida-Flanders-SFRI Workshop on Ocean Data Management in the IOCINCWIO Region (ODINEA project) – 1998
Intergovernmental Oceanographic Commission; Sea Fisheries Research Institute of South Africa

E13. WINDOW – Western Indian Ocean Waters, Vol. 9, No. 3, September 1998
Intergovernmental Oceanographic Commission of UNESCO on behalf of WIOMSA and RECOSCIXWIO Project

E14. WINDOW – Western Indian Ocean Waters, Vol. 9, No. 2, June 1998
Intergovernmental Oceanographic Commission of UNESCO on behalf of WIOMSA and RECOSCIXWIO Project

E15. Sharing Coastal Management Experience in the Western Indian Ocean – 1998
Proceedings of First WIOMSA Scientific Symposium

E16. Marine Science Programme – Workplan 1997 – 1999 – East Africa, Caribbean, Western Pacific
IOC-Sida (SAREC)

E17. The IOC-SAREC Marine Science Programme – Report of Activities 1996–1999, The East-Africa Component
IOC-SAREC

E18. Feasibility Study for Eastern African Journal of Marine Sciences – 1997
Intergovernmental Oceanographic Commission of UNESCO

E19. Sustainable Coastal Development through Integrated Planning and Management Focused on Mitigating the Impacts of Coastline Instability – 1997
UNESCO

E20. Development of a Regional Ocean Data and Information Network for the IOCINCWIO Region (ODINEA) - 1997
Intergovernmental Oceanographic Commission

E21. RECOSCIX-WIO Providing Scientific Information to Marine Scientists in the Western Indian Ocean Region – 1997
Intergovernmental Oceanographic Commission

E22. IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean – Fourth Session – Cape Town, South Africa 1997
Intergovernmental Oceanographic Commission

E23. IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean – Fourth Session – Mobasa, Kenya 1997
Intergovernmental Oceanographic Commission

E24. IOC-World Bank-Sida/SAREC-ONE Workshop on Integrated Coastal Areas Management, Nosy Be, Madagascar 1996
Intergovernmental Oceanographic Commission

E25. Atelier regional de la COI sur l' oceanographie cotiere et la gestion de la zone cotiere 1996
Intergovernmental Oceanographic Commission

E26. Joint IOC-CIDA-Sida(SAREC) Workshop on the Benefits of Improved Relationships between International Development Agencies, the IOC and other Multilateral Intergovernmental Organizations in the Delivery of Ocean, Marine Affairs and Fisheries Programmes – 1995
Intergovernmental Oceanographic Commission

E27. IOC Training Course Reports – 1995, 1996
Intergovernmental Oceanographic Commission

E28. IOC Training Course Reports – 1995
Intergovernmental Oceanographic Commission

E29. Postgraduate Course in Tropical Coastal Ecology Management and Conservation
KMFRI

E30. Babu Bahari Coastal Life and Environment – Video

E31. Mangroves: Planting for our Future – Video

Sida Evaluations - 1999

99/10 Working with Nutrition. A comparative study of the Tanzania Food and Nutrition Centre and the National Nutrition Unit of Zimbabwe. Jerker Carlsson, Suraiya Ismail, Jessica Jitta,Estifanos Tekle
Department for Democracy and Social Development

99/11 Apoyo de Asdi al Sector Salud de Nicaragua. Prosilais 1992-1998. Marta Medina, Ulf Färnsveden, Roberto Belmar
Department for Democracy and Social Development

99/12 Nordic Support to SATCC-TU, Southern Africa Transport Communications Commission, Technical Unit. Björn Tore Carlsson, Leif Danielsson.
Department for Infrastructure and Economic Cooperation

99/13 Cooperation Between Sweden and Ukraine in the Field of Local Self-Government.
Lars Rylander, Martin Schmidt
Department for Central and Eastern Europe

99/14 Research Cooperation between Sweden and Uruguay 1986-1995. An evaluation and some general considerations. Osvaldo Goscinski, Mikael Jondal, Claes Sandgren, Per Johan Svenningsson
Department for Evaluation and Internal Audit

99/15 Sida Supported Advantage Projects in the Baltic States. Claes Lindahl, Petra Stark
Department for Central and Eastern Europe

99/16 Diakonia Program for Democracy and Human Rights, the El Salvador Case. A qualified monitoring. Vegard Bye, Martha Doggett, Peter Hellmers
Department for Latin America

99/17 Dollars, Dialogue and Development. An evaluation of Swedish programme aid. Howard White, Geske Dijkstra, Jan Kees van Donge, Anders Danielsson, Maria Nilsson
Department for Evaluation and Internal Audit

99/18 Atmospheric Environment Issues in Developing Countries. Gun Lövblad, Per Inge Iverfeldt, Åke Iverfeldt, Stefan Uppenberg, Lars Zetterberg
Department for Infrastructure and Economic Cooperation

99/19 Technical Assistance to Central and Eastern Europe. A cooperation between Chambers of Commerce in Sweden and in Central and Eastern Europe. Claes Lindahl, Monica Brodén, Peter Westermark
Department for Central and Eastern Europe

99/20 Sida Support to the Energy Sector in Egypt. Rolf Eriksson, Edward Hoyt
Department for Infrastructure and Economic Cooperation

99/21 Sida Support to the Energy Sector in Jordan. Rolf Eriksson, Edward Hoyt
Department for Infrastructure and Economic Cooperation

99/22 Environmental Aspects in Credit Financed Projects. Gunhild Granath, Stefan Andersson, Karin Seleborg, Göran Stegrin, Hans Norrström
Department for Evaluation and Internal Audit

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