

MEDIUM SIZED TARGETED RESEARCH PROJECT BRIEF

PROJECT SUMMARY

Project Identifiers	
<p>1. Project name: The role of the coastal ocean in the disturbed and undisturbed nutrient and carbon cycles.</p>	<p>2. GEF Implementing Agency: UNEP</p>
<p>3. Country/ies in which the project is being implemented: Global: All GEF Development Regions</p>	<p>4. Country eligibility: Only institutions and individuals in GEF eligible countries will receive financial support through this project. Participation of institutions in non-GEF eligible countries will be through co-financing or at no cost to the project.</p>
<p>5. GEF Focal Area: International waters with relevance to climate change.</p>	<p>6. Operational Programme/short-term measure: Operational Program 10, Global Contaminants component.</p>
<p>7. Project linkage to national priorities, action plans and programmes: A majority of coastal and archipelagic states have pollution monitoring and control programmes and research activities in their coastal ocean, the present project will build on data collected through these baseline activities. The Global Programme of Action for the Protection of the Marine Environment from Land Based Activities identifies 'sewage' as a major contaminant of coastal waters the environmental consequences of which are a change in nutrient status of the coastal marine environment. The proposed project will provide a means of assessing the consequences of changes in nutrient flux from land to ocean for coastal system functioning, including estimations of changes in carbon cycling and the flux of CO₂ from ocean to atmosphere. The outputs from the assessments will assist Contracting Party states to the Framework Convention on Climate Change in meeting their obligations to assess national sources and sinks of greenhouse gases and will address the scientific uncertainties surrounding changes in flux of carbon dioxide from the coastal ocean as a consequence of enhanced nutrient inputs to coastal waters.</p>	
<p>8. GEF national operational focal point and date of country endorsement: Not applicable.</p>	
<p>Project Objectives and Activities</p> <p>9. Project rationale and objectives: <i>Rationale:</i> The status of coastal aquatic systems is changed by enhanced anthropogenic nutrient inputs. The global extent, and the wider regional and global impacts of these changes is unclear, due to the absence of empirical estimates from a sufficiently large and representative set of coastal sites world-wide. Nutrient enrichment of coastal waters, has profound effects on biological productivity and the health of the coastal ocean. Algal blooms, anoxia, fish kills, red tides, and pollution are increasingly widespread problems, in developing country regions of the world. Changes in the biological systems alter the rates of carbon fixation and respiration in coastal waters resulting in changes to the sink/source status of coastal seas with respect to carbon.</p>	

<p><i>Purpose:</i> The purposes of the present activity are to assemble: estimates of the impacts of nutrient enrichment on coastal waters; estimates of the changes in regional and global biogeochemical cycling of nutrients and carbon flux from coastal and shelf seas to the atmosphere; to assist governments in assessing the role of their coastal waters as sinks and/or sources of carbon; and thus to resolve scientific uncertainties concerning the Global Carbon Cycle.</p> <p>10. Project outcomes: This activity will result in several hundred empirical models of carbon and nutrients in undisturbed and disturbed (polluted) coastal systems that will be of value at the local and national level in assessing the state of eutrophication and carbon source/sink status of the coastal ocean.</p> <p>Up-scaling, using model derived empirical data as surrogate information, will provide regional and global estimates of carbon flux required for balancing the global carbon budget and assessing the role of the coastal ocean in the global carbon cycle.</p>	<p><i>Indicators:</i></p> <ul style="list-style-type: none"> • Integration of CO₂ source/sink data into countries' national reports to the UNFCCC; • Use by governments of project outputs in national planning/ decision-making regarding large scale investment in nutrient reduction; • Reduced scientific uncertainty concerning the role of the coastal ocean in the global carbon cycle; and, • Publication of regional and global assessments of the nutrient and carbon source/sink status of the coastal ocean; and the impacts of enhanced nutrient inputs into coastal waters. <p><i>Indicators:</i></p> <ul style="list-style-type: none"> • Publicly available (via the WWW) of at least 100 sub-regional and local carbon and nutrient budgets for the coastal ocean; • Publicly available analyses of the impacts of enhanced nutrient input to coastal waters on the carbon flux from coastal and shelf seas to the atmosphere; • Publicly available analyses of the impacts of enhanced nutrient input to coastal waters on the biological productivity of the coastal oceans; • Publication of regional and global assessments of the status of eutrophication of the coastal ocean.
<p>11. Planned activities to achieve outcomes (including cost in US \$ or local currency of each activity): LOICZ modelling guidelines based on empirical data have been developed and successfully applied to tropical and temperate coastal systems. In addition, LOICZ has established a WWW site through which interested individuals can obtain access to the modelling guidelines and to which they can add the outputs from their own budget calculations. The present data set encompasses some 40 sites, at present predominantly from developed countries.</p> <p>The planned activities seek to promote the use of these models by large numbers of developing country scientists through: convening a series of 8-10 regional workshops; wide distribution of the modelling guidelines; provision of training to</p>	<p><i>Indicators:</i></p> <ul style="list-style-type: none"> • Published reports of 8 regional workshops held in each developing country sub-region; • Training of 6-8 developing country scientists as regional advisors in the application of the LOICZ budget modelling guidelines; • Establishment of a network of trained modelling advisors in the developing

<p>developing country scientists in their application; establishment of a network of modelling advisors in the developing regions; convening of thematic workshops to develop budgetary generalisations for major coastal system types; and convening of a global synoptic workshop.</p> <p>Individual scientists and institutions will contribute data and models to the global website, substantially enlarging coverage of the world's coastal seas.</p>	<p>regions;</p> <ul style="list-style-type: none"> • Additional nutrient budget data and models added to the global website, substantially enlarging coverage of the world's coastal seas; • Published reports of three generalisation, and one final global workshop held to compile and synthesise data describing the state of the coastal ocean with respect to nutrient enrichment and carbon flux to the atmosphere. 																								
<p>12. Estimated budget (in US \$):</p> <table border="0"> <tr> <td>GEF:</td> <td style="text-align: right;">720,000</td> </tr> <tr> <td>Co-financing:</td> <td></td> </tr> <tr> <td> Cash:</td> <td></td> </tr> <tr> <td> Univ. of Stockholm:</td> <td style="text-align: right;">75,000</td> </tr> <tr> <td> LOICZ-IPO:</td> <td style="text-align: right;">100,100</td> </tr> <tr> <td> In-kind:</td> <td></td> </tr> <tr> <td> Univ. of Hawaii:</td> <td style="text-align: right;">75,000</td> </tr> <tr> <td> Univ. of Stockholm:</td> <td style="text-align: right;">100,000</td> </tr> <tr> <td> LOICZ-IPO:</td> <td style="text-align: right;">92,500</td> </tr> <tr> <td> UNEP</td> <td style="text-align: right;">15,000</td> </tr> <tr> <td> Total:</td> <td style="text-align: right;">457,600</td> </tr> <tr> <td>Total:</td> <td style="text-align: right;">1,177,600</td> </tr> </table>		GEF:	720,000	Co-financing:		Cash:		Univ. of Stockholm:	75,000	LOICZ-IPO:	100,100	In-kind:		Univ. of Hawaii:	75,000	Univ. of Stockholm:	100,000	LOICZ-IPO:	92,500	UNEP	15,000	Total:	457,600	Total:	1,177,600
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<p>13. Information on project proposer:</p> <p>The International Geosphere-Biosphere Programme (IGBP) of the International Council of Scientific Unions (ICSU) is a global, international Non-Governmental Organisation with a Secretariat located in Stockholm, Sweden. The programme is co-ordinated by a Scientific Committee of internationally renowned scientists and operated through a series of Core Projects of which the proposer, the Land Ocean Interactions in the Coastal Zone (LOICZ), has an International Project Office (IPO) located in the Netherlands Institute for Sea Research (NIOZ). LOICZ was established in 1992 by decision of the Scientific Committee of the IGBP and the International Project Office was established in 1993 with a substantial annual grant from the Netherlands Government that continues to 2003. Research contributing to the LOICZ objectives is funded through national governments, international research foundations and other sources. Activities are co-ordinated through the IPO, specialist research centres located world-wide, and regional networks such as the GEF supported START network.</p>																									
<p>14. Information on proposed executing agency (if different from above):</p> <p>The Executing Agency will be the Land-Ocean Interactions in the Coastal Zone IPO operating through the established biogeochemical modelling centres of LOICZ located in the University of Hawaii and at the University of Stockholm, Sweden. LOICZ is in a unique position to execute this activity since it operates through a global network of in excess of 2,500 marine scientists located in national governments, universities and research institutions in 140 countries. The network of participating institutions is particularly strong in developing countries of the world with major regional research initiatives planned or ongoing in South and Southeast Asia, East and West Africa, Latin America and the Caribbean and Oceania. The staff and co-ordination costs of the IPO and Universities of Hawaii & Stockholm will be largely met from non-GEF sources.</p>																									
<p>15. Date of initial submission of project concept: December 1997</p>																									
<p>16. Project Identification number: tbd</p>																									

17. Implementing Agency contact person:

Ahmed Djoghlaf, GEF Executive Co-ordinator

18. Project linkage to Implementing Agency program(s):

The United Nations Environment Programme is a co-sponsor of the IPCC process and a partner in the World Climate Research Programme. The present activity is complementary and additional to the ongoing programmatic work of UNEP in the field of climate change research and assessment conducted through these regular programmes and activities. In addition this activity will provide valuable information in determining appropriate strategies to address nutrient reduction as part of the implementation of the GPA/LBA for which UNEP acts as the Secretariat, and is complementary to the regional assessments of sources and loads being undertaken by the Secretariat.

Project Description

1. Project rationale and objectives

1.1 Land-based sources of pollution have been estimated to contribute around 80% of all marine pollution¹. Of these, sewage and agricultural run-off are recognised as major sources of nutrients by the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities. It has been estimated that the current rates of transfer of nutrients from land to sea have doubled compared with pristine levels. Increasing discharge of nutrients have profound effects on biological productivity and the health of the coastal ocean. The negative consequences of this enhanced rate of nutrient discharge to the ocean include eutrophication, toxic algal blooms, anoxia, fish kills, and red tides which have become increasingly wide-spread problems, particularly in developing country regions of the world. The response of coastal systems to increased nutrient inputs is not linear however and at low levels increased nutrient inputs may result in increased primary production and fish catches. Whilst many of these impacts can be quantified, changes in the rates of carbon fixation and respiration in coastal waters that result in changes to the sink/source status of coastal seas with respect to atmospheric CO₂ remain a significant scientific uncertainty.

1.2 In the GEF Contaminant-Based Operational Programme, targeted '*global projects useful in setting priorities for possible GEF interventions*' and '*meeting the technical needs of projects in this focal area*' are among the priority components that characterise the range of projects within this Operational Programme. The Regional/Global Technical Support Component of this GEF Operational Programme states that '*targeted regional or global capacity building projects may be necessary to help increase awareness on how to jointly address these contaminant problems. Global projects in this component can help individual groups of countries to share experience with other areas around the globe and lessons can be derived from the experience.*'

1.3 Large investments aimed at nutrient reduction or elimination from the pollutant load reaching the ocean, characterise the current response to perceived human and environmental health problems. The comparative costs and benefits of investing in: programmes and activities to reduce Nitrogen and/or Phosphorus, or in open as opposed to closed and semi-enclosed coastal systems are not well defined. In addition, such analyses currently take no account of the global environmental benefits of the proposed intervention with respect to changes in the storage of organic carbon in the coastal ocean. This results in part from the scientific uncertainties surrounding the determination of the sink or source status of the coastal ocean with respect to carbon which represents a significant scientific uncertainty in our understanding of the global carbon cycle and hence the global climate system.

1.4 With ODA resources becoming scarcer, and the GEF's desire to use its limited financial resources as cost-effectively as possible, it is critical to ensure that the cost-benefit analyses of nutrient reduction interventions are as holistic as possible and do not treat as externalities potential costs or benefits with respect to climate change. Hence, the need for this targeted research project. The present trend is to attempt to significantly reduce nutrient inputs from anthropogenic sources.

1.5 The biogeochemically active elements of, carbon, nitrogen and Phosphorus can be used to describe the net chemical transformations in coastal aquatic (brackish and marine) systems. These elements are critical to life, and simplifying assumptions can be made to estimate both the rates and the pathways by which reactions within coastal ecosystems occur. Carbon is considered critical in global climate change, but its chemical transformations are usually difficult to describe from existing data sets. Another of these elements, Phosphorus, can be used as a biogeochemical proxy for carbon, and the third

¹ GESAMP, (1990) *The Health of the Oceans*.

of these elements, nitrogen, is usually considered to control carbon metabolic processes.

1.6 The LOICZ Biogeochemical Modelling Guidelines² were developed in order to provide a relatively simple assessment technique which could be rapidly applied to coastal ecosystems using available or readily measurable data. Water and salt budgets for any particular aquatic ecosystem provide an estimate of the water exchange characteristics for that system. This simple hydrography is then used to describe the fluxes of dissolved nitrogen, and Phosphorus to and from the system using concentration data for each of these materials which in turn provide information on carbon metabolism and storage in the system. The deviations of the fluxes of these materials from the hydrographic fluxes describe the "nonconservative behaviour" (net internal sources or sinks) for each of these materials, and the comparisons among the nonconservative fluxes can be used to estimate reaction pathways.

1.7 The two main reaction pathways which are derived according to the procedures of the guidelines are the net rate of organic production minus respiration (p-r), that is, a measure of the strength of the system organic metabolism as a carbon sink or source; and the net rate of nitrogen fixation minus denitrification of the strength of the system as a source or sink for fixed nitrogen. These two pathways represent the most important modifications which the coastal zone imposes on the global cycling of reactive materials.

1.8 Operationally, there are three major sources of data that could be used in deriving the required budgets. With a very large financial budget and several decades, one might devise a research programme to collect primary data required to budget individual sites. This would be an efficient approach, because sites could be targeted as being ideal to be budgeted, and then exactly the required data could be collected for exactly those sites. Unfortunately, this approach is not feasible in terms of time, financial or human resources. An alternative approach would be to rely on readily available and published scientific literature. To date, about half of the budgets which are presently posted on the aforementioned WWW page or which are currently under development have relied on this source of information. While these efforts continue, this avenue is reaching the point of diminishing returns.

1.9 The third approach which is advocated in this proposal relies heavily on available data and human resources which are not readily accessed through standard literature searches, namely the introduction of researchers around the world to the budgeting procedure and the solicitation of budgets from these researchers. This approach captures the human resources required to do the budgeting and captures data which either are not published at all or are 'hidden' in various technical reports that are not unearthed in standard searches or extant databases. It has been found that workshops to target particular regions or research communities are an effective means of applying this approach. This approach is the most cost-effective means determined for gathering and collating the necessary data needed at national, regional and global levels. It will provide the necessary information to improve the current understanding of the global carbon cycle and the effect of increased nutrient inputs to coastal waters on this cycle, and on the CO₂ flux between the ocean and the atmosphere.

1.10 At national level, this project will enable countries to meet their obligations under the UNFCCC by assessing the sources and sinks of CO₂ in coastal waters within their national boundaries. It will further enable countries to base their national decisions relating to investment in nutrient reduction from pollutant loads reaching their coastal waters on scientifically sound data regarding the consequences of different nutrient loadings on the functioning of coastal systems. Qualitative and some quantitative information and data can be assembled regarding the relationships between changes in nutrient inputs and algal species composition and total primary production. The proposed project will provide a means of assessing

² Gordon et. al., (1996) *The LOICZ Biogeochemical Modeling Guidelines*.

the consequences of changes in nutrient flux from land to ocean for coastal system functioning.

1.11 The Global Programme of Action for the Protection of the Marine Environment from Land Based Activities calls on states to monitor and control pollution of the marine environment resulting from land based activities. Most coastal and archipelagic states have pollution monitoring and control programmes in their coastal ocean and the present activity will build on these baseline activities by providing an assessment of the change in state of individual country's coastal waters. Through standardised budgeting and use of budget outputs as analogue data sets comparable estimates can be provided for countries and areas where empirical data are not available and for evaluating likely future conditions at specific sites where rates of change of nutrient inputs can be predicted.

1.12 This project will assemble from existing scientific data and information, sufficient estimates of the impacts of nutrient enrichment on coastal waters, to prepare a global and regional estimates of the consequent changes in regional and global biogeochemical cycling and carbon flux from coastal and shelf seas.

2? Current situation

2.1 LOICZ has developed, through a series of international workshops, modelling guidelines for budgeting nitrogen, phosphorus, carbon, water and salt in coastal systems. These have now been applied to a variety of tropical, temperate and other coastal environments world-wide. These models are based on empirical data and their wide applicability has been tested through a series of research activities in Southeast Asia and a Caribbean workshop convened in Mexico in 1997. In addition LOICZ has established a WWW site through which interested individuals can obtain access to the model guidelines and to which they can add the outputs from their own model calculations.

2.2 To date, this effort has resulted in numerous nutrient budgets for several coastal waters, over 40 of which are now published on the WWW site and about that number are well along in development. The majority of these budgets are from temperate waters and from developed countries. While these efforts will continue, this approach has not captured data which either are not published at all or, are 'hidden' in various technical reports that cannot be retrieved from standard searches or extant databases. Without a GEF intervention a complete understanding of the global significance of nutrient inputs on the global carbon cycle and particularly on the carbon flux between atmosphere and ocean will not result in the near future.

3. Expected project outcomes, with underlying assumptions and context

3.1 The Global Programme of Action for the Protection of the Marine Environment from Land Based Activities calls on states to monitor and control pollution of the marine environment resulting from land based activities. Although many states have established monitoring systems they have not fully utilised the data collected through such systems since the approach advocated here is not widely known, particularly in developing country regions. In addition, Contracting Party states to the UN Framework Convention on Climate Change have to meet their obligations to assess national sources and sinks of greenhouse gases and although existing data can be used to make such assessments for their coastal seas national scientists are in most instances unaware of this possibility.

3.2 This project will address these needs, removing the scientific uncertainties surrounding changes in flux of carbon dioxide from the coastal ocean as a consequence of enhanced nutrient inputs to coastal waters. The activity will result in several hundred empirical models of carbon and nutrients in undisturbed and

disturbed (polluted) coastal systems that will be of value at the local and national level in assessing the state of eutrophication and carbon cycling in coastal waters. Up-scaling, using model derived empirical data as surrogate information, will provide regional and global estimates of carbon flux required for resolving some of the scientific uncertainties surrounding the global carbon budget and for assessing the role of the coastal ocean in the global carbon cycle. In addition such budgets will provide critical insights into processes resulting in transboundary issues of eutrophication and algal blooms.

4. Activities and financial inputs needed to enable changes

4.1 In the baseline, there will continue research in developed countries to produce individual local, site specific budgets, some of which will be published in readily accessible scientific literature. The continuation of the WWW site will attract additional budgets from researchers largely in the developed regions of the world. The LOICZ IPO and modelling centres will continue to manage and expand the web-site and encourage researchers to lodge their budget results on the site for easy access.

4.2 Two years has been spent developing a global coastal typology on land and ocean characteristics. As part of the baseline, a preliminary workshop will be held in 1998 to further develop the LOICZ coastal typology as a basis for budgetary generalisation. The aforementioned workshop will provide a basis for clustering coastal units of comparable characterization thus providing a framework for identifying numbers of coastal ocean types and hence the number of model budgets required for each type in order to upscale to regional and global levels.

4.3 In the alternative, researchers in the developing regions of the world will be introduced to the budgeting procedures and budgets will be solicited from these researchers. This approach captures the human resources required to do the individual site budget calculations and captures data which either are not published at all or are 'hidden' in various technical reports.

4.4 The project will therefore involve the following activities:

- **Activity 1.** Continuation of individual and institutional inputs to the LOICZ budgeting website;
- **Activity 2.** A first tier of 8 preliminary regional workshops held over a period of 20 months (Central America; Southwest Atlantic; East Africa; West Africa; Northwest Pacific; East Asia; South Asia; Southeast Pacific) Each workshop will involve between 12 and 15 persons from the region and up to 3 resource persons. The general plan for each workshop will be to 'pre-acquaint' the participants with the procedures by means of written materials and encouragement to: examine the introductory material on the WWW site; to have participants arrive at the workshop with preliminary budgets and defined datasets; and to refine those budgets for publication in both hard copy and via the WWW site. Conservatively, this effort should produce about 100 additional budgets. In addition participants would be encouraged to solicit additional budgets from other scientists within their regions following the workshop.
- **Activity 3.** Training of regional resource persons in the application of the modelling guidelines. Subsequent to each workshop a key individual from the region would be selected for further training at either the University of Hawaii or the University of Stockholm in the preparation and application of nutrient and carbon budget models. These individuals will then serve as the regional focal point for the preparation of additional budgets.
- **Activity 4.** The second tier of workshops would be more synthetic - by ecosystem and climatic type, that cross-cut geographic regions and involve the regional leaders. A

preliminary workshop is to be held in late 1998 to further develop the LOICZ coastal typology as a basis for budgetary generalisation. Three workshops will be convened under this GEF project over a one-year period (partially overlapping the first tier in time). These workshops would aim to produce budgetary generalities that can be used in upscaling to regional and ultimately global scales.

- **Activity 5.** A terminal global workshop will be held to bring together the results of the thematic workshops.
- Results will be published and widely disseminated via the workshop reports, formal publications, the WWW site and hard and electronic media for the regional and global assessments.

5. Sustainability analysis and risk assessment

5.1 The issue of sustainability does not arise since the project is self-contained resulting in regional and global models and estimates that represent the terminal activity. It is anticipated however that the WWW site will remain open for additions using the resources of the LOICZ IPO and participating network of scientists beyond the life of this project, hence refinements to the regional and global estimates could be produced subsequently as required. The LOICZ IPO anticipates maintaining this website for at least 10 years based on current plans.

5.2 There are no significant risks associated with this project since it is founded on on-going baseline activities using a tested methodology for producing the local scale budgets. The only risk is that insufficient budgets will be produced for particular system types to enable up-scaling to the global level. This risk is considered small by the project proponents on the basis of limited trials of the approach in the Caribbean and Southeast Asian regions.

6. Stakeholder involvement and social assessment

6.1 The stakeholders directly involved in executing this project will be developing country scientists and scientific organisations involved in coastal and marine research and the LOICZ network. Major stakeholder groups that will benefit from the outputs of the project will be government scientists and managers concerned with coastal zone monitoring, management and developing inputs to national communications under the Climate Change Convention. LOICZ anticipates forging additional links with Intergovernmental Organisations building on existing partnerships with the Intergovernmental Oceanographic Commission and with the coastal module of the Global Ocean Observing Systems.

7. INCREMENTAL COST ASSESSMENT

7.1 This activity is complementary and is thus almost entirely incremental. It builds on a past and ongoing baseline of nationally funded research results and through novel interpretation and aggregation of these data provides added value at wider regional and global levels. The baseline includes substantial contributions by the LOICZ International Project Office and the Institutions hosting the LOICZ modelling leaders, to co-ordination and scientific backstopping, including the training of developing country personnel. Table 1 provides a breakdown of baseline and incremental costs by component.

7.2 The project will have little direct national environmental benefit, but countries will benefit since the project will enable them to better meet their reporting obligations under the UNFCCC regarding the assessment of sources and sinks of CO₂ within their national boundaries. The outputs can also be used by countries in preparing more holistic cost-benefit analyses of interventions designed to reduce nutrient inputs to their coastal seas; for example, the modelling technique can be used to determine the relative

importance of different anthropogenic sources of nutrients, hence providing guidance as to whether domestic sewage or agricultural run-off should be the target of future investments. The global benefits derive from reduced scientific uncertainty concerning the global carbon cycle, and from strategic guidance regarding the costs and benefits of large scale investments in reducing nutrient discharge to the coastal ocean.

Table 1. Incremental cost matrix

	Baseline	Alternative	Increment
Global Environmental Benefits	457,600	1,177,600	720,000
Domestic Benefits	0	0	0
Costs (US \$)	Baseline Costs	Alternative Costs	Incremental Costs
Activity 1: Project Administration Scientific Co-ord. & WWW site	381,100	471,100	90,000
Activity 2: Regional Workshops	36,500	196,500	160,000
Activity 3: Training of Regional resource persons	0	200,000	200,000
Activity 4: Generalisation Workshops	0	150,000	150,000
Activity 5: Global Workshop	0	80,000	80,000
Activity 6: Publication & Dissemination	20,000	60,000	40,000
Evaluation	15,000	25,000	10,000

8. PROJECT BUDGET

Table 2 Framework Budget by component and source.

Component	GEF	Other sources	Project total
PDF:	0	0	0
Personnel:	60,000	381,100	441,100
U. Stockholm	0	150,000	150,000
U. Hawaii	60,000	75,000	135,000
LOICZ-IPO	0	156,100	156,100
Training:	200,000	0	200,000
Workshops:	390,000	36,500	426,500
8 Regional Wkshps	160,000	36,500	195,500
3 Generalisation Wkshps	150,000	0	150,000
1 Global wkshp	80,000	0	80,000
Publication & Dissemination	30,000	25,000	55,000
Monitoring & Evaluation:	10,000	15,000	25,000
Administrative costs	30,000	0	30,000
Project total	720,000	457,600	1,177,600

9. PROJECT IMPLEMENTATION PLAN

Table 3. Workplan and timetable for the project.

ACTIVITIES	DURATION OF PROJECT									
	Months									
	3	6	9	12	15	18	21	24	27	30
Development of preliminary budgets by national scientists	•	→	→	→	→	→	→	→	→	→
Regional workshops		•	→	→	→	→	→			
Training of regional resource persons			•	→	→	→	→			
Second tier of thematic workshops						•	→	→	→	
Publication and distribution of results						•	→	→	→	→
Global workshop										•
Publication of Global Assessment and dissemination of results										•
Terminal Evaluation										•

10. PUBLIC INVOLVEMENT PLAN

10.1 Stakeholder identification

Key stakeholders are developing country scientists and scientific organisations involved in coastal and marine research and the LOICZ network. As a targeted research activity dependent upon existing data and information held in governmental and non-governmental research and monitoring institutions the opportunities for participation of the wider public and civil society in this project are minimal.

Involvement of the wider public and civil society in this activity will be via open access to the WWW site and through dissemination of project outputs and results in the popular scientific literature. Government scientists and managers concerned with coastal zone monitoring and developing inputs to national communications on greenhouse gas sources and sinks required under the Climate Change Convention are also expected to benefit from the project.

10.2 Information dissemination and consultation

A tutorial will be developed on budgeting that will be made available on the WWW site and in hard and electronic copy particularly for those who do not have internet access. The internet site will serve as a 'virtual workshop'.

The outputs from the workshops convened under this project will be made publicly available through the internet and via published articles in the scientific and popular media.

Scientific and technical information and syntheses produced during the workshops will be published and disseminated widely to developing country scientific institutions in hard and electronic copy and via the internet. The findings of the global workshop will also be disseminated via the internet and hard copy publications.

10.3 *Stakeholder participation*

The primary participants in this project will be developing country scientists and institutions with leadership and training provided through the LOICZ network.

10.4 *Social and participation issues*

Not applicable.

11. MONITORING AND EVALUATION PLAN

11.1 LOICZ will be responsible for preparing and submitting to UNEP, quarterly reports outlining the status of activities undertaken. Based upon the results of these findings, necessary adjustments to the workplan and timetable will be made to ensure that results are obtained and syntheses produced according to schedule.

11.2 UNEP will take the lead, in consultation with LOICZ, in carrying out an independent end-of-project evaluation. Key performance indicators, will include:

- the extent to which the scientific objectives have been met;
 - the extent to which the results produced receive wide scientific acceptance;
 - the value of the results from the perspective of cost benefit analyses of large scale interventions aimed at reducing nutrient inputs to the coastal ocean.
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PLANNING TABLE FOR CO-FINANCING **NOT TO BE INCLUDED IN THE FORMAL SUBMISSION.** TO GEFSEC

Figures in the Project budget table are derived from these estimates. Figures in Bold are cash contributions, in normal face are in-kind contributions.

	LOICZ IPO			Uni Hawaii			Uni. of Stockholm			TOTAL
	Yr 1	Yr 2	Yr 2.5	Yr 1	Yr 2	Yr 2.5	Yr 1	Yr 2	Yr 2.5	
Professionals	25,000	25,000	12,500	30,000	30,000	15,000	30,000	30,000	15,000	212,500
Assistants in-kind	12,000	12,000	6,000							30,000
in-cash	63,600						30,000	30,000	15,000	138,600
Website							10K	10K	5	25,000
Central America	18,900									18,900
South America	17,600									17,600
In-Kind	37,000	37,000	18,500	30,000	30,000	15,000	40,000	40,000	20,000	267,500
Cash	100,100						30,000	30,000	15,000	175,100
Total	137,100	37,000	18,500	30,000	30,000	15,000	70,000	70,000	35,000	447,600