Asia-Pacific Network for Global Change Research

Regional Scoping Workshop on Science-Policy Linkages in Integrated Coastal Zone Management in South Asia

Final report for APN project 2005-19-NSG-Wikramanayake

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Regional Scoping Workshop on Science-Policy Linkages in Integrated Coastal Zone Management in South Asia

2005-19-NSG-Wikramanayake

Final Report submitted to APN

Overview of project work and outcomes

Non-technical summary

Land-Ocean Interactions in the Coastal Zone (LOICZ) is a core project of the IGBP and the IHDP that seeks to understand changes in coastal zones and the impact of these changes on human activities. As part of the second phase of this project – known as LOICZ II – it has been decided to establish Regional Nodes.

The LOICZ Regional Node for South Asia has been established at the National Science Foundation, Sri Lanka, since 2004. In order to foster the regional implementation of the LOICZ science plan, the Regional Node sought funding from APN to hold a Regional Scoping Workshop on Science-Policy Linkages in Integrated Coastal Zone Management in South Asia.

By holding the workshop immediately after a regional workshop on river-basin coast interactions it was possible to have a large number of participants representing the natural and social sciences and the policy and management areas. The development of a regional implementation strategy for LOICZ, discussion on how natural and social sciences can be integrated, the evaluation of several case study sites and the development of the proposal were the main activities of the workshop.

Objectives

The objectives of the workshop as listed in the proposal were to include scientists from the social sciences and the policy and management areas into the existing regional network of coastal scientists, identify existing policies relevant to coastal zone management and to develop a proposal for an integrated study of science-policy interactions in the region.

As it was possible to have a larger number of participants than originally planned due to the combination of workshops described above, it was decided to devote more time to the discussion of the regional network and implementation strategy and the combination of the natural and social sciences and reduce the focus on existing policies.

Amount received for each year supported and number of years supported

$15,000 for the year 2005/2006

Participating Countries

Participants from the following countries were funded by the project - Bangladesh (3), India (6), Pakistan (2) and Sri Lanka (6). Dr. Mohamed Ali, the director of the SAARC CZM Centre – which is based in the Maldives - attended as a resource person with funding from the project. Dr. Hartwig Kremer, Executive Officer of LOICZ and Dr. Martin Le Tissier, the Deputy Executive Officer of LOICZ participated with funding from LOICZ. The full list of participants is given in the Appendix.

Work undertaken

The principal activity was a three day workshop, held from the 20th to the 22nd of October, 2005, at Waikkal in Sri Lanka. This workshop was held immediately after the South and South-east Asia Basins workshop. An important feature of the workshop was that the participants were evenly divided into those with backgrounds in the natural sciences and the social sciences.

Results

The principal outcomes of the workshop are the following :

1) A proposal entitled "Development of an Integrated Framework for Science-Policy Interactions towards Enhanced Management of Coastal Systems in South Asia"

2) An enhanced regional network of coastal scientists and managers – with backgrounds in natural sciences, social sciences and policy development

3) A strategy for the regional implementation of the LOICZ science plan

Relevance to APN scientific research framework and objectives

Within the APN Research Framework as of 2004 the proposed project addresses three of the main issues; namely, Changes in Coastal Zones and Inland Waters, Integration of the findings of natural science findings with social and economic factors and Input to policy-making and implementation. The project also addresses the issue of the Human Dimension of Global Change in relation to human activities in the coastal zone.

When considering the Second Strategic Plan of APN published in 2005, the proposed project is directly relevant to Theme 3 of the Science Agenda as it is concerned with changes in coastal systems. However the project is also relevant to the other four themes as the proposed framework is intended to cover all drivers – including climate change – that lead to changes in coastal systems and result in science-based policies for the sustainable development of coastal zones. The activities proposed are closely related to those identified for APN support.

The project focus is on the linkage between science and policy. Furthermore it involves four countries as part of a regional network and its goals are closely related to those of LOICZ. Therefore the project is in accordance with the APN Policy and Institutional Agendas as well.

Self evaluation

The workshop was able to accomplish much more than originally envisaged due to the increase in the number of participants made possible by combining the workshop with the Basins workshop. The increased number made possible a representative regional meeting, an useful discussion between natural and social scientists and the initial assessment of a number of case studies covering a broad range of issues.

Potential for further work

The project proposal developed at the workshop has obtained part funding – for three years – from APN. The kick-off workshop is to be held in early 2007. Efforts are underway to obtain supplementary funds from a variety of regional and national sources. Supplementary funding for the kick-off workshop has been promised by the SAARC CZM Centre in the Maldives.

The project team has initiated contacts with several related regional and national projects and programs. In particular the country teams are in the process of linking the planned activities at the case study sites to activities that are part of the National Communications under the UNFCCC.

Publications

No publications resulted from the workshop

Acknowledgments

The contribution of the National Science Foundation, Sri Lanka, which hosts the LOICZ Regional Node for South Asia, in organizing the workshop is acknowledged with gratitude. The participation of Drs. Kremer and Le Tissier was supported by LOICZ.

Technical Report

Preface

The South Asian region accommodates a population of approximately 1.4 billion people, with a significant proportion of the population and the economy of the region based within the coastal zone. The sustainable management of the coastal zone requires an understanding of what causes changes in the coast and the impacts of these changes on human activities.

The object of the workshop was the development of a proposal to study science-policy linkages in the management of the coastal zone and the creation of a multi-disciplinary regional network of coastal scientists to implement the LOICZ scientific agenda.

1.0 Introduction

LOICZ II Science Plan

Land-Oceans Interactions in the Coastal Zone (LOICZ) is a core project of the International Geosphere-Biosphere Programme (IGBP) and the International Human Dimension Programme (IHDP) that seeks to understand these interactions and develop a scientific framework for sustainable management of the coastal zone at a global level. The second phase of LOICZ (known as LOICZ II) is being implemented from 2003-2012. LOICZ II has decided to regionalize its International Programme Office (IPO) as part of its implementation strategy. The scientific plan of LOICZ II is focused on the following five themes:

Theme 1: Vulnerability of coastal systems and hazards to human societies
Theme 2: Implications of global change for coastal ecosystems and sustainable development
Theme 3: Anthropogenic influences on the river basin and coastal zone interactions
Theme 4: Fate and transformation of materials in coastal and shelf waters
Theme 5: Towards coastal system sustainability by managing land-ocean interactions

Previous LOICZ-related Regional Activities

During the last 5 years, a number of coastal projects related to LOICZ I were initiated by Sri Lanka with the participation of several countries in the region, including Bangladesh, India, Maldives, Nepal and Pakistan. Two Regional Workshops, one on Estuarine Modelling and Coastal Zone Management – funded by START/LOICZ/IGBP - and the other on Biogeochemical Budgeting and Socio-Economic Modelling – funded by APN/LOICZ/START - were held in Colombo in April, 1999 and September, 2000, respectively. The need for better data was identified at the second of these workshops and the participants drafted a proposal for submission to APN for such a regional study.

This proposal was approved and a two-year study (later extended to a third year) entitled "An Assessment of Nutrient, Sediment and Carbon Fluxes to the Coastal Zone in South Asia and their Relationship to Human Activities" (APN 2001-20 and 2002-05) was carried out in 2001/04 with funding from APN, START and LOICZ. This project included the development of a network of regional coastal scientists, the collection and synthesis of existing data, gap-filling research studies, capacity building programs and a Regional Workshop to present and discuss the results of the studies and plan future work.

The outputs of this project – which included the Proceedings of the Regional Workshop, Biogeochemical Budgets for several sites, several conference presentations and other publications, several post-graduate theses, etc. – are described in detail in the Final Report of the project, which was submitted to APN and START in May 2004. It is planned to publish the biogeochemical budgets and related studies on nutrient fluxes as a separate LOICZ Research and Studies Report.

The results of this project showed that few studies are integrated or comprehensive enough to identify and quantify the causal relationship between the drivers of change and the response of the system. The socio-economic dimension is usually neglected. A regional inter-disciplinary network focused on the integration of the sciences into coastal zone management is needed. Furthermore there is a need to address the scientific and institutional issues raised by national Coastal Zone Management plans and the overlap between these plans and those for catchments management, water resources management, fisheries management, etc. Finally, the project demonstrated that the provision of supplementary funds for integrating on-going projects is a very cost-effective method of addressing the lack of integration.

Establishment of a LOICZ Node for South Asia.

In order that the momentum generated by this coastal project be maintained and in accordance with the desire for LOICZ II to establish a distributed project office, the National Science Foundation (NSF) of Sri Lanka consented to host the South Asian Regional Node. This offer was accepted and the Memorandum of Understanding (MOU) between LOICZ and the NSF was signed in December, 2004.

The establishment of a South Asian node is expected to increase the visibility and effectiveness of LOICZ II in the region and to offer greater opportunities for seeking closer collaboration and coordination of coastal research and increase networking (scientific, sponsors) within and between regions. It will also ensure that its research and synthesis are relevant to regional and local needs. One requirement of a Regional Node is that it should generate its own funding in addition to whatever seed funding that it may receive from the Central IPO of LOICZ.

A proposal entitled “Implementation of the LOICZ II Science Plan through Regional and National Workshops, Synthesis and Policy Assessment, Gap-filling Studies, Capacity Building and Networking in the South Asian Region” was submitted to APN in order to implement the LOICZ Science Plan in the region. After reviewing the proposal APN suggested that it be rewritten to focus on more specific issues and awarded a Seed Grant of US $ 15,000 for a regional workshop to develop the new proposal. The outcomes of this workshop are the subject of this report.

2.0 Methodology

The three day scoping workshop was the principal methodology adopted. However it is important to appreciate the “value added” to this workshop by holding it immediately after the South and South-east Asia Basins workshop, which was funded by UNEP and LOICZ. The Basins workshop was held over five days and had 25 participants, of whom 12 were from the South Asian region. Six of these regional participants stayed on for the scoping workshop.

The main objective of the Basins workshop was to develop a regional synthesis of river-basin coast interaction by up-scaling the assessments of representative river basins. A further objective was to assess the current state of integrated river-basin and coastal management using the "progress markers" developed by UNEP. Information on river-basin coast interactions from 11 basins from four countries in the South Asian region was presented at the Basins workshop.

Holding the workshops in succession had the following advantages

1) As five participants attended both workshops, it was possible to increase the number of participants from outside Sri Lanka

2) The discussion of basin-coast interactions at the Basins workshop set the stage for the integrated framework and provided information that was used to select the case study sites

An important feature of the workshops was that the participants were evenly divided into those with backgrounds in the natural sciences and the social sciences. Furthermore a wide range of institutions and programs – local, national and regional – were represented.

The first day of the workshop was set aside for the development of the regional LOICZ network and implementation strategy. Presentations on regional programs relevant to LOICZ and the recently established SAARC CZM centre were followed by a discussion on how the LOICZ objectives could be incorporated into their activities. A strategy to foster inter-disciplinary studies at state, national and regional levels and access available funding at these levels was developed.

The next two days were used to develop a proposal for the integrated study of science-policy interactions related to coastal zone management. The following activities were carried out

1) Presentations and plenary discussions on natural and social science approaches to changes in coastal systems

2) Small group discussions – with participants from natural and social science backgrounds - to compare natural and social science approaches to changes in coastal systems

3) Presentations on prospective case study sites

4) Country presentations on coastal zone management

5) Plenary discussions on project proposal – methodology, case study sites and implementation

6) Drafting project proposal

3.0 Results & Discussion

The principal discussions and conclusions reached at the workshop are described below.

Science-Policy Interactions

The assessment of river-basin coast management in the region that was carried out in the Basins workshop showed that a great deal remains to be done before a properly integrated management is achieved. Currently the management of river-basins and coasts have only very tenuous links – both at the policy and the institutional levels.

The discussion on science-policy linkages was continued at the scoping workshop. It was concluded that a stronger linkage is needed at all scales – regional, national, state and local. Many examples of policies developed and implemented with little or no scientific understanding were discussed.

Integrating Natural and Social Science Approaches

The small group discussions between scientists from natural and social science backgrounds brought out many differences in the terminology, methodology and priorities of the two groups. For example, natural scientists talk in terms of the "state" of a coastal system, while social scientists may refer to "social infrastructure". It is important that the two groups understand these differences before attempting inter-disciplinary research. A key difference – discussed in more detail below – is the difference of scale.

Development of an Integrated Framework

An outline of the integrated framework proposed for the assessment of science-policy linkages is given below. The approach is to expand the DPSIR framework used by LOICZ and integrate it with a livelihoods based approach – of which LIFE is one example – in order to assess the impacts on people.

DPSIR Framework

The D-P-S-I-R (driver-pressures-state-impacts-response) framework, was originally developed as a device for the scoping of complicated management issues and problems. The segments of the framework are described below :

Drivers – sectoral development activities that take place in response to societal demand

Pressures – processes affecting key natural and social system functions

State (and state change) – the indicator functions of the natural and social system functions and how they change as a result of the pressures

Impact – effect of the change in state on the characteristics of the system and the provision of goods and services

Response – action taken. This can be a management action or a social response

A graphical representation of the DPSIR framework as it could be applied to investigate the causes of changes in coastal systems is given in Figure 1. Note that natural drivers such as climate change and sea level rise are considered separately from anthropogenic drivers.

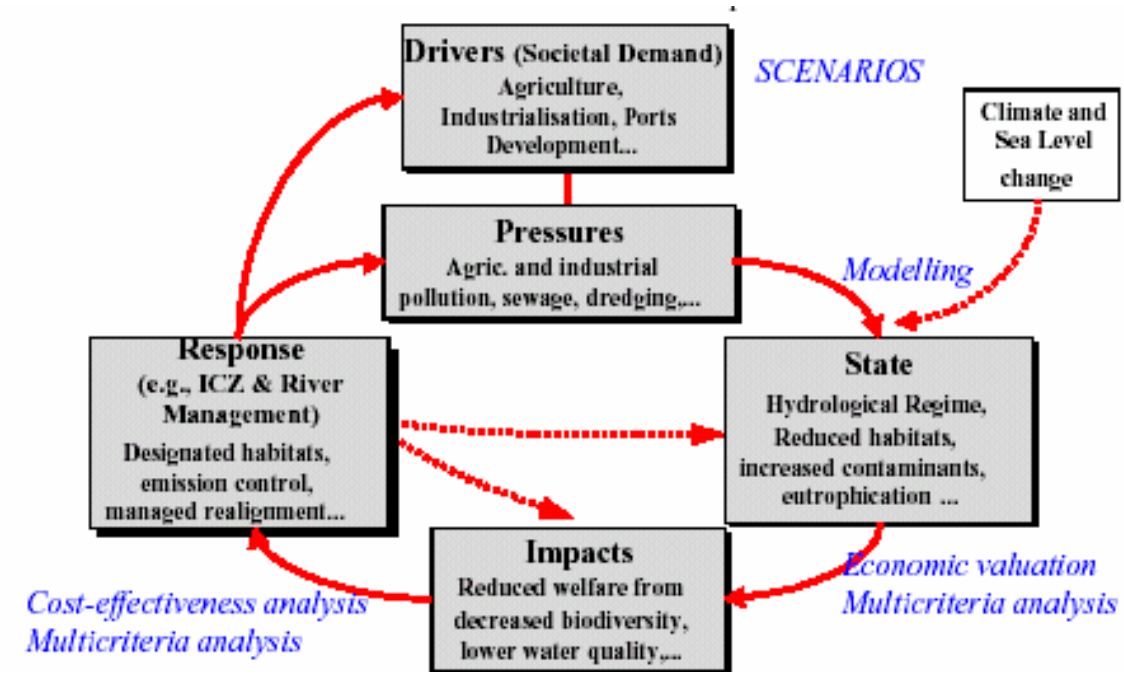

Figure 1 : Graphical Representation of the DPSIR Framework (adapted from The DPSIR framework (adapted from Ledoux et al., in press).

The DPSIR approach was used extensively in the first phase of LOICZ to investigate the causes of changes in coastal zones, and in particular to understand the relationship between those changes and development activities in river basins. A great deal of research was carried out to quantify the flux of materials from catchments and the resulting impact on the bio-physical functioning of coastal systems. One particular project (Biogeochemical and human dimensions of coastal functioning and change in Southeast Asia, LOICZ Reports & Studies No. 17) took this quantification a step further and developed quantitative relationships between incremental changes in economic activity in the catchment and changes in the quality of coastal waters.

LIFE and other approaches to socio-economic impacts

Frameworks such as DPSIR are on the scale of coastal systems and catchments. However the impacts on people are felt at the much smaller scale of individuals, households and communities. A particular change in a coastal system may have widely different impacts on the different communities that depend on the system due to the diversity of socio-economic conditions that can exist.

Similarly social and economic indicators that are averaged over administrative regions also do not capture the impact of a change in a coastal system because of the difference in scale and demarcation. Administrative regions are very rarely demarcated according to catchments and coastal systems!

Therefore a "bottom up" approach is needed to capture the impact of changes in coastal systems on humans. The LIFE framework (Ghosh and Roy, in press) is one such approach that has the household as the smallest unit and the community as the next smallest unit. This framework was developed to understand the vulnerability of people to droughts and floods in rural areas of India.

The components of the framework are identified as

L – livelihood patterns

I – institutional presence required to build social capital

F – food security

E – empowerment parameters such as health and education

This framework has been used to construct indices to quantify the vulnerability of households and communities to extreme events. The differences in the vulnerability indices within and between study areas has then been used to identify the main determinants of the capacity to cope with the extreme events.

There have been other similar bottom-up approaches developed for a variety of purposes. The "sustainable livelihoods" framework has been proposed by the Department for International Development (DfID) of the UK to assess the objectives, scope and priorities of development projects. In this framework livelihood assets are defined in terms of five components – human, natural, financial, physical and social – and placed within a vulnerability context. Development project are then assessed on whether and how they change the livelihood assets and reduce the vulnerability to changes.

Extension and Combination of Frameworks

While the DPSIR framework used in LOICZ I yielded important results from the point of view of bio-geochemistry and coastal management, it did not develop a complete linkage between the primary causes of change and the final impact on people. For example "agriculture" was considered as a catchment driver with fertilizer runoff being a pressure.

However, the actual quantity of fertilizer runoff will depend on the area cultivated, the price of fertilizer, farming practices etc. which in turn are dependent on agricultural policies and subsidies, the macro-economic climate and awareness and education. Similarly the consideration of impact was usually limited to the impact on the coastal system or the goods and services – such as fish catch – provided by it. The actual impact of the change in the goods and services on human well-being was not investigated in detail.

Therefore the DPSIR framework has to be extended at both the "driver" end and the "impact" end to allow a complete understanding of the primary drivers of coastal change. As the primary drivers – i.e. national or regional policies and prices - operate at a scale that is larger than or equal to the scale of the catchments and the systems it is possible to incorporate them into the DPSIR framework.

However, as discussed in the preceding section, a different approach has to be taken to quantify the human impact because of the difference in scale. Therefore it is proposed that a household centered approach such as LIFE be modified and extended to capture the impact of coastal changes on humans.

The two frameworks will have to be integrated to complete the overall framework. The integration of the two frameworks will be a challenge because of the difference in scale and the different methods used to quantify the bio-physical changes and the human impacts. It is generally assumed that the bio-physical changes are amenable to deterministic modeling, while this is definitely not the case for the human impacts and the human response.

Policy analysis

The final goal of the project is to use the integrated framework to study the interaction between science and policy in the case study areas, to assess the suitability of existing policies and to develop policy alternatives. The policy analysis will also encounter the difference in scale because policies are generally formulated at the larger scale while a proper assessment of the impact of the policies can only be done at the smaller scale of households and communities. As the integrated framework is to be developed to bridge the scale divide it will allow such an analysis on two different scales.

The policy analysis will involve activities such as the development of policy narratives using available documents and interviewing key stakeholders, studying the institutional arrangements for the development of policies, assessing the participatory nature of the process, assessing the interaction between the various sectoral and development policies that affect coastal systems etc.

Example of Negombo Lagoon

The need for and the potential uses of the integrated framework and policy assessment proposed in the project will be shown by a brief description of one of the environmental management problems related to Negombo Lagoon, Sri Lanka (Wikramanayake, 2003).

The Negombo Lagoon and the associated Muthurajawela Marsh form a continuous coastal system on the west coast of Sri Lanka. The system area is approximately 7200 ha of which about half is the lagoon and half the marsh. The catchment of the system is about 600 km^2 in extent. The lagoon is affected by a variety of problems such as poor water quality, algal blooms, decline in fishery, sedimentation, land reclamation, etc. The lagoon fishery supports about 3000 families while the lagoon also functions as a breeding ground for fish that are caught in coastal waters.

The algal blooms are considered one of the key issues as they impact the sea grass beds and the lagoon fishery. It appears that the principal factor causing the blooms is the fertilizer runoff from paddy (rice) cultivation. A study by Wikramanayake et al. (2003) has shown that very high loss of nitrogen fertilizer is possible from the type of rain-fed

rice cultivation prevalent in the catchment. However the fertilizer runoff is directly related to fertilizer use, which in turn depends on the degree to which fertilizer is subsidized and the market value of paddy.

The variation in the price of the three principal types of fertilizer – Urea, Triple Super Phosphate (TSP) and Muriate of Potash (MOP) - used in rice cultivation in Sri Lanka is shown in Figure 2. The figure shows that while the prices of all three types were increasing from the early 1990's, the price of Urea was reduced from 1997 due to a decision to subsidize Urea more than the other fertilizers. The price of Urea was brought down to about Rs. 650 a metric tonne by 1998 while the price of the other fertilizers continued to rise.

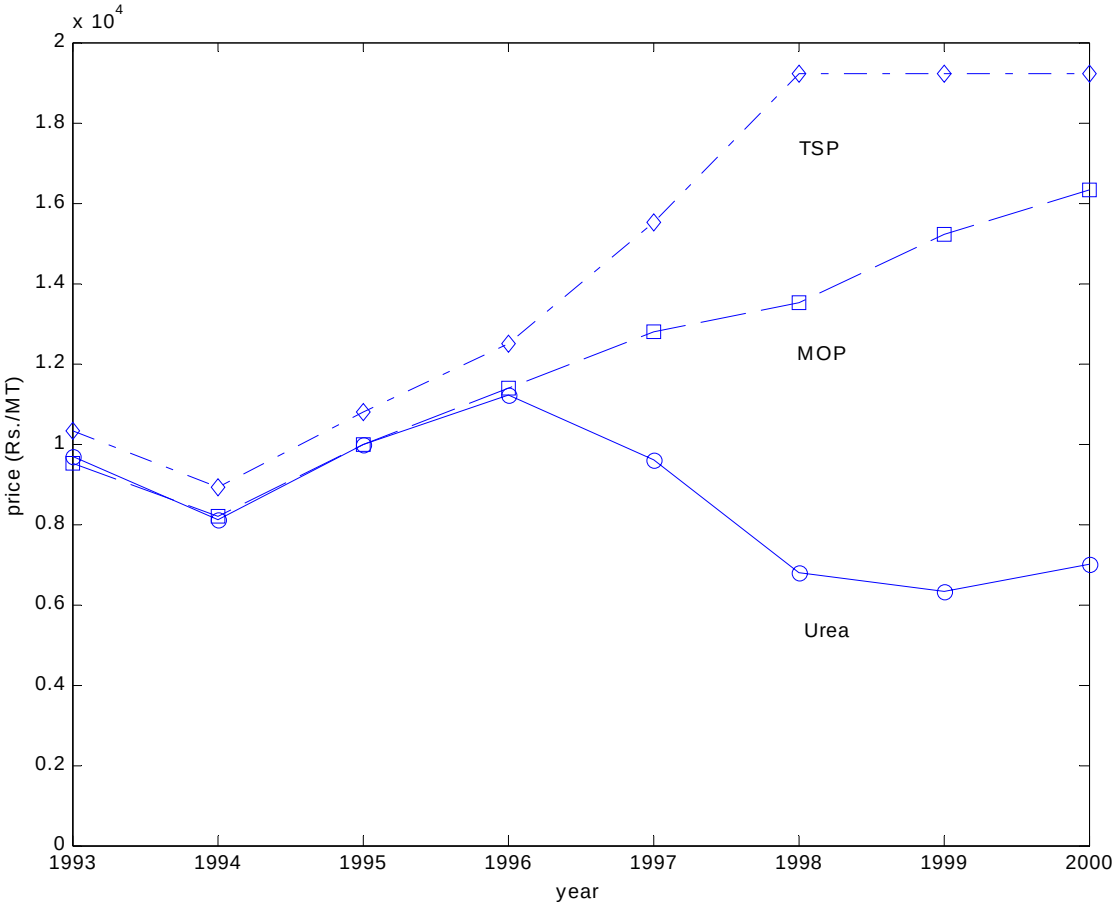

Figure 2 : Variation in price of Fertilizers from 1993 to 2000. TSP – Triple Super Phosphate, MOP – Muriate of Potash, Urea – Urea (Source : National Fertilizer Secretariat, Sri Lanka)

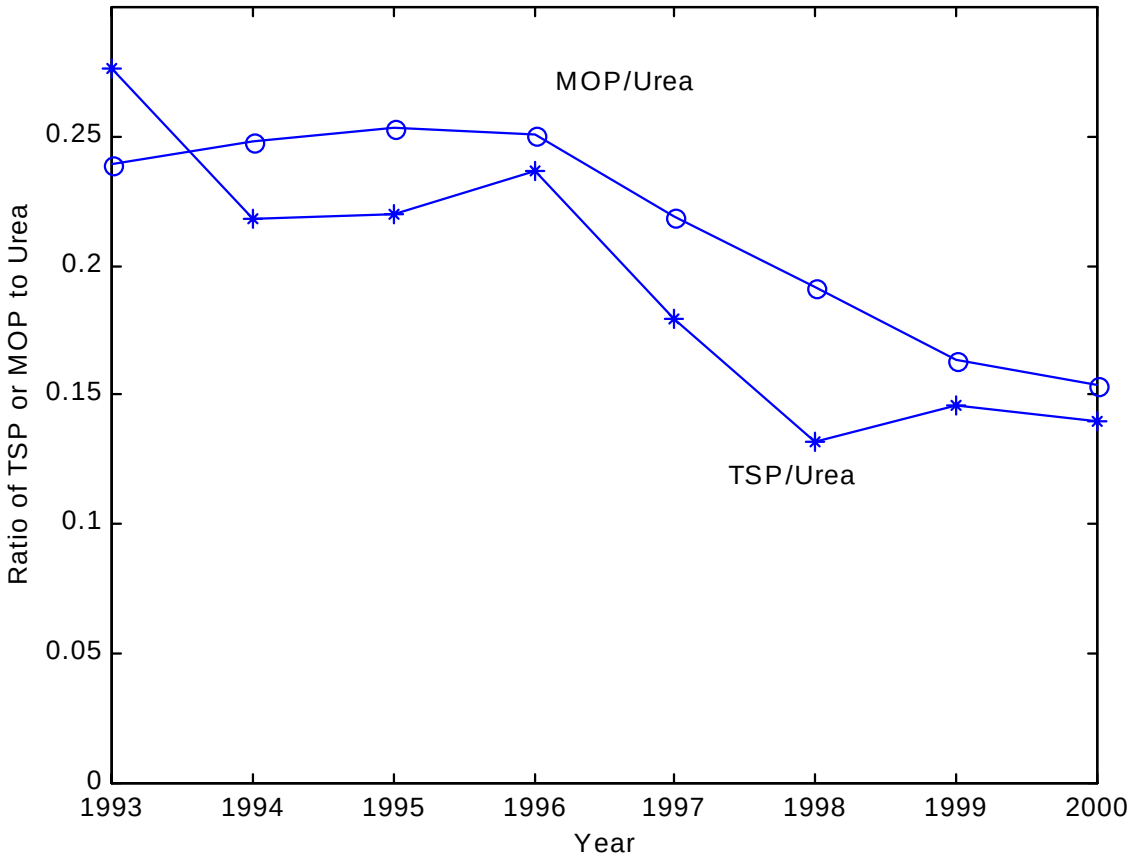

Figure 3 : Variation in the ratio of Triple Super Phosphate to Urea and Muriate of Potash to Urea used in rice cultivation from 1993 to 2000. (Source : National Fertilizer Secretariat, Sri Lanka)

Figure 3 shows the results of an analysis of the total island-wide fertilizer use in rice cultivation over the same period. The figure shows how the ratio of TSP/Urea and MOP/Urea has varied during this period. When the two figures are compared it is clear that these ratios have decreased significantly since the introduction of the preferential subsidy for Urea. The indication is that farmers are using more Urea when compared to the more expensive types of fertilizer.

The fertilizer subsidy was changed in 2002 after a change in government. The preferential subsidy on Urea was reduced. The market price of Urea also rose steeply in response to world oil prices. There is anecdotal evidence that the severity of algal blooms in the lagoon has decreased since 2002.

Thus there appears to be a causal chain between the fertilizer subsidy and the livelihood of the lagoon fishermen. The links in the chain would be

1) Price of fertilizer – agricultural policy influenced by political thinking

2) Response of farmers – cultivate more land, use more fertilizer

3) Change in fertilizer runoff – depends on rainfall pattern and water management as well as on fertilizer use

4) Algal blooms in lagoon – depend on water exchange with ocean as well as on quantity of fertilizer runoff

5) Decline in fishery – factors other than the algal blooms such as direct pollution and inappropriate fishing methods may also cause a decline

6) Impact on fisher families – not all families may be equally affected

While the sequence appears to be straightforward this is in fact a very complex problem. Every link is affected by other factors, which have also to be understood – ideally in quantitative terms - if the impact of the subsidy on the fishermen is to be assessed. The actual impact on the fishermen will depend on a range of local factors including alternative livelihoods, food security, etc.

The DPSIR framework as used in LOICZ I is able to link the response of the farmers to the decline in the fishery. This framework will have to extended to relate the response of the farmers to the change in the subsidy and other economic variables. As discussed in Appendix I a livelihood based approach will be needed to link the decline in the fishery to the impact on the fisher families.

Once the overall significance of the fertilizer subsidy with respect to the changes in the fishery are understood using the integrated framework, it will be possible to assess the policies and develop alternatives. This process would involve questions such as

1) What was the background to the fertilizer subsidy policy? What scientific information was used? What changes can be made in this policy formulation process so that the concerns of the coastal population will be considered?

2) What policies can be adopted to reduce the over-application of fertilizer? What policies and practices can be adopted to reduce the fertilizer runoff?

3) What policies and other measures can be adopted at the local level to mitigate the impact on the fisher families?

Case Study Sites

The presentations made on studies of specific coastal systems were assessed with a view to selecting case study sites for the proposal. Some material from the Basins workshop was also discussed. The focus of the discussion was to assess the following

1) Problems and issues observed and likely drivers

2) Impact of these problems and issues on human activities

3) Quantity and quality of information available

Another aspect of the presentations was that some were by natural scientists and some by social scientists. Therefore the discussions also focused on comparing the different objectives and methods of studies from each group.

Project Proposal

The principal outcome of the workshop was the development of the project proposal entitled "Development of an Integrated Framework for Science-Policy Interactions towards Enhanced Management of Coastal Systems in South Asia". The important features of this project will be discussed here while the complete proposal (without the curriculum vitae) is contained in the Appendix.

The objectives of the project are as follows :

1) To develop an integrated framework that combines natural and social science approaches to the analysis of change in coastal systems

2) To assess the pathways by which scientific knowledge facilitates policy response to these changes

3) To develop a network of natural and social scientists at the national and regional levels to study coastal change issues

4) To formulate a policy portfolio for the case study areas

5) To share experiences and lessons learned between participating countries

The development of the integrated framework and its application to assess science-policy linkages was described in detail in a preceding section. The framework will then be tested by application to six case study sites.

The six sites were selected during the workshop according to the criteria described above. The case study sites, together with the principal issues and the lead institution handling the case study, are listed in Table 1. There are six case study sites in four countries. Further sites may be added if supplementary funding is obtained at the national level.

Table 1 : Summary of Case Study Sites

Study Area	Principal Features and Issues	Lead Institution
Western Indus Delta, Pakistan	Sea level rise, salinisation, mangrove destruction, coastal fishery	National Institute of Oceanography, Pakistan
Mumbai coastal area, India	Urbanization, Pollution, Shipping, coastal ecosystems	National Institute of Oceanography, India
Vembanad Estaury, India	Damming, pollution, lagoon fishery, reclamation	Centre for Earth Science Studies, Kerala
West Bengal Sunderbans, India	Mangrove destruction, salinisation, eco-tourism, aquaculture	Calcutta University, Kolkata
Negombo Lagoon, Sri Lanka	Pollution, lagoon fishery, reduced water exchange, reclamation	University of Moratuwa,
Karnaphully Estuary,Bangladesh	Pollution, coastal fishery, damming	University of Chittagong

The main activities that will be carried out under this project are

1) A kickoff regional workshop to develop the integrated framework considering the information available from the case study areas

2) National workshops to identify the policy and management background

3) Application of the framework to make a first assessment of the science-policy interactions in the management of the case study areas

4) A mid-term workshop to report on progress, identify data gaps and refine the framework

5) Gap-filling studies and refinement of the assessments in the case study areas

6) Development of policy options for the case study areas

7) Final workshop to discuss the results and plan future work

The expected outcomes of the project are as follows :

1) An integrated framework that combines natural and social science approaches to the analysis of change in coastal systems.

2) A network of natural and social scientists at the regional and national level to study coastal issues.

3) A report articulating the process of communication and dissemination of scientific information for scientists and decision makers.

4) A policy options portfolio for the case study areas.

5) Sharing experiences and lessons learned between participating countries.

The proposed project is complex, and couples regional framework development with activities at the case study sites. Therefore it was decided to divide the participants into three groups. The first group – consisting of six members from diverse backgrounds – is the Core Research Group. This group has the responsibility of developing the framework and assisting the application to the case study sites.

The second group consists of the six Case Study Team Leaders. These researchers are from the lead institution in charge of the case study. They have the responsibility of forming inter-disciplinary case study teams at the local level in order to apply and test the framework. This group also has the responsibility of raising supplementary funds from national and local sources and liaising with related national programs and projects at the local level.

The remainder of the participants are in the Regional Support Group. They will lend their specific expertise to Core Research Groups as required while also supporting a case study team if possible. They will support both groups in the search for supplementary funds.

Regional Implementation Strategy for LOICZ Science Plan

The development of a regional implementation strategy for LOICZ was discussed on the first day of the workshop. The existence of regional institutions and projects such as the SAARC CZM Centre, SACEP, IWMI, IUCN, SANDEE was recognized and it was agreed that it was imperative that the Regional Node stay in close touch with these institutions. In particular it was agreed that there should be a particularly close link between the Regional Node and the SAARC CZM Centre.

An important outcome of this discussion was the concept of establishing a regional committee to provide guidance to the regional node. The objectives of establishing a regional committee are

1) To increase the participation of scientists in the activities of the regional node in terms of geography, institutions and disciplines

2) To improve the acquisition and dissemination of information and scientific results in the region

3) To increase the acceptance of the regional node by regional scientists and national and regional institutions engaged in coastal zone management

The participants agreed that it was necessary that a Regional Committee be established. After some discussion the following points were agreed upon :

1) The committee shall have an advisory and supporting role similar to that of the Scientific Steering Committee (SSC) of LOICZ.

2) The members shall participate in their individual capacities as scientists and coastal managers rather than in their official capacities

3) The committee shall have between 5 and 10 members with a broad geographic and disciplinary representation

It was proposed that the structure and the TOR for the Regional Committee be modeled closely on those of the SSC of LOICZ itself. In particular the members of the committee are to take the lead in disseminating information about LOICZ in their countries and placing the LOICZ scientific questions on the national science funding agenda. In this way the Regional Committee will help apply the results of global science at the local level – which is one of the key goals of LOICZ.

4.0 Summary and Conclusions

1) A Regional Scoping Workshop on "Science-Policy Linkages in Coastal Zone Management in South Asia" was held in Sri Lanka from the 20th to the 22nd of October, 2005.

2) The workshop was enriched – both in terms of increased participation of regional scientists and in terms of information on river-basin coast interactions and management – by holding it immediately after the South and South-east Asia Basins workshop of LOICZ.

3) There were 16 participants and 3 resource persons, with the participants evenly divided between those with natural science and social science backgrounds.

4) The presentations and discussions at the workshop showed that there was an urgent need to improve the linkages between science and the development of policies that affect the coastal zone at regional, national and local levels.

5) The key outcome of the workshop was the development of a project proposal entitled "Development of an Integrated Framework for Science-Policy Interactions towards Enhanced Management of Coastal Systems in South Asia".

6) The proposed methodology is to extend the DPSIR framework, used by LOICZ to assess river-basin coast interactions, in order to capture the linkages between external drivers of change and observed changes in coastal systems. The extended DPSIR framework will be combined with a livelihood-based framework such as LIFE to link the changes in the coastal system to impacts on human well-being.

7) It is proposed to test and refine this network by applying it to six case study sites in four countries. This work will be carried out by inter-disciplinary teams at the local level who are expected to raise supplementary funds from national sources.

8) The development of the framework and the application to the case study sites is intended to foster a close working relationship between scientists from many disciplines – both at the regional and national level.

9) A Regional Implementation Strategy for LOICZ, including links to existing institutions and projects, was developed during the workshop.

5.0 Future Directions

The proposed project is closely aligned to the scientific plan of LOICZ. In particular it is closely related to the topic "Linking Natural and Social Systems" which was selected as one of three key topics by LOICZ in late 2005.

It is proposed that the project – and particularly the Case Study Teams – work closely with the national institutions that are charged with making the National Communications under the UNFCCC.

References

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Wikramanayake, P.N., Priyadarshini, W.N.C., Liyanage, B.C. and Wickremaratne, S. (2003) Fertilizer Runoff from Rain-fed Rice Cultivation, World Water & Environmental Resources Congress 2003, American Society of Civil Engineers, Philadelphia, June 2003

Appendix

This Appendix contains the following material

1) Funding sources outside APN
2) Glossary of Terms
3) Workshop Agenda
4) List of Participants
5) Project proposal entitled "Development of an Integrated Framework for Science-Policy Interactions towards Enhanced Management of Coastal Systems in South Asia"

Funding sources outside the APN

Funding for the airfares of Dr. Hartwig Kremer and Dr. Martin le Tissier was provided by LOICZ. The National Science Foundation, Sri Lanka, provided in-kind support for the organization of the workshop.

Glossary of Terms

CZM

IGBP

IHDP

IWMI

IUCN

LOICZ

SAARC

SACEP

SANDEE

UNFCCC

Workshop Agenda

List of Participants

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DEVELOPING AN INTEGRATED FRAMEWORK FOR SCIENCE POLICY INTERACTIONS TOWARDS ENHANCED MANAGEMENT OF COASTAL SYSTEMS IN SOUTH ASIA

(APN2006-11NMY)

PROJECT PROPOSAL SUBMITTED TO THE ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH UNDER THE FRAMEWORK "CHANGES IN COASTAL ZONES AND INLAND WATERS"

Participating Countries :

Bangladesh, India, Pakistan, Sri Lanka

LOICZ Regional Node for South Asia
National Science Foundation, Sri Lanka

30th June, 2006

Project Title :

Developing an integrated framework for science policy interactions towards enhanced management of coastal systems in South Asia

1. Fully Detailed Proposal

2.1 Background

The South Asian region accommodates a population of approximately 1.4 billion people, with a significant proportion of the population and the economy based within the coastal zone. The sustainable management of the coastal zone requires an understanding of the pressures exerted by natural and anthropogenic drivers in the catchments, in the open ocean and within the coastal zone itself and how the natural and social systems responds to these pressures.

Land-Oceans Interactions in the Coastal Zone (LOICZ) in its second phase (LOICZ II) is a core project of the International Geosphere-Biosphere Programme (IGBP) and the International Human Dimension Programme (IHDP). The scientific plan of LOICZ II is focused on four scientific themes with the overall goal of coastal system sustainability by managing land-ocean interactions.

LOICZ II has decided to establish Regional Nodes as part of its implementation strategy in order increase participation and to ensure that its research and synthesis are relevant to regional and local needs. Following two training workshops and a three year regional research project (APN 2001-20 and 2002-05) related to the LOICZ themes that were funded by APN, it was decided to establish the South Asian Regional Node at the National Science Foundation, Sri Lanka.

The results of this project and other studies show that current assessments of coastal changes do not capture adequately the interaction between humans and natural systems. Few studies are integrated or comprehensive enough to identify and quantify the causal relationship between the drivers of change and the response of the system. The socio-economic dimension is usually neglected.

This proposal is the result of two consecutive workshops. The first was the LOICZ South and South-east Basins Workshop where the Driver-Pressure-State-Impact-Response (DPSIR) framework was used to assess catchment coast interactions. Data on twelve South Asian basins was used to develop a regional synthesis. The second workshop was funded by APN (APN2005-19-NSG) to develop a proposal on science-policy interaction in coastal zone management. The participants included seven from the Basins workshop who were joined by six social scientists, two policy makers and two natural scientists.

The participants discussed and compared the approaches used in the natural and social sciences to understand changes in coastal systems. The limitations of the individual approaches were identified and methods of integrating the two disciplines were proposed. Case study areas were selected based on the data that had been presented at the Basins workshop. The participants also identified existing regional networks and groups that were relevant to the goals of the proposed project.

2.2 Objectives

1) To develop an integrated framework that combines natural and social science approaches to the analysis of change in coastal systems
2) To assess the pathways by which scientific knowledge facilitates policy response to these changes
3) To develop a network of natural and social scientists at the national and regional levels to study coastal change issues
4) To formulate a policy portfolio for the case study areas
5) To share experiences and lessons learned between participating countries

2.3 Methodology

Integrated Framework

The project proposes to use two approaches, namely the DPSIR framework used by LOICZ to study catchment-coast interactions and the Livelihood-Institution-Food Security-Empowerment (LIFE) framework (developed under APN2002-12) to quantify human vulnerability to extreme climatic events. The contribution of the project will be to integrate these two approaches after making the extensions needed to represent the full range of interactions between the natural and human systems in coastal zones.

Case Study Approach

The project intends to use Case Study as a tool to test the integrated framework described above. The Case Study areas will be where there have been changes in coastal systems that have resulted in significant impacts on people and a management response. The selection of these sites from those discussed at the Basins workshop ensures that these criteria are met as well as ensuring that most of the data required are already available. The case study teams will include both natural and social scientists.

Policy Interface

Pathways of assimilation of scientific knowledge into policy and decision making will be identified by developing a history of impact manifestation and response. Policy options will be developed after assessing the relevance of existing policies.

2.4 Case Study Areas

The Case Study Areas are summarized in the table below. Extensive data on the changes in the coastal systems in these areas is available.

Study Area	Principal Features and Issues	Lead Institution
Western Indus Delta, Pakistan	Sea level rise, salinisation, mangrove destruction, coastal fishery	National Institute of Oceanography, Pakistan
Mumbai coastal area, India	Urbanization, Pollution, Shipping, coastal ecosystems	National Institute of Oceanography, India
Vembanad Estaury, India	Damming, pollution, lagoon fishery, reclamation	Centre for Earth Science Studies, Kerala
West Bengal Sunderbans, India	Mangrove destruction, salinisation, eco-tourism, aquaculture	Calcutta University, Kolkata
Negombo Lagoon, Sri Lanka	Pollution, lagoon fishery, reduced water exchange, reclamation	University of Moratuwa,
Karnaphully Estuary,Bangladesh	Pollution, coastal fishery, damming	University of Chittagong

2.5 Main Activities

1. A kickoff regional workshop to develop the integrated framework considering the information available from the case study areas
2. National workshops to identify the policy and management background
3. Application of the framework to make a first assessment of the science-policy interactions in the management of the case study areas
4. A mid-term workshop to report on progress, identify data gaps and refine the framework
5. Gap-filling studies and refinement of the assessments in the case study areas
6. Development of policy options for the case study areas
7. Final workshop to discuss the results and plan future work

2.6 Expected Outcomes

1. An integrated framework that combines natural and social science approaches to the analysis of change in coastal systems.
2. A network of natural and social scientists at the regional and national level to study coastal issues.
3. A report articulating the process of communication and dissemination of scientific information for scientists and decision makers.
4. A policy options portfolio for the case study areas.
5. Sharing experiences and lessons learned between participating countries.

2.7 Relationship to the Second Strategic Plan of APN

As the project is concerned with changes in coastal systems it is directly relevant to Theme 3 of the Science Agenda. However the project is also relevant to the other four themes as the proposed framework is intended to cover all drivers – including climate change – that lead to changes in coastal systems and result in science-based policies for the sustainable development of coastal zones. The activities proposed are closely related to those identified for APN support.

The project focus is on the linkage between science and policy. Furthermore it involves four countries as part of a regional network and its goals are closely related to those of LOICZ. Therefore the project is in accordance with the APN Policy and Institutional Agendas as well.

2. Regional Collaboration

The project will expand the regional network developed under previous APN funded activities. Of particular importance is the collaboration of natural and social scientists – both at the national and the regional level. Over ten institutions will be involved in the study of six areas spanning the entire coastal zone of the region. The implementation of the project by the LOICZ Regional Node will ensure the sustainability of the network and the development of follow-up activities.

3. Relationship to the Human Dimensions of Global Change

The primary objective of the project is to integrate natural and social science approaches to develop an integrated framework that identifies the pathways by which natural and anthropogenic forcing factors affect human well-being. Therefore the human dimension of global change – in terms of the drivers, the impacts and the policy response – is an integral component of the project.

4. Capacity Building for Global Change Research

The use of the integrated framework to assess science-policy interactions in the six case study areas will build capacity for global change research within the six case study teams. Existing capacity will be enhanced and new capacity developed in the areas of integration of natural and social sciences, collaboration across disciplines and policy analysis. Both the development and the application of the framework are expected to lead to post-graduate theses and peer-reviewed publications.

5. Scientific Contribution of each Participating Country

The proposal was developed by a group of 17 scientists from five countries during an APN-funded regional workshop (APN2005-19-NSG). The development of the integrated framework will be carried out by a Core Research Group, while Case Study Teams – six inter-disciplinary teams in four countries - will apply the framework to each study area. Each team will be responsible for conducting the relevant activities and reporting the results, while overall coordination of the project will be handled by the LOICZ Regional Node for South Asia.

6. Links to Policy and Sustainable Development Issues

As the integrated framework described above is to be used to assess existing policies in the case study areas and develop policy options for sustainable development, issues of policy, management and sustainability are at the heart of the project. The inclusion of scientists from the IUCN Regional Office and the SAARC CZM Centre in the project team will help feed the results of the project into the decision- and policy-making processes at regional and national levels.

7. Relationship between Global Change Research Programmes and Networks

As described above the proposed project is directly related to LOICZ and will be implemented by its South Asian Regional Node. The project activities will contribute to the development of a regional LOICZ network. The project is relevant to the networking and capacity building objectives of START. The project findings will also contribute to the Indian Ocean Global Ocean Observation System (IOGOOS) by developing the scientific, social and economic justification for long-term coastal monitoring programs.

8. Related Research Work

The use of the DPSIR framework is documented in the reports of the Regional Basins Assessments carried out by LOICZ (www.loicz.org)

The LIFE framework is described in the following publications :

Ghosh. A and J. Roy (2005) , Coping with Extreme Climatic Events: Analysis of Household and Community Responses from Selected Hotspots in India, Science and Culture (forthcoming)

Roy J, A. Ghosh, A Majumdar, P Roy, A.P. Mitra, C.Sharma (2005), Socio-economic and Physical Perspectives of Water Related Vulnerability to Climate Change: Results of Field Study in India, Science and Culture (forthcoming)

Appendix 1: Timeline

The timelines for the main activities under the project are given below. The project duration will be three years and the timeline is given in terms of the activities in each quarter, beginning with the third quarter of 2006.

Table 1.1 Timeline of proposed project

No.	Activity	2006		2007				2008				2009	
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1.	Development and Refinement of Framework	X	X	X	X					X	X	X	
2.	Case Studies : Compilation of data	X	X	X	X								
3.	Kick-off workshop to develop framework			X									
4.	Case Studies : National/State and Local workshops				X								
5.	Case Studies : Science assimilation in policy					X	X	X					
6.	Case Studies : Preliminary assessment					X	X	X					
7.	Mid-term workshop							X					
8.	Case Studies : Gap-filling studies and refinement of assessment								X	X	X	X	
9.	Preparation of policy portfolio								X	X	X	X	
10.	Final Workshop											X	
11.	Reporting and dissemination			X	X			X	X				X

Appendix 2: Budget Estimate

The budget estimates for each year of the proposed project is given in Tables 2.1, 2.2 and 2.3 below. The numbering of the activities follows the numbering in Table 1.1 in Appendix 1. The expected outcomes after each year of the project are listed in Section 2.6 of the main body of the proposal.

Table 2.1 Details of APN funding requested and anticipated in-kind funding for Year 1 (all values in US $)

	Activity / Item	**APN funding requested (US $)**	**Additional funding expected (US $)**		
			LOICZ	**National**	**In kind**
1.	Development of Framework	7,000			7,500
2.	Case Studies : Compilation of data	18,000		3,000	7,500
3.	Kick-off workshop to develop framework	30,000	5,000		
4.	Case Studies : National and Local Workshops	6,000		5,000	
11.	Reporting and dissemination	1,000		2,000	
	Administration costs incurred by the Node (Documentation, Communications, Travel, etc)	3,000			2,000
	Total	**65,000**	**5,000**	**10,000**	**17,000**

Table 2.2 Details of APN funding requested and anticipated in-kind funding for Year 2 (all values in US $)

	Activity / Item	**APN funding requested (US $)**	**Additional funding expected (US $)**		
			LOICZ	**National**	**In kind**
5.	Case Studies : Science assimilation in policy	15,000		2,500	5,000
6.	Case Studies : Preliminary assessment	15,000		2,500	5,000
7.	Mid-term workshop		20,000	15,000	
11.	Reporting and dissemination	2,000		2,000	
	Administration costs incurred by the Node (Documentation, Communications, Travel, etc)	3,000			2,000
	Total	**35,000**	**20,000**	**27,000**	**17,000**

Table 2.3 Details of APN funding requested and anticipated in-kind funding for Year 3

(all values in US $)

	Activity / Item	**APN funding requested (US $)**	**Additional funding expected (US $)**		
			LOICZ	**National**	**In kind**
1.	Refinement of Framework	3,000		5,000	
8.	Case Studies : Gap-filling studies and refinement of assessment	6,000		10,000	5,000
9.	Preparation of policy portfolio	3,000		8,000	5,000
10.	Final Workshop	10,000	15,000	5,000	
11.	Reporting and dissemination	5,000		5,000	
	Administration costs incurred by the Node (Documentation, Communications, Travel, etc)	3,000			2,000
	Total	**30,000**	**15,000**	**33,000**	**12,000**

Details of Additional Funding

Funding from LOICZ

Under the Memorandum of Understanding between the LOICZ International Project Office and the National Science Foundation, Sri Lanka, LOICZ will provide seed support for targeted scientific activities that include regional workshops. Some of these funds will be used to support the project, as it will be one of the most important regional activities to be undertaken by the Node in the project period.

"Linking Natural and Social Systems" was selected as one of the three focal topics for global LOICZ initiatives over the next five years. This proposal fits in very closely with this topic. It was also decided that one Regional workshop on one of these topics would be organized each year by each Regional Node. Therefore LOICZ funding for two of the workshops can be expected.

National Funding

The integrated framework developed under the project will be applied to six case study sites in four countries. It is expected that National research funds will be tapped to augment the project funds for work on the case studies. For example funds for inter-disciplinary research related to the LOICZ program will be available in Sri Lanka from 2006. National funds will also be made use of for dissemination activities such as publications and travel to conferences. Financial support from the Indian government will be sought to support the mid-term workshop – which will be held in India.

In-kind Funding

The project will be implemented in four countries and will involve more than 10 institutions. These participating institutions will provide in-kind contributions that include staff time of permanent employees, provision of computer, communication and laboratory facilities and other infrastructure, transport, etc. The project will be implemented by the LOICZ Regional Node for South Asia, which is hosted by the National Science Foundation, Sri Lanka. The in-kind contribution of the National Science Foundation in terms of staff time, office space and facilities will reduce the administrative costs that have to be borne by the project.

Appendix 3: Details of Project Proponent and Major Collaborators

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