

REPORT SNO 3335:95


PRELIMINARY TRAVEL REPORT

A study of the potential
for collaboration on water-
related environmental
projects in Sri Lanka

- I Coastal
aquaculture and
zoning plans
- II Environmental
education
- III Other projects



NIVA - REPORT

Norwegian Institute for Water Research  NIVA

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Abstract:

This travel report presents a summary of meetings held in Sri Lanka 25/9-6/10/95 between Sri Lankan authorities and institutions, NORAD and NIVA. The objective of the mission was: (1) to discuss the implementation plan for a coastal zoning plan for Hambantota with the emphasis on environmental problems related to shrimp farming; (2) to establish a foundation for the transfer and adaptation of the Norwegian model for environmental education to Sri Lanka and (3) to explore the potential for other water-related environmental technology projects for collaboration with NIVA and other Norwegian institutes/industries. The report presents the conclusions from the meetings, and suggests further activities for cooperation.

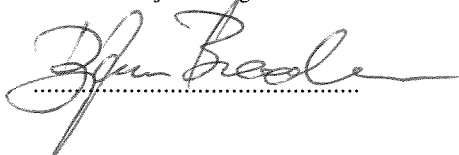
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Project manager



For the Administration

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Preface

The coastal -and freshwater resources of Sri Lanka represent ecologically rich areas of major importance to future development of the country. The coastal area of Hambantota will be further focused with industry development in the near future. Thus it is important that the planning process is carried out in a way where both local and governmental authorities can secure the environmental conditions in the area. Zoning and management plans, pollution abatement plans and raising of environmental awareness are very important in this respect. NORAD is willing to finance such studies and NIVA has presented some ideas of how they can assist the authorities of Sri Lanka in this matter. This study report presents the result of meetings and field visits in Colombo, Kandy and Hambantota Districts.

Bjørn Braaten
Harsha Ratnawera
Anne Lyche Solheim
Jan Sørensen

Oslo 27 october 1995

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1. Background

Research Director Gunnar Aasgaard and Research Scientist Harsha Ratnaweera, NIVA visited Sri Lanka in July 1994 and had various meetings with local authorities and institutions about relevant environmental projects. In April 1995 Research Manager Bjørn Braaten, NIVA participated in a Norwegian industrial cooperation programme to discuss possible future projects between Norway and Sri Lanka. During meetings with governmental representatives there was expressed a need for both financial and professional support. The visit resulted in three project proposals from NIVA to NORAD. One project comprised participation in a coastal zone plan for the Hambantota district, a second project on the economic, social and environmental impact of coastal aquaculture in the Puttalam district, and a third project on environmental education. All the three projects were further discussed at a meeting in Oslo in August with NORAD representative Arild Skåra which opened the possibilities to include some of the projects in the existing country program for Sri Lanka in 1995. As a result of the meeting in Oslo, NORAD decided to support a visit for NIVA with four persons to Sri Lanka in September 1995, to present and discuss two of the projects and some additional environmental problem areas with representatives in the Sri Lankan Ministry of Environment and Central Environmental Authority.

Proposals of the three original projects (coastal zone plan for Hambantota, environmental impact from shrimp farms in Puttalam, and environmental education) were also submitted to NORAD Oslo with reference to large Asia program in 1995 and 1996-97.

The Puttalam project was decided postponed by the Sri Lankan environmental authorities due to the more urgent need to incorporate environmental concern in the plans for development in Hambantota.

2. Objectives

The aim of the visit to Sri Lanka was to present the relevant project proposals and discuss the possibilities to implement the studies together with relevant research institutes and governmental authorities. Another important task was to identify other relevant collaborative projects. NIVA prepared a work-plan for the various projects and presented a tentative program for our visit. The projects were:

1. Coastal zone plan for Hambantota with main emphasis on the environmental problems with shrimp farming.
2. Environmental education through resource monitoring.
3. Industrial pollution abatement: Waste management and air pollution abatement.
4. Identification of project proposals including the participation of Norwegian institutions/industries and evaluation of possibilities for institutional development.

3. Project group and working plans

Project group:

Bjørn Braaten, M.Sc. (Project manager)
Harsha Ratnaweera, Ph.D.
Jan Sørensen, M.Sc.
Anne Lyche Solheim M.Sc.

Working plan:

Phase 1: Planning of visit and preliminary preparation of a work-plan/sketch- plan (1 week)

Phase 2: Visit to Sri Lanka, meetings with relevant institutions and visit to Hambantota and Kandy districts (2 weeks).

Phase 3: Report writing in Norway (2 weeks)

4. Working program

Date and time		Programme
23.09	07:00	Departure Oslo
25.09	08:00	Meeting with NORAD
“	10:00	Meeting with Ministry of Transport, Environment and Women's affairs (TEWA)
“	14:30	Meeting with TEWA and Central Environmental Authority (CEA)
“	16:00	Meeting with NORAD
26.09	09:00	Preparation of documents, reporting
“	12:00	Meeting with Environmental Laboratories and Bamber & Bruce
27.09	09:00	Preparation of documents
“	14:30	Meeting with S. Perera
“	15:00	HAR Meeting with Chairman CEA
“	16:00	Meeting with Ministry of Fisheries and Aquatic Resources (MFAR)
“	17:00	HAR Meeting with World Bank
28.09	09:30	HAR Meeting with Geological Survey and Mines Bureau (GSMB)
“	10:00	Meeting with TEWA
“	10:00	ALS Meeting with Ministry of Education
“	14:00	Meeting with Chairman and Director, National Aquatic Resources Agency (NARA)
“	17:00	Meeting with the Task Force for Southern Development Authority

			(TF/SDA)
“	19:00		Dinner, Arild Skåra, NORAD
29.09	07:00		Departure to Kandy
“	09:00	ALS	Visit to Kurulukelle school
“	11:15		Visit to Hemamali Matra and field study centre school, Kandy
“	15:00		Meeting with Director and Research Staff of Institute for Fundamental Studies (IFS), Kandy
30.09			Free day
1.10	08:00		Departure to Hambantota
2.10	09:00		Meeting with NORAD office in Hambantota
“	10:00		Meeting with District Environmental Agency (DEA), Hambantota
“	11:00		Meeting with JICA-team (Japan International Cooperation Agency)
“	11:00	ALS	Visit to 4 schools in Hambantota and Tangalle
“	15:00	ALS	Visit to District Educational Office in Tangalle
“	12:00		Visiting possible shrimp farming sites and wildlife sanctuaries
3.10	09:00	ALS	Meeting with DEA. Hambantota
“	10:00		Leaving Hambantota
“	13:00		Meeting and visit at Embilipitya paper mill
“	14:30		Return to Colombo
4.10	10:00		Meeting with TEWA
“	10:00	ALS	Meeting with National Education Commission, Colombo
“	11:00		Meeting with Customs Dep. and Marine Pollution Authorities
“	11:00	ALS	Meeting with Sri Lanka Association for Science and Mathematics Education (SLASME)
“	12:00	ALS	Meeting with National Institute of Education (NIE)
“	14:30	ALS	Lecture at the university of Colombo (Environmental Education)
“	16:00		Meeting with TF/SDA
5.10	08:30		Meeting with Director NARA and leader of field staff
“	08:30	ALS	Meeting with P.D.Alwis, NARA
“	16:00		Meeting with TF/SDF
6.10	08:00		Meeting with NORAD, TF/SDA and TEWA, final discussion
“	10:00		Meeting with Hydrolanka consultants
“	16:00		Meeting with NORAD and TEWA about the contract
7.10	00:30		Leaving Colombo for departure to Norway
“	14:30		Arrival Oslo

4.1. Coastal Aquaculture and zoning plans

4.1.1. Background

The main task of the visit was to establish a basis for collaboration on a coastal zone management plan for Hambantota District with special reference to the environmental impact of coastal shrimp farming. One important issue is allocation/distribution of resources and areas for prawn farming in Hambantota between the local population and investors coming from outside the district. Idealistically, development within prawn farming should first of all give revenues to the local community and the people living in the area. However, experiences from Puttalam show that local farms are mostly small-scale without proper management and many of them have been established illegally without any environmental concern. To avoid uncontrolled establishment of farms in Hambantota it is necessary to develop a zoning plan and guidelines for the location and operation of such farms. This should be done in close cooperation and understanding with the local authorities, and also involving the local population in the planning and decision process.

The environmental problems of shrimp farming had been discussed in the Cabinet that in turn had explored the possibility of funding from NORAD. When Bjørn Braaten visited Sri Lanka in april, the possibility of technical support from NIVA was discussed with officials in Ministry of Fisheries and Aquatic Resources (MFAR). NIVA took up the discussions in Norway when Arild Skåra, NORAD visited Oslo, august 16-95, and it was agreed that the study could be carried out by NIVA with NARA as a counterpart: Central Environmental Authority (CEA) should participate and the project should be coordinated by the Ministry of Transport, Environment and Women's affairs (TEWA).

4.1.2. Objective

The objective was to discuss the implementation of a coastal zone plan for Hambantota with the main emphasis on the environmental problems with shrimp farming.

4.1.3. Summary of meetings.

Altogether five meetings were carried out to discuss criteria for identification of shrimp culture sites, terms of reference for the study, and future cooperation with NARA.

Since NARA did not participate in the three first meetings, it was therefore necessary with two separate meetings with NARA, a first meeting with the chairman and director together with TEWA and CEA, the second with director Dr. M. U. Jayasekara and team leader for the shrimp location studies.

It appeared in the meetings that NARA had already been asked by MFAR to conduct a short term study to identify a few possible sites for shrimp farming, and within 4 months identify both suitable, possible and unsuitable sites in the coastal area of Hambantota District. They had prepared a document which described the work involved to carry out a zonal plan for coastal aquaculture and was not interested in NIVAs involvement. The reason for this misunderstanding of planning and implementation between NIVA and

NARA is due to lack of communication and information in written statements and reports from earlier meetings.

MFAR is the approving Ministry in licencing prawn farms and they will also be responsible for the projects undergoing Environmental Impact Assessment (EIA).

NARA, which is one executing agency under MFAR, was appointed to carry out the zoning plan for prawn farming in Hambantota. It is an urgent need to get the plan approved before the development boom starts. The development cannot be stopped, but should be controlled to avoid similiar problems as experienced in Puttalam.

NARA will be doing all necessary surveys with the use of criteria that have already been identified. NARA will produce a preliminary report for potential prawn areas which will be finalized in 4-5 weeks. The time schedule for the whole study is 4 months. CEA wants to secure that environmental concern is sufficiently taken into account, and will review the terms of reference/project scope of work, and expresses also the need for better communication with NARA.

NARA's study represent only one of many sectors of interest. During our discussions with TEWA, CEA and the newly appointed Task Force it has become clear that the most important issue is to carry out an integrated coastal zone mangement plan (ICZMP) that includes all interests and that secure the environmental conditions in vulnerable and highly sensitive ecological areas.

The various meetings (25 sept. 2 meetings with TEWA and CEA, 27 september with MFAR and 28 sept. with Chairman NARA) about the integrated development of shrimp culture in Hambantota District was summarized by CEA, and is presented in appendix 5.3.

A series of meetings were also held with the Presidential Task Force for the Development of the Southern Area, TF/SDA. A preliminary meeting were held at 28/9/95, a more formal meeting 4/10/95, a third meeting together with JICA 5/19/95 and a final meeting 6/10/95 with 4 members of the Task Force, W. S. Perera and Padmini Batuwitige from TEWA and A. Skåra from NORAD. After the meetings with NIVA, a document was formulated by the Task Force that summarized the areas of agreement (Appendix 5.1).

Through the series of meetings, the Task Force pointed out the need for assistance in a follow up on a special area mangement plan for the Rekawa lagoon area, for preserving the lagoon, the shoreline, and marine resources, and for poverty alleviation. A detailed proposal is already available. They also supported the proposed integrated coastal zone management plan for Hambantota, but stressed the importance of a stepwise study, where results could be presented regularly during the whole study

4.1.4. Summary of discussions and conclusions

The Southern Province and especially the Hambantota District faces an increased pressure for economic development. Aquaculture/prawn farming is one sector that can bring revenues to the coastal region with moderate needs for investments. At present, there are

no established prawn farms in Hambantota, but the area is believed to have well suitable locations/sites for prawn farming and the demand for such sites is growing rapidly.

Recent experiences from the Puttalam area show, however, that prawn farming can easily develop in an uncontrolled and undesired way that can create negative conditions for the industry itself and long-term and adverse negative effects on the coastal environment. To avoid the same happening in Hambantota, it has therefore been decided that a suitability study/zoning plan for prawn farming should be carried out immediately.

A terms of reference for such a study has already been given to NARA and later revised by the Natural Resources Management Division, CEA. Since the premises for the study have already been settled, and because it will be conducted within a short period of approximately 4 months, NIVA will not be able to take any active part in the project.

During NIVA's meetings with MEPA/CEA and the Southern Development Board, it was strongly argued that the next step should be to conduct a fully integrated **Coastal Zone Management Plan (CZMP) for Hambantota** taking all existing and potential user-interests into account. An integrated approach will imply selecting optimal solutions for the community as a whole (based on the principle of sustainable development/environmental concern) rather than looking at each individual sector separately.

Based on the discussions with the authorities and experiences from other CZMP-projects in Sri Lanka, a preliminary framework is presented in the following as a "starting point" for further elaboration and discussion by the involved parties.

4.1.5. Proposals to further activities

Proposed framework for integrated CZMP in Hambantota

Background

The background for the CZMP for Hambantota are growing conflicts and environmental deterioration in the coastal zone caused by unsustainable use and poor resource management in the area.

Sectors/user-interests located in the coastal zone in Hambantota are (not complete):

- traditional fishery
- mining/sand extraction
- aquaculture; prawn farming, marine aquaculture etc.
- agriculture/irrigation
- industry development, i.a. paper mill, oil refinery, tanneries etc.
- ship traffic/harbour and reception facilities.
- tourism development
- recreation
- nature protection areas/biodiversity areas
- water supply/water extraction
- recipient interests, i.a. waste water from settlements.

Some environmental problems caused by over-exploitation and bad management practises are:

- marine pollution, reduced water quality and suitability for uses
- coastal erosion, loss of economic values/properties
- degradation of important biological habitats/fish breeding areas i.a coral reefs, mangrove forest, coastal lagoons etc.
- pollution of ground water (pesticides, salt intrusion etc)
- adverse effects on the coastal landscape, less suitability for tourism/recreation.

Objectives

The main objectives for an integrated CZMP in Hambantota will be to:

- promote sustainable use of coastal resources and reduce environmental degradation
- prevent and minimise conflicts between user-interests.

Parallely, a program for capacity building and strengthening of the local authorities and institutions should be carried out.

End-product

The formal end-product will be a report , stating proposed strategies and measures for coastal management and resource use in Hambantota based on an environmental profile of the area and thematic maps showing existing and planned user-interests and potential conflict areas. A draft zoning plan (general map scale 1:50 000?) for allocation of resources/areas between different user-interests will be designed, supplied with management guidelines and an action program for implementation of short-term and long-term projects.

Legal aspects

The CZMP for Hambantota should be based on the existing legal framework , i.a. the Coast Conservation Act, the Marine Pollution Act etc. Strategies and decisions made in other plans and program should be taken into account, i.a. Coastal 2000, The Master Plan for Southern Area etc.

Planning concept

The CZMP should focus on environmental/physical aspects, but also include socio-economic, cultural and other social and political factors. Environmental concern should underly all decisions and not be regarded as a sector-interest. The financial and social benefits of sustainable resource use practices should be documented as far as possible. The planning should be based on the experiences and lessons learned by other planning efforts in the coastal zone and follow the principles developed and agreed upon through the SAM-projects.

All existing, planned and potential user interests should be identified, classified and measured in relation to the environmental profile and the carrying capacity of the area. The dynamics of the area should be identified, special care have to be taken in planning upstream activities that can affect a major part of the downstream area and create conflicts. Both water-use (marine water) and land-use should be seen in connection and coordinated (ecosystems-approach).

Specific problems and conflicts, related to i.a. water pollution, restraint on shore areas, over taxation of biological resources etc. should be predicted and identified at an early stage in the planning process so that alternatives can be investigated and preventive measures taken. The main strategy should be to avoid negative environmental impacts from planned activities, or if not possible, to minimise them, e.g. through mitigating actions.

The necessary preparations for the planning (data collection, systematization etc) should be carried out in a rational way, i.a. collecting necessary information and data from existing and ongoing projects and to produce thematic maps/sketches as a basis for the planning. Data used by other planning projects, i.a. the Master Plan for Hambantota, SAM for Rekawa Lagoon etc. should be obtained. The decisions to be taken should determine the amount of data needed and the level of detail. The collected information should provide a basis for solid documentation.

The planning should not be static, but should produce results that can be used for continuous decision making, i.a. thematic maps, special documentation reports. In addition pilot projects/actions should be implemented while the planning goes on.

Organization

The organization of the planning process is of utmost importance. The plan should be developed and designed through an open process in which the decision makers play an active role together with the organisations and the public (participatory approach), the sector interests and the experts. It must be stressed that the CZMP should not be carried out as an isolated administrative exercise, but should be recognised as a consensus process ("give and take") between participants representing different interests and where the experts play an advisory role. Bringing participants together in multifunctional groups or core groups has often proved to be successful, although demanding. As such planning is meant to be an instructive process for those who are involved and create better understanding, awareness and agreement as a result.

Experiences so far have shown that the main reason for CZMP failure in Sri Lanka has been inadequate participation by local communities in the planning, decisions and implementing process. CZMP implementation which has been done mainly by state officials who have not communicated well with local leaders, has been viewed as interference by outsiders and therefore rejected. It is therefore necessary to secure local participation and involvement in the process. The SAM projects have shown that cooperative management with representation from both the community level and the governmental level is the model that seems to function best.

4.2. Environmental education cooperation

This cooperation presently involves two separate initiatives or project proposals, which may eventually be combined into a larger program. One is the transfer and adaptation of a Norwegian network model for environmental education through resource monitoring to Sri Lanka. The other is the establishment of a planned center for environmental education and research in Sri Lanka (Rekawa Lagoon).

4.2.1. Prefeasibility study for transfer and adaptation of a Norwegian network model for environmental education through resource monitoring to Sri Lanka.

Background:

Low public awareness about aquatic ecosystems and about environmental problems related to water pollution is a major obstacle for a sustainable management of water resources in Sri Lanka. The level of pollution is severe in many water bodies, and the water is unsuitable for drinking, as well as for fish cultivation. Mass mortality of local fish species and other aquatic protein sources has also been reported due to pollution or other man-made impacts on the water bodies. Pollution and physical impacts in freshwater and coastal areas also severely reduce the biodiversity in the aquatic ecosystems.

Lack of knowledge about the interactions between human activities and the environmental conditions in the water bodies impair or delay planning and implementation of appropriate restoration and pollution abatement measures. The severe environmental problems occurring in a number of important water bodies could be significantly reduced by involving the local population in the protection of the water resources in their own neighbourhood.

To approach this goal it is essential to raise the environmental awareness in the population by means of efficient environmental education of students and adults on the ecological impacts of human activities related to water resources. Training in practical project-oriented work to monitor the environmental conditions in the local water resources, and subsequently in suggesting appropriate abatement measures is used as a strategy for environmental education in Norway, as a highly efficient way to increase the environmental awareness and competence in the population. The training is based upon network communication between schools, research institutions and local environmental authorities, and the data collected by the students are stored in a central database, which is available to all the actors in the network. The schools receive guidelines for simple environmental monitoring developed by research institutions, they repeatedly perform simple and systematic monitoring of a selected water body, and thereby provide regular and long-term information about the environmental conditions in their locality. They get regular feed-back on their results from research institutions and local environmental authorities. The schools also establish dialogue with the local environmental authorities in order to select appropriate water bodies to investigate, and to discuss and take part in implementing appropriate protective measures.

Most environmental education in Norway as well as in other countries has traditionally concentrated on stimulating local school projects through production of a variety of educational materials. Little effort has been made to direct what kind of investigations and

activities that could be useful to the local environmental management authorities, nor to provide feed-back to local school projects. The environmental information assembled by the schools involved in these local, often short-term projects, have not been structured and collected, and the applied methodology has not been standardized. The results obtained from these local projects therefore cannot be compared, and the schools project efforts have often been short-lived, since they have not been followed up over time.

The Norwegian network model briefly described above therefore represents a new way of thinking about environmental education, involving information exchange between schools, management authorities and research institutions. This model may also be useful in other countries, such as Sri Lanka.

Objective:

The objective of the present visit to Sri Lanka was to establish contact with relevant collaborating partners in order to assess the interest and feasibility for transfer and adaptation of the Norwegian model for environmental education to Sri Lanka.

Summary of meetings:

Through a series of meetings with central and regional environmental and educational authorities as well as research institutions at Sri Lanka (Table 1) NIVA presented the Norwegian model, and the potential for collaboration was discussed. The general impression from these meetings was that the idea was well received, understood and appreciated, and that there was great enthusiasm and will to try to implement this model of environmental education in Sri Lanka.

The model was also presented in a lecture at Colombo University, organised by the Sri Lanka Association for the Advancement of Science. 25 persons attended the lecture, which ended with a fruitful discussion about potential problems related to traditional school curricula and to possibility for quality control of the environmental data collected.

Information on the current status for environmental education in Sri Lanka was gathered in order to get an idea of how the Norwegian network model of environmental education could be linked to ongoing activities and past experiences in Sri Lanka. Information was obtained both from meetings with central and district level authorities, from visits to 6 schools in the Kandy and Hambantota districts, who provided educational materials (booklets, videos, journals) and student project reports, as well as from the mid-term review report of the NORAD - Sri Lanka environmental education programme.

The main impression is that focus has been on tree-planting, agriculture and forest ecology and conservation, and relatively few projects have dealt with issues related to water resources. Several field study centers have been in operation, where students have done project-oriented work in the field, but no efforts have been made to use the results in local environmental management, nor to collect the results in any systematic way. The field study centers have only been used by a restricted number of schools.

Table 1. Institutions met in Sri Lanka for discussing collaboration on environmental education through water resource monitoring.

Institution	Contact-person	Responsibility	Meeting date
Ministry of Transport, Environment and Women's affairs (TEWA), Colombo	W. S. Perera, Co-ordinator of Environmental Programme,	Central authority for environmental protection in Sri Lanka	25.09.
Ministry of Education, Colombo	A. Mahinda Ranaweera, Specialist consultant	Central authority for education in Sri Lanka	28.09.
Kurulukelle Field Study Centre, Kegalle college and Hemamali Maha college, Kandy district	W. S. Perera and Principals at the schools	Local education and environmental education projects	29.09.
Institute for Fundamental Studies, Kandy	Dr. Rohan Weerasooriya	Basic and applied research institute	29.09.
District Educational Office, Hambantota, Tangalle	R. M. Karunanayake, Deputy Director of Education	District (regional) authority for education	02.10.
4 schools / colleges in Hambantota and Tangalle divisions	R. M. Karunanayake and Principals at the schools	Local education and environmental education projects	02.10.
District Environmental Agency (DEA), Hambantota	M. P. Gamage, District Secretary	District (regional) authority for environment	02.10. 03.10.
National Education Commission, Colombo	J. Alles, Vice-chairman (Planning)	Government commission on Education reporting to the President	04.10.
Sri Lanka Association for Science and Mathematics Education (SLASME), Colombo	Prof. V. Basnayake, Chairman	Academic organization for stimulating science and mathematics education	04.10.
National Institute of Education, Colombo	Dr. P. Udugama, Director General,	Central institution (directorate) responsible	04.10.

		for teacher training and curriculum development	
National Aquatic Resources Agency, NARA	Dr. P. De Alwis, Director, Environmental Study Division	Central applied aquatic research institute (NIVA-analogue)	05.10.

Output/conclusion:

The conclusion from the study trip is that both central and regional environmental and educational authorities want to try the Norwegian network model of environmental education related to water resources. Two central research institutions (IFS and NARA) have also agreed to collaborate in the adaptation of this model to Sri Lanka, if funding can be provided.

The visit ended with a preliminary intentional agreement of collaboration between central and regional environmental and educational authorities, central research institutions and NIVA. The agreement involves a set of specified activities to be planned and implemented over a two-three years period, and suggests relevant collaborating partners. All activities should be coordinated by W. S. Perera at the Sri Lankan Ministry of Environment, and supported and assisted by NIVA. The first step in establishing a cooperative program on environmental education is to develop a program proposal to NORAD for 1996, in which the necessary activities listed in the agreement are described in detail, and all associated costs are thoroughly estimated. The intentional agreement is presented below.

Proposal to further activities:

Collaborating partners:

Ministry of Environment, Colombo, Mr. W. Sterling Perera (co-ordinator)
Ministry of Education, Colombo, Mr. A. Mahinda Ranaweera (Specialist consultant)
National Institute of Education (NIE), Colombo,
District Education office, Hambantota, Deputy Director of Education, Mr. R.M. Karunanayake,
District Environmental Agency (DEA), Hambantota, Secretary, Mr. M. P. Gamage,
Institute for Fundamental Studies (IFS), Kandy, Dr. E.I.L. Silva and Dr. S. V. Rohan Weerasooriya,
National Aquatic Resources Agency (NARA), Colombo, Dr. Padmini de Alwis,
Norwegian Institute for Water Research, (NIVA), Project manager, Mrs. A. Lyche Solheim.

Pilot area for implementation:

Two restricted pilot areas should be selected as test areas for early implementation of the Norwegian model for environmental education related to water resource monitoring. The Hambantota District in the southern province and the Kandy district in the central province are suggested as pilot areas, due to previous experience with environmental education, and to concentration of other NORAD activities in these districts.

Preliminary proposal for activities in 1996-1998:

- Planning and development of program proposal to NORAD (autumn 1995)
- Study trip to Norway for Sri Lankan officials and selected teachers (spring 1996).
- Development and production of educational materials (guidelines and standardized schematic forms)
- Establishment of a central database and necessary software development
- Teacher training courses for master teachers and supervisors (practical training)
- Supply of simple equipment to selected schools
- Field level training of selected teachers and students from selected schools (local master teachers and supervisors)

Costs for each activity should be approximated as soon as possible, and will involve:

- NIVA-assistance, time-costs, travel expenses
- Travel expenses for study trip to Norway for 5-8 Sri Lankan officials
- Local travel expenses for collaborating partners in Sri Lanka,
- Transport and meals for participants in teacher training courses
- Field equipment costs
- Computer and software costs
- Printing costs for educational material
- Support to IFS and NARA staff (timecosts, salaries)

4.2.2. Establishment of a coastal environmental education and research center in the Rekawa lagoon.

Background:

Through several meetings with the Task Force of the Southern Development Board we were informed about the already elaborated plans for the establishment of a center for environmental education and research at the Rekawa lagoon in the southern province. This area urgently needs new activities in order to prevent social riots, and the environmental education and research center is defined as a sustainable top priority measure in this context. The center is ment to provide environmental research facilities, and to be a forum for raising the environmental awareness in the local population. This will be obtained through the establishment of a series of activities, like special training courses of local advisors, environmental exhibitions of coastal ecosystems, a library with current environmental books and journals, conference facilities and an aquarium with local aquatic flora and fauna.

Possibilities for cooperation:

The Task Force has expressed a need for NORAD-funding and for collaboration with NIVA in planning and implementing various activities in the center. It is also possible to direct some of the proposed activities planned in the environmental education project above (the network model) to the center. The center could for instance serve as an arena for teacher training courses and visits from schools in the region. Further negotiations with the

Task Force are necessary to continue planning of the extent and type of involvement they would need from NIVA and possibly other Norwegian institutions in establishing activities in this center.

4.3. Pollution abatement

4.3.1. Background

The National Environmental Action Plan (NEAP) of Sri Lanka has identified a number of priority environmental projects and defined them in the Environment Action 1 Project (EA1P). The EA1P has a financial frame of US\$ 100 million during 1995-1998, which will be partially supported by donor organisations. Only part of the important issues has been given priority in EA1P due to the limited financial frame.

4.3.2. Objective

The objective was to explore the environmental projects both within the EA1P and beyond it, especially projects indirectly related to the two major activities referred in sections 4.1 and 4.2 above for the Hambantota district.

4.3.3 Summary of meetings

Meeting with the World Bank, Sri Lanka

A meeting between Dr Sumith Pilapitiya, Engineer - Energy, Infrastructure & Environment Operations and Ratnaweera was held at the World Bank, on the 27/9/95 at 17:00. The World Bank co-ordinates the NEAP and EA1P. About 35-40% will be financed through an IDA-loan, while the remaining will be funded considerably by other donor agencies, including NORAD.

The project appraisal mission for NEAP has been postponed to from April to November 1995 due to the need for restructuring some sections in the Environment Action 1 Project (EA1P). Dr Pilapitiya has been working on the specific projects proposed by EA1P while another consultant was working on the institutional & policy issues. Their evaluations are to be submitted to the appraisal mission.

NIVA has received a preliminary draft of the evaluation report, which identifies the needs for additional projects in issues which is not covered by the EA1P. This document will be submitted to all donor organisations, including NORAD in the near future. The document is very valuable in project planning, since the needs are already identified on behalf of the Sri Lankan government.

Meeting with Central Environmental Authority (CEA)

A meeting with Mr G.K. Amaratunge, Chairman CEA and Ratnaweera was held at CEA on the 27/9/95 at 15:00. Mr Amaratunge was present at the previous meeting with the NIVA-

team where the discussion on Hambantota CZM project was discussed. This meeting was scheduled to investigate the needs for Norwegian consultancy services in other environmental related issues.

Mr Amaratunge stated that 5 important rivers need to be studied in respect to Water Resource Management (WRM) and Water Pollution Abatement (WPA) Plans. These are: Maha Oya, Kalu Ganga, Ging Ganga, Walawe Ganga (in Hambantota) and Kelani Ganga. Among these, only Ging Ganga has an ongoing study, while the need for studies on other rivers are high due to the partial use of water for drinking purposes. Since a CZM project will be started at Hambantota, it was agreed to give the highest priority to the Walawe River WRM & WPA study. Mr Amaratunge also stated the need for an action on the wastewater treatment at Embilipitiya Paper Mill. Furthermore the need for a wastewater treatment plant for Hikkaduwa was mentioned. This project has completed its pre-feasibility studies, and is ready for implementation, which would be an ideal activity for Norwegian wastewater treatment plant suppliers.

The meeting was concluded with the identification of the above project needs and with the recommendation from CEA to work further for realisation of the projects.

Meeting with Geological Survey & Mines Bureau (GSMB)

A meeting was held between Dr N. P. Wijayananda, Director and Ratnaweera at GSMB on the 28/9/95 at 9:30. The GSMB has four primary operations: mining titles & mining regulation; core activities, client responsive activities and geoscience information.

Dr Wijayananda elaborated the need for assistance in several activities of GSMB. Among the environment related issues, the inland coral mining activities by individuals (small scale) was identified as the priority. The coral deposits are found along the south-west coast of Sri Lanka between 1-3 m depth in the ground. The building material (containing calcium) developed from the corals from the southern coast is highly appreciated in the industry due to its specific quality. The industry is mostly run as a family business, and is thus difficult to control without creating other incentives to them. The pits created by these activities threaten the environment in several ways: ground water pollution, erosion, etc. The difficulty in obtaining filling ground to close the pits create additional health risks. This problem has been identified in the last EA1P -project evaluation draft, and suggests the attention of donors.

It was agreed that a competent person from NIVA on mine pollution, for e.g. Mr Karl Jan Aanes, should directly contact Dr Wijayananda in order to identify the specific issues where the Norwegian experts could provide assistance. It was also mentioned that the director of the Swedish Geological Survey, Dr Naz Ahmed Shaik (tel: +46 18179120; fax: + 4618179210) was in contact with the GSMB, and would be a good contact in Scandinavia. The possible corporation with the Norwegian Geological Survey was stated and was suggested to be followed up by NIVA's contact person.

Meeting with the Embilipitiya Paper Mill (EPM), National Paper Company Ltd,

A meeting was held with Mr J.C.A. Abeyratne, the mills manager, at the paper mills office on the 3/10/95 at 13:00. The EPM is situated about 70 km north to Hambantota, and discharging wastewater to the Walawe River.

The EPM was designed to function on the paddy straw. However, the 300 mln rupees worth chemical recovery unit (CRU) was not designed to function with this type of wastewater which contains about 12% of Silica. For this reason the CRU was not functioning well and later was abandoned. Thus the resulting wastewater contains large amounts of black liquor (200-400 m³/day) and is stored in lagoons (350.000 m³) with the need for discharging to the Walawe river during the rainy seasons. The white water (about 10.000 m³/day) is continuously discharged to the river after transportation through a tube for 6 km. However, the farmers in the area believe that the white liquor as is a good substitute to fertilisers and insecticides. They make holes on this tube and take the white water to their paddy fields. The EPM claims that due to this activity, at periods, there seem to be no discharge to the river. The environmental and the health damage caused from these two waste flows are not documented yet, but suspected to be considerable.

The Norwegian Wastewater Treatment companies have successfully resolved the treatment problems of such wastewater. In fact, one of the companies is now engaged in treating wastewater from a paper mill in China, which is also based on paddy straw. It was agreed to follow up this case with the Norwegian companies.

Meeting with the Institute of Fundamental Science (IFS)

A meeting was held at the IFS on the 29/10/95 AT 15:00. Prof. C.B. Dissanayake, Director and Dr R. Weerasooriya, Research Fellow were participated in the discussions. The IFS was established in 1981, with the primary aim of establishing a cohesive network of local scientists involved in basic research. Promote research of national importance and the interaction with scientists of other countries are also among the aims. The IFS consists with five departments: Physical and Chemical sciences, Life sciences, Earth and Space sciences, Philosophy and Social sciences and Environmental Sciences.

In addition to the activities discussed in context with environmental education, two issues were identified as relevant for IFS. A water pollution assessment and abatement study for the Kandy lake was identified as one of the important projects where IFS has the interest and the capacity to engaged in. As the second project, the adoption of nitrate removal techniques form ground water was discussed. This study is partially financed by NORAD already, and the possibilities for continuation with further assistance form Norway was discussed.

Meeting with the Lanka Hydraulic Institute Ltd.

A meeting with LHI was held at the Taj Samudra hotel, on the 6/10/95 at 13:30. Mr S.G.Wijesiri, Chief Engineer and Dr Priyantha Gunaratne, Senior Research Engineer were

present at the meeting. The LHI is a public limited liability company with major shareholding by the govt. of Sri Lanka. The LHI undertakes field and laboratory investigations and offers consultancy in hydraulic engineering with special emphasis on coastal, port and water resources. The institute owns a fully equipped modern hydraulic laboratory, with technical staff trained mostly trained abroad.

The LHI has been working in several coastal zoning projects together with international organisations, including the Danish Hydraulic Institute. Unfortunately the key personnel of the LHI were attending an international seminar at the time NIVA was in Sri Lanka, and it was not possible to get in to details of the completed and on-going work. It was decided to contact LHI at a later visit if necessary.

4.3.4 Summary of conclusions

The potential and the need for environmental pollution abatement actions were identified. The need for a water resource management plan and a pollution abatement strategy for the Walawe river was identified as the issue with the first priority. This also includes the wastewater treatment problem at the Embilipitiya paper mill, which will be followed up further with the Norwegian industries. A water pollution identification and abatement plan for the Kandy lake was identified as an important issue. The GSMB needs assistance on the environmental issues related to coral mining.

Many of the above mentioned issues were also discussed with the Presidential Task Force for the Southern Area Development. The priorities concluded from the above meetings were in agreement with the priorities identified by the Task Force, which is given in Appendix 5.1.

4.3.5. Proposal for further activities

The identified priority projects needs further documentation to be presented for evaluation by funding agencies. Many of the projects seem to be suitable for financing through the newly established Asia Environment program. This will strengthen the possibility for realising projects together with the support from the country program. Therefore it is recommended to prepare the detailed work plans with identifying the necessary resources and time-scheduling of project phases.

4.4. Other activities

4.4.1. Background

Both NORAD and The Norwegian Ministry of Environment asked us to identify other possible environmental projects in our discussions with authorities, institutions and others.

4.4.2 Objectives

The objective was to explore the environmental projects and discuss them with NORAD and authorities in Sri Lanka.

4.4.3 Summary of meetings

Meeting with NORAD District office in Hambantota

A lot of sector studies have been carried out in Hambantota. In the coastal zone Special Area Management (SAM) has been carried out for the Rekawa Lagoon, but no integrated planning has been adapted to the whole coastal zone of Hambantota. At the regional level, JICA is conducting a Master Plan for the Southern Province focusing on development activities. The Southern Development Programme (UNDP) is responsible for coordinating all project activities in the Southern Province.

Hambantota has several nature protection areas in the coastal zone, i.a. bird sanctuaries. According to the Coast Conservation Act it is forbidden to build or construct within a distance of 300 m from the shore-line. In the sanctuaries this rule apply for the whole area and in the buffer zone (1.6 km) from the borders. The Wildlife Conservation Department can, however, make exeptions from the rule in these areas.

Lately, there have been an increased pressure on the areas, i.a. in Yala sanctuary where prawn farm developers have been looking for private land in the buffer zone.

In the management of the coastal zone, the District Environmental Authority which acts under the CEA, will play an important role.

Meeting with MEPA/CEA and the Marine Pollution Prevention Authority (MPPA)

The Marine Pollution Act is now under revision. After the revision the law will be easier to enforce. Very little has been done related to the marine environment. Some fish stock assessment has been carried out, but less related to marine pollution. There seems to be a general lack of policies for handling marine problems and pollution and the problems are also insufficiently handled in the NEAP.

Better handling of wastes from ship traffic and constrution of reception facilities in the most important harbours are considered one important priority for action.

Several conflicting interests are under expansion in the region. According to MPPA there is a need for an integrated coastal zone management plan for the Southern Area, which includes the marine environment.

Meetings with NARA

315 people is employed at NARA.. In addition to Hambantota, NARA is also planning prawn farming suitability studies at the regional level, for both the Southern and Eastern

provinces. The costs are estimated to 26 mill SLR. For these studies NARA will need more technical equipment than they have available today.

There is also a need for environmental restoration of the Puttalam area, and NARA has already carried out a preliminary assessment.

The two meetings with NARA are summarized in 4.1

4.4.4 Conclusions

There is a number of specific environmental sector projects in the southern region that are of interest to NIVA and other Norwegian companies. They need to be discussed further with NORAD and official authorities in Sri Lanka. Some of these projects were also presented by the Task Force for the Development of the Southern Area.

5. APPENDIX

5.1.

Prioritised projects within the Southern Area, (by the Presidential Task Force for the Southern Area Development)

APPENDIX (prepared by the Task Force)

NIVAS ASSISTANCE FOR SRI LANKA'S DEVELOPMENT EFFORT

Introduction

A preliminary meeting was held with the NIVA project identification mission and the members of the Presidential Task Force for the Development of the Southern Area, on 27th September 1955. The purpose of the meeting was to ascertain the areas in which NIVA assistance could be obtained for the development of the Southern Area. Subsequently a formal meeting of the task force was held on the 4th October 1995 to decide on the areas of mutual cooperation between the Task Force and NIVA.

The Task Force

The Government of Sri Lanka considers the development of the southern area as a major concern of its current strategy, as the south has been and still is the seat of youth unrest with grave implications for the political instability of the country. During the last decade the South has produced a major armed uprising against the civilian rule which was equal in intensity to the civil war in the North-east. The rebellion was ruthlessly crushed over a period of time by the security forces with thousands of youth, civil administrators, politicians, community leaders and the soldiers losing their lives in the process.

The fundamental cause for the armed struggle in the South is lack of economic opportunities, unemployment and the general backwardness of the area, although the natural and human resource potential is very high.

Therefore Her Excellency The President has appointed a Special Task Force to speedily address the issue of resolving the numerous problems in the Southern Area which has constrained economic development. This is the first instance that the Government of Sri Lanka is considering the setting up of a Regional Authority in which all powers are vested to spearhead development. Owing to the urgency of the situation, the Task Force was established as an interim measure until the Authority is legally incorporated by an act of Parliament.

The Task Force has been vested with the Authority of effectively coordinating the efforts of all Line Ministers and the Provincial Government to bring about accelerated development of the Southern Area.

Areas of agreement

A meeting was held on 4th October 1995 between the Task Force and the NIVA team to seek common ground where involvement of both parties would lead to effective and efficient outcomes.

Participants at the meeting

Name	Representation
Kumar semage	Private sector industry
Ralph Gunawardene	Banking sector
M. York Smith	UNDP Advisor
Nanda Abeywickreme	Member of Tasks Force, former director IIMI
Sarath Hemachandra	Member of Task Force, Civil Engineer
Piyasena Ganewatte	Sociologist
Stephen Nakashima	USAID Control Resource Management Project
S. Amerasekara	Member of Task Force Director Regional Dev. M/of Planning.
S. Rahubedda	D. Director Reg. Dev. M/ of Planning
Navin Gooneratne	Chairman Task Force
Nihal Mendis	Member of Task Force, Plantation Sector
Specialist Brig T. D Rajapakse	Member of Task Force, Social Mobilisation
Ananda Lecamwasam	Member of Task Force, Management Specialist
Harsha Ratnawera	NIVA
Jan Sørensen	NIVA
Bjørn Braaten	NIVA

The NIVA team had visited the southern area and has carried out rapid social and technical assessments in the area, and are in the process of identifying projects and intervention measures which could be implemented in the country to safeguard the environment.

The Task Force stressed the importance of making serious attempts to reduce the time frame required for planning and formulation as much as possible. It was agreed in principal that a two-step strategy, incorporating environmental issues and efforts to reduce unemployment would be adopted.

NORAD has formulated a financial assistance package to countries in Asia to plan and adopt measures to preserve natural resources and the environment. A "Country Programme" will be identified for each country, which would be implemented through the Ministry of Environment. Outside the "Country Programme" assistance schemes are also available to support specific projects. It was mentioned that small countries and/or specific regions are most appropriate for intervention strategies for NORAD as results are easily discernible and controllable.

NORAD's interest in participating in an environmental programme was pointed out.

There was a general concensus that an Environmental Zonal Plan is required to assist in the location of tourist centres, aquaculture projects, industries, and infrastructure facilities.

The environmental research and survey carried out in the Rekawa lagoon area, belonging to the Hambantota District was extensively discussed and it was agreed that maximum support be given to sustain the effort made so far. A considerable amount of research has been carried out to protect the mangroves, lagoons, wetlands and the coastal areas in Rekawa so that problems, solutions and intervention strategies have already been identified in most instances.

The death of lagoons, problem of coral mining, river pollution (more specifically the problems associated with the Walawe river), potential environmental degradation from the proposed tanneries and the oil refinery, particular adverse impacts of the existing Embilipitya paper factory, and the proposed industrial estate in Mirijjawela and Bata-Atta were discussed.

The chairman of the Task Force informed the meeting that he had informal discussions with the Hon Minister for Environment on the need for senior officials from the Central Environmental Authority (CEA) to work closely with the Southern Area Development Authority in order to speedily resolve administrative bottlenecks and facilitate environment friendly development. Such close involvement will also assist in bringing to the attention of CEA, the areas of conflict between development issues and environmental concerns which need to be resolved. This issue to be taken up soon with the Hon Minister at a formal meeting in the near future.

It was agreed to support the activities of NIVA in its long term plans for environmental preservation and to identify a few priority areas where NIVA assistance could be sought in the short term.

Priority Areas for Immediate Action

1. Establishment of an environmental education and research center and mobilisation of environmental animators

The proposed centre will promote participatory planning for resources management as well as environmental awareness among the people. The role of the centre will be broad based to benefit the entire Southern Area.

Under the direction of the authority, the centre will mobilise about 25 educated youth (possibly graduates) from each electorate in the Southern Area (25 in all) to spearhead environment protection and assist in the environmental education programmes in schools as well as at village level. Such youth will also be given specialised training by the authority to function as social mobilisers to promote participation at village level in the development process.

Thus a strong institutional base, as well as an effective catalytic force will be established to support the envisaged regional development. In this way preservation of the environment could be made sustainable in the long term.

2 Walawe river water resources management and pollution abatement plan

It was decided to include this project also as a priority item as the preservation of the Walawe river basin has wide implications for the sustainable development of the region. It will also successfully address the pollution problems of the Embilipitya paper factory and other sources of pollution in the vicinity.

3 Special area management plan for the Rewawa lagoon area

The projects seeks to successfully address the issues of preserving the lagoon, the shoreline, marine resources and poverty alleviation. A detailed proposal is already available.

4. Proposed integrated coastal zone management plan for the Hambantota District

HE the president has expressed the need to speedily implement this project. Already DFCC and the NDP are making preliminary arrangements to implement this project. NIVA assistance will be required to speedily assess adverse environmental impacts and formulate sound mitigatory measures, for different development projects

5. Proposed industrial estates in Mirijjawila and Bata Atta

Similar environmental assessments will have to be made in the two locations as a priority need before finalising the overall zonal plan for the Southern Area. Considerable amount of work has been carried out to assess the feasibility of the location at Bata-atta. Future investigations will take into account the work already carried out.

6. Central sewerage and affluent treatment facility for Hikkaduwa tourist resorts

Resort areas in Hikkaduwa and the beaches are fast becoming environmentally degrading owing to affluent accumulation and ill-planned disposal of sewerage. An acute need exists to address these problems by planning a central affluent, sewerage and waste water treatment plant to service the tourist industry in Hikkaduwa.

Institutional arrangements, legal provisions, financial viability and the technology will have to be carefully planned before the establishment of such a facility. Statutory provisions may have to be framed to make it mandatory for the industry to channel their waste through the central facility and also pay for the use of such services.

7 Technical assistance provisions for new projects

The creation of a budgetary provision to be used in the future for identification and study of new projects.

5.2.

Reports from the meetings (by M/TEWA)

COASTAL AQUA CULTURE STUDY
NIVA TEAM MEETING WITH S/TEWA - 25.9.95 AT 10.00 A.M.
Meeting No.1 at M/TEWA

Attendance:

- | | | | |
|-----|----------------------|---|-----------------------|
| 1. | Mr.Cecil Amerasinghe | - | S/TEWA |
| 2. | Mr.J.G.Keerthiratne | - | Addl S/TEWA |
| 3. | Mr.G.K.Amaratunga | - | Ch/CEA |
| 4. | Mr.J.I.Samarakoon | - | Consul WLP/CEA |
| 5. | Mr.N.W.Dissanayake | - | AD/CEA |
| 6. | Mr.W.S.Perera | - | C/ND TEWA |
| 7. | Mr.B.Braaten | - | Research Leader/NIVA |
| 8. | Ms. Anne Lyche | - | Project Manager/NIVA |
| 9. | Mr.Harsha Ratnaweera | - | Research Manager/NIVA |
| 10. | Mr. Ian Soerensen | - | Research Manager/NIVA |
| 11. | Mr.W.M.Leelasena | - | Senior Adviser/NORAD |

After introduction of the participants, there was a general discussion on the purpose of the study.

Chairman/CEA informed the meeting that quotations were obtained for the study on the basis of the Cabinet Decision and presented to the Ministry for funding support. The Ministry in turn explored the possibility of obtaining funding from NORAD. C/ND further informed the meeting that NORAD responded to the request and that there was a meeting with officials of M/F&ARD with NORAD officials and Mr. Braaten of NIVA participating. Senior Adviser/NORAD, Mr. Leelasena, also informed the meeting that the study and any follow-up may have to be supported by the three sources of NORAD funding viz:

- (a) LKA 027 Environmental Co-operation Programme.
- (b) Asia Programme.
- (c) The Commercial Co-operation Programme.

The initial study with NIVA assistance would be funded by LKA027 - Environmental Co-operation Programme administered by M/TEWA. It was decided at the meeting that as indicated, NARA will be the main collaborator with CEA's participation. The co-ordination of the study will be by the M/TEWA.

The documents concerning the main tasks of the visit and two sets of the terms of reference of study prepared by the Ministry as required by M/F&ARD and by the NIVA study group were presented at the meeting. It was decided to have another meeting with M/F&ARD participating to decide on the modalities for collaboration etc. The attendees were informed that the next meeting with CEA and M/F&ARD would be held at the Ministry office, Unity Plaza on the same evening.

COASTAL AQUA CULTURE STUDY
NIVA TEAM MEETING WITH S/TEWA - 25.9.95 AT 10.00 A.M.
 Meeting No: 2 at Env't. Div. M/TEWA

Attendance:

- | | | | |
|-----|----------------------|---|-----------------------|
| 1. | Mr.J.G.Keerthiratne | - | Addl S/TEWA |
| 2. | Mr.K.Thayaparan | - | Acting S/M/F&ARD |
| 3. | Mr.G.K.Amaratunga | - | Ch/CEA |
| 4. | Mr.J.I.Samarakoon | - | Consul WLP/CEA |
| 5. | Mr.N.W.Dissanayake | - | AD/CEA |
| 6. | Mr.A.M.Jayasekara | - | D/Aqua Cul. M/F&ARD |
| 7. | Mr.W.S.Perera | - | C/ND TEWA |
| 8. | Mr.B.Braaten | - | Research Leader/NIVA |
| 9. | Mr.Ian Soerensen | - | Research Manager/NIVA |
| 10. | Mr.Harsha Ratnaweera | - | Research Manager/NIVA |

This meeting was held to determine the modalities of co-ordination and collaboration. It was decided that the overall co-operation will be by the Ministry NORAD unit with the study collaborator being NIVA group, NARA and the CEA. It was decided to have representatives from the Coast Conservation Department, Forest Department (Mangrove Management) and the Southern Development Programme. The collaboration and participation of District Secretaries, Divisional Secretaries, NORAD IR^o project, Southern Province Provincial Council and North-Western Provincial Council will be obtained as required. NARA will function as the counterpart agency. It was also decided to have an inter-agency meeting once a month convened by the M/TEWA. The desirability of having contact persons for the study was also discussed and the following names were suggested :-

- (a) Ministry co-ordination - Mr.W.S.Perera - C/ND
- (b) Mr.P.P.G.S.Siriwardene, Research Officer, NARA.
- (c) Mr.D. Hettiarachchi, DP, M/F&ARD.
- (d) Mr.N.W.Dissanayake, Assistant Director, CEA.
- (e) Mr.R.A.D.M.Samaranayake, Coast Conservation Dept.
- (f) Mr.Sunil Liyanage, DCF, Forest Dept (Mangrove Consvn.)

Terms of Reference of Study:

The Terms of Reference included the study of the Puttalam district and the preparation of the Zoning Plan for the Southern Province (Hambantota district). In view of the impending decisions regarding allocation of land in the Hambantota district for shrimp farming, it was decided to give priority to the Hambantota district Zoning Plan. In this respect M/F&ARD informed that the issue of three blocks of land have already been requested and the decision

with regard to their allocation has to be made very soon. C/ND undertook to investigate the possibility of obtaining maps from the Forest Department prepared by the Mangrove Conservation Project. Dr. Samarakoon indicated that the Zoning Plan should include all land above 1.5 metre elevation MSL.

The need for preparing very clear guidelines for future allocation of land for shrimp farming was accepted.

In effect this meant the study taking into account as a priority - Item Nos. 2,3 and 4 of the Terms of Reference prepared by the Ministry. Other details required indicated elsewhere in the Terms of Reference to be taken up mainly for the purpose of producing the Zoning Plan for the Hambantota district. NIVA indicated that a contract would have to be signed soon with M/TEWA with modified Terms of Reference as suggested.

Funding: With regard to funding, the letter written to Secretary, M/F&ARD indicating the situation with regard to NORAD funding under LKA027 was taken up in response to query made by the Acting Secretary M/F&ARD. The current study would be taken up under the LKA027 provisions but other development aspects which may come up as outputs of the study would be taken up with NORAD separately under other assistance programmes.

Programme of work - visits and meetings.

The NIVA team indicated that they would be in Sri Lanka till 6 October, 1995. The programme of visits and meetings would be worked out. The first meeting was fixed for 2.30 p.m. at the office of M/F&ARD with Chairman, CEA and other relevant officials participating.

W.S.Perera - C/ND

cc : File No: TEWA/E/E/14/9.13

VISIT OF NIVA TEAM
REPORT OF ACTIVITIES ON 29.9.95

The NIVA team comprising:

1. Mr.B.Braaten
2. Ms Anne Lyche Solheim
3. Mr.Harsha Ratnaweera
4. Mr.Ian Soerensen

were accompanied by Mr. W.S.Perera and the visit programme included a visit to Kurulukelle, Kegalle, Hemamali Balika Vidyalaya, Kandy and Udawattakelle, Kandy and to IFS, Kandy. The team left Colombo at 6.45 a.m. and after the last meeting stayed overnight at IFS, Kandy.

Visit to Kurulukelle:

Only one member, Ms Solheim attended the meeting at Kurulukelle and Kegalle Vidyalaya. The officer in charge of the project at Kurulukelle had a display of the documents and student reports prepared during the period beginning August 1979. This had been a student project for utilisation of the Nature Reserves for teaching-learning done under the HNCE project work scheme in 1976-77. Later it was added to the network of Field Study Centres in 1979. The project has had a very active period from 1979 till about 1983 when equipment was provided under SIDA assistance. The visual equipment given is still in use. At the meeting with teachers, Ms Solheim was given an idea of the scope and potential of Field Studies programme. The studies included measurements of water quality, pH, among other things.

Under the Field Studies programme, the students are required to prepare reports of their studies and present them at meetings. These reports were available for perusal. The purpose of Ms Solheim's visit was to see how Sri Lanka's Field Environmental Education could be linked and enriched by the Norwegian BEKKIS Water Quality Monitoring Scheme. At Kurulukelle it was apparent that there was adequate preparedness and infrastructure build up for a productive link up with NIVA programme. The Field Study Centre photo laboratory was able to provide pictures of the visit within the one and a half hour period of stay of the team. Ms Solheim provided an illustrative outline of the BEKKIS scheme assisted by a visual presentation.

Hemamali Maha Vidyalaya:

The entire team visited Hemamali Balika Vidyalaya, one of the schools participating in the Udawattakelle Field Studies programme. The team was given an exposure to the work done by means of a one-hour video produced by the school pupils at Udawattakelle. A detailed account of the work done by various groups of pupils was

presented through this video. The student reports of each of the projects were presented at the meeting. Here too, there was ample evidence of the preparedness of the school pupils of Sri Lanka to take over a much more simple Water Quality Monitoring Scheme as proposed by the NIVA team. Here too, Ms Solheim gave an illustrated presentation of the NIVA BEKKIS programme. The principal and teachers expressed their willingness to serve not only as a monitoring station but also as a co-ordinator of the Kandy programme.

Visit to IFS:

A special meeting was arranged at the IFS for the NIVA team. The following members of the IFS participated:

1. Prof. C.B.Dissanayake, Director, IFS.
2. Dr.R.P.Rupasinghe.
3. Dr.W. Kehelpannala.
4. Ms Lalani Munaweera.
5. Dr.Rohan Weerasuriya.
6. Ms Chandra Breckenridge.

The director provided an overview of the scope and functions of the IFS with emphasis on research concerning water and the outreach scheme of the school science programme. The use of a school network for obtaining water samples for measurement of acidity was presented by Ms Lalani Munaweera. This was similar to the BEKKIS programme and indicated the preparedness of the IFS to participate in such a scheme. After an illustrated presentation of the BEKKIS scheme, IFS indicated that they would be willing to collaborate and function as the research organisation which would validate the school data.

One member of the team suggested a study on the Eutrophication of the Kandy lake. This suggestion received the favourable response of IFS. Among the other things discussed was the possibility researcher inter-changes. The visiting team was shown the laboratories of IFS with a view to indicating its potential as a possible collaborative agency.

W.S.P.

W.S.Perera - C/ND

PREPARATION OF ZONING AND MANAGEMENT PLANS FOR SUSTAINABLE DEVELOPMENT OF COASTAL AQUACULTURE IN HAMBANTHOTA DISTRICT

Discussion Note Prepared for the Meeting with NIVA on 27 september 1995, NRM/CEA

Venue: Ministry of Fisheries and Aquatic Resources Development

Objective: Preparation of Framework and Terms of Reference

PREAMBLE. Worldwide, serious concern is being expressed about the adverse environment impacts of unplanned and unintegrated development of coastal shrimp culture. In response, the United Nations Joint Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP) commissioned a study on Reducing Environmental Impacts of Coastal Aquaculture (GESAMP, 1991: Reports and Studies No.47). Guidelines for the Development of Environmentally Acceptable Coastal Aquaculture included 14 actions, Viz.:

- 1: Formulate coastal aquaculture development and management plans
- 2: Formulate integrated coastal zone management plans
- 3: Apply the environmental impact assessment (EIA) process to all aquaculture proposals
- 4: Select suitable sites for coastal aquaculture
- 5: Improve the management of aquaculture operations
- 6: Assess the capacity of the ecosystem to sustain aquaculture development with minimal ecological change
- 7: Establish guidelines governing the use of mangrove wetlands for coastal aquaculture
- 8: Establish guidelines for the use of bioactive compounds in aquaculture
- 9: Assess and evaluate the true consequences of transfers and introductions of exotic organisms
- 10: Regulate discharges from land based aquaculture through the enforcement of effluent standards
- 11: Establish quality control measures for aquaculture products
- 12: Increase public awareness of the safety aspects of consuming seafood
- 13: Apply incentives and deterrents to reduce environmental degradation from aquaculture activities
- 14: Monitor for ecological change

IMPLICATIONS FOR PLANNING

1. Foremost implication for planning is the need for an implementable policy. The lesson learned from the experience of shrimp culture development in the North Western Province is that, in the absence of an implementable policy, the pattern of implementation has become policy, Viz. unplanned and unintegrated land allocation resulting in the entrainment of unauthorized pond development and environmental degradation.
2. The integrated coastal management (ICM) approach incorporates all ingredients that contribute to land allocation resulting in sustainable shrimp culture development.
3. The ICM approach is based upon:
 - (i) serious consideration being given to maintaining the structure and function of supporting ecosystems, and
 - (ii) imparting legitimacy to a land allocation strategy.

Because of (i) serious environmental degradation may be minimized, and because of (ii) socio-political conflict may be minimized.

RECOMMENDATION

Land allocation for shrimp culture development not be made until an ICM plan is developed and approved by all participants in the implementation process.



PREPARATION OF ZONING AND MANAGEMENT PLANS FOR SUSTAINABLE DEVELOPMENT OF COASTAL AQUACULTURE - HAMBANTHOTA DISTRICT

Notes based upon the meeting held under chairmanship of Mr.K.Thayaparan, Addl. Secretary, MFARD on 27 September 1995.

Participation: NIVA Team
Mr.Sterling Perera, Mrs.Padmini Batuwitige, MTEWA
Mrs.Shirani Yasaratne, Dr.Jayampathy Samarakoon, CEA
Mr.A.Hettiarachchi, MFARD

1. The Chairman informed the meeting that two officers of NARA were in the field making an evaluation for sites proposed by several investors for shrimp culture development in the Hambanthota District. He added that the NIVA Team could plan its work programme based upon the recommendations contained in the NARA report.
2. The CEA pointed out that since the criteria being used by NARA for the evaluation are not known, it is premature to anticipate that the recommendations made by NARA would fit into an integrated coastal management planning framework. It was pointed out that some of the major environmental problems stemming from shrimp culture development in the Northwestern Province may be attributed to a NARA report, which used limited criteria for site indication.
3. The CEA indicated that the NIVA Team would have to integrate into their analysis, the recommendations in the Wetland Site Reports and Conservation Management Plans prepared by the Wetland Conservation Project of CEA for wetlands in the Hambanthota District, Viz: Palatupana Lewaya, Bundala Wetlands (situated in Bundala National Park), Karagan Lewaya, and Lunama & Kalamatiya Kalapuwa and other relevant plans prepared for the district.
4. Concern was expressed that development of shrimp culture at particular sites may foreclose other, future development options. The CEA suggested that this problem may be overcome by defining the planning area to include a part of a watershed such that sites proposed by prospective investors are seen as parts of wider ecosystems. The environmental analysis may then be based upon the structure and functioning of that ecosystem.
5. The CEA pointed out that rural landlessness is an acute problem in Hambanthota District. Single purpose development interventions such as irrigation and salt exclusion for paddy cultivation has already resulted in large extents of lowlying land becoming uncultivable. If again, landuse planning is done only with the focus on shrimp culture development, existing land scarcity may be further aggravated.
6. The CEA indicated the need to give very serious consideration to the scarcity of freshwater in the Hambanthota District. The freshwater requirements for penaeid shrimp culture (particularly *Penaeus monodon*) is very high, and it will have to be acquired in competition with irrigation water for paddy cultivation. Under prevailing conditions, during a part of the year, the surface freshwater supply to coastal bodies of water (lagoons) is non-existent. By implication, fresh water supplies may have to be drawn from existing irrigation systems.
7. MTEWA and CEA stated that a programme EIA will be essential before land allocation is made for shrimp culture to ensure that cumulative impacts are adequately addressed.
8. The CEA indicated that it would prepare the TOR for the overall study to be conducted by the NIVA Team in collaboration with CEA and NARA, within which the areas suited for aquaculture could be considered on a priority basis.

5.3.

Proposal for TOR for the CZMP - Hambantota (by CEA)

COMPONENTS OF ASSESSMENT AND ANALYSIS, ISSUES AND OPTIONS PERTAINING TO PLANNING FOR INTEGRATED DEVELOPMENT OF SHRIMP CULTURE IN HAMBANTHOTA DISTRICT

Draft Prepared by the Natural Resources Management Division, Central Environmental Authority for Discussion with the National Aquatic Resources Agency and NIVA (consultants to the Norwegian Organization for International Development, NORAD)

1.0 BACKGROUND

The present draft is the result of four, previous preparatory discussions with the NIVA Team:

- 25 September 1995, discussion chaired by the Secretary, Ministry of Transport, Environment and Womens' Affairs (TEWA) held at the office of the Secretary, TEWA. Participation: Secretary, Additional Secretary, Director/Environment TEWA; Chairman, Asst Director, CEA; Coordinator, NORAD/TEWA; NIVA Team; Consultant, Wetland Conservation Project, CEA.

Since representation by the Ministry of Fisheries and Aquatic Resources Development was absent, the decision was taken to continue discussion in the afternoon of the same day.

- 25 September 1995, discussion chaired by the Additional Secretary to TEWA. Participation: Additional Secretary, TEWA, Chairman, Assistant Secretary, CEA; Additional Secretary, Ministry of Fisheries and Aquatic Resources Development, Director/Planning, and Director/Inland Fisheries Development, MFARD; NIVA Team; Environmental Programme Officer, TEWA/NORAD; Consultant, WCP/CEA.

Since NARA was not represented, a third meeting was scheduled with Chairman, NARA for 27 September 1995.

- 27 September 1995, discussion chaired by the Additional Secretary, MFARD. Participation: Additional Secretary, Director/Planning, MFARD; Director/Environment TEWA; Director, Natural Resources management Division, CEA; NIVA Team; Consultant; WCP/CEA.

Director, NRM/CEA submitted a discussion note which embodied a framework for integrated coastal management which would ensure sustainable development of shrimp culture in Hambanthota District (Annex 1).

Since NARA was not represented a meeting was scheduled with Chairman, NARA on 28 September 1995.

- 28 September 1995, discussion chaired by Chairman, NARA. participation: Chairman, Director General, NARA; Director?environment, TEWA; Director, Assistant Director NRM/CEA; NIVA TEAM; Consultant WCP/CEA.

Since the NARA field investigators were not represented, a meeting with them was scheduled for later in the first week of October. The NIVA Team would in the meanwhile visit Hambanthota District and establish contact with the NARA Team to acquire some first hand field experience.

Director, NRM/CEA distributed notes from the previous meeting with the Additional Secretary, MFARD to provide continuity and cohesiveness to the ongoing discussions. It was also suggested that, since the criteria used by NARA for site identification for shrimp culture development in the Northwestern Province were apparently inadequate, NRM/CEA would seek to supplement them.

CEA suggested that, based upon its experience with the shrimp culture situation in the Northwestern Province, and the adverse environmental impacts thereof, an integrative terms of reference for the proposed study by NIVA would be prepared for discussion at the meeting with the technical team of NARA.

2.0 TERMS OF REFERENCE/GUIDELINES

The foremost lesson learnt from the adverse environmental consequences stemming from the unintegrated and inadequately planned development of shrimp culture in the NWP is the need for a clear and practical set of objectives. This set of objectives, if proven to be practical, will then constitute a policy. The policy may be appropriately revised based upon implementation experience.

2.1 OBJECTIVES:

1. Identify resource opportunities (land, water, ecosystem support) for optimal development of shrimp culture, and where potential site identification has already been made by prospective investors, evaluate suitability within an integrated ecosystem framework.
2. Identify mitigatory measures to prevent adverse impacts of shrimp culture on the ecological support system (externalities) in order to ensure that non-beneficiaries are not forced to bear environmental and economic costs.
3. In the prevailing climate of land scarcity in the Hambanthota District, identify mechanisms for mediating a flow of benefits to the local residents who may not have the capability to participate in the development activity but would like to do so.
4. Map all potentially suitable sites for shrimp culture development on the scale 1:10,000, based upon clearly defined criteria, with water intake and drainage outlets clearly defined in relation to existing streamflows and flood retention areas.
5. Map existing land uses on the scale 1:10,000 in relation to potential sites for shrimp culture such that maps 4 and 5 are superimposable.
6. In order to minimize institutional conflicts, identify and establish mechanisms for integration with:
 - development plans of the ADB/Southern Province Rural Development Project,
 - development and planning activities of the Hambanthota Integrated Rural Development Project,
 - development and planning activities of the newly appointed Southern Province Development Authority, and
 - recommendations incorporated in the site reports and conservation management plans for wetlands in Hambanthota District prepared by the Wetland Conservation Project of the Central Environmental authority,
 - special area management plan for the Rekawa Lagoon area prepared by the Coastal Resources Management Project of the Natural Resources and Policy Project (USAID)/Coast Conservation Department.
7. Prepare a matrix which clearly defines the "path toward adverse environmental consequences" that may flow from deviation from guidelines, such that the decision makers may become fully aware of such relationships.

2.2 GUIDELINES

Figure 1 shows the proposed framework for integrated planning for shrimp culture development in the Hambanthota District. The proposed guidelines are given below, taking into consideration the document "Preparation of a Zonal Plan for Coastal aquaculture in Hambanthota District" prepared

by NARA. The guidelines pertain to five categories; resources, uses, effects, socio-economic conditions and institutional conditions (Figure 1).

2.2.1 Resources

This assessment would focus on physical aspects, land and water (manpower and financial resources will be addressed under socio-economic conditions and institutional aspects). NARA has already indicated the parameters of the physical resources assessment, viz. climate and watershed conditions, soil quality, topography of the site, type and density of vegetation, accessibility, river and surface runoff, retention of flood water. *Additional parameters could include available infrastructure.* The resource assessment may be supplemented during discussion based upon the known limitations in the climatic zone in which Hambanthota District is situated.

2.2.2 Uses

This assessment would have to focus on a comprehensive range of land and water uses. NARA has listed many of the uses that may have to be taken into consideration. However, it may be useful to include agricultural land uses including paddy and cash crop cultivation.

2.2.3 Effects

The effect listed by NARA is confined to water pollution and assessment in relation to water quality as it relates to aquaculture. However, this category of effects would have to include existing impacts of diverse engineering interventions such as drainage and salt exclusion schemes that were implemented in the Hambanthota District to previously promote paddy cultivation.

2.2.4 Socio-economic conditions

The socio-economic parameters identified by NARA include:

- social and employment structure,
- income and sources of income, degree of dependence on local resource bases,
- alternative resource use/employment options,
- social constraints toward shrimp farm development, and
- impact of development on the social and economic status of the local communities.

First, it would be necessary to adopt both a retrospective and a prospective approach. The historical (recent) trends that have resulted in existing rural land scarcity in the Hambanthota District will have to be given consideration to understand the potential future socio-economic impacts of land alienation for shrimp culture.

The second socio-economic parameter that would have to be explored relates to the institutional aspects that exist to provide manpower resources (training and credit facilities) to enable the local population to benefit from shrimp culture development.

2.2.5 Legal, institutional and administrative conditions

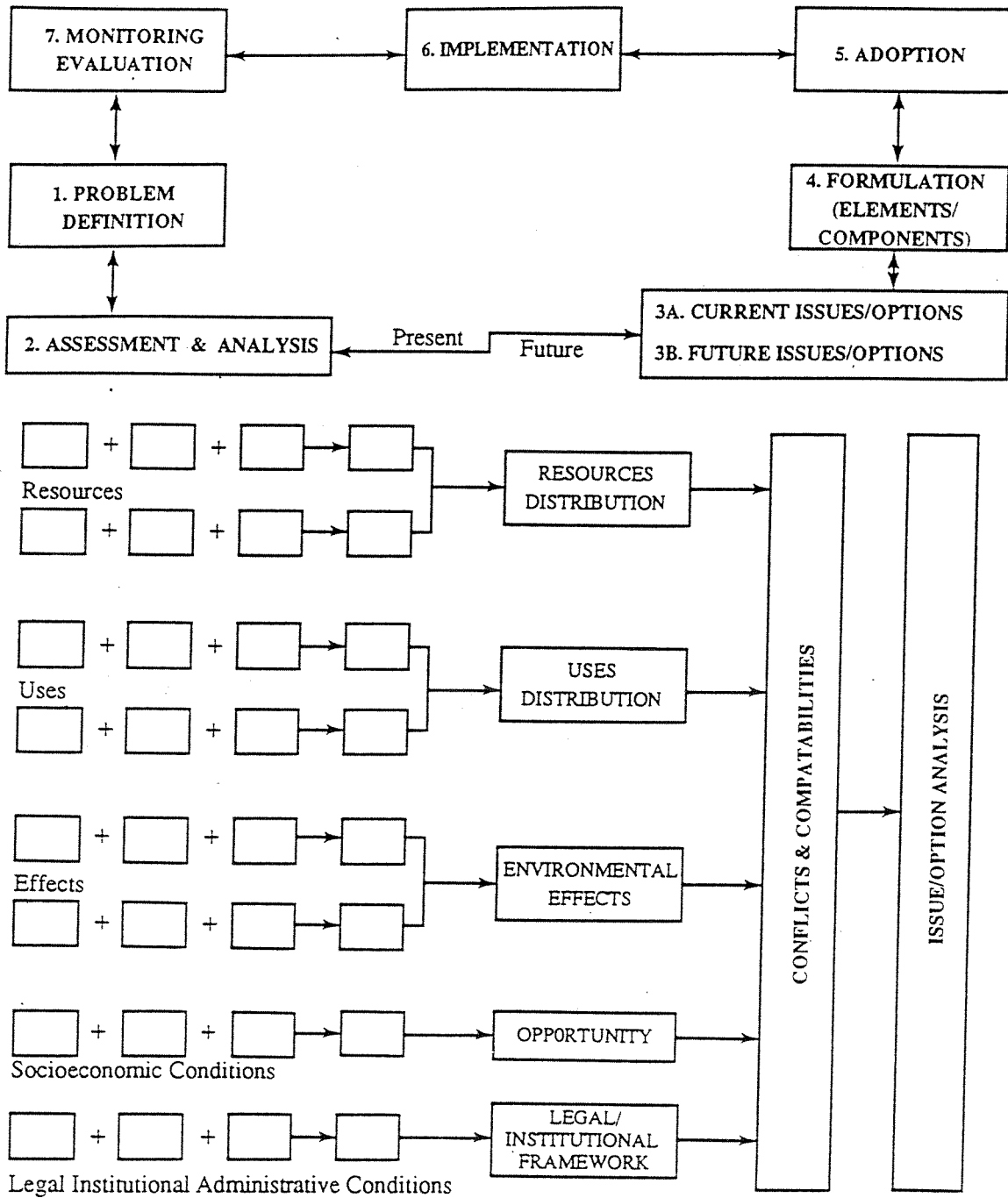
This aspect has been left out by NARA. It would be necessary, not only to explore the existing legal, organizational and administrative aspects, but also the capacity of existing credit facilities to contribute to equitable participation of a wide range of actors in shrimp culture development.

The monitoring criteria and standards need to be specified in a geographically appropriate manner.

2.2.6 Conclusions and Recommendations

The site specific recommendations for shrimp culture development would have to be made in a manner that may be evaluated in relation to the criteria used for site selection.

Figure .1 Components of the Assessment and Analysis, Issues and Options of the Coastal Area Planning Process



5.4.

Proposal for the work plan for a follow-up visit (by NIVA)

PROGRAM/PROJECT FORMULATION AND PREPARATION OF APPLICATIONS ON ENVIRONMENTAL ISSUES IN SRI LANKA FOR 1995- 1996.

Background:

The Norwegian Institute of Water Research (NIVA) has visited Sri Lanka during 25/9-6/10/95 following up of Mr Arild Skåra's (NORAD, Colombo) visit to NIVA in August 1995. The NIVA mission, which consisted of 4 scientists representing aquaculture, coastal zone planning, water & wastewater treatment and environmental education had the opportunity of conducting 35 meetings with the senior officials of the Government of Sri Lanka (GOSL) and central and regional authorities and institutions during a 10 days period. As a result of these meetings the mission was able to identify a set of projects with an environmental profile, which are highly prioritised by the Sri Lankan Government.

Incitements for project collaboration:

As we see it, 3 essential incitements presently appear to enhance and stimulate project collaboration between NIVA-NORAD-GOSL:

- The Sri Lankan government authorities have indicated their special interest in receiving support for environment related projects, and have identified suitable projects.
- NIVA has the competence and the capacity of conducting the projects, and has the possibility and interest in promoting projects to other relevant Norwegian institutional partners.
- NORAD, Sri Lanka and the Norwegian Government have shown a special interest in supporting environment related projects for 1995 and 1996.

Strategy:

The high interest shown by GOSL for environment related projects calls for a formulation of an "environmental program" for the southern area (Hambantota district) where the projects are positioned according to the available time, resources and importance. Additionally, a number of prioritised issues beyond the Hambantota district should also be planned as individual projects.

Work plan:

To cope with the limited time-frame available for proposal formulation, and especially to assist the NORAD project co-ordinating body at the Ministry of Environment (TEWA) in Colombo, NIVA suggests to have an intensive work session in Colombo during 30/10-3/11/95 in order to prepare the necessary proposals and applications which will be the outcome of this activity.

Resources:

The proposed activities requires 9 man-weeks of researchers, including one week work in Sri Lanka for 3 persons. The funds for this activity are already obtained from Norway.

Preliminary work plan for the proposed activities

1. Formulation of a water related environmental program for Hambantota district with the definition of long term objectives: Environmental status evaluation and strategies for sustainable development and resource use; Environmental planning related to proposed activities and preparation of provisions for future activities interacting with the environment; Establishment of a co-ordinating body for environmental issues.
2. Identification, shortlisting and time-scheduling of short- and long- term projects starting in 1995/96 and preparation of proposal documents with the required degree of detailing for immediate processing at GOSL and NORAD. The preliminary shortlisting includes the following projects with time defined sub-projects:
 - (1) Integrated coastal zoning plan for Hambantota district
 - (2) Walawe river catchment: Water Resource Management & Pollution Abatement Plan including immediate action for Embilipitiya paper mill effluent
 - (3) Environmental education issues including the transfer and adoption of the Norwegian BEKKIS-model and the Rekawa lagoon environmental research centre (alternatively as a separate program).
3. Preparation of project application documents for selected prioritised projects beyond the Hambantota district:
 - (1) Norwegian wastewater treatment plant for Hikkaduwa,
 - (2) Kandy Lake restoration,
 - (3) Strategies/action plan for reduction of adverse environmental effects of shrimp farming in Puttalam lagoon.
4. Assist in preparation of project documents for the proposals involving other Norwegian institutions:
 - (1) Capacity building of Sri Lanka Customs in relation to the UN/Basel convention on hazardous wastes (State Pollution Control Authority of Norway),
 - (2) Institutional strengthening of the Marine Pollution Prevention Authority (“Marine CEA”) - (Norwegian Ministry of Environment).

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