

ANNUAL REPORT AND ACCOUNTS

1991



NATIONAL AQUATIC RESOURCES AGENCY
Crow Island, Colombo 15.

MARINE BIOLOGICAL RESOURCES DIVISION

The research programme of the Division was successfully continued during the reporting period. Two new research projects were initiated during this year with the financial assistance from the Bay of Bengal Programme. Bio-socio-economic of the small pelagic fisheries on the south west coast of the Sri Lanka was started in September 1991 and the study of the Dolphin catches in Sri Lanka was started in July 1991. The programme of the projects undertaken by the officers of this division are given below.

1. STUDY OF THE LARGE PELAGICS

1.1 The IPTP/NARA sampling program

It was continued for the year 1991 at the major fish landing sites on the west south coasts of Sri Lanka. The activities of the samplers were monitored by the NARA staff. The data collected by the samplers were entered into the computer data bank for detailed analysis. The analysed data was published in a scientific paper titled. The status of the kawakawa stocks on the west coast of Sri Lanka in the Asian Fisheries Science. A paper on the status of the yellowfin tuna fishery in Sri Lanka, was presented at a workshop on the yellowfin tuna.

1.2. Exploratory fishing by NW 35

During this year a total of 22 cruises were conducted each cruise lasting for about 10 sea days with 5-6 fishing days in each cruise. Fishing was carried out in the offshore water of the Sri Lanka. A series of maps were prepared to indicate the time taken for fishing boats to reach the outer limits of EEZ of Sri Lanka. These maps will be distributed to fisherman.

1.3. Tuna Tagging Programme.

Around 15 tuna tags were recovered by the Sri Lanka fisherman. These tags were from Mirissa, Tangalla, Negombo, Beruwala and Kandakuliya. Rewards were given to these fisherman.

2. STUDY OF THE SMALL PELAGIC PELAGIC FISHERIES

Small meshed gill net fishery, beach seine fishery and purse seine fishery were studied in several areas between Hambanthota & Chilaw.

Small meshed gill net fishery was monitored at Tangalle, Marata, Kalutara, Negombo & Chilaw DFEO's divisions. The sampling programme was enhanced through IPTP/NARA joint programme which employed samplers at 4 of these areas.

The data brought in was stored in the computer data base and was analysed upto November 1991. The monthly CPUE distribution for different areas is given in Table 1.

Beach seine, Purse seine & Small meshed gill net fisheries were studied on a greater intensity in the area between Maggona and Dodanduwa under the Bio-socio-economic project funded by BOBP. The biological part of this project is handled by NARA while the socio economic part is handled by the Dept. of Fisheries. several research papers dealing with small pelagic fish were written and were sent to relevant journals like Asian Fisheries Science & Journal of Fish Biology.

Information was provided to the Dept. of Fisheries on affairs dealing with small pelagic fisheries.

3. PRAWN FISHERY SURVEY

The areas covered by this project were Negombo and Chilaw, the main prawn landing centres of the west coast of Sri Lanka. In Negombo prawn trawling is carried out by sail driven out-rigger canoes and in Chilaw it is operated by 3.5 ton mechanised boats. Each landing site was visited twice a month and data on catch by species and effort were collected. Morphometry studies of *Penaeus indicus*, and analysis of soil samples of the trawling ground were also carried out.

The highest catch rate of 19 kg/boat/day was recorded from Negombo in the month of March and from Chilaw in December which is 22.8 kg/boat/day. A considerably high catch rate was observed in December from Negombo area too. From the findings of this project several research papers were prepared and few reports were sent the Department of Fisheries.

Report handed over to the Ministry of Fisheries and Aquatic Resources

1. Provided information on the prawn fishery of Negombo to
2. "Prawn trawling in Chilaw using 3.5 ton mechanised fishing boats"
3. "Status of prawn resources around Sri Lanka"

4. LOBSTER FISHERY SURVEY

During the period from 1991 Jan. - Oct., I was away from the country for my Ph.D studies. I returned to Sri Lanka on 9th Oct. 1991.

There field visits were made to the south coast during Oct.-Dec. period to monitor the spiny lobster fishery of the south coast. Spiny lobster production was very low during Oct. - Dec. period when compared to the similar months of the previous year. Catch rates ranged from 0.5 kg -1kg per canoes per day.

Two field visits were made to Malala and Rekawa lagoons under the southern lakes development project. Information on lagoon fish production was recorded.

A report explaining the reasons for decline of shrimp catches in Rekawa lagoon was submitted to the Ministry of Fisheries. I was incharge of the NW 35 operations from Dec. 1991 and two fishing trips were made during Dec. 1991.

5. DEMERSAL FISHERY SURVEY

This survey was carried out at Negombo and Chilaw. The data collected were catch and effort length frequency of common demersal species and operational information on important fisheries

while exploit demersal resource. Field visits were made to the landing sites as programmed. The data collected were analysed and used when necessary.

6. STUDY OF PUTTALAM ESTUARINE SYSTEM

Capture Fishery of Puttalam Estuary

Biweekly field trips were made to Kalpitiya in the twelve months throughout the year and data on the fishery of the estuary and length measurements of the selected clupeid. Nematalosa nasus were collected from four landing centres. These data were analysed and the catch rates and the total productions for eight different fishing craft and gear combination were estimated (from October 90 to Sept. 1991).

The estimated total production Feb., June & July months especially due to the changing weather.

In March 1991 an advisory and evaluation tour comprising Dr. Dhua Thia-Eng., De. Houise fallon and Mr. Gesenimo Sylvestre visited Sri Lanka and they visited all the landing sites in the area with the officers working at NARA under SAREC project. In June Dr. Klanse koop and Miss. Petra walbug visited Sri Lanka & conducted short term research programme with Mr. M.M. Alwis of the project, on the primary production of the Puttalam estuary.

During the course of the year another 25 species of fish well indentified in addition to the 50 species which had been identified earlier.

In Oct. a survey on the total number of fishing crafts operating in the estuary was carried out in which about 28 fish landing sites around the estuary were visited and about 800 FRP boats, 514 log crafts, 200 dug out canoes with outriggers and 7 large dug out canoes with outriggers were visually counted.

The data from Oct. 1990 to Sept. 1991 were analysed and a research paper was written on the present status of the Fishery of Puttalam Estuary.

Two sampling stations have been identified from the associated coastal region to monitor the trawler fishery and the small mesh fishery.

At Kalapitiya sampling station 2 types of trawlers are operated. They are 11 ton ABD type trawlers and 3 1/2 ton wooden boats Mainly they are trawling for prawns but considerable by catch could also be seen.

At Kandakuliya small mesh gill net fishery is carried out through out the year. They are mainly fishing for sardines. Other than that various groups of fish could be seen among the catches. flying fish fishery started from Sept. to March at Kandakuliya. Some fishermen from kandakuliya and migratory fishermen mainly from Chilaw area are engaged in this fishery.

7. CORALS REEF SURVEY

Three coral reef areas in the north western province was selected to carry out a study to compare the quality of degraded and undergraded fringing and barrier reefs. The three locations selected

were the bar reef. Kandakuliya coral reef and the Talawila coral reef. Their status was relatively pristine, partly degraded and degraded sites respectively.

Line transect method was used to determine the percentage of live coral cover, dead coral cover, substrate, sediment, algal cover etc. In addition the species diversity of corals, other locations.

Results obtained from this study indicated that the species diversity of fish was extremely high for the undegraded Bar reef and the other sites contained lesser numbers of fish and the species diversity was low.

Information was obtained on different fishing methods employed at the investigated locations. The severe reef degradation at Talawila and Kandakuliya can be attributed directly, to the use of Bottomset nets and to excessive collection of live marine organisms for export.

A study was initiated to determine the effects of coconut husk retting within reef lagoons. Polhena was selected as the ideal location for this study as it is extensively carried out within the Polhena reef lagoon. Equipment necessary to conduct this study was set up at NARA and at the Colombo University. This study's primary aim is to determine the possible effects of pollution on coral growth of other reef organisms including marine molluscs. In the former Alizarin stain technique and the buoyant weight technique is being used. In the latter the growth bands laid down by the molluscs under stress is being investigated.

Coral specimens collected during reef investigations were identified and placed in the coral reference collection at NARA. Over 50 specimens belonging to 7 families have been collected to update the coral reference collection. Among them are three genera and 7 species of reef building coral new to Sri Lanka.

8. BIO-SOCIO-ECONOMIC SURVEY

The above project was initiated in August 1991 with the financial assistance from BOBP. To carry out the bio-economic component one research officer and one research assistant were recruited by BOBP. Data forms and questionnaires were prepared and arrangements were made to carry out the frame survey in the 1st week of Oct. 1991. Discussions were held with the Department of Fisheries to have a few meetings with the fishermen in the area to introduce project to the fishermen. The meetings were held at Balapitiya, Ambalangoda, Hikkaduwa and Dodanduwa on 21st and 22nd Oct. 1991.

The survey of purse seine fishery, pocket net (ring net) fishery, beach seine fishery and gill net fishery for small tunas and small pelagic fishes were initiated during the month of Oct. 1991 and carried out fortnightly for three months between Dodanduwa and Beruwala. The landing centres covered under this project were Dodanduwa, Ambalangoda, Haraspola, Hikkaduwa and Beruwala. The gill nets fishery data were collected from Dodanduwa, Haraspola, Beruwala and Ambalangoda. The purse seine fishery data were collected from Hikkaduwa, Ambalangoda, Beruwala and Haraspola and pocket nets fishery data were collected from Dodanduwa and Hikkaduwa. From Dodanduwa pocket nets fishery data were collected from early morning and evening fishery catch. Beach seines fishery data were collected from the study area between Dodanduwa and Beruwala.

The operational cost of the individual boats and nets were recorded and length measurements for the various pelagic fishes were also recorded from the landing centre. The total CPUE value for purse seine fishery for Hikkaduwa, Ambalangoda, Haraspola and Beruwala for the year 1991 were 220.80 kg/boat/day, 238.15 kg/boat/day, 77.99 kg/boat/day and 142.05 kg/boat/day respectively.

In the case of pocket net fishery the total CPUE value for Dodanduwa and Hikkaduwa were 36.15 kg/boat/day and 13.05 kg/boat/day respectively.

The total CPUE value for Beach Seine fishery for the Study area between Dodanduwa and Beruwala is 152.00 kg/net/haul.

Workshops attended

1. Workshop on RAMSAR conventio -27th 28th Aug. 1991 organised by Dept. of Wildlife Mrs.C.Jayawikrema.
2. Worksho on CITES -27th -30th Aug. 1991 organised by Dept. of WildlifeMrs.C.Jayawickrema.

Other activities

1. Carried out studies on the insect problem of the Chilaw lagoon.
2. Poster was prepared for Gam Udawa.
3. The work carried out under the project was presented to the Governing Board of NARA on 1stAug. 1991.
4. Information on the water quality of Chilaw lagoon was handed over to CEA to set up environmental standards.
5. Report on How to increase demersal fish production in Sri Lanka was submitted to Hon. State Minister.
6. Report on The status of demersal resource around Sri Lanka..Submitted to Lanhua Fisheries Co. (Pvt) Ltd.
7. Participated IOMAC 5th standing committee meeting at BMICH.
8. Attended MIS training organised by CARP and information on projects budget etc. prived to CARP for documentation.
9. Development of the Hikkaduwa Marine sanctuary held at the CISIR auditorium.
10. The second meeting with regard to the above subject was held at the parliament complex at Sri Jayawardenepura
11. Attend four meeting regarding the export of live marine organisms for aquariums and to introduce a fish quarantine system to Sri Lanka.
12. Attend two meetings in the northwestern provincial council offices at Kurunegala and Chilaw.
13. Coral specimens were collected from the coral reef at Rumassala for the National Maritime Museum in Galle. These specimens were indentified to the specific level wherever possible.
14. Regular maintenance was carried out on all equipment belonging to the unit.

Publications

Dayaratne, P. & R. Maldeniya. Status of the yellowfin tuna fishery in Sri Lanka. paper presented at the workshop on Yellowknife tuna held in Colombo in October 1991.

- Dayaratne, P. & R. Maldeniya. Status of the yellowfin tuna fishery in Sri Lanka. paper presented at the workshop on Yellowknife tuna held in Colombo in October 1991.
- Dayaratne, P. 1991. preliminary observation of the purse seine fishery in the south west coast of Sri Lanka. Vidyo. J. Sc. Vol.3.
- Dayaratne, P. & C. Amarasiri 1991. A preliminary investigation on the handling fishery in the west coast of Sri Lanka. vidyo. J. Sc. Vol 3.
- Dayaratne, P. 1991. Valuable living resources from our seas. Vidurava Vol. 13 No.2.
- Dayaratne, P. Age and growth of narrow based spanish mackerel. Paper seno to the Journal of Fish Biology.
- Jayawickrema, S.J.C. 1991. Towards sustainable utilization of prawn resources in Sri Lanka waters - VIDURAVA. Vol. 13. No.2.
- Jayawickrema, S.J.C. 1991. An estimation of the biomass of *Penaeus Semisulcatus*_(De mann) in portugal Bay trawling ground (Prepared for publication).
- Jayawickrema, S.J.C. 1991. Status of the Chilaw lagoon fishery (In press) - NARESA journal.
- Amarasiri, C. The declining pole and line fishery in Sri Lanka. Vidyodaga Journal of Science Jan.1991.

INLAND AQUATIC RESOURCES AND AQUACULTURE DIVISION

PROJECT:

Following major research projects/ studies were continued or completed during year 1991.

1. Reservoir fishery management project.
2. Mollusc culture project.
3. A study of socio-economic, cultural and historical aspects of Kattudal fishery in Chilaw lagoon
4. Ornamental fish breeding and development project.
5. Biology Ecology and use of artemia in aquaculture.
6. Monitoring of effluents from aquaculture sites.
7. Litter production decomposition and associated microbial of mangrove in Negombo lagoon
8. Studies on the disease outbreaks in the cultured shrimp.
9. Sea weed culture project.
10. Mud crab fishery project.
11. Study on Mundal lake fishery.

MAJOR FINDINGS / PUBLICATIONS AND REPORTS

In reservoir fishery management project. The beneficial effects of Tilapia and other species of fish have been investigated. It has been proved that Inland fisheries of Sri Lanka should be developed through rural organizations

Encourageous results on growth and production were observed for the culture of oysters on concrete blocks.

Data has been collected on community structure, fishery and biology of clams and cockles in Puttalam lagoon and culture experiments were conducted on mussels.

An investigation on socioeconomic cultural and historical states of the kattudal fishery at Chilaw lagoon was started with the view of collecting information to minimize the user conflicts among fishery of communities.

The work regarding the ornamental fishery included the breeding of several exotic species, the transfer of technology training of personal on water quality management, breeding and treatment of deceases.

Inoculation studies were carried out at Palavi salterns with SFB strain Artemia in a closely monitored pond system. Very high production rates of cysts (02 Kg / 1500 m²/40 days) and

biomass 124 kg/ 1500 m² / 40 days) were obtained. Several experiments were carried out to evaluate the nutritional quality of different *Artemia* strains for early stages of commercially important shrimp.

The water qualities of the farm effluents were monitored. The levels of total suspended solids and turbidity were found beyond the permissible limits. Other parameters were within acceptable ranges. This study suggests the future trends to increase the pollutant threats in the shrimp areas of Sri Lanka.

Differences in the litter decomposition rates in the mangrove areas with cages in the environment was studied. A clear correlation has established for litter decomposition and seasonal changes in the environmental parameters.

A study was completed on mud crab fishery at Negombo lagoon. Valuable information on maturity exploitation rate fishing effort has emerged. The crab resources of this lagoon was found subjected to heavy over exploitation.

A literature review has been completed on sea weed culture. Encouraging results on growth, production has been observed at Puttalam lagoon at experimental culture sites.

Training

Two officers completed their Ph.D programmes and one officer completed her M. Phil programme successfully during this year. Two officers are engaged in their Ph.D programmes (full time abroad) and two officers are on split Ph.D programmes.

Consultancy

Consultancy work in the area of aquaculture site assessment, water soil quality assessment, environmental impact assessment have been carried out. About 160 project proposals, and consultancy reports and other reports were prepared by the division.

Publications

Amarasinghe, U.S., (1991) Recent trends in the inland fishery of Sri Lanka. Paper presented at the Fifth Session of the IPFC working party of experts on inland fisheries, Bogor, Indonesia, 24-29 June 1991.

Amarasinghe, U.S. and S.S. De Silva, in press. Population dynamics of *Oreochromis Mossambicus* and *Oniloticus* (Cichlidae) in two reservoirs of Sri Lanka. Asian Fish. Sci.

Amarasinghe, U.S. and S.S. De Silva, in press. An empirical approach for evaluating the efficiencies of different fishing methods in tropical, shallow reservoirs: a Sri Lanka case study. proceedings of the Workshop on Advances in Reservoir Fishery Management and Development in Asia (S. S. De Silva ed.), 15-19 October 1990, Hangzhou, China, International Development Research Centre, Ottawa, Canada.

Amarasinghe, U.S. and S.S. De Silva, in press. Cichlidae verses Cyprinidae: experience from the inland fishery of Sri Lanka. Paper presented at the Fifth Session of the IPFC Working Party of Experts on Inland Fisheries, Bogor, Indonesia, 24-29 June 1991.

Jayasuriya P.M.A. (1991) The status of the industry and cultivation of seaweeds in Sri Lanka. British phycological journal Vol. 26. No. 01 March 1991.

- Jayasuriya, P.M.A. (1991) Bibliography on sea weed research in Sri Lanka. Sent for publication to the Ceylon Journal of Science.
- Jayasuriya, P.M.A. (1991) The status of the industry and cultivation of seaweeds in Sri Lanka. British Phycological Journal 1991 Vo 26 No. 1.
- Jayamanne, S.C. and Jinadasa, (1991) Food and feeding habits of the mud crab (*Scylla serrata*). in the Negombo lagoon. (in press).
- Jayamanne, S.C. (1991) Bionomics of mud crab fishery, *Scylla serrata*. Univ.Sri Jayawardenapura.
- Jayamanne, S.C. (1991) crab resource of Sri Lanka. Vidurava. Vol. 13.No 3.
- Jayamanne, S.C. (1991) Mud crab fishery in Sri Lanka. A paper presented at the Seminar of culture and trade of mud crab in the BOBP region. 4 - 9th November. Surat Thani, Thailand.
- Jayamanne, S.C. and Jinadasa, J. Size at 1st maturity and spawning periodicity of the mud crab, *Scylla serrata* in the Negombo lagoon. (submitted to NARESA Journal).
- Gunaratne, A.B.A.K and Jayamanne, S.C. Status of fin fish fishery in the Mundal lake (in preparation).
- Jayamanne, S.C., and Jinaiadasa J. Population dynamics of mud crab (*Scylla serrata*) in the Negombo lagoon (in preparation).
- Amarasinghe, M.D. and Balasubramaniam, S.(in press) Structural properties of two types of mangrove stands on the north - western coast of Sri Lanka. *Hydrobiologia* Vol. 0: 00 (in press)
- Amarasinghe, M.D. and Balasubramaniam, S. (in press)
- Net primary productivity of two mangrove forest stands on the north - western coast of Sri Lanka. *Hydrobiologia* , Vol. 0 : 00 (in press).
- Jayasinghe, J.M.P.K., Utilization of acid sulphate of the west coast of Sri Lanka is shrimp culture. Ph.D thesis University of Stirling.

Seminars Workshops

U.S. Amarasinghe,

5th Session of IPFC working party of experts on inland fisheries. 24-29 June 1991, Bogor, Indonesia (Invited participant)

S.C. Jayamanne

Seminar on culture & trade of mud crab *Squilla serrata* in the BOBP region - Nov. 5-8, Surat Thani, Thailand

M.D. Amarasinghe

Workshop on mangroves organized by the International Society for Mangrove Ecosystems 18-21 November 1991 (Invited participant).

OCEANOGRAPHY DIVISION

1. OBJECTIVES

The main objectives of the Division

- a) Systematically explore, harness and manage the non living resources in the vast oceanic heritage which comes under the jurisdiction of Sri Lanka for the benefit of the region.
- b) To study the physical, chemical and biological oceanographic parameters in the region which could effect the distribution and the formation processes of the living and non living resources.

2. STAFF

Research Officer	7	(2 on SAREC Project)
Research Assistants	5	(1 casual , 1 No pay leave and 1 SAREC project)
Lab. Assistant	1	
Sampler	1	
Typist	1	
Peon	1	

3. RESEARCH WORK

3.1 Swedish Funded Project to Study the Oceanographic Parameters in the Kalpitiya Lagoon

This is a project funded by the Sweden Government. The first year of the three year project was successfully completed. The objective of the project is study the physical parameters in the Kalpitiya Lagoon. Tidal, salinity and current measurements were taken every fortnight. All the collected data are compiled, but too early to arrive at any conclusions.

3.2. Puranawella Environmental Study

This study was requested by the Ministry of Fisheries and Aquatic Resources. The work was carried out during the Northeast and Southwest Monsoons. The work was completed and the final report was submitted.

3.3. UN Revolving Fund Funded Project to Identify and Evaluate the Deposits of Heavy Mineral Concentrations in the South west Coast of Sri Lanka

The agreement for this project was signed on 23rd June, 1991 and the work is to start in 1991. and the work is to start in 1992.

3.4. Oceanography Studies in the Negombo Lagoon.

This is a continuous monitoring programme of the oceanographic parameters in the Negombo Lagoon. An extensive study was completed in 1990 and the work was continued during 1991. The Swedish research programme (SAREC) has agreed to fund this project during 1992.

3.5. Monitoring of the organo-carbon pollution on the South and Southwest Coast Beaches of the Island.

This study is carried out to monitor the intensity and the frequency of the occurrence of "Tar balls" in our beaches. Such a study was carried by the Division few years back. After the sea pollution in the 'Gulf War' the necessity of a similar study was felt and the monitoring was started during the Southwest Monsoon. Every month two field visits were done, one upto Tangalle and the other upto Kalpitiya. 'Tar ball' monitoring was carried out at the selected sites.

There is an increase in the 'tar ball' beach pollution in the South and Southwest Beachs of the Island during the Southwest Monsoon. No increase in pollution is noted after the Guld War. We belive the Tar Balls are formed from the tank washings of the crude oil carrying vessels.

3.6. Preparation of the Fisheries Charts

This work is done to prepare the base maps, (bottom topography) for the 'Fisheries Charts' around the Island. With the information extracted from the bathymetric charts, of the studies carried out using R/V Samudra Maru the bathymetric maps of the continental shelf from Mannar upto Great Basses are completed. Based on the bathymetric maps the bottom topographic maps are to be prepared. This work is very badly hampered due to the short of staff. No progress was made in this work during the last few months.

3.7. The Ecological Survey of the Muthurajawela Marsh

This study was carried out as a contract for the G.C.E.C. during 1990 and 1991. The tides, currents, salinity, suspended matter were measured. A comprehensive report on the following topics was prepared and submitted to G.C.E.C.

- (a) General Water Balance
- (b) Salinity Distribution

4. SEMINARS/WORKSHOPS/TRAINING'S

- 4.1 Dr. N.P. Wijayananda- completed his ph.D at the Imperial college London and come in May 1991
- 4.2 Mr. K.S. Guruge attended a training programme on Semi Enclosed Seas at ICTP in Italy and a training course in handling physical oceanography equipments in Sweden.
- 4.3 Dr. Gamini Ranatunge attended a training programme on Marine Geophysics in China.
- 4.4 Officers of this Division participated in the annual sessions of the Geological Society of Sri Lanka held in peradeniya in January 1990
- 4.5 Dr. N.P. Wijayananda participated the semiar held in Colombo organized by ESCAP.
- 4.6 Dr. N.P. Wijeyananda attended the Seventh IOMAC expert meeting held at BMICH in July 1991.

5. INFRASTRUCTURE

The Division Office is moved to new premises during this year. The computer room and the dry lab were air conditioned. The Oceanography lab was rubber tiles and the contract to partition the wet lab was awarded. Money is allocated to complete the repository. During this year new vehicle was allocated for the oceanography Division. This has facilitate our work very much.

6. LECTURES/EXTENSION AND OTHER ACTIVITIES

- 6.1. Dr. N.P. Wijayananda participated the National Atlas Committe meetings and contributed for the National Atlas of Sri Lanka.
- 6.2. Dr. N.P. Wijayananda attended the International Union of Geological Sciences of Sri Lanka National Committee meetings. He has been appointed as the Secretary of the National Commitee.
- 6.3. Dr. Gamini Ranatunge is nominated for the Committee of the National Sand Study. This is being organized by the Central Environmental Authority.
- 6.4. Dr. Gamini Ranatunge participated the meetings organized by UNDP in studying the progress of the projects funded by them.
- 6.5. Mr. Arulanandan made useful contributions in deciding the fishing grounds for Luna Fishing Corporation.
- 6.6. The officers of this Division attended and made useful contributions for the Gam Udawa Exhibitions and Ministry Mobile Services.

- 6.7. Presentations, on the studies carry out by the Division were made by Dr. N.P.Wijeyananda to the following visitors to NARA.
- 6.7.1. Mr. R.N. Bary, a British Consultant, who is preparing a report to design a dredger to be given to our Government under a British Government Aid Programme.
- 6.7.2 Mr. E. Allersoma and M.C.L.M. Van Mierlo from Delft Hydraulics, Netherlands visited us with the officers of the Coast Conservation Dept.
- 6.8 A lengthy paper article on the activities of the Division is published in "Vidusara" on 16th September, 1991.

7. CONSTRAINTS

- 7.1 The major constraint we faced during 1991 was the lack of research staff. During this year our Director and a research officer left NARA. One officer is selected to go for higher studies. Out of six Research Officers now we are left only with three.
- 7.2. Delay of the repairs for the Research Vessel Samudra Maru has hampered all our work in the sea. No progress in the UNDP Project work was possible due to the unavailability of the Research Vessel.

NATIONAL HYDROGRAPHIC OFFICE

1. The National Hydrographic Office (NHO) of the national Aquatic Research Agency (NARA) was established on 13th March 1984 jointly with the Sri Lanka Navy and the Survey Department. The NHO is managed by a Directorate of three, consisting of the Chairman, NARA the Commander of the Navy of his nominee and the Surveyor General or his nominee,

The main objectives of the NHO are to carry out detailed Hydrographic survey inland water bodies and inshore, nearshore and offshore national ocean space upto the outer limit of the Exclusive Economic Zone of Sri Lanka and the production of navigation charts and other documents embodying the results of these surveys.

The main activities of the NHO are to produce the following:

- (a) Navigation Charts of Sri Lanka waters from the territorial baseline to the outer limit of the Exclusive Economic Zone
- (b) Tide Table of National Waters
- (c) Co-tidal charts of National Waters
- (d) Preparation and issue of notices to mariners
- (e) Continuous updating of the above documents

2.0. PERSONNEL

The Staff of the NHO in 1991 was follows:

- (a) Director / NHO Mr. R.De. S.S. Ameresekere B.Sc (Ceylon) M.Eng. Fred/
Canada)
- (b) Chief Land Surveyor Mr. Wimal Kumarasinghe - Professional Exam Advanced
surveying (cambridge Univ/UK)
- (c) Hydrographic Surveyor Mr. B.H.B. Nihal Silva - Diploma in Surveying Levelling
- (d) Charge Surveyours Mr. S.W.S. Weerasinghe -B.Sc. Diploma in programming.

Mr. S. Withana -B.Sc., Prof. Exam I Computing parts I,II & iii
Australian Computer Society

Mr. M.A. Ariyawansa B.Sc. Post Graduate Diploma in Statistics.
- (e) Land Surveyors Mr. A.W. Gunasekera Diploma in Surveying & Levelling
(Adv.Level),(on secondment from Survey Dept.)

- Mr. P.N. Kodikara Diploma in Surveying & Levelling (Adv.Level), (on secondment from Survey Dept.)
- Mr. H.H. M.N. Weerakumara Diploma in Surveying & Levelling
- (f) Survey Recorders
- Mr. A.P. Thilakaratne (on secondment from Sri Lanka Navy, upto 29th May 1991)
- Mr. K.A. Ranasinghe (on secondment from Sri Lanka Navy, from 4th June 1991)
- Mr. A.W.M. Thilakasir (on secondment from Sri Lanka Navy upto 18th Sept.1991)
- Mr. R.D.M. Dharmadasa, (on secondment from Sri Lanka Navy from 19th Sept.1991)
- (g) Draughtsmen
- Mr. P.B. Ratnapala (Surveyor General's Licence for Authorized Draughtman)
- Mr. W.A. Wilfred (surveyor General's Licence for Authorized D'man)
- (h) Stenographer/Typist
- Mrs. M.D.C. Jayanthi -Certificate Course in Word Perfect of the IBM
- (I) Consultant Cartographer
- Mr. Walter Gunaratne, Diploma in Cartography (City & Guilds of London)
- (j) Project Personnel
- Mr. Michael Gruber- M.Sc. Dipl. Ing. (Geodesy) Consultant Hydrographer and Team Leader
- Miss U. Bielke -Dip. Ing. (Geodesy & Hydrography) Short Term Expert in Hydrography (from 28th Sept.1991)
- Mr. Herman Nuffer .Dipl. Ing.(Electronics) Short Term Expert in Electronics (from 18th Dec.1991)

3.0. CHANGE OF PERSONNEL, INCLUDING PROMOTIONS, CONFIRMATIONS, ETC, AND TRAINING COURSES FOLLOWED (LOCALLY)

- (a) Mr. S.W.S. Weerasinghe, Charge Surveyor was granted two years no-pay leave to work abroad.
- (b) Mr. S. Withana followed a course in Computing (Parts I,II & III) of the Australian Computer Society.

4.0 SEMINARS, SYMPOSIA AND WORKSHOPS ATTENDED

4.1 Seminar on Causes of Coastal Erosion

Messrs. R.de S.S. Ameresekere, Director/NHO Mr. Wimal Kumarasinghe, Chief Land Surveyor and Mr.H.M. Gruber, Consultant Hydrographer, NARA/GTZ, attended the seminar "Causes of Coastal Erosion" held in Colombo on 9th and 10th February 1991 organized by the Coast Conservation Department/GTZ Project.

4.2 Course in Maritime Boundary Delimitation

Mr.M.A. Ariyawansa, Charge Surveyor, followed a Course in Maritime Boundary Delimitation at the University of Toronto, Canada, sponsored by the International Centre for Ocean Development (ICOD). The course commenced on 13th May 1991 and ended on 29th June 1991

4.3 Meetings of the Board of Directors of NHO

During the period under review 09 meetings of the Board of Directors of NHO were held.

The following comprised the Board of Directors :

Mr. M.R.P. Molligoda, Chairman/NARA and Chairman, Board of Directors of NHO. were held.

Mr. Elmore Perera, Member (upto 24th Sept.1991)

Mr. T. Somasekaram, Member (from 29th Oct.1991)

Commodore C.A.M. Jayamaha, Member (upto 6th Aug.1991)

Capt.A.H.M.Razeek, Member (from 3rd Sept. to 24th Sept.1991)

Capt D.W.K. Sandagiri, Member (from 29th Oct.1991)

4.4 Meetings of the Inter-Ministerial Committee on Wrecks

During the period under review three meetings of the Inter-Ministerial Committee on Wrecks were held at NARA under the Chairmanship of Mr.. Molligoda, Chairman/NARA

5.0 VISITS TO NHO

5.1 Education Tour of the 26th Intake Officer Cadets of the Sri Lanka.

The 26th Intake Officer Cadets, consisting of 3 Senior Officers and 12 Officer cadets of the Sri Lanka Navy visited NARA and NHO on an Educational Tour on 20th September 1991 and were taken around the various divisions of NARA..

6.0. TRAINING OF OFFICERS FROM OUTSIDE DEPARTMENTS

6.1. Mr. G.D.S.K. Gunaratne, Ass.Suptd. of Surveys of the Survey Dept, who has been selected to follow a M.Sc. course in Hydrography at the University of New, Canada, Underwent a two weeks orientation programme in NHO, before leaving for Canada.

7.0. REPORT OF HYDROGRAPHIC SURVEYS DONE IN 1991 UNDER CONTRACT

7.1. Coastal Engineering Investigations at Bentota to Ambalangoda Coastal Stretch

This survey was undertaken by NHO under contract for the Coast Conservation Department/ Project on 14th March 1990 for a contract sum of Rs.318,306.00. The survey was completed in 1990 and the final plans and documents were handed over to the project Manager on 20th December 1990.

The contract for the optional work in the Induruwa Stretch of the same project was also awarded to NHO by the CCD/GTZ project on 16th April 1990 for a contract sum of Rs.412,733.00. The optional work covered a repetition of the beach profiling in the Induruwa Stretch (Badungala to Godagala, every month over a period of one year (a total of 671 profiles) from May 1990, and a repetition of sounding prior to the onset of the South West Monsoon in 1991.

Eight monitorings were completed in 1990 and the balance three monitorings together with the repetition of soundings prior to the onset of the South West Monsoon were completed during the first quarter of 1991.

The report on the survey, copies of plans and other documents connected with the surveys were handed over to the CCD/GTZ project Manager on 6th June 1991.

7.2. Coastal Engineering Investigations at Coastal Stretch for the Coast Conservation Department

This survey was undertaken by NARA/NHO under contract for the Coast conservation Dept. on 11th April 1990 for a contract sum of Rs.210,637.50. The shore control and shore front detail survey, levelling, monumenting of control points, beach profiling and bathymetry were completed during the latter part of 1990.

The office work and preparation of final plans and reports were completed during January and February 1991. Analysis of 50 beach samples taken by the Oceanography Division was also completed during January, 1991.

The final plans and reports were handed over to the Coast Conservation Department on 15th February 1991.

7.3. Coastal Engineering Investigations at Ambakandawila/Thodurwawa Coastal Stretch for the Coast Conservation Department

This survey work was undertaken by NARA/NHO under contract for the Coast conservation Dept. on 1st June 1990 for a contract sum of Rs.205,375.00. The survey

commenced during the 3rd quarter of 1990 and about 50% of the shore control and shore front detail survey was completed and 31 beach profile lines were set out.

The work was continued during the first quarter of 1991 and the final plans and report were handed over to the Coast Conservation Dept. on 5th March 1991

7.4. Hydrographic survey at Puranawella

This survey was undertaken by NARA on contract basis for the Ministry of Fisheries and Aquatic Resources.

The objective of the survey was to determine the environmental aspects of the existing breakwater. The NHO carried out and completed the shore control survey, beach profiling and general bathymetry in the coastal stretch from Matara to Gandara, in collaboration with the Oceanography Division. The NHO completed the tasks assigned to it and copies of the final plans and the report were handed over to the oceanography Division on 24th May 1991.

7.5. Follow-up Survey at Puranawella

A follow-up bathymetric survey was carried out by NHO at Puranawella Fishery Harbour in July 1991, to be representative of the South West Monsoon. In addition the NHO assisted the oceanography Division to carry out current measurements in the inner harbour and the outer harbour and to collect beach and bottom samples.

Copies of the final plans and the report were handed over to Oceanography Division on 26th September 1991.

7.6. Survey for Reclaiming of land from the sea at Mutwal

This work was undertaken by NHO on contract basis for Ceylon Grain Elevators Ltd., for a sum of Rs.80,000.00.

The objective of the survey was to determine the quantity of sand required for filling an area earmarked for development.

The survey work was completed on 9th September 1991 and the final plans and reports were handed over to the client on 30th September

7.7. Hydrographic Survey of Cross Sections of Rivers falling into Bolgoda Lake

This survey work was undertaken by NHO on contract basis for the Sri Lanka Land Reclamation and Development Corporation, for a sum of Rs.170,000.00.

The work involved the observation of 14 cross sections of rivers falling into the Bolgoda lake.

The field work was completed on 20th September 1991. The plan work, volume calculations and other office routines were attended to in October 1991 and final plans and reports were handed over to the client on 15th October 1991.

7.8. Survey of Land for NARA Research Station at Kapparatota, Weligama

This survey was undertaken by Ho to expedite the acquisition survey assigned to the survey Department and was carried out by the land surveyors in NHO under the supervision of the survey Department. The area involved covered an area of 1.03 hectares and the preparation of the plan was completed in June 1991. The plan has to be certified and passed by the Supdt. of Surveys of Matara Division to finalize the acquisition. This will be taken up in January 1992 as priority was given to the surveys of lagoons in the Hambantota District.

7.9. Survey of Lagoons in the Hambantota District

This survey was undertaken by NHO for the Marine Biology Research Division of NARA in connection with the study of the development potential of six lagoons in Hambantota District, Mawella, Rekawa, Kalametiya, Chitragala Malala and Ambiligala, on a project funded by NORAD. A primary field investigation was carried out in November 1991 prior to the commencement of the hydrographic survey.

The Hydrographic survey commenced with work at Malala lagoon on 13th December 1991 and will be continued during January 1992.

8.0. MISCELLANEOUS WORK

The following miscellaneous works were completed during 1991.

- 8.1. Preparation of sketches for a report on the Muthurajawela Ecological Survey.
- 8.2. Plan of Kelani Ganga for a report by Oceanography Division.
- 8.3. Drafting of a grid showing the geographical co-ordinates covering the Exclusive Economic Zone of Sri Lanka for use in the establishment of a Fisheries Search and Rescue Service in Sri Lanka for the Ministry of Fisheries & Aquatic Resources.
- 8.4. four posters, in draft form, showing activities of NHO, for the Gam Udawa Exhibition.
- 8.5. Lettering on NARA Visitors Cards and NARA Identity Cards
- 8.6. Drafting of maps for the NARA handbook.
- 8.7. Drafting of plans showing proposed additions and improvements to buildings of NHO.
- 8.8. Drafting of 5 maps for Marine Biology Division showing the Exclusive Economic Zones of Sri Lanka, India and Maldives for the use of fishermen to determine their position at sea with reference to the Maritime Boundaries of the 3 countries.
- 8.9. Design of a cover for a booklet for Marine Biology Division.
- 8.10. Drafting of a map of Sri Lanka showing the 1:100,000 scale sheet layout.
- 8.11. Over and above the foregoing miscellaneous work, assistance and support for NARA Units in the making of maps, charts, diagrams and sketches and pursuing survey related inquiries with the Survey Dept. and other agencies were undertaken during the period under review.

9.0. NARA/GTZ PROJECT OF TECHNICAL CO-OPERATION BETWEEN SRI LANKA AND GERMANY FOR STRENGTHENING OF THE NATIONAL HYDROGRAPHIC OFFICE

The first phase of this project commenced in September 1988 and was phased out till September 1990

A detailed plan of operation for phase II was drawn up at a subsequent Workshop conducted in May 1990, covering a period of 3 years from October 1990.

Negotiations to go into phase II were completed in 1991 and the Agreement signed on 19th November 1991.

The German commitment in phase II is estimated to be DM 4.5 million. This will be in the form of expertise (long & short term), equipment, survey boat for near-shore and inland surveys, a fully equipped survey vessel for offshore surveys, a technical library and training of local staff.

The survey boat and equipment for the Electronic Workshop arrived in Sri Lanka in December 1991 and are awaiting clearance.

To meet the requirements of the Man Power Development plan of NHO applications were called for in 1991 to fill the following vacancies:

Electronic Engineer, Store-Keeper, Accountant, Senior Hydrographic Surveyor, Systems Analyst/Programmer, Trainee Hydrographic Surveyors, Cartographer and Electronic Trainee. An interview was held to recruit the Electronic Engineer and a selection made for the appointment to be given in January 1992.

Miss U. Bielke, shore term German expert hydrographer and Mr. Herman Nuffer, short term expert in Electronics arrived in 1991.

INSTITUTE OF POST HARVEST TECHNOLOGY DIVISION.

1. STAFF

Research officer (permanent)	05
Research Officer(project)	02
Research Officer(trainee)	01
Research Assistant	04
Laboratory Attendant	01
Labourers	06
Typist	01

2. RECRUITMENTS

No recruitment in 1991.

3. RESIGNATIONS

Mr. M.F. Mohideen, a Research Officer (project) attached to the microbiology laboratory resigned in September.

4. LEAVE OF ABSENCE

Mrs. V. Jayaweera(Research Officer) continued her post graduate studies in UK during the year. Mr.T.S.G. Fonseka (Research Officer) left for UK in May to start second phase of his post graduate study. Dr. S. Subasinghe, Director/IPHT left the institute on no pay leave for a period of ten months beginning in June. Dr. S.Y. Namaratne was appointed to act as the OIC of the division in the absence of the director.

5. TRANSFERS

None

6. POST GRADUATE STUDIES

Mr. T.S.G. Fonseka and Mrs. V. Jayaweera are continuing their studies for ph.D in UK. Miss C.V. Liyanage (trainee Research Officer) is following a M.Sc course in Food Science at Sri Jayawardenapura university.

7. PROMOTIONS

None during the year under review.

8. TRAININGS SEMINARS AND WORKSHOPS

- 8.1 Miss B.D.Y. Amarasinghe attended a workshop on Agricultural Research Management held at University of Peradeniya from 5th to 21st February, 1991.
- 8.2 Dr. S.Y Namaratne participated in a consultation meeting on Cleaner Fishery harbours held in penang, Malaysia from 9-11 Dec.1991.

9. PROGRESS OF PROJECTS

9.1 DNA plasmid profiling of pathogenic bacteria in shrimp

This study was undertaken to identify various forms of pathogenic bacteria found in Sri Lanka shrimp and the possible sources of contamination. Nearly 200 samples of shrimp, farm water and feed were tested for pathogenic bacteria and the isolates were characterized biochemically. The isolates were taken to UK under freeze dried condition for DNA plasmid profiling. The results of the study will be published in due course.

9.2. Accelerated fish Sauce production

A new method for the preparation of fish sauce from amblyaster sirm was tried using pineapple

extract with a view to reducing the fermentation period. Experimental trials on the production of the sauce and its shelf life were conducted. The product prepared by the accelerated method was found to be satisfactory for human consumption even after 3 months of storage under ambient temperature. Organoleptic studies indicated that the quality of new sauce was better than that of fish sauce imported China. An information leaflet was prepared to disseminate production methodology.

9.3. Extraction of Agar and alginic acid from seaweeds

Appropriate methods were developed for extraction of agar from *Gracilaria* and alginic acid from *Saragassum* in laboratory scale. Crude seaweed products were further purified using coconut charcoal and filtration technique. Quality of the products was tested against those available in the market.

9.4 Experimental trials on gutting skipjack tuna at sea (funded by BOBP/ODA)

Experimental trials were conducted to see whether gutting skipjack tuna on board fishing vessels improves the quality of the fish at landing. Four gutting trials were conducted and gutted/ungutted fish were examined organoleptically. Based on the results of the study, it was concluded that gutting at sea did not improve quality of fish at landing due to limited space and lack of facilities in the boats operating in Sri Lanka.

9.5. Ice meltage trials in insulated fish/ice boxes (BOBP/ODA)

As traditional ice storage methods are not satisfactory a proposal was put forward to introduce insulated boxes for storage of *v.e* and/or fish in ice. Two types of boxes were designed to fit bicycle carrier and bicycle trailer respectively and a third, to hold ice blocks. These boxes are being tested against traditional ice storage boxes/methods.

9.6. Cleaner Fishery Harbour Project (funded by BOBP)

A short term project was conducted under the directive of the Ministry of Fisheries and Aquatic Resources to evaluate the present conditions of three selected fishery harbours- Tanalle, Galle and Beruwela in regard to the effect of harbour pollution on fish quality. Three harbours were visited in July and August to collect relevant information. Photographs, slides and video highlighting the present status of the harbours were also taken. The findings were submitted to BOBP/NARA in the form of a report. A presentation was made at a consultation meeting convened in this regard. (This project was conducted jointly with ESU.)

9.7. Study of Quality and Health Hazard implications of fish sold in retail markets of Colombo.

The objective of the study was to examine the extent of bacterial contamination of fish sold in retail markets of Colombo. More than fifty fish and water samples collected from six different markets were subjected to microbiological analysis. The study indicated that although most of the fish samples tested were of fair quality they were contaminated with pathogenic organisms like *Faecal coliform*, *E. coli* and *Vibrio sp.*

9.8. Storage trials of yellow fin tuna in dry ice/ice mixture

A study was carried out to compare keeping quality of yellow fin tuna in dry ice/ice mixture as against ice alone. Fish quality was monitored by measuring chemical and microbiological parameters. Findings were documented in a report submitted to NARA.

9.9. Study on spoilage patterns of *sardinella longiceps*

Keeping quality of *Sardinella longiceps* ('Salaya') was examined at four different temperatures by monitoring changes in chemical and microbiological parameters as well as conducting organoleptic assessment. The temperatures employed were 28°C (ambient), 7°C (chilling), 0°C (icing) and -17°C (freezing). A report was prepared detailing the findings of the study.

10. EXTENSION WORK TEST SERVICES AND DISSEMINATION OF INFORMATION

10.1 Issued sixteen test reports on fish quality

10.2 Conducted training programmes on fishery product development at Tangalle, Mundalama, Chilaw and Kalamatiya. Trainings were given on preparation of 'Jaadi', 'Ambul Thiyal', fish meal, 'Rasa Jeewa' and low cost fish feeds. More than 300 women of the localities were trained.

10.3. A booklet was prepared on 'Fish handling and preservation' to be distributed among fishermen.

10.4 One week training programme on fish handling, processing and preservation was conducted for the fisheries inspectors of the Ministry in collaboration with the extension and training division of the Ministry.

10.5. Fishery products and posters highlighting activities of the division were prepared and displayed at

- (a) Gam Udawa exhibition held in Kamburupitiya
- (b) National Museum
- (c) Fisheries Pension Scheme day held in Negombo

10.6. Lectures pertaining to post harvest fishery technology were given to

- (a) Participants of a fish quality control seminar conducted by SLSI
- (b) Final year zoology special students of the University of Kelaniya.
- (c) Students following a deck hand course in Sri Lanka Fisheries Training Institute.

10.7 Consultancy service was provided to Sri Lanka Prawn farmers association for preparation of value added products from fish and prawn to be exhibited in a trade fair in Germany. More than 450 packets of value added products were prepared for them.

10.8. Assistance and advices were given to the Ministry of Education to revise the section of year 10 and 11 teachers guide pertaining to fishery industry.

10.9 A fish processing factory was inspected on request of the client and a report on hygienic condition of the factory was issued.

10.10. Two reports on prawn waste utilization and production of 'rasa jeewa' were submitted to the Hon. State Minister on request.

10.11. Participated in the Ministry mobile service held at Kalutara Gnanodaya Vidyalaya.

10.12. More than 200 students of schools and training colleges visited the division. They were given a understanding on the activities of the division.

11. REPORTS AND PUBLICATIONS

11.1 S.Y. Namaratne and H.Dassanayake, Present conditions of three selected fishery harbours of Sri Lanka - Tangalle, Galle and Beruwela, submitted to BOBP in Oct. 1991.

11.2. W.M.A.K. Wanisekara, Spoilage patterns of *Sardinella longiceps* stored at four different temperatures, dissertation submitted to University of Peradeniya (Supervisor - Dr. S.Y. Namaratne).

ENVIRONMENTAL STUDY UNIT

1. NARA/GCEC ENVIRONMENTAL MONITORING PROGRAMME

1.1 Katunayake Export Processing Zone

Forty four inspection visits were made to the KEPZ and effluent samples were collected for field and laboratory analysis. Reports with analytical results indicating necessary recommendations were sent to the GCEC for follow up action.

1.2 Biyagama Export Processing Zone

Forty inspection visits were made to the BEPZ and collected effluent samples were analysed for 14 physicochemical parameters. Analytical reports with comments and suggestions were sent to the GCEC.

1.3. Industries Located Outside Export Processing Zones - Tan Lanka Ltd., Hendala.

The Lannary which was located close to the mouth of Kelani river was inspected regularly for the purpose of preventing the discharge of unsatisfactory effluents. Sample were collected from the treatment plant outlet as well as from the Kelani river which receives effluents. Analytical reports indicating suitable measures were sent to the factory management for follow up actions

2. RIVER INPUTS OF POLLUTANTS TO COASTAL SYSTEMS(KELANI RIVER & KELANI GANGA)

SAREC Project 3

Kelani river and kalluganga were select for the purpose of standing impacts of agro-chemical pollution on fish and aquatic organisms under the Swedish Agency for Research Cooperation with Developing Countries (SAREC) programme. The ESU of NARA received Rs.4,20,000/- for the year 1991 and study commenced in Oct. 1991. A member of the project staff has trained in Sweden on pesticide residues analysis. Laboratory facilities were strengthened and necessary equipment were. purchased for the purpose of carrying out the project.

3. NATIONAL RESOURCES & ENVIRONMENTAL POLICY PROJECT - USAID

The Project proposals forwarded by the NARA were selected for funding by the United States Agency for International Development (USID) through the Ministry of Environment and Parliamentary Affairs.

The area selected for the study under the special area management was Koggala Lagoon. A list of necessary equipment to be procured for this study was submitted for funding.

4. POLLUTION & NUTRIENT STATUS OF HAMILTAN CANAL

This study was initiated for the purpose of establishing baseline data on water quality of the canal and studying the possibility of pollutant transport along the canal from Kelani river to Negombo estuary.

5 EMERGENCY STUDIES

5.1 Environmental Task Force to Study & Report Possible Impact of Gulf War

A committee appointed by his Excellency the president to study the probable adverse impact of the Gulf war on our environment.

Dr. Padmini de Alwis participated in the study and a brief report was prepared in the context of marine resources and fisheries in collaboration with the Ministry of Fisheries & Aquatic Resources and submitted to the environmental task force.

5.2. Fish Mortality Studies

5.2 I Kalamatiyakulam Reservoir - Trincomalee

Investigations were conducted at the request of Sir Lanka Navy on fish mortality in a reservoir which supplied drinking water to Trincomalee town.

Analytical results carried out the possibility of chemical pollution of water was the primary cause for the mortality. Fish samples studies showed the symptoms of Epizootic Ulcerative Fish Syndrome. A report indicating necessary follow up action was submitted to the relevant authorities

5.2 ii Mass Fish Mortality of Tisa Wewa - Anuradapura.

Preliminary investigations were carried out on the mass fish mortality report from Tisa wewa on the request of CEA. According to the observations made fish mortality was taken place only in Tisa wewa but also in Nuwara wewa.

Results indicated that dissolved oxygen depletion associated with high temperature and heavy rainfall resulted in fish mortalities.

5.3. Water Quality Problems Associated with Ornamental Fishery Project Wennappuwa

Mortality of fingerlings was reported to the LSU by the owner of the project. Study revealed that the poor quality of the ground water used was the cause for the problem. Necessary instructions were given and the problem got corrected.

5.4. Drinking Water Problems - Kalpitiya Navy Base

On the request of the Add. Secretary of the Defence Ministry quality of the drinking water source of Navy base at Kalpitiya was monitored. A Report indicating necessary advise to improve the water quality was sent to the Ministry of Defence.

5.5. Eutrophication Problems at Kotmale Reservoir

Preliminary investigations were done in , 1991 on the eutrophication problems at Kotmale reservoir. *Microcystis* sp. dominated algal bloom was observed and the analytical results showed that the feeder streams of reservoir contained higher nutrient levels.

5.6. Eutrophication Problems at Castlereagh Reservoir

Preliminary investigations were done in Dec. 1991 on the reported eutrophication problems at the Castlereagh reservoir which in one of the source for hydropower generation.

The algal counts and nutrient levels were found to be higher in the reservoir.

6. Consultancy Works

6.1. NARA/BOBP Cleaner Fishery Harbour Project

On the request of the Ministry of Fisheries and Aquatic Resources a short term study was carried out on the pollutions and post harvest handling aspects of the three selected fishery harbours. (Tangalla, Galle, Bereuwala). Present problems and mitigatory measures.

A workshop was organised by the BOBP for the purpose of discussing the problems in fishery harbour and getting funds from donor organist, such as IHO, FAO etc. to mitigate the situation. ESU & IPHT of NARA participated in the consultation held in Malaysia in Dec.1991.

6.2. Intergrated Roral Development Project - under Foster Parant programme Badulla

On the request made by the plan international who conducted research studies on the rural development, three reservoirs were studied by ESU/NARA to determine the production capacities of the reservoirs. All three reservoirs were found to be seasonal and reports with comments & recommendations were sent to the organisation.

6.3. Inspection of Waste Water Treatment Plant at Air Lanka Catering Services Ltd. - Katunayake

Investigated the efficiency of the treatment plant on the request of the company manager. Reports with recommendations were sent to the company for follow up action.

6.4. Drinking Water Problem at CFC

On the request of Chairman, Ceylon Fisheries Corporation, quality of the drinking water provided to the CFC was monitored. A report indicating suitable measures was to the Chairman, CFC.

7. ACTIVITIES RELATED TO ENVIRONMENTAL AND ADVISORY COMMITTEES.

7.1. Monitoring Committee on Sea Outfall Investigation of Koggala Export Processing Zone

Dr. Padmini de Alwis attended the committee meetings and contributions were made on the way of designing the ocean outfall.

7.2. Steering Committee Meeting for USAID Project

Participated in the monthly review meeting held at Ministry of Environmental and Parliamentary Affairs.

7.3. Rehabilitation of Kirinda Fishery Harbour

Participated in the meeting held at the Ministry of Fishery and Aquatic Resources.

7.4. Monitoring of Development Activities along the Kelani River - CEA

Participated in the above committee meeting and contribution was made to prepare a draft project proposal.

7.5. Pollution Control Guidelines for textile & Metal Plating Industries

Attended the above committee meeting and contributions were made to prepare guidelines.

7.6. Muthurajawela Master Plan

Attended the meeting on Muthurajawela Master plan and comments & suggestions were made on the environmental and conservation aspects.

7.7. Environmental core Course for the University Education

Participated for the meetings for the preparation of a number of chapters regarding the inland water resources & environmental aspects.

7.8. Draft Fisheries Act.

Comments regarding the regulation of export and import, conservation and aquaculture aspects which should be included in the act were submitted to the DG/NARA.

Dr. Padmini de Alwis participated in the meetings on the above

7.9. Preparation of the Draft Declaration - Sixth SARC Summit, Colombo 1991

A member of the ESU was selected to a committee appointed by the Ministry of Foreign Affairs in order to look into environmental matters. The NARA representative took the responsibility of preparing a draft addressing pollution aspects of the environmental sector.

8. SEMINARS, WORKSHOPS AND TRAININGS

8.1.Seminar on the Beira Lake

Dr. Padmini de Alwis delivered a lecture on factors affecting beira water quality and fish in the lake. At a seminar organised by the Toxicological Society of Sri Lanka held at SLAAS auditorium in Jan. 1991.

8.2.Seminar on National Conservation Strategies (NCS)

Dr. Padmini de Alwis de Alwis participated in the seminar on the Draft action plan to implement the NCS and shared her knowledge to prepare an action plan.

8.3. SEANAL Emergency Response & Decision Support for Oil & Hazardous Chemicals at Sea - Netherlands

Dr.Padmini de Alwis participated in the above training held in Sep.1991.

8.4.Training on Pesticide Analysis - Sweden

Mr.U.S.AbeysiriGunawardana participated in a training course on pesticide residues analysis under the SAREC project 3.

8.5.Cleaner Fishery Harbours in BOBP Region

Mr. Hemantha Dassanayake attended the work shop on the above project organised by BOBP and presented the project report jointly conducted with Dr. S.Y. Namaratna of IPHT, NARA Which was held in Malaysia.

8.6Mr.Hemantha Dassanayake attended a workshop on "Environmental and Economic Development, is there an Eco - friendly path to progress" held in 14th Dec. at IFS, Kandy.

LIBRARY AND INFORMATION DIVISION

1. INTRODUCTION

The NARA Library contains literature in all fields of aquatic sciences to meet the information needs of policy makers, scientists, engineers, industrialists and the vast majority of people actively engaged in fisheries. The present collection comprises of more than 2000 books, 440 periodical titles, FAO reports (over 1000), a large collection of reprints, technical reports, maps and admiralty charts, standards, microfiche and slides.

2. STAFF

Information Officer 1

Assistant Librarians 2

Office Aid 1

3. PERIODICALS

During 1991 NARA subscribed for thirteen foreign journals, six local journals. The Agricultural, Research Project (ARP) provided us with another fourteen journals. Given below the periodical titles we received during 1991.

3.1. Subscribed for 1991 - Foreign

1. Asian Fisheries Science
2. Aquatic Botany
3. Current Content: Agriculture, Biology & Environmental Science
4. Environment International
5. Estuarine Coastal and shelf science
6. J.of Aquaculture in the Tropics
7. J. of Fish Biology
8. J. of Fish Diseases
9. J. of Food Science
10. Mahasagar
11. Marine Pollution Bulletin
12. Tropical Fish Hobbyist
13. Marine Geology

3.2. Local Periodicals

1. **J. of the Geological Society of Sri Lanka**
2. **Loris**
3. **Marge Journal**
4. **Spolia Zeylonica**
5. **Annual Report - Bank of Ceylon**
6. **Discover**

3.3 Periodicals from ARP (Agricultural Research Project)

Aquaculture
Aquaculture & Fisheries Management
Asian Food Journal
Asian Fisheries Science
Fish Farming International
Fisheries Research
Fishery Technology
Fishing News International
Food Science & Technology Abstract
International J. of Food Science & Technology
J. of crustacean Biology
Seafood International
Seafood processing & Packaging International
World Fishing

3.4. Periodicals from free of charge

Abstracts of science & Technology in Japan: Agriculture, Forestry & Fisheries
Aquaculture News - Institute of Agriculture, University of Sterling, Scotland
The ASTINFO Newsletter
Bulletin of the faculty of Fisheries Hokkaido University
CSIRO Space Industry News
Environmental News - Central Environmental Authority
ESA Bulletin
ESA Journal
FAO : Freshwater & Aquaculture contents tables

FAO ; Marine Science contents tables
 Fishery Journal
 Geological Society of Sri Lanka Newsletter
 IDRC Reports
 Law of the Sea Bulletin
 Maritime
 NAGA - The ICLARM Quarterly
 Natural Resource Institute Newsletter
 Oceanus
 Records of the Australian Museum
 Sea Grant Abstract
 Sri Lanka Investment news
 UNCTAD Bulletin
 UNESCO - Ims Newsletter
 UNESCO Technical papers in Marine Science
 UNIDO Newsletter

3.5. Aquatic Science & Fisheries Abstract CD-ROM

During this year we subscribed for the above literature storage package 1988 - 1991

HASSELGREN, L, Sarec Report

The Philippines recommends for mussel and oysters 1997.

BOSSI, Richard, mangroves of the wider caribbean toward sustainable management.

SUERDRUP, H.U., The Oceanos

WILLIAM, S, An introduction to physical oceanography

Meteorology for mariners

BERRIDGE, M.J., Cellular Oscilltors

JAGER, J., Climate Change : Science, impacts and policy

The directory of U.S. Marine CD-ROMS

Meterology and Oceanography of the Middleeast

Mariculture research and development in Japan

ICOD, Building partnerships in Ocean development

SMITH, T.E., Science Review 1988 - 1989

Centre for water research, water research 1989 -1990

WINDOM, Herbert, Gesamp : two decades of accomplishments

IDRC, Community based and traditional fisheries management in Africa

WITHANAGE, Sumudu, Towards local protection of tropical forests

Environmental consequences of deepsea bed mining

International centre for ocean development building partnerships in ocean development.

SORGELOOS, P. Artemia Research and its applications

SORGELOOS, P. Artemia Research and its applications Vol. 1.

SORGELOOS, P. Artemia Research and its applications Vol. 2

SORGELOOS, P. Artemia Research and its applications Vol. 3.

4. BOOKS

During 1991 we had the following fifty two books additions to the library.

National Science Council of Sri Lanka, A Survey of Expenditure on research and Experimental Development in Sri Lanka - 1966 -1975.

Liyanage, S., Sri Lanka Science and Technology Indicators.

Gannew Robert, Tropical Fish

Axelrued, H.R., A complete guide to breeding fishes

Pethiyagoda, R., A Complete guide to breeding fishes

Pethiyagoda, R., A complete guide to breeding fishes

Anderson, Charles, Common reef fishes of the Maldives

Anderson, Charles, Common reef fishes of the Maldiva pt.2.

Anderson, R.C., Living reef of the Maldives

Frieh, Bob, Underwater Maldives

IDRC, Use of simple, inexpensive microbial water quality tests

Oceanography 1985 Marselle

Oceanography 1985 Marselle

UNDP, Inter-country prog. management from Asia and the pacific.

National Expert Development Plan 1989-1993.

Information Systems for Promotion and Utilization of Technology

SEAFDEC, Report of the Seminar on fishery and aquaculture information systems in Southeast Asia and the Pacific - July 1989.

IDRC, Community based and traditional fisheries management in Africa

Income and Expenditure Account for the Year ended 31st December 1991

	1990	1991
	13500000.00	
Government Contribution	240066.08	14000000.00
Sundry income (Sch: 11)	462759.34	169040.53
Other Contributions (Sch : 02)	-----	302657.63
	14202825.42	-----
		14471698.16

Recurrent Expenditure
Administrative Expenses

Salaries and Allowances (Sch: 03)	7715916.01	8179527.83
Provision and gratuity	367224.00	597032.00
Employees Provident Fund (Sch: 04)	1041115.75	1102167.76
Overtime	768918.19	1003771.82
Traveling	558723.97	486018.66
Security Charges	624074.06	574826.70
Fees	54154.05	126337.50
Fuel	1234815.81	840538.27
Advertising	118414.00	185575.00
Stationary (Sch: 05)	573946.05	642466.64
Postage	48635.86	40083.55
Entertainment	122495.23	48116.85
Welfare	20508.30	18052.33
Telephone	347735.70	58293.35
Foreign Traveling	70841.10	67582.87
Sundries other service (Sch:06)	181233.15	365742.43
Maintenance of motor vehicles, Buildings, Vessels & Boat equipment ect. (Sch:07)	3791937.85	2102297.11
Uniforms	2380.00	-
Audit fees	50000.00	50000.00
Bank Charges	8908.51	4650.50

472710.22
 75501.80
 95990.24
 462759.34

Consumable (Sch:08)
 Printing
 Provision for bad debts(Sch:09)
 Special projects expenses (Sch:02)
 B.T.T

186408.85
 61475.50
 2669.00
 302657.63
 13099.06

18808939.19

17059391.21

Establishment Expenses

1160578.50
 4643.00
 500.00
 2943534.77

Electricity
 Gas
 Rents and Rates
 Provision for deprecation
 Excess for deprecation
 Adjustment for Previous year

1373322.80
 43329.20
 673090.00
 3056508.17

4109256.67
 22918195.86
 (8715370.44)
 475249.95

 (8240120.49)
 =====

5146250.17
 22205641.38
 (7733943.22)
 (1724142.11)

 (9458085.33)
 =====

M.R.P.Molligoda
 CHAIRMAN

Dr. M.U.Jayasekara
 Director General

NATIONAL AQUATIC RESOURCES & DEVELOPMENT AGENCY

Balance Sheet as at 31st December 1991

	1990	1991
	<u>Contribution Employed</u>	
Balance B/F as per last year Sch: 11 Adjustment		44,601,301.51
Grant for the year	43,125,314.00	
Foreign aid for the year Sch: 12	7,900,000.00	
Other contributions Sch: 13	1,694,699.00	
	121,409.00	
	52,841,422.00	
Excess of expenditure over income	8,240,120.49	9,458,085.33
	<u>44,601,301.51</u>	<u>81,937,037.91</u>

Employment of Contribution

Fixed Assets

Buildings	12929227.34	7068312.14	5860415.20	13326276.71	8361734.87	4964541.84
Machinery	2985516.20	1227340.38	1758175.82	3109643.00	1525892.00	1583751.00
Equipment	9529444.74	3599229.32	5930215.42	9799854.53	4552173.79	5247680.74
Furniture	862737.67	331991.51	530746.16	862737.67	418265.27	444472.40
Library Books and Journals	927363.04	366765.91	560627.13	1402460.99	459505.21	942955.78
Vehicles	245585.33	1147819.65	1307765.68	2496485.33	1393378.18	1103107.15
Main Pond	361376.27	103006.68	258369.59	361376.27	139144.30	222231.97
Auditorium	513801.44	121560.79	392240.65	513801.44	172940.93	340860.51
Other capital projects Sch: 14	4980033.68	-	4980033.68	6239625.01	-	6239625.01
Foreign aided projects Sch: 15	366835.50	-	366835.50	496457.21	-	496457.21
Samudra Maru	21562093.58	-	21562093.58	48499519.16	-	48499519.00
	57474014.79	13966526.38	43507518.41	99108237.81	17023034.55	82085203.26
	<u>57474014.79</u>	<u>13966526.38</u>	<u>43507518.41</u>	<u>99108237.81</u>	<u>17023034.55</u>	<u>82085203.26</u>

Current Assets

398610.29	Stock Sch : 16	727369.14
1454768.97	Debtors Sch : 17	1331811.16
238215.00	Deposit Sch : 18	233715.00
1923708.16	Advanced Sch : 19	1226226.37
1421740.44	Debtors employment Sch :20	1603751.71
3716846.19	Cash and Bank Sch :21	9332473.61

		14455346.99

Current Liabilities

3108995.00	Creditors & Accrued Expenses Sch: 22	4128779.91
3447173.21	Deposits Sch: 23	5937685.67
1503937.74	Privusuibs Sch: 24	2057442.74
	Projects	2479604.02

8060105.95		14603512.34

		(148165.35)

		81937037.91
		=====


M.R.P.Molligoda
CHAIRMAN

Dr. M.U.Jayasekara
DIRECTOR GENERAL

විගණකාධිපති සටහන.

ජාතික ජලජ සම්පත් පර්යේෂණ සහ සංවර්ධන ක්ෂේත්‍රයන්හි 1991 දෙසැම්බර් 31 දිනෙන් අවසන් වර්ෂය සඳහා වූ ගිණුම් 1971 අංක 38 දරණ මුදල් පනතේ 13(1) වගන්තිය සහ සාමාන්‍ය සම්පත් ක්ෂේත්‍රයේ සහ ප්‍රජාතාන්ත්‍රික සමාජවාදී ජනරජයේ අණවිදි ව්‍යවස්ථාවේ 154(1) ව්‍යවස්ථාවේ අඩංගු විධිවිධාන ප්‍රකාර මාගේ විධානය යටතේ විගණනය කරන ලදී.

යොමුකර මුදල් පනතේ 14(2)(සී) වගන්තිය ප්‍රකාර ප්‍රකාශයට පත් කළයුතු මෙම ගිණුම් පිළිබඳ මාගේ නිරීක්ෂණයන් නියෝජිතයන්ගේ සහායකවරයා අමතක ලද සම දින දරණ මාගේ වාර්තාවේ ඇතුළත්ව ඇත.


(එස්.එම්.සබ්‍රි)

විගණකාධිපති.

1993 අප්‍රේල් 29 දින.

කොළඹ 07, විගණකාධිපති දෙපාර්තමේන්තුවේදීය.

NOTE OF THE AUDITOR GENERAL

The accounts of the National Aquatic Resources Research & Development Agency for the year ended December 31, 1991 were audited under my direction in pursuance of provisions in Article 154(1) of the Constitution of the Democratic Socialist Republic of Sri Lanka read in conjunction with Section 13(1) of the Finance Act No.38 of 1971.

My observations on these accounts which should be published in terms of Section 14(2)(c) of the said Finance Act are contained in my report of even date addressed to the Chairman of the Agency.

Sgd. S.M. Sabry
29 April 1993.
Auditor General's Department,
Colombo 07.

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My No. }
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LS/G/NARA/17/91



විගණකාධිපති දෙපාර්තමේන්තුව
නිදහස් වතුරලය, කොළඹ 7, ශ්‍රී ලංකාව
கணக்காய்வாளர் தலைமை அறியத்தி திணைக்களம்
சுதந்திர சதுக்கம், கொழும்பு 7, இலங்கை
AUDITOR-GENERAL'S DEPARTMENT
INDEPENDENCE SQUARE, COLOMBO 7
SRI LANKA (CEYLON)

දිනය/திகதி/Date 29 April 1993

The Chairman,
National Aquatic Resources Research
and Development Agency,

Report of the Auditor General on the Accounts of the
National Aquatic Resources Research and Development
Agency for the year ended December 31, 1991 in terms
of Section 14(2)(c) of the Finance Act, No. 38 of 1971.

The audit of accounts of the National Aquatic Resources
Research and Development Agency for the year ended December 31,
1991 was carried out under my direction in pursuance of
provisions in Article 154(1) of the Constitution of the
Democratic Socialist Republic of Sri Lanka read in conjunction
with Section 13 (1) of the Finance Act No. 38 of 1971. My
observations which I consider should be published with the
annual report of the Agency in terms of Section 14 (2) (c) of the
Finance Act appear in this report. A detailed report in terms of
Section 13(7)(a) of the Finance Act was forwarded to the Chairman
of the Agency on November 24, 1992.

1:2 Scope of Audit

Audit opinion, comments and findings in this report are based
on a review of the financial statements presented to audit and
substantive tests of samples of transactions. The scope and
extent of such review and tests were such as to enable as wide
an audit coverage as possible within the limitations of staff,
other resources and time available to me. Sub-sections (3) and (4)
of Section 13 of the Finance Act give discretionary powers to the
Auditor General to determine the scope and extent of the Audit.

cont'd...2.

2. Accounts

2.1 Opinion

In view of my comments appearing in this report, I am unable to express an opinion on the accounts presented. Major deficiencies observed in this connection are tabulated below:

Deficiency	Reference to Paragraph in the report
-----	-----
i) Accounting Policies	2:5:1
ii) Accounting Deficiencies	2:5:2
iii) Lack of evidence for audit	2:5:3
iv) Non-compliance with Laws, Rules, Regulations, Management Decisions etc.	2:5:4
v) Uncertainties regarding Accounts Receivable and Payable	2:5:5
vi) Unreliability of Financial Statements	3:1
vii) Deficiencies in Systems and Controls	4

cont'd..3.

2:2 Financial Results

According to the accounts, the working of the Agency during the year under review resulted in a deficit of Rs. 7,733,944 as compared with the deficit of Rs. 8,715,370 for the preceding year. The following statement gives a summary of the financial results for the year under review and the preceding year.

	<u>Year ended December 31</u>			
	<u>1 9 9 1</u>		<u>1 9 9 0</u>	
<u>Income</u>	Rs.	Rs.	Rs.	Rs.
Government Contribution	14,000,000		13,500,000	
Sundry income	<u>169,041</u>	14,169,041	<u>240,066</u>	13,740,066
 <u>Expenditure</u>				
Administrative expenses	17,059,393		18,808,939	
Establishment expenses	2,089,742		1,165,722	
Provision for depreciation	<u>3,056,508</u>		<u>2,943,534</u>	
	22,205,643		22,918,195	
Less : Amount recouped from Projects	<u>302,658</u>	<u>21,902,985</u>	<u>462,759</u>	<u>22,455,436</u>
Deficit for the year :		(7,733,944)		(8,715,370)
Accumulated deficit brought forward	(35,975,672)		(27,735,552)	
Less: Prior year adjustments	<u>(1,724,142)</u>	<u>(37,699,814)</u>	<u>475,250</u>	<u>(27,260,302)</u>
Accumulated deficit carried forward		(45,433,758)		(35,975,672)
		=====		=====

cont'd..4.

2:3 Financial Structure

The financial structure of the Agency as at December 31, 1991 compared with that as at December 31, 1990 is given in the following statement.

	<u>As at December 31</u>			
	<u>1991</u>		<u>1990</u>	
	Rs.	Rs.	Rs.	Rs.
<u>Resources</u>				
Government Contribution		60,313,380		47,453,380
Foreign Aid	63,139,782		41,505,960	
Adjustment for Special Dollar Account balance	<u>(8,853,775)</u>	54,286,007	<u>(8,853,775)</u>	32,652,185
Other Contributions		<u>12,771,409</u>		<u>471,409</u>
		127,370,796		80,576,974
Accumulated deficit		<u>(45,433,758)</u>		<u>(35,975,672)</u>
		<u>81,937,038</u>		<u>44,601,302</u>
<u>Utilisation</u>				
Fixed assets at written down value		14,849,603		16,598,556
Vessel "Samudra MAYA"		12,000,000		-
Foreign Aid Projects		48,499,519		21,562,094
Other Projects		6,239,625		4,980,034
Capital Work-in-progress		496,456		366,835
Net Current Assets/(Liabilities)		<u>(148,165)</u>		<u>1,093,783</u>
		81,937,038		44,601,302
		=====		=====

cont'd..5.

2:4 Source and Application of Funds

The following statement shows the source and application of funds of the Agency during the year under review.

	Rs.	Rs.	Rs.
<u>Source</u>			
Government Contribution			12,860,000
Foreign Aid			21,633,822
Other Capital Contribution			<u>12,300,000</u>
			46,793,822
<u>Application</u>			
Deficit for the year		(7,733,944)	
Adjustment for items not involving movement of funds - Depreciation		<u>3,056,508</u>	
		(4,677,436)	
Prior year adjustments		<u>(1,724,142)</u>	
		(6,401,578)	
Addition to fixed assets	(13,307,554)		
Transfer from Capital Works in progress	<u>(129,622)</u>		
		(13,437,176)	
Increase in expenditure on foreign aid projects		(26,937,425)	
Increase in expenditure on other Projects		<u>(1,259,591)</u>	<u>(48,035,770)</u>
Decrease in Working Capital as analysed below:			(1,241,948)

cont'd. b.

	<u>Effect on Working Capital</u>		
	<u>Increase</u>	<u>Decrease</u>	
	Rs.	Rs.	
Stocks	328,759		
Debtors		122,958	
Deposits receivable		4,500	
Advances		697,482	
Staff loans receivable	182,011		
Cash and Bank balances	5,615,628		
Creditors and accrued Expenses		1,019,785	
Deposits payable		2,490,512	
Provisions for employee gratuity		553,505	
Consultancy project		2,479,604	
	<u>6,126,398</u>	<u>7,368,346</u>	(1,241,948)
	=====	=====	=====

2.5 Comments on Accounts

2.5.1 Accounting Policies

The Project expenditure totalling Rs. 54,739,144 as at the end of the year under review had been shown as Fixed Assets, Rs. 48,409,510 under Foreign Aid Projects and Rs. 6,239,625 under other Projects. The corresponding figures at the end of the previous year were Rs. 21,562,094 and Rs. 4,980,034 respectively. However, the Project expenditure is not represented by any tangible assets and it would appear that proportionate amounts should be amortised on a regular basis,

2.5.2 Accounting Deficiencies

- (a) The assets transferred from the former Fish Technology Division of the Ministry of Fisheries to the Agency when the latter was established in September, 1981 had not been valued and brought to account after getting them vested in terms of the Act.

- (b) Depreciation had not been provided on the fixed assets valued at Rs. 13,307,554.
- (c) Provision had not been made for Rs. 2,407,830 due to Colombo Municipal Council as rates for the period from 1979 to 1990.
- (d) Wages, other expenses and chemical stock amounting to Rs. 54,571 and the fish stock had not been brought to account.
- (e) A sum of Rs. 1,580,000 has been shown as value of cheque deposited but not realised although the particular cheque had been deposited only in the following year.
- (f) Long outstanding Petty cash advances totalling Rs. 50,000 paid for purchases of goods for the sales outlet had continued to be shown as assets.
- (g) Expenses in respect of previous year amounting to Rs. 152,598 had been disclosed as expenditure for the year under review.

2.5.3, Lack of Evidence for Audit

The following items in the accounts could not be satisfactorily vouched or accepted in audit due to lack of documentary evidence indicated against each item.

Item -----	Value (Rs.) -----	Documentary evidence not made available -----
(a) Fixed Assets	99,108,238	(i) Fixed Assets Register (ii) Vehicle Files (iii) Verification Reports
(b) Repairs & Maintenance	108,663	Vouchers, Bills etc.
(c) Purchases	187,000	Vouchers supporting documents etc.
(d) Petty Cash Advances	213,005	Schedules.
(e) Unclaimed Salaries	88,990	Schedules.

(f) Tender Deposits	62,910	Schedules.
(g) Unclaimed Travelling	345,821	Schedules.
(h) Miscellaneous Expenditure	155,441	Payment vouchers
(i) Motor vehicles	-	Running charts in respect of 17 vehicles for 161 months.
(j) Running Expenses	34,545	Fuel Bills.

2.5.4 Non-compliance with Laws, Rules, Regulations, Management Decisions etc.

Instances of non-compliance observed in audit are given below:

<u>Reference to Laws, Rules, Regulations etc.</u>	<u>P a r t i c u l a r s</u>
a) Finance Act No.38 of 1971	
- Section 12	The approval of the relevant Ministers had not been obtained for the form and content of the accounts.
- Section 13(5)(b)	Reports had not been furnished to the Auditor General as specified by him.
- Section 13 (6)	Report on accounts as specified by the Auditor General had not been furnished along with the accounts.
- Section 13 (8)	No reply had been furnished to the Auditor General, for the report issued by him under Section 13 (7) (a) in respect of the year 1990.
- Section 14 (1)	A copy of the draft annual report had not been submitted within 04 months after the end of the financial year.
b) National Aquatic Resources Research & Development Agency Act. No. 54 of 1981.	
- Section (5) (13)	National Aquatic Resources Management Council had not been formed.

cont'd.9.

- (d) Out of debtor balances of Rs. 1,331,881 debts amounting to Rs. 1,054,682 were outstanding for periods ranging from one to four years.
- (e) Confirmation of balances had not been received in respect any of the 15 creditors amounting to Rs. 4,128,780.
- (f) Creditors balances amounting to Rs. 746,598 and Rs. 1,744,250 were outstanding for periods ranging from one to five years and over five years respectively.

3. Financial and Operating Review

3.1 Financial Results

The working of the Agency during the year ended December 31, 1991 had resulted in a deficit of Rs. 7,733,944 compared with the deficit of Rs. 8,715,370 for the preceding year.

In view of the material uncertainty reflected in the financial statements as described below, any attempt to analyse this variance is not likely to lead to any meaningful results.

The financial results disclosed in the annual financial statements of the Agency had been adjusted by the agency for omissions and errors etc. observed in the subsequent years as a regular feature. For instance, the deficit of Rs. 8,715,370 shown in the accounts for the previous year had been adjusted during the year under review by Rs. 1,724,142. Similar adjustments made during the previous five years are given below:

<u>Year</u>	<u>Financial results</u>	<u>Adjustments made in the subsequent year</u>
----	Rs.	Rs.
1985	(1,974,832)	110,123
1986	(4,538,360)	(8,326,598)
1987	(3,858,065)	(37,962)
1988	(6,335,458)	(1,058,134)
1989	(6,129,198)	475,250

In this context, the possibility of similar adjustments of the financial results and the financial position for the year under review in subsequent years cannot be ruled out. Therefore, no reliance can be placed on the financial results and on the financial position reflected in the accounts.

3.2 Identified Losses

Items lost during the year under review amounted to Rs. 88,118. However, appropriate action had not been taken by the Agency to recover the loss or to write-off such loss.

3.3 Idle Resources

12 Motor vehicles, some spare parts, computers, fish tanks and some building space remained idle during the year under review. Suitable action had not been taken by the Agency to utilise these resources or to take appropriate alternative course of action.

These resources were idling for periods ranging from one to seven years.

3.4 Uneconomic Transactions

- (i) A sum of Rs. 57,920 had been paid as salaries to one Research Assistant although no research work has been done during the year under review.
- (ii) The sales outlet of the Agency had a turnover of Rs. 217,825 during the year while the cost of sales was Rs. 229,259 thus incurring a loss of Rs. 11,434.

3.5 Repair and Maintenance of Research Vessel 'Samudramaru'

The research vessel 'Samudramaru' handed over by the Ministry of Fisheries in February, 1985 remained inoperative with a crew of 09 as at the end of the year under review too.

Following observations are made :

- (a) Although the vessel had not been vested in the Agency, it had been insured for an estimated value of Rs. 12,000,000 and the annual premium paid was Rs. 398,905.
- (b) A total sum of Rs. 4,454,373 had been incurred for repair and maintenance during the 04 years ended December 31, 1990.
- (c) A sum of Rs. 1,104,986 had been spent for repairs during the year including UNDP Funds amounting to Rs. 618,112.
- (d) The cost of spare parts purchased during the year by UNDP amounted to Rs. 19,999,500.
- (e) The annual cost of salaries of the crew of the vessel amounted to Rs. 270,716.

3.6 Transport Fleet

The Agency had a fleet of 33 vehicles as at the end of the year under review. The total cost of running and maintenance etc. of this fleet during the year under review was Rs. 1,025,536 compared with Rs. 2,122,980 during the previous year.

Some of the significant data relating to these vehicles are given below :

	<u>1991</u>
- Total distance travelled - Kilometres	210,148
- Fuel consumed - Litres	28,216
- Overall average performance per litre - Km	7.45
- Total expenditure incurred on fuel - Rs.	840,538
- Average expenditure on fuel per Kilometre - Rs.	4.00
- Total expenditure on repairs - Rs.	184,998
- Average expenditure on repairs per kilometre - Rs.	0.88
- Average expenditure on repairs and fuel per kilometre - Rs.	4.88

3.7 Budgetary Control

Significant variations were observed between the budget and the actual income and expenditure during the year under review thus indicating that the budget had not been made use of as an effective tool of management control.

4. Systems and Controls

Deficiencies observed during the course of audit were brought to the notice of the Chairman of the Agency in my detailed report furnished in terms of Section 13 (7) (a) of the Finance Act. Special attention is needed in respect of the following areas of control.

- (a) Delegation of financial authority
- (b) Purchasing
- (c) Debtors - employees
- (d) Petty Cash
- (e) Cash collections
- (f) Maintenance of Accounting records
- (g) Review by the Internal Audit.


Auditor General.

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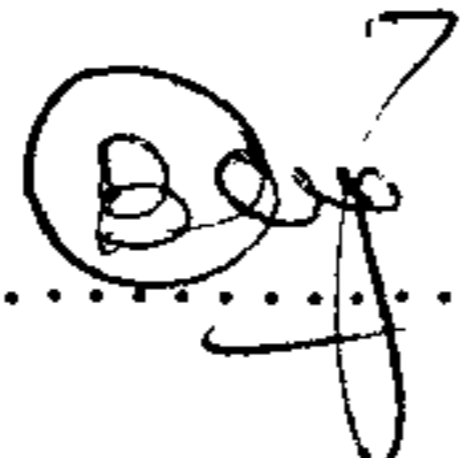
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