MINISTRY OF FISHERIES & AQUATIC RESOURCES DEVELOPMENT

ANNUAL REPORT & ACCOUNTS 2011

National Aquatic Resources Research and Development Agency
Crow Island, Colombo 15
Telephone : 011 2521000, 011 2521006 Fax : 011 2 521932
Web : http:// www.nara.ac.lk

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NATIONAL AQUATIC RESOURCES, RESEARCH & DEVELOPMENT AGENCY

1. CORPORATE INFORMATION

The National Aquatic Resources Research and Development Agency (NARA) is the principal national institution charged with the responsibility of carrying out and co-coordinating research development and management activities on the subject of aquatic resources in Sri Lanka. NARA was established in the year 1981 by restructuring the Research Division of the Department of Fisheries. In the restructuring process Research Division was amalgamated with the institute of Fish Technology which existed in the present premises of NARA at Crow Island, Mattakkuliya, Colombo15 to establish a fully fledged research agency, under an Act of Parliament, National Aquatic Resources Agency Act No. 54 of 1981 and amended subsequently by National Aquatic Resources Research and Development Agency Act No. 32 of 1996. NARA functions as a statutory body under the Ministry of Fisheries and Aquatic Resources Development.

Our Vision

To be the premier institution for scientific research in conservation, management and development of aquatic resources in the region.

Our Mission

To provide innovative solutions for national development issues in the aquatic resources sector utilizing scientific and technological knowledge & resource base.

The main objectives and functions of the Agency are as follows:

To ensure application and utilization of Scientific and Technological expertise for the implementation of national development programs.

- To promote and conduct research activities directed at identification, assessment, management and development of living and non-living aquatic resources.
- To co-ordinate and provide advisory and consultancy services on matters relating to exploitation, management and development of aquatic resources.
- To undertake collection, dissemination and publication of scientific research information on aquatic resources & related subjects.
- To provide trainings.

Governing Board

The Governing Board consists of Eight (08) Appointed Members and Eight (08) Ex officio members in accordance with the Section 6 of the National Aquatic Resources Research & Development Agency Act No 54 of 1981 as amended by Act No 32 of 1996.

The following members served as the members of the Governing Board during the year 2011 and Eleven Board Meetings were held during the year.

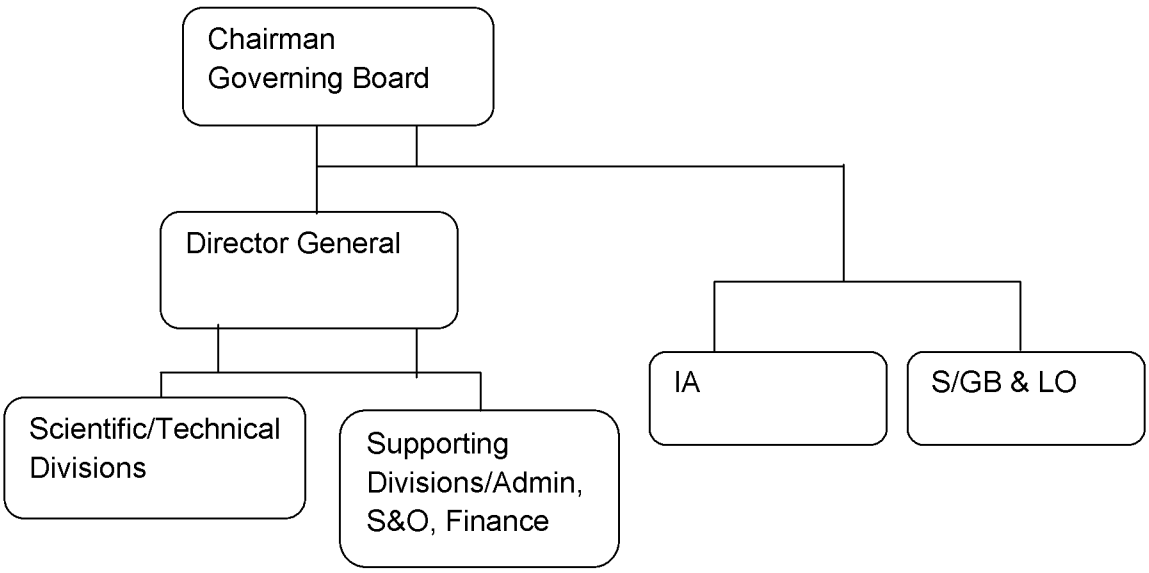
Appointed Members

1. Dr. Hiran W. Jayewardene – Chairman
2. Dr. K. Sivasubramaniam
3. Prof. W. M. T. B. Wanninayaka
4. Dr. S. G. Samarasundera
5. Mr. Dunstan Fernando
6. Dr. Oscar Amarasinghe
7. Mr. K. N. Rienzie Perera
8. Mr. M. J. Irshad Rumy Jauffer

Ex –officio Members

1. Dr. (Mrs) Damitha de Zoysa- Secretary, Ministry of Fisheries & Aquatic Resources Development
2. Rear Admiral S. A. M. J. Perera – Director General (Operations) – Sri Lanka Navy
3. Mr. A. R. Wickramarathne - Deputy Director, Department of National Budget
4. Mr. S. M .W. Fernando - Surveyor General
5. Dr. Sarath Abayawardana - Director, National Science Foundation
6. Mrs. Nilmini Diyabedanage - Director General, NARA
7. Mr. Nimal Hettiarachchi – Director General, Department of Fisheries & Aquatic Resources (since September 2011)
8. Mr. Anura Jayawickrama – Additional Secretary, Ministry of Ports & Highways (since November 2011)

Organizational Structure



(IA – Internal Auditor, S/GB& LO – Secretary to the Governing Board & Legal Officer S & O – Service & Operations)

Organization

Dr. Hiran W. Jayawardene and Mrs. Nilmini Diyabedanage functioned as the Chairman and the Director General respectively during the year under review.

In order to perform the mandated functions of the Agency the organization had been designed to constitute ten Research and Technical/Services Divisions, Environmental Studies, Fishing Technology, Hydrographic Office, Information and Technology, Inland Aquatic Resources & Aquaculture, Library & Information, Marine Biological Resources, National Institute of Oceanography & Marine Sciences, Socio-Economic and Market Research, Institute of Post Harvest Technology and Engineering & Technology divisions. Supported divisions were, Administration, Services & Operations and Finance Divisions.

Following officials officiated as Heads of Divisions during the year 2010.

Research Divisions

Mr. S. A. M. Azmy	Environmental Studies
Mr. N. B. P. Punyadeva	Fishing Technology
Mr. M. A. Ariyawansa	Hydrographic Office
Mr. A. B. A .K. Gunaratne	Information Technology
Dr. H. M. P. Kithsiri (01.01.2011-12.01.2011) Dr. P. K. M. Wijegoonawardena (12.01.2011-03.08.2011) Dr. V. Pahalawattaarachchi (05.08.2011 – 31.12.2011)	Inland Aquatic Resources & Aquaculture
Mrs. K. G. B .S. Kariyawasam	Library & Information
Dr. R. R. P. Maldeniya	Marine Biological Resources
Dr. T. K. D. Tennakoon (01.01.2011-21.08.2011) Dr. K. Arulananthan (22.08.2011-31.12.2011)	National Institute of Oceanography & Marine Sciences
Dr.(Mrs.) K. W. S. Ariyawansa	Institute of Post Harvest Technology
Mr. K. H. M. L. Amaralal	Socio Economics & Marketing Research
Dr. T. K. D. Tennakoon 01.01.2011-21.08.2011)	Engineering & Technology

Support Services Divisions

Mr. Sumedha Jayasinghe	Administration
Mrs. R. H. P. Ranasinghe	Finance
Dr. T. K. D. Tennakoon (01.01.2011-21.08.2011) Mr. N. B. P. Punyadewa (26.07..2011-31.12.2011	Services & Operations
Mr. M. D. Senarathne	Internal Auditor

2. RESEARCH HIGHLIGHTS

Marine fish resource: Small pelagic fish largely contributes to the coastal fish production in Sri Lanka. Small pelagic fish landings were monitored at the major fish landing sites in the western, southern and the eastern coasts of Sri Lanka. This includes the details on fishing operations, total catch landed by the fishing boats operated for small pelagic and its species composition, measuring the lengths of key species and reporting the active fishing boats operated. Biological fish samples taken at landing sites were also analysed to study the reproductive biology of key small pelagic fish. There are no enough evidences to accept the current fishing practices of small pelagic species and factors other than fishery (depletion of the stocks due to other reasons) might have produced some severe changes in availability of the fish resources resulting in apparent over fishing but for limited duration of time. With the development of the offshore fishery, the contribution of billfish to the marine fishery became significant, and the catch has increased over the years highlighting their importance especially in the large pelagic/offshore fishery in Sri Lanka. Over the last five years, around 65% of the total catch has come from the offshore fishing vessels.

Oceanography: Side scan sonar (underwater imaging) survey has done for shipwrecks in the East coast of Sri Lanka and confirmed their exact location and availability conditions to promote tourism on scuba diving and fish aggregating sites. Tuna fishing ground forecast and information dissemination to fishermen have been continued to promote deep water fisheries by reducing operational cost and increasing the efficiency of fishing thereby landing quality fish for export. Ocean observation center, alerting ocean based disasters such as tsunami, storm surges etc. was operated.

Navigational charts: Bathymetric survey was completed for Hambantota and Trincomalee harbours, Beruwala and Panadura nautical charts were produced for the same. Maps of maritime boundsries including depths, light houses were prepared and distributed among the fishers to ensure navigational safety.

Environmental research: Six rapid assessments surveys were conducted to find out current status of water quality in different types of freshwater and coastal water bodies. Water quality was monitored in the sites in which sea cucumber resource is available in North coast of Sri Lanka. A short report was prepared to find out the possibility to conserve the islands located in Puttalam lagoon as sensitive habitats. Initial Environmental Examination on Air Taxi operations on Negombo lagoon was carried out. Worked as the recognized institution for environmental impact monitoring during the proposed offshore drilling in Mannar sea.

Minimizing post harvest losses: Technology has been transferred to the fisher folk to produce nutritional, hygienically and high quality fish based products (dried fish, Maldives fish, smoked fish and Jaddi). Awareness programs were conducted to improve the knowledge of fisher folk regarding good handling practices and sanitary requirements to be adapted during handling of fish. Polymerase Chain Reaction (PCR) based detection methods were established in the laboratory for *Salmonella* spp., *Listeria monocytogenes* and *E. coli*. Pharmaceutically important chemicals were extracted from marine organisms.

Aquaculture and inland fisheries: Sea cucumber breeding and culture techniques are being developed and ready to disseminate the knowledge for private sector. Research on endemic and exotic ornamental fish breeding was carried out and the acquired knowledge was disseminated to the farmers through training courses. Culture techniques, suitable locations, seasons and the constraints were identified for the successful development of seaweed (*Kappaphycus alverazii*). Feed development for food fish and ornamental fish has been conducted and the commercial level feeds are to be introduced. Untapped fisheries resources harvesting methods identification is in progress.

Fishing technology: Deploying fish aggregation devices for small scale fishermen in North-Western province was done.

Socio-economic study: Conducted a study on economic efficiency of multi-day fishing operated in deep sea areas. The multi-day boats use gill nets and long lines together have earned higher revenue than the single gear operators. Among the multi-day boats, the highest profit margin is attained by boats operating surrounding nets (*Kadan course*) for Iinna. Annual publication, 'The fisheries industry outlook- 2011 has been published.

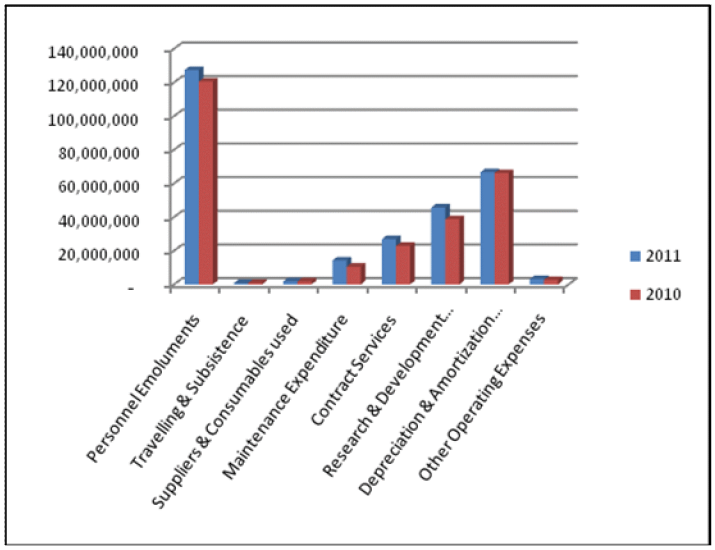
Detail research and development activities carried out by the respective divisions are discussed seperately.

3. FINANCIAL HIGHLIGHTS

Operating Expenses

GOSL Grants

	2011	2010
Personnel Emoluments	127,402,151.00	120,500,110.40
Travelling & Subsistence	823,047.00	897,479.15
Suppliers & Consumables used	1,833,537.00	1,770,764.95
Maintenance Expenditure	14,272,686.00	10,549,315.67
Contract Services	26,909,468.00	22,863,665.05
Research & Development Expenditure	45,666,861.00	38,727,358.46
Depreciation & Amortization Expenses	66,665,521.00	66,159,828.03
Other Operating Expenses	3,229,134.00	2,650,180.38
Total	**286,802,405.00**	**264,118,702.09**



- Despite the unfavorable macroeconomic condition prevailed in the country government grants towards Research & Development increased by 23% whereas recurrent grant increased only by 3%.

- Due to maintenance of old fleet of Vehicles and unavailability of sufficient number of vehicles for field activities, were adversely affected for the overall performance of the institution

Vehicle Pool at a Glance

Type	No of Vehicles	Age (No of Years)
Car	1	12
Double Cab	5	14, 12, 4, 4, 1
Jeeps	4	24, 20, 18, 17
Vans	5	19, 19, 15, 2, 1
Trucks	1	23
Three Wheeler	1	10

Total 17 (including assigned Vehicles for Chairman & DG)

Age Analysis – All Vehicles at a Glance

Less than 10 years	05
Between 11 – 19 years	15
More than 20 years	08
Total	28

Vehicles – Under Repair

Type	No of Vehicles	Age (No of Years)
Double Cab	5	17,15,15,14,8
Jeeps	2	24,21

Vehicles – To be Disposed

Type	No of Vehicles	Age (No of Years)
Car	2	16, 14
Cab	1	26
Van	1	21

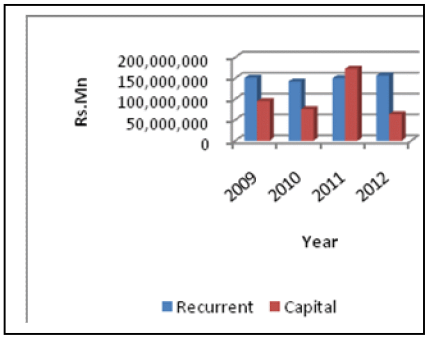
- Due to increasing trend of price increase of contractual services such as electricity, water, telephone total expenditure towards said expenditure were increased.

Self Generated Income

Remarkable increase of 37% was reported from self generated sources.

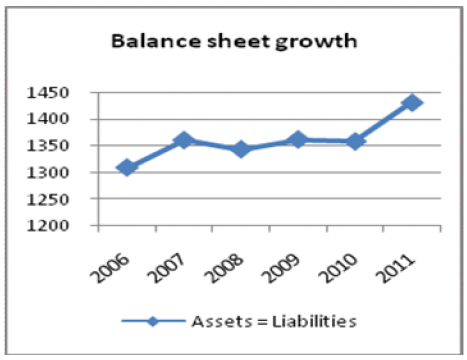
Allocations at a Glance – GOSL

	2009	2010	2011	2012
Recurrent	150,900,000	142,243,000	150,000,000	156,800,000
Capital	95,106,000	75,950,000	173,000,000	63,700,000



Balance Sheet Growth

Description	2006	2007	2008	2009	2010	2011
Assets = Liabilities	1309.257	1361.09	1343.698	1362.354	1358.65	1431.65



- Mobilization advance paid for New Research Vessel and construction of CRIOMM boat were captured under Non Current Assets as work in progress.
- Receivable from claim of mobilization on the previous contract for construction of research vessel were converted to Government Treasury Bills during the year.

4. HUMAN RESOURCES INFORMATION

Recruitments

Name	Designation	Date of appointment	Nature of Appointment
Mr. T.R. Abewickrama	Research Assistant	2011.01.03	Assignment Basis
Mr. D.M.A.B. Rathnayake	Graphic Designing	2011.01.11	Assignment Basis
Ms. C. Wickramararathne	Research Officer	2011.02.01	Contract Basis
Mr. W.P.M.R. Pathirana	Research Officer	2011.02.07	Assignment Basis
Ms. N.D. Hettige	Research Officer	2011.02.07	2011.02.07 to 2011.02.16 Contract 2012.02.07 Permanent
Mr. R.P. Perera	Accountant	2011.02.07	2011.02.07 to 2011.10.02 Contract 2011.10.03 Permanent
Ms. B.N.J. Ariyarathne	Research Officer	2011.03.01	Assignment Basis
Mr. A.P.P. Wickramasuriya	Chief Engineer	2011.05.23	Contract Basis
Mr. W.R.U. Gunasiri	Landscaping Officer	2011.06.07	Assignment Basis
Ms. J. Y. K. Udayadiwakara	Research Assistant	2011.06.20	Contract Basis
Mr. G.R. Samaraweera	Research Assistant	2011.08.11	Assignment Basis
Ms. M. M. P. Mayadunne	Personal Assistant	2011.09.12	Daily pay
Mr. H.H. Sanjeewa	Driver	2011.10.17	Contract Basis
Ms. Shalani Sinnathambi	Research Officer	2011.11.03	Daily Pay
Mr. R M R M Jayathilaka	Scientist	2011.12.01	Permanent
Mr. H. D. Tharindaka	Scientist	2011.12.06	Permanent
Mr. P. D. A. Fernando	Welder	2011.12.15	Assignment Basis
Mr. M. D. I. C. Kumara	Research Assistant	2011.12.15	Contract Basis
Ms. W. P. S. Kalani	Research Assistant	2011.12.15	Contract Basis
Ms. G. D. P. Niroshini	Research Assistant	2011.12.15	Contract Basis
Mr. B. W. M. Indika	Lab Attendant	2011.12.15	Permanent
Ms. N. D. Randombage	Research Assistant	2011.12.15	Contract Basis
Mr. M. H. M. Kumara	Office Labourer	2011.12.19	Permanent

Departures of the Service

Name	Designation	Departure date	Reason for departure
Dr. E. M. S. Wijerathne	Research Officer	2010.08.06	Vacated of Post
Mr. M. J. C. B. Herath	Research Officer	2011.02.03	Resigned
Mr. H. A. R. E Perera	Research Assistant	2011.02.22	Retired
Mr. K.W. Rathnapala	Supervisor (Electrical)	2011.02.28	Retired
Ms. H. K. Kanthi	Research Assistant	2011.02.28	Retired
Mr. A. R. Gunathilaka	Driver	2011.02.28	Retired
Mr. K. W. Rohan	Unskilled Labourer	2011.03.28	Interdict
Ms. D. N. Karunarathne	Research Officer	2011.03.31	Resigned
Mr. M M. M. Nijam	Office Labourer	2011.04.01	Resigned
Mr. R. P. Nanayakkara	Research Officer	2011.04.08	Vacated of Post
Mr. U. D. R. Jayaweera	Deck Hand	2011.06.01	Retired
Ms. M.I. Perera	Research Assistant	2011.06.13	Resigned
Mr. S. N. S. Amarasinghe	Senior Hydrographic Surveyor	2011.06.13	Resigned
Mr. W. G. Lasantha Kumara	Research Assistant	2011.06.23	Vacated of Post
Mr. W. T. S. Jayasuriya	Research Officer	2011.06.24	Vacated of Post
Mr. A. P. P. Wickramasuriya	Chief Engineer	2011.07.15	Vacated of Post
Ms.P. K. M. Wijegunawardena	Research Officer	2011.08.04	Retired
Mr. T. R. Abewickrama	Research Assistant	2011.09.15	Resigned
Mr. R. M. N. Danushka	Unskilled Labourer	2011.09.01	Vacated of Post
Mr. W. P. M. R. Pathirana	Research Officer	2011.09.21	Resigned
Mr. H.H. Sanjeewa	Driver	2011.10.17	Vacated of Post
Mr. U. Mallikarachchi	Research Officer	2011.11.09	Resigned
Ms. N. D. Randombage	Research Assistant	2011.12.15	Vacated of Post
Ms. B. N. J. Ariyarathne	Research Officer	2011.12.30	Resigned

Unfilled Vacancies

Srl. No.	Post	Vacant
1	Bungalow Keeper	1
2	Boatswain/Samudramaru	1
3	Caretaker	1
4	Carpenter	1
5	Chief Administrative Officer	1
6	Chief Cartographer	1
7	Chief Engineer	1
8	Chief Hydrographic Surveyor	1
9	Cook / Samudramaru	1
10	Coxwain	1
11	Deak Hand	1
12	Draughtsman	2
13	Driver	6
14	Dy. Chief Cartographer	1
15	EDP Assistant	1
16	Electronics Engineer	1
17	ERA/Samudramaru	2
18	Extension Officer	1
19	Instrument Technician	1
20	Land Surveyor	3
21	Librarian	2
22	Maintenance Engineer	1
23	Mason	2
24	Mechanical Engineer	1
25	Motor Mechanic (Forman)	1
26	Personal Assistant	1
27	Project Assistant (Data Base)	1
28	Project Assistant (GIS/RS)	1
29	Project Assistant (Management)	1
30	Purchasing & Supply Officer	1
31	Research Assistant	9
32	Research Officer	11
33	Sampler	4
34	Seaman/Samudramaru	2
35	Senior Draughtsman	1
36	Senior Hydrographic Surveyor	2
37	Skipper/FTD	1

38	Skipper/Samudramaru	1
39	Skipper/Sayuri	1
40	Store Keeper	1
41	Supervisor (Mechanical)	1
42	Supervisor (Electric)	1
43	Supervisor(Civil)	1
44	Survey Labourer	1
45	System Analyst/ Programmer	2
46	Technical Assistant (Mechanical)	1
47	Translator	1
48	Unskilled Labourers	3
49	Watcher	3
50	System Analyst/ Programmer	2
51	Technical Assistant (Mechanical)	1
52	Translator	1
	Total	**89**

Promotions

Name	Designation	Effective date	Promote	
			From	To
Mr. J. K. Rajapakse	Research Officer	15.05.2009 (back dated)	II	I
Mr. M. Gammanpila	Research Officer	25.01.2010 (back dated)	III	II
Mr. B. K. K. K. Jinadasa	Research Officer	07.02.2010 (back dated)	IV	III
Mr. D. S. Ariyaratne	Research Officer	26.02.2010 (back dated)	IV	III
Ms. K. A. W. S. Weerasekera	Research Officer	30.03.2010 (back dated)	IV	III
Mr. R. P. P. K. Jayasinghe	Research Officer	05.05.2010 (back dated)	IV	III
Ms. D. N. A. Ranmadugala	Research Officer	01.07.2010 (back dated)	IV	III
Dr. D. C. T. Dissanayake	Research Officer	18.08.2009 (back dated)	III	II
Ms. W. N. C. Priyadarshani	Research Officer	03.10.2010 (back dated)	IV	III
Mr. A. A. D. Amaratunge	Research Officer	05.10.2009 (back dated)	IV	III
Mr. K. H. M. L. Amaralal	Research Officer	01.11.2010 (back dated)	II	I
Mr. Neil Samantha Gunathilake	Driver	26.11.2010 (back dated)	VII	VI
Dr. A. D. W. R. Rajapakse	Research Officer	28.11.2010 (back dated)	III	II
Mr. H. D. Wimalasena	Economist	21.12.2010 (back dated)	IV	III
Ms. K.K T. E. Kahatapitiya	Audit Clerk	01.02.2011	VIII	VII
Mr. R. A. M. Jayathilake	Research Assistant	16.02.2011	VI	V
Mr. J. P. Wickramarachchi	Research Assistant	16.02.2011	VI	V
Mr.N.W.Janaka Pushpakumara	Research Assistant	18.02.2011	VI	V
Mr. N.G.K. Bandara	Unskilled Labourer	03.03.2011	IX	VIII
Mr. R.K.A. Gamini	Unskilled Labourer	03.03.2011	IX	VIII
Mr. Indika Wijesinghe	Assistant Bungalow Keeper	28.03.2011	IX	VIII
Mr. G. D. L. Bonifes	Survey Labourer	18.04.2011	IX	VIII
Ms. Y. M. A. N. Kumari	Hydrographic Surveyor	11.05.2011	IV	III
Ms. P. H. Ginigaddarage	Research Officer	09.05.2011	IV	III

Ms. W. A. A. P. Wijesundara	Hydrographic Surveyor	10.05.2011	IV	III
Mr. R.D.S Jayasinhge	Unskilled Labourer	22.06.2011	IX	VIII
Mr. T. H. Dharmasena	Skilled Labourer	23.06.2011	VII	VI
Ms. H. D. W. Kumudu Kumari	Audit Clerk	01.07.2011	VII	VI
Ms. W. A. K. R. Mallika	Clerk	01.07.2011	VII	VI
Ms. A. Nisansala Perera	Clerk	03.07.2011	VIII	VII
Mr. R. K.A. Ariyaratne	Hydrographic Surveyor	07.08.2011	IV	III
Mr. S. Muralidaran	Sanitary Labourer	30.08.2011	X	IX
Mr. A. Krishnan	Sanitary Labourer	16.09.2011	X	IX
Ms. S. B. N. Ahamed	Research Officer	14.11.2011	IV	III
Ms..M. W. Gayani Chathurika	Word Processing Operator (Sinhala)	11.12.2011	VIII	VII

Local Training

Name/Post	Participated Local Training/Seminar/Work shop	Institute	Fees (Rs)
Mr. S. Gunaratne Shroff	Certificate in Business English	University of Colombo	15,000/=
Mr. Sumedha Jayasinghe Administrative Officer	How to Negotiate Effectively	National Institute of Labour Studies	1,950/=
Mr. H. A. M. Priyankara Tissera Electrician Mr. H. D. Sunil Shantha Electrician	Maintenance of Electrical Systems	Institute for Construction Training and Development	8,500/= per head
Mr. Nadeeshan de Silva Storekeeper	Certificate course on Stores management	Institute for Construction Training and Development	18,000/=
Ms. K. A. A. N. Jayaratne Secretary to the Governing Board & Legal Officer	Writing Board Papers	Sri Lanka Institute of Development Administration	5,000/=
Ms. R. H. S. P. Ranasinghe Accountant	Writing to Board Papers	Sri Lanka Institute of Development Administration	5,000/=
Ms. A. R. Wanigasekera Assistant Accountant	General Conversational Skills	Sri Lanka Institute of Development Administration	10,000/=
Mr. B. L S Wimalasinghe Transport Officer	Common Rail Diesel Fuel System, Engine/Emission Petrol Fuel System	Institute for Construction Training and Development	2,500/=
Mr. B. K. K. K. Jinadasa Research Officer	Analytical Method Validation	Advanced Scientific & Laboratory Services (Pvt)Ltd	25,000/=
Ms. R. H. S. P. Ranasinghe Accountant Mr. Prashantha Perera Accountant Ms. A. Wanigasekera Assistant Accountant Mr. M. D. Senaratne Internal Auditor	Seminar on New Development in Tax Law	Skills Development Fund Ltd	3,500/= per head
Mr. B. L. S. Wimalasinghe Transport Officer	Use of vehicles scientifically.	Institute for Construction Training and Development	2,500/=
Mr. M. D. Senaratne Internal Auditor	Seminar on Effective Internal Auditing	Skills Development Fund Ltd	3,500/=

Mr. W. A. S. Perera Labourer	Certificate Course in English Language	Skills Development Fund Ltd	8,000/=
Mr. M. A. Jude Ranjith Labourer Mr. Kalinga Kodituwakku Driver Mr. Samantha Pushpakumara Labourer	Skills Development for Drivers and Minor Employees	Skills Development Fund Ltd	4,000/= per head
Ms. K. G. L. Irangani Book keeper Mr. H. M. C. Hemamalie Accounts Clerk	Fixed Asset Management	Academy of Financial Studies	5,000/= per head
Mr. B. L. S. Wimalasinghe Transport Officer Mr. P.S. Ranaweera Work Assistant Ms. D. C. Udawatte Work Supervisor(Civil) actg.	Training Program on Industrial Safety & Health	Institute for Construction Training and Development	5,750/=

Foreign travels

Name of the Officer	Purpose of the travel	Duration	Country
Ms. M. H. S. Ariyarathna Research Officer	Asian Pacific Aquaculture Conference 2011	16 -21.01.2011	India
	09th Asian fisheries & Aquaculture forum (9 AFAF)	20-26.04.2011	China
Dr. M. G. I. S. Parakrama Research Officer	Asian Pacific Aquaculture Conference 2011	16 -21.01.2011	India
Mr. W. D. N. Wickramarachchi Research Officer	For PhD Studies	28.01.2011 – 28.01.2014	South Korea
Mr. S. A. M. Azmy Research Officer	BOBLME Workshop on the Status of Marine Managed Areas in the Bay of Bengal	18– 19.01.2011	Malaysia
Ms. D. R. Herath Research Officer	BOBLME Meeting 2011 Work Plan Development Workshop	09-10.02.2011	Thailand
Mr. R. P. P. K. Jayasinghe Research Officer	BOBLME Meeting 2011 Work Plan Development Workshop	09-10.02.2011	Thailand
Dr. HiranW. Jayawardena Chairman	IOC Technical Committee Meeting on Allocation and Criteria	16-18.02.2011	Kenya
Mr. A. N. D. Perera Deputy Hydrographic	11th North Indian Ocean Hydrographic Commission	28.02.2011 – 05.03.2011	India
Ms. D. N. A. Ranmadugala Research Officer	Regional Training Course on Strengthening Fisheries Data Collection and Stock Assessment	25.04.2011 – 07.05.2011	India
Mr. S. U. P. Jinadasa Research Officer	Arctic Antarctic Seafloor Mapping Meeting	03-05/05/2011	Sweden
Dr. K. Arulananthan Research Officer	Regional Workshop on Applications of Climate change on Fisheries and Aquaculture	24-26/05/2011	Nepal

Dr. S. S. K. Haputhantari Research Officer	09th Session of the Working Party on Billfish	2706.2011 – 01.07.2011	Seychelles
Mr. R. P. P. K. Jayasinghe Research Officer	GTC Stock Management and Enhancement in the Sea	12.07.2001-23.10.2011	Japan
Mr. Rochana Weerasinghe Research Officer	For M.Sc. studies	27.06.2011-01.09.2012	South Korea
Ms. Nilmini Diyabedanage Director General	Study Tour on Fisheries Development & related ponds in Thailand	17.07.2011 - 22.07.2011	Thailand
Ms. P. P. M. Heenatigala Research Officer	Study Tour on Fisheries Development & related ponds in Thailand	17.07.2011 - 22.07.2011	Thailand
Ms. R. R. A. R. Shirantha Research Officer	Study Tour on Fisheries Development & related ponds in Thailand	17.07.2011 - 22.07.2011	Thailand
Mr. D.S. Ariyarathna Research Officer	Training on quality management of fish handling & processing	11.09.2011 – 09.03.2012	Iceland
Mr. S.U.P. Jinadasa Research Officer	POGO Score fellowship program	17.08.2011 – 11.05.2012	USA
Ms. G.R.H. Rupika Research Assistant	BIMSTEC International training programme on Aquatic Tissue Centre	28.08.2011 – 27.09.2011	Thailand
Mr. A.A.D. Amaratunge Research Officer	For PhD Studies (No-pay)	19.09.2011 – 18.09.2014	Japan
Dr. R.R.P. Maldeniya Research Officer	1st Bi – National stakeholder consultation on sustaining the gully of manner ecosystem and its resources	05 – 06.09.2011	India
Dr. K. Arulananthan Research Officer	1st Bi – National stakeholder consultation on sustaining the gully of manner ecosystem and its resources	05 – 06.09.2011	India
Mr. J S. Jayanatha Research Officer	Regional workshop on strengthening Assessments of Fisheries & Aquaculture in the Asia – Pacific Region for policy Development & Management	03-07.10.2011	Myanmar
Ms. K.A.W.S. Weerasekara Research Officer	MFF Course on communicating science effectively BOBLME Training on scientific paper writing & scientific presentation	11 – 14.10.2011	Maldives
Mr. R.H.P. Weligodapitiya Hydrographic Surveyor	Port & shallow water survey workshop	21 – 25.11.2011	South Africa
Mr. M.A. Ariyawansa Hydrographer	Technical Visit regarding ship building process	20 – 27.11.2011	Thaiwan

Court Cases And Disciplinary Inquiries

Labour Tribunal

a) Case No :2/ LT/2300/2001 – B. J. K. Balapatabendi Vs NARA
The case was concluded. Judgment delivered in favour of the applicant i.e. Mr. B. J. K . Balapatabendi.
b) Case No : 2/Add/2869/2006- G. Lamahewa Vs NARA
The case was concluded. Judgment is pending.
c) Case No : 02/ Add/3183/06 – J. B. A. Magammana Vs NARA
With regard to the applicant made by Mr. J .B. A. Magammana at the Additional Labour Tribunal , the Application is at the inquiry stage.

District Courts

a) Case No : 3894/10/DMR – District Courts, Colombo

The case filed against Mr. N. H. Dassanayake, Research Officer and his two sureties on the grounds of breach of Agreement/ Bond entered in to with the institution. Steps have been taken to issue Summons through the Ministry of Justice since the 1st Defendant is residing in Canada.

b) Case No: 3237/10/DMR- District Courts , Colombo
The case filed against Mr. A. W. Gunasekara, Hydrographic Surveyor who resigned from service without serving the required bonded period. Case is at the trial stage.

Files forwarded to the Attorney General's Department

- The file has been forwarded to AG's Department to institute legal action against Ms. S. Thalakada, Chief Librarian on the grounds that she has not reported for duty after completion of No-pay leave period abroad.

- The file of Dr.(Mrs) C. V. L. Jayasinghe who handed over her resignation without serving the compulsory service period and / or not repaying the bonded amount as per the agreement/bond entered in to with the institution has been forwarded to the Attorney General's Department in order to institute legal action against her.

Disciplinary inquiry.

Mr. Nimal Jayawardena and Mr. M. K. Siril, two drivers have been issued with charge sheets on 23.12.2011 and the disciplinary inquiry has been preceded.

Mr. M. K. Siril was interdiction with effect from 05.01.2011 based on the charge sheet and as per the findings from his past service records.

Welfare Activities

Annual New Year festival celebrated. In addition to that transport facilities provide to the staff to make easy their travelling.

5. RESEARCH DIVISIONS

5.1 ENVIRONMENTAL STUDIES DIVISION

Head of the division: Mr. S.A.M. Azmy

Overview of the year

The main function of the division is to conduct studies related to environmental aspects of aquatic resources with special reference to water quality and aquatic ecology. The information resulting from the comprehensive research undertaken by the division is used to provide technical advice to government and other organizations, in order to inform and assist decision making processes and implement sustainable environmental management strategies. Five Research Officers, two Research Assistants, a Word Processing Operator and two Labourers contributed to the strength of the division. During this period the division carried out five research projects related to the environmental management and the aquatic health, a project to cater to emergency situations such as fish kills and pollution and a project to improve the quality of the laboratory.

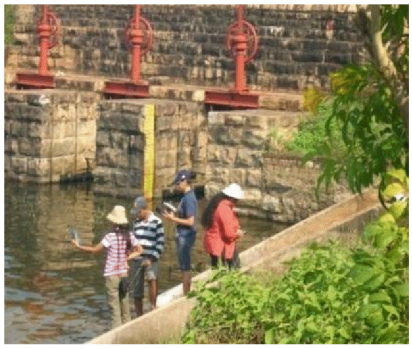
Program		Project	Allocation (Rs .Mn.)	Officer Responsible	Period	
					From	To
1	Environment	2.1 Study on Baseline Environmental Conditions in selected Inland waters (A study on Chronic Kidney Disease)	1.2	S.A.M. Azmy K.A.W. S. Weerasekara C.Wickramarathne N.D.Hettige A.A.D. Amaratunga	Feb 2011	Dec 2011
2	Environment	2.2 Status, Present Trends, and Assessment of Aquatic Health of the River Basins – Kalu Ganga	2.0	A.A.D. Amaratunga K.A.W. S. Weerasekara S.A.M. Azmy C.Wickramarathne N.D.Hettige	Jan 2011	May 2011
3	Environment	2.4 Assessment of Pollution Conditions of Coastal Waters including Lagoons - Lunawa Lagoon	0.7	K.A.W. S. Weerasekara A.A.D. Amaratunga S.A.M. Azmy C.Wickramarathne N.D.Hettige	March 2011	May 2011

4	Environment	2.5 Assessing environmental damage caused by emergencies such as Fish mortality, oil spills, harmful algal blooms, pollution incident and short term pollution study on industrial sector	0.6	S.A.M. Azmy A.A.D. Amaratunga K.A.W. S. Weerasekara C.Wickramarathne N.D.Hettige	Jan 2011	Dec 2011
5	Capacity Building and Human Resource Development	10.11 Laboratory improvement to comply with international standards	1.0	S.A.M. Azmy A.A.D. Amaratunga K.A.W. S. Weerasekara C.Wickramarathne N.D.Hettige	Jan 2011	Dec 2011

Performance

Project 1: Study on Baseline Environmental Conditions in selected Inland waters (A study on Chronic Kidney DISEASE)

There has been a rapid increase of the patients suffering from Chronic Kidney Disease in Sri Lanka. Majority of the cases are reported from the Dry zone, especially from Anuradhapura districts. As this is having heavy impacts on the social, economical and environmental aspects of the country, it was considered important to identify the cause for the above problem. Therefore, this project was carried out with the aim to assess the quality of water in four main reservoirs that supply water to the Anuradhapura district. Water quality parameters including nutrients and heavy metals are quantified and any abnormalities will be recorded. Finally project completion report was written.



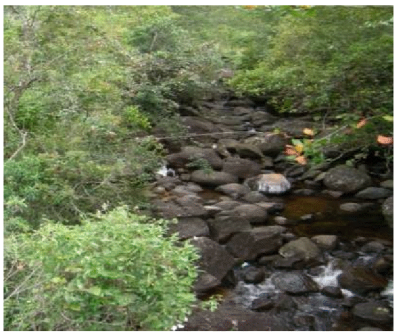
Plates showing the project high lights

Progress (%): Financial: 89% Physical: 85%

Project 2: Status, Present Trends, and Assessment of Aquatic Health of the River Basins – Kalu Ganga

Basic objective of the study was to identify the health of the aquatic environment by the identification of factors contributing to the deterioration of the quality of aquatic environment and assessing the present status of the water bodies in terms of pollution loadings, sediment, and nutrient accumulation. However this project is now on hold since management instructed to terminate the activities. Field visits, sample collection and analysis were carried out from February to May. However, this project was terminated by the NARA management since May 2011.

During the study period, water quality investigations were done for various water quality parameters and it was revealed that it is more likely to contain pristine water. Prevailing climatic condition and suitable land use pattern indicates a good possibility for ornamental fish industry.

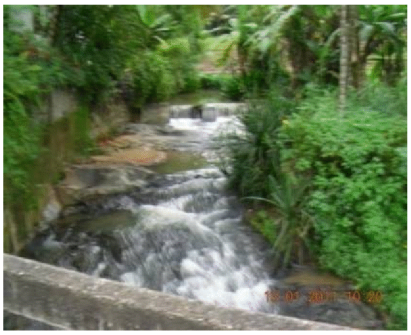


Plates showing ecosystem status at Kalu Ganga catchments

Progress (%): Financial: 63% Physical: 80%

Project 3: Assessment of Pollution Conditions of Coastal Waters including Lagoons - Lunawa Lagoon

The effluent from most of the industries and waste water from houses are discharged into the storm water drains and canals around Lunawa lagoon without any treatment. The shanty dwellers living along canal banks do not have proper sanitary facilities and toilet wastes are directly discharged to the canals without treatment.


Plates showing condition in Lunawa lagoon system

Progress (%):- Financial: 34 % Physical: 60 %

The project was aimed to determine the water quality within the lagoon and identifying source points of pollution. The results can be used to develop management plans for the lagoon to conserve biodiversity however this project was on hold since management instructed to discontinue the project from May 2011. Thus, field visits, sample collection and analysis were carried out from February to May.

Project 4: Assessing environmental damage caused by emergencies such as fish mortality, oil spills, harmful algal blooms, pollution incident and short term pollution study on industrial sector

The objective of the study was to assess and investigate the causes for emergency situations in terms of water pollution, oil spills, fish kill incidents and algal blooms etc. and finally giving recommendations to overcome the situation. Seven fish kill incidents in Thalan Lagoon (Bentota), Siyambalagamuwa Reservoir, Dadugan Oya, Diyawanna Oya, and Beira Lake were inspected by the division in cooperation with the Inland Aquatic Resources and Aquaculture division. It was determined that majority of the fish kills occurred due to poor health conditions. Field visits, sample collection and sample analysis were carried out and the resulting internal reports with suitable recommendations were sent to the relevant authorities.

Plates showing inspection studies on fish kills incidents

Progress (%): Financial: 100% Physical: 100%

Water Body	Causes	Remedies
Thalan Lagoon	The levels of pollution owing to the increase of unionized ammonia, low dissolved oxygen and nitrite has resulted pathological effects in the gill tissue. EUS (Epizootic Ulcerative Syndrome) was identified.	Open sluice gate across the Dunkolawatta–Ela and Open the mouth of the Dunkolawatta–Ela for better water circulation. Increase awareness of people about best land use practices in the catchment

Siyambalagamuwa Reservoir	Ammonical Nitrogen, pH, Bio Chemical Oxygen Demand, Total Dissolved solids, Turbidity levels which did not comply with the standard limits for the survival limits of fish and aquatic life were recorded during the investigations. The disease is suspected as Episootic Ulserative Syndrom (EUS).	Enforce existing environmental regulations to overcome discharge of sediments and pollutants by anthropogenic activities in the area
Dadugan Oya	High Ammoniacal _ N levels Low dissolved oxygen levels in the water which is below the acceptable limits for survival of fish and aquatic life.	The canal should be rehabilitated by uprooting high aquatic plant densities
Diyawanna Oya	Low dissolved oxygen levels in the water which is below the acceptable limits for survival of fish and aquatic life.	Water pollutant sources, which discharged pollutants into the inland waters directly or indirectly, should be identified through proper monitoring programs & actions should be taken to prevent further damage to the water bodies. Avoid discharging of untreated water or prevent discharging effluents into water bodies which do not follow the guidelines and general standards limits for discharge of effluents into inland surface waters using recommended dilution factors.
Beira Lake	Ammonical-Nitrogen, Biochemical Oxygen Demand and the phosphate levels at some locations did not comply with the standard limits for the survival limits of fish and aquatic life were recorded during the investigations. Fish didn't have external lesions leading to speculate that the mortality was due to any disease condition. Eutrophic conditions are reasons for this situation.	Water pollutant sources, which discharged pollutants into the Lake directly or indirectly, should be identified through proper monitoring programs and actions should be taken to prevent further damage to the water bodies.

Project 5 : Capacity and human resource development

The objective of the project was to cater the improvement of laboratory facilities and to transform the present laboratory into a full-fledged accredited water quality and environmental laboratory through a series of improvement programs on step by step basis. As an initial stage, consultant was selected by quotations to implement to obtain the ISO 17025. Several internal meetings were conducted by the consultant as an initial stage. In addition, eleven test services were offered during the period.
Initially, between 2009-2010, lab cupboards were ordered through quotations. However, during the reception of the ordered goods, they were rejected due to not complying with the specifications. New quotations have been called and three quotations are being reviewed and evaluated for the purchasing of the lab products. However it also failed due to the high cost (Rs.8.0 million) to be incurred.

Furthermore, regular meetings are being carried out with the ISO consultants with regards to the development of the lab facilities. Currently arrangements for the purchasing of Digital thermometer and humidity meter are ongoing as a requirement of the ISO 17025. Additionally, quotation calling for calibrate the laboratory instruments and inter laboratory comparison of analysis of ten selected parameters is in progress.

Progress (%): Financial: 46 % Physical: 60 %

During this period, Research Officers participated in six rapid assessments surveys apart from above research projects such as current status of water quality in Puttalam Lagoon, water quality status of the Giant's Tank in Mannar, water quality status of the Akurala water bodies, water quality Status of the Pambala-Chilaw Lagoon and water quality status of the Sea Cucumber Resource survey off the North Coast of Sri Lanka.

Project 6:Current status of water quality in Puttalam Lagoon (in April 2011)

This short report was done by the division consequent to the request made by Dr. Hiran W.Jayewardena /Chairman, NARA to find out the possibility to conserve the Islands located in Puttalam Lagoon as sensitive habitats. Therefore, this rapid appraisal study was conducted to investigate the existing environment of the Lagoon area with special reference to water quality.

Therefore, the main objective of this study was to find out current status of water quality of the islands located in the Puttalam Lagoon.

Plates showing Putttalam lagoon Ecosystem

The study showed that the water quality parameters measured i.e. pH, Dissolved Oxygen levels, Chlorophyll-a and nutrients are within the accepted limits for the fish and aquatic life. However, total suspended solids, turbidity and total dissolved solids concentrations were showed considerably high values. Therefore, it would bring negative impact to aquatic fauna in the lagoon. Also, in some places high chlorophyll-a

values and dissolved phosphate concentrations were recorded reflecting meso-trophic conditions.

Changes in pollutant inputs and runoff from land could adversely affect the water quality of the lagoon. Aquaculture farm effluents could also bring detrimental impacts.

Project 7: Initial Environmental Examination on Air Taxi operations out of Negombo lagoon- June 2011

This report was prepared by National Aquatic Resources Research and Development Agency following a request from Sri Lankan Airlines Limited. This, according to the information provided to us, has been necessary as the earlier clearance given by the Central Environmental Authority appears to be unacceptable to some of the users and community living around the Negombo Lagoon.

The operations of the Sea Planes in the Negombo Lagoon involve take off and landing in an area of the lagoon close to the Colombo- Katunayake- Puttalam Road and is in close proximity to the Bandaranaike International Airport from and to which the Float Plane passengers will utilize the operations of the Float Planes.

The report has considered the existing environment of the Lagoon area where the communities of local residents, fisher-folk and other communities depend on the Negombo lagoon for their livelihood activities. The factors considered within in this study include inputs of existing fisheries, socioeconomic status, sea grasses, planktons and water quality.

Further, the operation and the construction and dredging to obtain the required depth for the operations have been considered.

Impacts of the operations on the natural environment as well as on the community have been considered, based on interviews with the community and an analysis of likely impacts.

Below mitigatory measures have been proposed;

a) This project should be implemented within the Negombo Lagoon only after detailed discussions with the local community, including fisheries cooperatives societies and community based organizations.
b) The main apprehensions and doubts should be addressed through frank and transparent exchange of ideas.
c) With Close proximity to the airport, this is an ideal location for floatplane operations, provided the community is satisfied in the larger national interest.
d) A written agreement between Sri Lankan Airlines and a representative organization of (a) above addressing mutual requirements and concerns is recommended. This may address possible loss of livelihoods, loss of income and other issues and an acceptable compensation package should be developed.
e) The Ministry/Department of Fisheries may be asked to facilitate the agreement.
f) If agreement is reached the following measures are recommended.
g) Seaplanes should not discharge any solid or liquid waste at any time into the lagoon.

h) An Area ten times the wing span of the float plane should be restricted at the time of landing and takeoff.
i) Use of a picket boat at the time of landing, pick up and taxiing
j) Establishment and maintenance of a small watch tower in the lagoon adjacent to the runway, which could be used to serve security purposes as well as to ensure the safety of fishermen
k) If refueling is to take place in the lagoon, it should be done under strict operation procedures appropriate safety kits and spill kits should be located on the pontoon at the refueling point. This will ensure the minimum impact on water quality during refueling operations. Maintenance work on seaplane should not be allowed in the lagoon area.

This assessment was carried out in coordination with other divisions of NARA.

Project 8: Water Quality Status of Giant's Tank, Mannar - June 2011


Plates showing the Giant's tank ecosystem and fishing activism

The aim of this study was to assess the sustainability of the ecosystem within and surrounding the Giant's tank in related to water quality. Water quality parameters are an important observation that would reveal the current conditions within a catchment and would assist in understanding the potential impacts on the system if the conditions are to be changed. Hence, this study is an attempt to understand how the water quality within the system may be altered if industrial development activities such as eco-tourism or aquaculture are to be initiated within the vicinity of Giant's Tank. Most of the water quality parameters were either slightly above or in align with the ideal range or the maximum levels proposed by the CEA as the ambient water quality standards for the aquatic life in the inland waters of Sri Lanka. Hence, the proposal to initiate eco-tourism or education centre based on the Giant's Tank should be reconsidered as the particular eco-system may be vulnerable to additional developments. The information gathered from the Irrigation Department also revealed that the ecosystem is at the highest level of self-sustenance and therefore, may be sensitive to disturbances.

However, the water quality results were based only on a single preliminary study carried out during the month of June and therefore, would not give a thorough idea of the system which could be subjected to seasonal and other numerous environmental changes. Hence, a comprehensive study is required to further support the above results. This assessment was collaboratively done with other divisions of NARA.

Project 9: Water Quality Status of Akurala water bodies- August 2011

Akurala is a coastal village in the Galle district which was once famous for its lime industry. The villagers have been engaged in mining both the seabed and the landside for lime stones for generations. The aim of this study was to assess the sustainability of the ecosystem within and surrounding the Akurala coastal lagoon system at present in related to water quality within the system. Water quality parameters are an important observation that would reveal the current conditions within a catchment and would assist in understanding the potential impacts on the system if the conditions are to be changed. Hence, this study is an attempt to understand how the water quality of the system may be altered if the area is to be rehabilitated for commercial utilization.

The DO values obtained from the Akurala samples were lower than the minimum DO concentration required for aquatic life as proposed by the CEA at most of the sites. The reason for pH Values observed at sample points could be due to the presence of limestone generation activities by villagers. The observation of fish communities was rare at the duration of sampling. Hence, the proposal to initiate re-habilitation and utilization based on Akurala area such as a water related theme park should be reconsidered as the particular eco-system may be vulnerable to additional developments.

It should be noted that the following results are based only on a single preliminary study carried out during the month of August and therefore, would not give a thorough idea of the system which could be subjected to seasonal and other numerous environmental changes. Hence, a comprehensive study is required to further support the above results.

This assessment was carried out in coordination with other divisions of NARA.

Plates showing the Akurala water body

Project 10: Water Quality Status of the Pambala-Chilaw Lagoon - September 2011

This report has been prepared by the instructions given by the Hon. Minister Dr. Rajitha Senaratne, with regards to the article published on the Lakbima newspaper, dated 19th of August 2011 on the health of the Pambala Lagoon. The fishermen community state that the catch per day has decreased from 25 kg to 2 kg since three years back (Lakbima 2011). Accordingly, a research team from NARA visited the site on the 9th of September 2011. The discussions with people in the vicinity were carried out and some physical observations and in-situ measurements of water quality were made. Several samples of water were collected for further investigations.

The observations made at the site and the resulting water quality analysis conducted revealed that the conditions persisting in the Pamabala-Chillaw Lagoon is possibly related to nutrient enrichment. During the dry periods extending from August to October, the water level in the lagoon drops. This could be leading to the concentration of nutrients within the system resulting deteriorated water quality.

Remediation measures include dredging which would remove the nutrient rich sediments collected at the bottom and would assist the deepening of the water column to allow thermal stratification. This would limit the nutrient movement from deep-water areas to the surface waters. Dredging in areas of rooted aquatic plants can control their growth through direct removal and can also limit the future re growth if the new water depths are deeper than sunlight can reach. Furthermore, better management and legal strategies should be implemented to control the effluent removal from industries such as prawn farming and agriculture. Land use changes that are taking place within the vicinity should be prevented in order to conserve the mangrove habitats and to reduce the runoff entering the lagoon.

Plate showing decomposing organic matter, black ooze at Pambala Lagoon

This assessment was carried out in coordination with other divisions of NARA.

Project 11: Water Quality Status for assessment of the sea cucumber Resources off the North Coast of Sri Lanka- October 2011

Sea cucumbers require live sand, very high water quality and a friendly community of fish that are not aggressive and will not scavenge and possibly try to eat the sea cucumber (Nicole Papagiorgio, 2011). Therefore water quality management and environmental monitoring are important for the survival of sea cucumber species.

The aim of this study was to assess the abundance and distribution of major sea cucumber species off the north coast in Sri Lanka. Water quality parameters and benthic ecology are an important observation that would reveal the current conditions for sea cucumber distribution. Hence, this research is an attempt to understand how the water quality and benthic ecology within the coast may be altered abundance and distribution of sea cucumber species.

Plates showing some observed sea cucumber species during the survey

Most of the water quality parameters such as pH, salinity, water temperature and ammonical-nitrogen were either slightly above or in aligns with the ideal range or the maximum levels from the recommended values. Hence, the proposal to initiate sea cucumber farming should be carried out off the north coast of Sri Lanka.

The following results are based only on a single preliminary study carried out during the two days of August. This period is off season for sea cucumber species off the north coast of Sri Lanka according to the experience of fishermen and therefore, would not give a thorough idea of the survey which could be subjected to seasonal and other numerous environmental changes. Hence, a comprehensive study at season is required to further support the above results.

During this period, Research Officers participated in several scoping meetings related to EIA and IEE projects conducted by the Central Environmental authority and the Coast Conservation Department to advise on management and conservation of aquatic resources.

This assessment was carried out in coordination with other divisions of NARA.

Project 12: Environmental monitoring around the drilling locations in SL-2007-01-001 block, Gulf of Mannar – October 2011

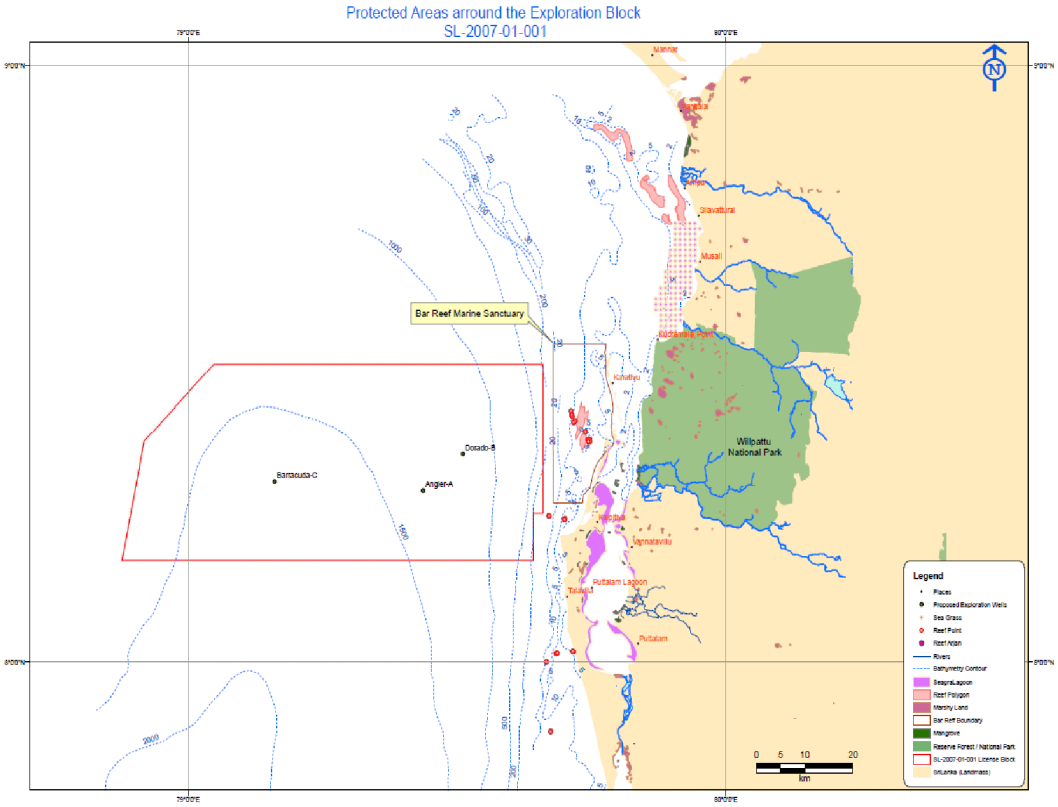
The National Aquatic Resources Research & Development Agency (NARA) has been appointed by the Marine Environment Protection Authority (MEPA) as the recognized institution for environmental impact monitoring during the proposed offshore drilling in SL-2007-01-001 block. One of the main roles that NARA has been assigned in this regard is to carry out the baseline studies pre and post drilling operations to determine the change in marine environment, if there is any. The Head/ESD was the coordinator of this project and was on board the drilling vessel in the Gulf of Mannar on several occasions during the drilling program for three wells by the drilling vessel-DV-Chikyu from Japan. On board, offshore and costal environmental monitoring was done by NARA.

As requested, the environmental factors considered in this study include seawater quality, fish tissue quality, coral and mangrove diversity and zooplankton diversity. This assessment was carried out in coordination with other divisions of NARA. Therefore the main task of environmental studies division was to assess the water quality of samples collected at 3 different depths, at 1m (surface), at 20m (middle) and at 50m (bottom) in the Gulf of Mannar region before the commencement of the drilling of the first well. These results represent the samples collected from the location "Dorado" (Latitude: 08° 20' 53.633" N, Longitude: 79° 30' 41.845" E). This is the site of the first exploratory drilling site.

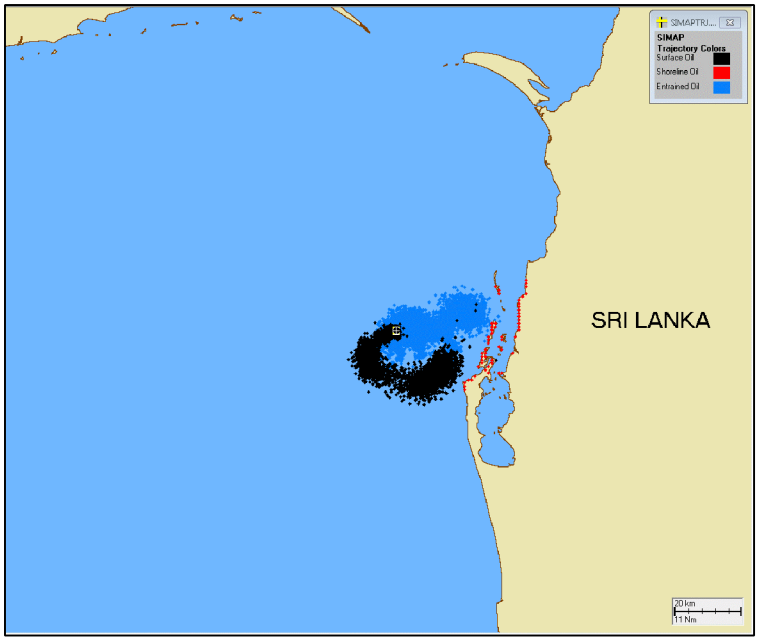
It was identified that, most of the water quality parameters, nutrient levels are below or within the acceptable levels as defined in literature (BOBLME 2011, Sondervan 2001). However, free ammonia and COD levels slightly exceeded the standard levels and this could be due to the high organic contents present due to strong mixing under the prevailing weather conditions at the time of sample collection. The targeted trace elements were undetected except for copper which was at the maximum acceptable level.

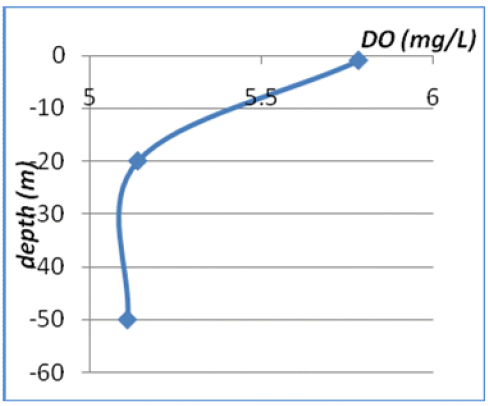
In addition to the analysis of water and fish tissue samples, NARA was entrusted with the task of supervising and certifying the sampling analysis being done independently by SGS Lanka (PVT) Ltd. NARA personnel including the team leader visited the premises of SGS Lanka (PVT) Ltd. and inspected the facilities and procedures being adopted for the analysis. Further, NARA personnel on board the drilling vessel D/V-Chikyu which is currently drilling for petroleum in the Gulf of Mannar at the said locations, have supervised the sampling, fixing, storage and transportation of bilge water and sewage samples from the ship prior to transfer to the laboratories of SGS Lanka (PVT) Ltd. in Colombo. It was found that the procedures conformed to standard procedures of sampling and analysis.

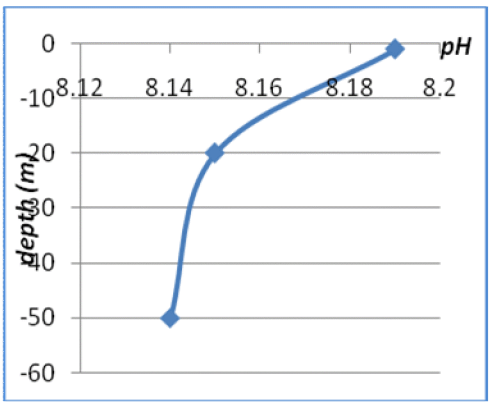
Map of oil exploration sites and adjacent coastal areas



Map showing likely path of oil during an accident







Figures showing variation of DO with depth and variation of pH with depth

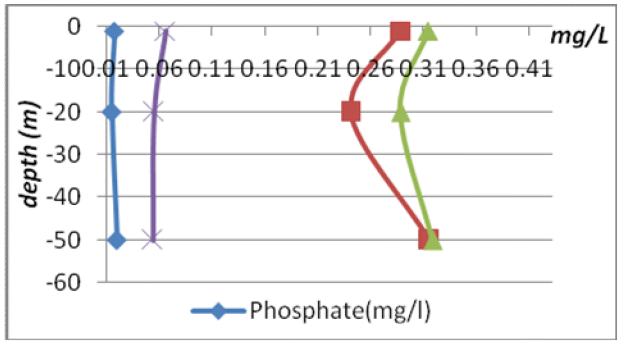


Figure showing variation of phosphate, nitrate, silicate and free ammonia concentrations with depth

Meetings Attended during the period

1. Meeting on increase of density of fish in Bogambara Lake in Kandy
2. Scoping committee meeting for proposed hotel project at Mahapalana – Kosgoda
3. Final forum of stakeholders – MFF funded project implemented at Maha Oya by Environmental Foundation
4. Meeting on proposed 151 roomed hotel project Kudawaskaduwa -Waskaduwa ,kalutara
5. Meeting on proposed sea sand processing project at Kerawalapitiya
6. Implementation of Strategic Management System
7. National project Steering Committee participatory coastal zone restoration and sustainable management in the Eastern province of post tsunami Sri Lanka
8. Meeting on Environmental Impact Monitoring and Laboratory Testing – exploratory drilling project at block SL-2007-01-01-001 in Gulf of Mannar
9. Field inspection on proposed Koggala eco five star villa resort Malkabana,Koggala
10. Technical Evaluation Committee meeting for Initial Environmental Examination on proposed 92 roomed for four star hotel project at Palana,Weligama
11. Meeting on proposed 50 villas and 410 roomed 05 star Deluxe hotel project Chitragala, Hambantota
12. Meeting on proposed 35 storied luxury hotel and mixed development project with 650 roomed and 300 apartments – in front of Gall Face Green, Colombo 01

13. Scoping committee meeting for an Initial Environmental Examination on proposed 98 roomed 03 star sanctuary resort and SPA – Kahandamordara,Tangalle
14. Inspection of proposed development sites for hotel projects
15. Scoping committee meeting for an Environmental Impact Assessment on proposed 190 rooms hotel project – Sanathoduwa , Mukkuthoduwawa
16. Meeting for an Initial Environmental Examination on proposed 350 roomed 3 star city hotel project with Damro show room – Kollupitiya,Colombo 03.
17. Consultative work shop on preparation fauna and flora inventories for the identified key eco systems
18. Field inspection on Ratmalana to inspect fish ponds to control of algae
19. Scoping committee meeting for an Initial Environmental Examination on proposed 50 roomed hotel project and 20 luxury villa project Punniyakuda, Batticaloa
20. Work shop on effluent discharge standards for sea outfalls
21. Workshop on third national symposium on disaster risk reduction and climate change adaptation
22. Workshop on UNDAC disaster response preparedness mission
23. Initial meeting on proposed mineral sand mining project along the coastal stretch of Mannar Island
24. Steering Committee on post tsunami coastal rehabilitation and resource management programme
25. Scoping committee meeting on proposed waste water collection treatment and disposal system for Hambantota new townships
26. User seminar for agricultural scientists/academics in agricultural information network (AGRINET)
27. Field inspection of the Colombo – Katunayake express way project

Publications

Public awareness – Posters

1. Importance of Water Quality Management
2. Environmental Studies Division - NARA

Project completion reports

1. Project completion report on Study on Baseline Environmental Conditions in selected Inland waters in North Central Province - 2011
   N.D. Hettige, C.Wickramarathne, K.A.W. S. Weerasekara, S.A.M. Azmy, A.A.D. Amaratunga

Fish kills investigation reports

1. Internal report on fish kill incident at Thalan Lagoon
   S.A.M. Azmy, C. Wickramarathna, B.R.C. Mendis (April 2011)
2. Internal report on fish kill incident at Dandugan Oya
   B.R.C. Mendis (May 2011)
3. Internal report on fish kill incident at Diyawannawa
   N.D. Hettige, B.R.C. Mendis (June 2011)
4. Internal report on fish kill incident at Siyabalagamuwa reservoir
   K.A.W.S. Weerasekara, P.P.M. Heenatigala(June 2011)
5. Internal report on fish kill incident at Thalan Lagoon
   W. Rajapakse, K.A.W. S. Weerasekara (June 2011)

6. Internal report on fish kill incident at Beire Lake
   K.A.W.S. Weerasekara, N.D. Hettige, P.P.M. Heenatigala (October 2011)
7. Internal report on fish kill incident at Beire Lake
   N.D. Hettige, S. Epasinghe (December 2011)

Rapid assessments survey reports

1. Current Status of Water Quality in Puttalam Lagoon-April 2011
   K.A.W.S. Weerasekara , A.A.D. Amarathunga, S.A.M. Azmy
2. Water Quality Status of Giant's Tank, Mannar - June 2011
   C. Wickramarathna and N.D. Hettige
3. Water Quality Status of Akurala Water Bodies- August 2011
   N.D. Hettige, C. Wickramarathna
4. Water Quality Status of the Pambala-Chillaw Lagoon - September 2011
   C. Wickramarathna
5. Water Quality Status for assessment of the sea cucumber Resources off the North Coast of Sri Lanka- October 2011
   S.A.M. Azmy, K.A.W.S. Weerasekara, N.D. Hettige

External Reports

1. Initial Environmental Examination on Air Taxi operations out of Negombo lagoon- June 2011
   S.A.M. Azmy, A.A.D. Amarathunga , K.A.W. S. Weerasekara ,W.D.N. Wickramaarachchi (As a contributor)
2. Environmental monitoring around the drilling locations in sl-2007-01-001 block, Gulf of Mannar – October 2011
   S.A.M. Azmy, A.A.D. Amarathunga, K.A.W. S .Weerasekara , C. Wickramarathna, N.D. Hettige (As a contributor)
3. Travel report on Training on Communicating Science Effectively. Training on scientific presentation on 11-15 October 2011 in Male, Maldives.
   - K.A.W. S. Weerasekara

Reports submitted as a partial fulfillment of IOMAC-ONs course on Integrated Marine Affairs Management (August 2011)

1. Review of Steps to prevent marine pollution in Sri Lanka by K.A.W. S. Weerasekara
2. Development of Sustainable whale watching in Sri Lanka by C. Wickramarathna
3. Marine protected area management in Sri Lanka by N.D. Hettige

Trainings obtained

Local

1.Helicopter under water escape Training (HUET) at Sri Lanka Air Force (SLAF)-July 2011 -S.A.M. Azmy

2.IOMAC -ONS Certificate course on Integrated Marine affairs Management- August 2011 A.A.D. Amarathunga, K.A.W. S. Weerasekara , C. Wickramarathna, N.D. Hettige

Foreign

Training on Communicating Science Effectively. Training on scientific presentation on 11-15 October 2011 in Male, Maldives- K.A.W. S. Weerasekara

5.2 FISHING TECHNOLOGY UNIT

Head of the Unit: N.B.P.Punyadewa

Project 1: Deploying, Monitoring and promoting the use of Fish Aggregating Devises (FADs) and Fish Enhancing Devises (FEDs) for small scale enterprises to increase the fish production in coastal waters of Sri Lanka.

Activities:

Fishermen were interviewed and the suitable area was identified to deploy the fish aggregating devises. Designs of the fish aggregating devises were completed. Four fish aggregating devises were deployed. First two were deployed in April and other two FAD s were deployed in the month of May. Due to monsoon period from mid May to September field activities were done.

Performance

The project activities, constructing bamboo FADs were completed the month of March. Deploying of the two FADs were done in April. Experimental fishing associated with FADs were started in mid May 2011. Under this project experimental fishing FADs designs were completed. Suitable fishing areas for deploying were identified with discussion with the fishermen. Due to monsoon period several scheduled field visits were not done. After the Monsoon period two fads were damaged by the strong currents of the area. Catch data were obtained from the fishermen who are operated their fishing activities associated with the FADs.

Progress (%):- Financial: 95 % Physical: 90 %

Publications

4.1 Research Report:

Deploying, Monitoring and promoting the use of Fish Aggregating Devises (FADs) and Fish Enhancing Devises (FEDs) for small scale enterprises to increase the fish production in coastal waters of Sri Lanka.

Training / Awareness programmes conducted

Meetings were arranged with, Fisheries Inspectors and fishermen of in the fishing area.

Constrain

Most field visits were cancelled due to lack of vehicles and experimental fishing trials were not carried out due to monsoon.

5.3 NATIONAL HYDROGRAPHIC OFFICE

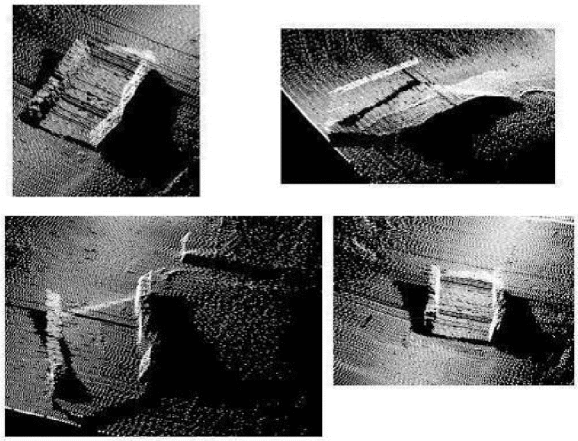
Head of the Division : M.A. Ariyawansa

Overview of the Year

National Hydrographic Office's prime objective is to provide services to assist safe and efficient navigation. The principal services are the provision of up dated and accurate nautical information and other data for coastal zone management, environmental protection and maritime delimitation. The provision of accurate and up to date charts offers significant economic and commercial benefits through facilitation of maritime trade and other marine activities.

For the year 2011 the following surveys and activities were conducted.

1.Produce nautical chart Approach to Hambantota International Harbour,
2.Conducting Bathymetric Survey of Trincomalee Harbour
3.Establishment of Marine Spatial Data Infrastructure
4.Surveys conducted for special request
  4.1Nautical Chart – Approaches to Norochcholai coal power plant for Ceylon Shipping Corporation
  4.2Bathymetric survey of Dikovita Harbour for Cey-Nor foundation
  4.3Bathymetric survey across the Sinker Line at Kerawalapitiya for Dredging International
  4.4Sinker Line Bathymetric survey at Dikovita for Dredging International Welfare
  4.5Bed leveling survey Ma Oya for Environmental Foundation Ltd.
  4.6Hydrographic training program for fisheries officers from Maldives
5.Special surveys undertaken for NARA research & development work
  5.1 Wreck survey at Trincomalee and Batticaloa
  5.2 Kapparatota Research Regional Center (RRC) Development survey
  5.3 Kalpitiya RRC Development Survey
  5.4 Land for NARA RRC at Jaffna
  5.5 Land for NARA RRC at Trincomalee
  5.6 Topographic survey at Magama, Kirinda
  5.7 Demarcation survey at Akurala
  5.8 Monitoring of Shore line changes (from Suduwella to Patalangala)

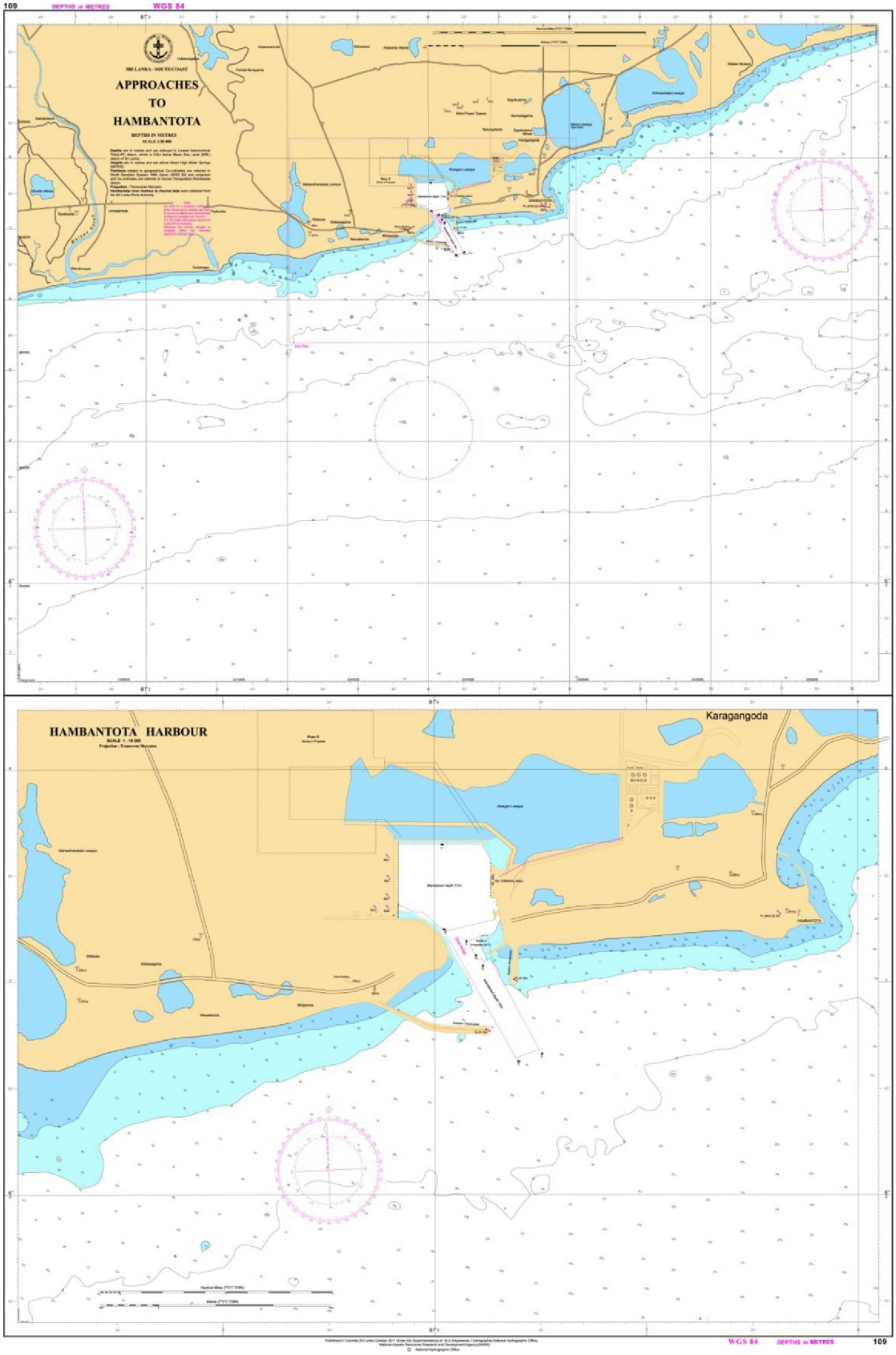


Wreck of Floating Deck at Trincomalee (Multibeam survey in 2011)

Activities undertaken

Program	No.	Project	Officer responsible	Period
1National Nautical Charting	1.1 1.2 1.3	Data Acquisition of Hambantota (remaining work of 2010) Data Acquisition of Trincomalee Harbour Data processing and Cartography	A.N.D. Perera R.H.P. Weligodapitiya C.K. Amarasinghe S.W.S.Weerasinghe	Jan-Feb.
2.Establishment of Marine Spatial Data Infrastructure(MSDI)	2.1	Identify available data, data standardization, define data format, define meta data format, define data collecting methods	R.K. Ariyaratne W.A.A.P. Wijesundera	Jan-Dec
3.Surveys conducted for special request	3.1 3.2 3.3 3.4 3.5	Nautical Chart – Approaches to Norochcholai coal power plant Bathymetric survey of Dikovita Harbour Bathymetric survey across the Sinker Line at Kerawelapitiya. Bathymatric survey at Chirativu (Jaffna) Bed leveling survey Ma Oya	A.N.D. Perera R.H.P. Weligodapitiya C.K. Amarasinghe S.W.S.Weerasinghe	Jan-Dec
4.Special surveys undertaken for NARA Research work	4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8	Wreck survey at Trincomalee and Batticaloa Kapparatota RRC Development survey Kalpitiya RRC Development Survey Land for NARA RRC at Jaffna Land for NARA RRC at Trincomalee Topographic Survey at Magama, Kirinda Demarcation Survey at Akurala Monitoraing of shore line changes (from Suduwella to Patalangala)	A.N.D. Perera R.H.P. Weligodapitiya C.K. Amarasinghe S.W.S.Weerasinghe	Jan-Dec
5.Trainingg program	5.1	Hydrographic training for Maldivians	M.A.Ariyavansa A.N.D.Perera S.R.C.S.Ranawera C.K.Amarasingha	Sep -Oct

Nautical Chart – Approaches to Hambantota



Performance

Project 1: Data Acquisition of Hambantota

(remaining work of 2010) 15% of the remaining surveys has completed and nautical chart of approaches to Hambantota Harbour is produced. This is a mandatory requirement to full fill obligation of coastal nation enforce by SOLAS (Safety of Life at Sea) convention to provide safety information to mariners.

Progress (%) Physical: - 100% Financial: - `100%

Project 1.2: Data Acquisition of Trincomalee Harbour

The Nautical Chart has been designed to approach to the Trincomalee Harbour from the International Sea Route. All bathymetric data has been incorporated to the bathymetric data base of NHO. Producing of sea chart is fulfillment of one of the requirement of International Maritime Organization's SOLAS Convention (Field work interrupted due to bad sea condition and delayed due to unavailability of allocated funds in time).

Progress (%) Physical: - 70% Financial: - 100%

Project 1.3: Data processing and Cartography

Cartographic work related to production of the nautical chart of approaches to Hambantota Harbour is completed.

Progress (%) Physical: - 100 % Financial: 100%

Project 2.1: Marine Spatial Data Infrastructure MSDI

Identify available data, data standardization, define data format, define meta data format, define data collecting

Progress (%) Physical: - 80% Financial:- 100 %

Project 3.0: Surveys conducted for special request from Government and other institutions

3.1 Nautical Chart – Approache to Norochcholai coal power plant , acquire Bathymatric data and processed data to produce a Nautical chart to approach to Norochcholai anchorage and handle barges to transport coal to plant.

3.2 Bathymetric survey was conducted for Dikovita Harbour to acquire Bathymatric data for numerical modeling to design back water for local fishing community to develop landing site at Dikovita .

3.3 Sinker Line Bathymatric survey at Dikovita – Bathymatric surveys were conducted using dual frequency echo-sounder to trace buried pipe connected to land which should be used by dredge.

3.4 Bathymatric survey at Chirativu, Surveys were conducted around the island to demarcate high water line and contour map for the Ministry of Social Services and Social Welfare to develop the island as a tourist destination.

3.5 Bed Leveling survey Ma Oya was conducted for environmental Foundation limited for comprehensive study of issues related to sand mining.

Project 4.1 – 4.8: Special surveys undertaken for NARA research work

Wreck survey at Trincomalee and Batticaloa to incorporate data to MSDI Surveys conducted at Kapparatota & Kalpitiya RRC to prepare necessary infrastructure development plan and Land for NARA RRC at Jaffna.

Progress (%) Physical: - 100 % Financial:-100%

Project 5.1: Hydrographic training

Hydrographic training was conducted for Maldivians fisheries officers by NHO to cover basic theoretical at NHO/NARA and practical training on board " Tharanga " included topographic , single beam, Multi beam data acquisition and post processing to map production.

Progress(%) Physical: - 100 Financial:- 100

Publications / Maps

a). Nautical chart of Approaches to Hambantota Harbour
b). Nautical chart of approaches to Norochcholai coal power plant.
c). Fishery Map – Bay of Bengal Up-graded (Northern Part) for Fishing Community
d). Development proposal maps for Kapparathota & Kalpitiya Regional Research Centers.
e). Maps of Proposed Regional Research Centers in Jaffna & Trincomalee for NARA.
f). Topography & Bathymetry maps for proposed fish cage farm development at Akurala

Training / Awareness programs conducted:

Foreign Training

1. NIOHC meeting - 01 Officer
2. Hydrographic Surveying (post Graduate FIG/IHO Cat A) - 01 Officer
3. IHO training –Hydrographic Surveying - 01 Officer

Awareness Program

Routine awareness programs in Hydrographic Surveying and Chart Production for Naval Officers and Seamen

Non Scheduled Activities / Consultancies

Project	Contract Amount
Nautical Chart – Approaches to Norochcholai coal power plant	1,600,000.00
Bathymetric survey of Dikovita Harbour	500,000.00
Sinker Line Bathymatric survey at Dikovita	478,400.00
Bathymatric survey at Chirativu for Minister	684,420.00
Hydrographic training program for Fisheries officers from Maldives	847,350.00
Bed leveling survey Ma oya for Environmental Foundation Ltd.	296,400.00
	4,406,570.00

5.4 INLAND AQUATIC RESOURCES AND AQUACULTURE DIVISION

Head of the division : Dr.V.Pahalawattaarachchi

Overview of the year

The Inland Aquatic Resources and Aquaculture Division (IARAD) contributes to the fisheries sector development mainly focusing on research related to inland and brackish water aquaculture through sustainable utilization of the natural resources.

During year 2011 division has carried out 12 research projects on the following thrust areas.

Project No.	Project Name	Allocation (Rs. Mn)	Officer Responsible
2.6	Conservation of Sensitive habitats (Coral reefs, salt marshes, mangrove, sea grass etc)	0.1	A. Rajasooriya V. Pahalawattaarachchi
4.1	Mapping, culture and product development of economically important sea weed resource in Sri Lanka with community participatory approach	0.45	V. Pahalawattaarachchi
4.2	Taxonomic survey of seaweeds	0.1	U. Mallikarachchi
4.3	Technology development for selected economically important shell fish (crab) and sea cucumber species	1.4	J. Mallawaarachchi
4.4	Development of exotic and indigenous/endemic fish breeding and culture and aquatic plant propagation techniques	0.50	S. Epasinghe
4.5	Development of hatchery and culture techniques for selected marine finfish with special reference to Barramuni at Sinnapadu	0.52	P.A.D.A. Kumara
4.6	Development of Marine ornamental aquarium and experimental study of captive breeding of spiney Lobster (*P. homarus)* for stock enhancement Kapparatota	0.3	U. Liyanage
4.7	Aquatic Health management	0.03	S.Corea P. Heenatigala
4.8	Development of economically feasible feeds for ornamental and food fish species	0.75	S. Ariysratne I. Parakrama
4.9	Environmental monitoring of Negombo lagoon	0.35	M. Gammanpila
4.10	Development of breeding, culture and management of disease outbreaks of ornamental fish industry in Southern province with community participation.	0.25	W. Rajapakse
4.11	Exploitation of untapped fishery resources in reservoirs through proper management	0.40	D. A. Athukorala
	Total allocation	**5.15**	

In summary, the major outputs of the mari-culture projects carried out were Captivity breeding trails on *Holothuria scabra* and development of protocol for breeding and larval rearing techniques. Success of breeding of mud crab *Scylla serrata* has given a new pathway to establish larval rearing techniques which is the most critical part of the procedure. The culture techniques and nursery keeping of seaweeds, *K. alverezii* have been transferred to the community. Study on distribution ranges of the critically endangered endemic fish species *P. asoka* was carried out. Collection and maintenance of endemic aquatic plants, *Cryptocoryne* spp. were in progress. Thirty sea bass wild brooders were continuously reared in cages and ready to be used for breeding purposes once the hatchery starts operation for sea bass breeding.

Feed enrichment of lipid sources and different colour enhancement on growth and color development of ornamental fish species has indicated notable results.

Standing stock assessment and determination of % cover of seaweeds have been conducted in sites in North Western and Northern costs. Studies related to status of inland reservoirs have shown that most of the studied reservoirs contained sizable populations of minor cyprinids to withstand a fishery which fisherman can obtain an additional income in addition to the existing cichlid fishery. Quantitative and Qualitative study of *Vibrio* communities pond culture system of tiger shrimps reveled that the main bacterial disease conditions identified was Vibriosis. Effect of slatterns on water sources for shrimp culture studies reveled that there is a threatened for the aquatic life. Organic pollution prevailed several locations of Negombo lagoon

Performance

Project 1: Conservation of Sensitive habitats (Coral reefs, salt marshes, mangrove, sea grass etc)

Reef and sea grass communities contain high biodiversity that they have often been called the tropical rainforests of marine environments. These communities offer comfort to marine organisms and beneficial relationships with other living creatures so that they can feed and live among the sea grass beds. As there are some evidence that sea grasses are diminishing due to various anthropogenic and natural reasons monitoring of these habitats are much important in order to their sound management as well as conservation of associated valuable fauna such as fish and marine mammals. Data gathered in the first phase of the project will be used in a management and conservation of the sea grass resources from Puttalam to Mannar upper region. Sea grass beds around the islands in Puttalam lagoon were located. *Halophila ovalis* and other *Halophila* species mixed with halodule spp. were found in the periphery where the bottom is exposed in the low tide of the islands while deeper areas up to 1.5m depth occupied by *Enhaulus acroides, Cymodacea rotundata* and *Cymodacea serrulata*. Two kilometer

wide belt of sea grasses were found from Puttalam to Mannar coastal belt which is occupied by the dominant species of *Enhaulus acroides*. Mangrove profiles of the islands of the Puttalam lagoon, Kala Oya estuary and Achchankulum in Mannar were studied. Dominant species in the islands were *Avicennia marina* trees with huge basal area and stand heights. Very tall *Rhizophora* trees were located in the islands such as Periya Archchi and Sinnaarachchi. Hudge trees of *Rhizophora* with large basal area located in the Kala Oya estuary. Sparsely distributed *Pempis acidula* was found in the periphery of the islands. Salt mashes and the associated mangrove species are inhabit the middle area of the islands. Common species found Achchankulum mangrove area was *Sonneratia alba*. Mangroves in Puttalam and Mannar are usually associated with salt mashes such as *Salicornia* spp, *Sueda a*nd *Athronicum* species.

Progress (%): Physical: 80% Financial: 92%

Project 1: Mapping, culture and product development of economically important sea weed resource in Sri Lanka

Component 1: Assessment of availability of economically important seaweeds along the west coast of Sri Lanka.

Coordinates of the major seaweed beds along the North West coast in Sri Lanka was compiled. Baseline maps were prepared. The main economically important seaweed species found in Mannar coast are *Gracilaria edulis, Sargassum, Turbinaria species* and *gracillaria salicornia*. Apart from those many varieties of seaweeds are found seasonally. Highly abundant species found in Mannar (Erukakalampidy to Pallimunei) was *Ulva intestinalis. Codium geppi* was the most common species in Thevanpidy to Anpupurum during South East monsoons. Brown algae (Pheophyta) *Sargassum wigitti*, *Padina antilarum* was the most common species found in coastal areas of Mannar district. Out of red algae (Rodophyta) most economically important species found was *Gracilaria edulis* which is casted to shore in during the South East monsoons. Huge amounts of *Gracilaria* were accumulated along the costs of Mannar, Poonaryn and Kalmunei. Jania and *Acanthophora* were the most common species found during the South East monsoons. Most common green algae found in Killinochchi coastal area was *Codium geppi.* Among red algeae most dominenet species found was *G. edulis, G. salicornia, G. corticat* and *Acnthophora spp.* Most common brown algae species found in Jaffna was *Sargassum* while most common red algae was *Gracilaria salicornia.*

Progress (%): Physical: 80 Financial: 92

Project 2: Taxonomic survey of seaweeds

Progress (%): Physical 70%: Financial: 90%

Project 3: Technology development for selected economically important shell fish (crab) and sea cucumber species

Hatchery facilities developed at Kalpitiya RRC for sea cucumber breeding. Brood stocks collection, maturation and conditioning were carried out. Mass rearing of live food was performed. Different sea cucumber breeding trials were conducted at Kalpitiya RRC. Sea cucumber larvae were reared in indoor condition. Juveniles were reared in outdoor condition. Sea cucumber pens were constructed and introduced juveniles to the pen. A protocol was developed to breed *Holothuria scabra* in captive condition.

Methodology was developed to rear *Holothuria scabra* larvae in an indoor hatchery and juveniles in outdoor condition and pen culture methodology for *Holothuria scabra*.

Progress (%): Physical: 100% Financial: 60%

Project 4: Development of breeding technology for selected endemic/exotic ornamental fishes and propagation techniques for commercially important aquatic plants.

The objectives of this project were to develop breeding and culture techniques for selected endemic fishes i.e. *Garra ceylonensis*, *Schistura notostigma, Puntius asoka* and the exotic fishes i.e. *Botia macracantha* and *Labeo bicolour,* to identify different *Labeo* species in Sri Lanka through PCR techniques, to develop new strains of exotic ornamental fishes and setting up a tissue culture laboratory, collection and maintenance of *Cryptocoryne* mother plants.

Captivity breeding trails on some of important endemic fish species i. e. *Punitus bandula, P. srilankensis, P. reval, P. martenstyni, P. nigrofasciatus* and *Belontia signata* were continued through environmental manipulating procedures for which captive breeding techniques have already been developed during the last few years. Study on distribution ranges of the critically endangered endemic fish species *P. asoka* was carried out. Few individuals were collected from the wild conditioned to the NARA cement tanks. Though they were subjected to captive breeding condition trails were failure due to unknown reason. At the same time extra attempts were made to develop captivity breeding technologies for another commercially important two endemic ornamental fish species *Schistura notostigma* and *Garra ceylonensis* giving different environment condition. All were unsuccessful though environment manipulation procedure followed. Since the captivity breeding of *P. asoka* and *G. ceylonensis* was found to quite difficult and it needs further exploration on their ecological aspects in order to replicate their requirements in a non-natural condition. However, the collected information on their ecological aspects and experienced failures can be employed to develop a successful captive breeding technology in near future. New brood stocks for commercially important

endemics *Malpulutta krethsiri* and bi-colour variety of *Rasboroides vaterifloris* were collected from the wild and now being reared at NARA for future experiments.

New varieties of some commercially important fish species i.e. barb spp. ciclids spp., platy, guppy, angle, juwel, discus and gold fish were purchased and are being reared for future breeding trails as well as for new variety development. A considerable amount of time/capital was spent to establish a new hatchery with all aquarium facilities for future research and development activities. At the same time chemicals, hormones and other required materials were purchased and documented especially basically for induced breeding experiments which will be initialed in near future. The renovation work of the existing old indoor aquarium was initiated and still in progress.

A new tissue culture laboratory was temporary established at the divisional algal culture room until the exact laboratory will set up. Collection and maintenance of brood stock of *Cryptocorynes* was conducted fro the tissue culture purpose.

Progress (%): Physical: 80% Financial: 80%

Project 5: Development of hatchery and culture techniques for selected marine finfish with special reference to Barramundi at Sinnapadu

Attempts were made to initiate hatchery setup at Sinnapadu due to unavoidable reasons the attempt was futile. Despite of that the broodstock of Baramundi was reared at Negombo lagoon.

In December 2010 during rainy season the water salinity decreases up to 0 ppt, aquatic organisms use up more dissolved oxygen for respiration indicating an increase in metabolic rate. Therefore low salinity in the water would be negatively affected for the brood stock management in the present location. Nevertheless during 2011 salinity changes were not affected to the fish growth. However other physico-chemical properties are optimum for coastal aquaculture and sea bass cage culture except phosphate level in the water which was higher than standard levels. If waste material from the cage is deposited at the bottom, due to water current it would not be affected to increase the level of bottom sediment.

Progress (%): Physical: 20% Financial: 100

Project 6: Development of Marine ornamental aquarium and experimental study of captive breeding of spiney Lobster (P. homarus) for stock enhancement Kapparatota.

Since several buildings are required to start a hatchery, required buildings were acquired from the Coastal Resources Management Project which was constructed for the different purposes of the fishermen. The holding tank (concrete aquaria) was build up near to the coast at the NARA premises. Fiberglass hatchery jars for stocking and larval rearing were separated from the stock at Rekawa RRC. Water pumps, Irrigation and drainage pipes, electrical items were purchased. Pump house construction work partially completed. The project targeted to release the breeding lobsters to the Weligama bay.

Fry collection and rearing work was started with community participation. Two types of fry collection rafts which are used in Vietnam were used for the trial basis. But those rafts were found to not success and they were damaged due to rough sea condition within a short period of time. These rafts were abandoned and the repaired rafts with some modifications were deployed but not success. Plastic barrel (250 l) cages were used as a modified fry collection trap to rearing undersize lobsters. One - two months after deploying these cages with undersize lobsters, small size lobsters (2-3 cm) are settling inside these cages.

Progress (%): Physical: Financial: 92

Project 7: Aquatic Health management

Component 1. : Aquaculture management and water circulation in the Mundel –Dutch canal estuarine system with respect to current water uses

Project is a continuous one for 2 years from 2011 to 2012.

Monitoring water quality in selected farm sites, stocked with MBV positive and MBV negative larvae with details on water exchange and water treatment and observations of any disease symptoms, studying the impacts of presence of MBV on the growth of shrimp, water quality and growth monitoring in harvesting shrimp with details on management practices, water quality monitoring in Mundel–Dutch canal estuarine system in selected sites where shrimp and other industries are located and collection of data on water use by each industry on a monthly basis were the objectives of this project.

Water salinity changes were observed in areas where salterns are placed, when bittern is released. Dilution depends on the available water volume and mixing capacity of the lagoon. Bittern contains high ratio of salts other than NaCl and

some of these may be toxic to aquatic life at this high concentrations. Recorded salinity of the bittern was > 260ppt, while the salinity in the lagoon close to the discharge point varied between 180 – 250ppt. During these periods fish kills were also observed. Salterns take water 1 – 3 times per year. Salt is harvested 1-3 times annually depending on weather conditions.

Harvested water was found to contain a high level of Sulphide, ammonia, nitrite and suspended particles. The major parameters detected were ammonia 0.542-.92 mg/l, Sulphide 0.62-.96 mg/l, Nitrite 2.84 0.38 mg/l, suspended solid 44400-620 and nitrite 0.43-.76 mg/l.

Component 2: Quantitative and Qualitative study of *Vibrio* communities found in pond culture system of tiger shrimp in Sri Lanka.

The study was aim to establish the relationship between *Vibrio* (diversity and members) occurring in the shrimp pond culture systems, nutrition and water quality and the survival and health of shrimps cultured in ponds. Further to that find out geographical distribution of the *Vibrio* species and the most effective management practices and chemotherapeutant to kill those pathogenic bacteria.

Twenty farms North-western province in the country were monitored during the study. Antibiotics such as_ Oxytetracycline, Erythromycine were commonly used by farmers. As prophylactic treatments as well as for the treatments for the diseases following chemoteraputents. Other_chemicals used are EDTA and lime. Main bacterial_disease_conditions_identified_were *Vibriosis and t*otal bacterial counts (TBC) in collected water samples from farms were range from 1 x 10^3 to 3 x 10^5 cfu /ml and Total Vibrio counts TVC were ranged from 0 to 5 x10^3 cfu /ml.Four *Vibrio* species were isolated and identified during the study and those were *V.alginolyticus, V.parahaemolyticus, V. damsela* and *V. anguillarum* .In the identified bacteria, no seasonal variations or specific geographical distribution was observed with the samples analyzed. Project will be continued to next year and species confirmation of identified bacteria and antimicrobial assays will be done in 2012, when required chemicals received.

Progress (%): Physical: 75% Financial: 92%

Project 8: Development of economically feasible feeds for ornamental and food fish species

Main objective of the project was to preparation and improvement of economical feasible feed for aquaculture development (Ornamental and Food fish species). Two types of feeds with crude protein levels of 35% and 25% were prepared and enriched with different lipid sources- Feed A and B (prepared under component 1). Growth trails were

carried out in indoor tanks using feed A, B. Furthermore, feed were enriched with different colour enhancement ingredients for the betterment of ornamental fish species. Economical feed was prepared for ornamental fish (Tiger barb and Guppy) and food fish (Tilapia) and the knowledge disseminated.

Progress (%): Physical 70%: Financial: 100%

Project 9: Environmental monitoring of Negombo lagoon

The objective of this project was to monitor seasonal abundance and distributions of plankton in Negombo lagoon in relation to some physico-chemical parameters of the lagoon from January to December 2011. Zooplankton and surface water samples were collected from six sampling sites where effluent discharges to the lagoon and analyzed using standard methods.

Mean surface water salinity varied strongly and spatially from 3.45±3.91 to 19.55±7.47 ppt in Dandugam oya and Pitipana respectively. Mean dissolved oxygen ranged from 2.45±0.75 mg/l to 5.07±1.45 mg/l in Munnakkaraya and Dungalpitiya, Biological Oxygen Demand varied from 1.74±0.61mg/l in Munnakkaraya and 2.65±1.20 mg/l in Pitipana, mean water depth varied from 54.45±12.09 cm in Madabokka to 220.27±29.25 cm in Dandugam Oya while mean water turbidity ranged from 9.47±3.06 NTU in Pitipana to 14.47±8.44 NTU in Dandugam oya where the main fresh water inlet to the lagoon. Mean chlorophyll a of the sampling stations were ranged from 1.77±1.52 to 6.27±6.26 mg/m^3 in Madabokka and Pitipana veediya respectively. The mean nitrite-N varied from 0.0097±0.0097 mg/l (Munnakkaraya) to 0.0172±0.0367 mg/l (Madabokka), mean nitrate-N varied from 0.02±0.03 to 0.20±0.34 mg/l, while phosphate ranged from 0.75±0.54 mg/l (Munnakkaraya) to 1.85±3.15 mg/l (Pitipana veediya) during the study period.

Zooplanktons show that crustaceans represented the major component and ranged from 66.34 to 92.66% of the zooplankton community during investigation period. Highest percentage (11.86±24.71) and density (1219 number/l) of rotifer recorded in Munnakkaraya followed by 12.14±18.25% in Dungalpitiya, 10.53±13.96% in Hamilton canal and 10.08±8.36% in Pitipana veediya respectively. The significant and positive correlation ($P<0.05$) observed between rotifer density and amount of phosphate in Munnakkaraya (r^2 = 0.569). Highest density of molluscans (16.49%) and annelids (5.84%) were recorded in Munnakkaraya and Madabokka respectively. The nauplius larvae represented the 42.34% (Hamilton canal) to 63.70% (Munnakkaraya) of the crustacean density followed by copepods which was recorded of 35.25 % to 57.16% of the crustacean population in Munnakkaraya and Hamilton canal. Out of the copepods majority were represented by cyclopoids and calanoids ranged from 10.56±11.73 to 25.76±19.39% and 9.67±7.32 to 27.81±27.65% respectively. The significant and positive correlation ($P<0.05$) observed between water turbidity and nauplius density (r^2 = 0.569) in Dungalpitiya, whereas naupilus density positively but insignificantly correlated with

Nitrate-N (r^2 = 0.423) in Pitipana area, and negatively but insignificantly correlated with biological oxygen demand (r^2 = 0.227) in same area. Futhermore, copepodite density in Dandugam oya and Dungalpitiya area also showed a positive, but insignificant relationship with salinity (r^2 = 0.354 and r^2 = 0.380) and phosphate content in Pitipana (r^2 =0.3495).

Relatively higher amount of nutrient especially phosphate concentration and pollution indicator organisms such as rotifers showed that organic pollution in several locations of the lagoon. This is further evidence that distribution patterns of zooplankton are often influenced by environmental factors, and their distributions at some times and places and are obviously influenced by anthropogenic activities and hydrodynamic processes in the estuary.

Progress (%): Physical: 100% Financial: 99

Project 10: Development of breeding, culture and management of disease outbreaks of ornamental fish industry in Southern province with community participation.

1. More than 50 farmers engaged in ornamental industry in the region.
2. Most of them are collecting fish from outside farmers.
3. Less than 25 framers are conducting breeding and outgrow systems.
4. They have good demand for their fish in the industry.
5. Diseases are the major problem for their futhre.
6. Diseases spread by the fish purchased from out side farmers.
7. Mostly encountered parasites are , *Dactylogyrus, , Gyrodactilus* and *Trichodina*
8. Dropsy condition sever in angle fish.

Progress (%): Physical: 50% Financial: 100%

Project 11: Exploitation of untapped fishery resources in reservoirs through proper management (2010-2011).

Fishermen are not engaged in minor cyprinid fishing due to excisting fishery regulations and low demand for small sized fish species. Effective mesh sizes of gill nets to catch *Hyporhampus limbatus, Amblypharyngodon melettinu, Rasbora daniconius* was found as 12 to 15 mm streatched mesh. Effective time period and depth to catch *Hyporhampus limbatus, Amblypharyngodon melettinu, Rasbora daniconius* sps were found as 4.00 pm to 7.00 pm and 1m to 3 m respectively. It was found that no *Oreochromis* sps jeveniles caught in these fishing nets at this depth and time.

According to the data gathered from the study it was obvious that the most of the studied reservoirs contain sizable populations of minor cyprinid fish species to withstand a

profitable fishery. Introduction of minor cyprinid fishery to Sri Lankan reservoirs will help to increase the inland fish production and to get an additional income for fishermen in addition to the income get from the existing cichlid fishery.

Progress (%): Physical: 92% Financial: 69

Project 12: Establishment of ornamental fish farm- Kalutara district

Training and awareness programmes on ornamental fish farming and management were carried out in all divisional secretaries. The land was selected to acquire and the plans were made to establish a sales centre in order to develop marketing.

Progress (%): Physical: 62% Financial: 27%

Extension work:

1. Detection of disease samples brought by fish culturists and shrimp farmers and recommending treatments.
2. Dissemination of knowledge on *Macrobarchium rosenbergii* farming on request.
3. Committee member of the National Action Plan for "Haritha Lanka program".
4. Resource personal to NIFINI, University of Uva Wellassa and University of Rhuhuna, Wayamba University.
5. Aquaculture Technical committee – National Aquaculture Development Agency
6. Shrimp culture technical committee – National Aquaculture Development Agency
7. General Research committee – Sri Lanka Association for Advancement of science
8. Executive committee member – Sri Lanka Association for Fisheries and Aquatic Resources
9. Data has been used for recommendations and management of coastal lagoon environment with proper scientific background
10. Exhibits were prepared on sea grass ecosystems for "Deyata Kirula"
11. Committee member of National committee on Livestock, Fisheries and Aquaculture at CARP
12. Committee member National committee on research programs and projects at CARP.
13. Aquarium fish advisory committee member at Export Development Board.
14. Committee member of the Aquatic Animal Health task force of NACA.
15. Dissemination of knowledge on disease diagnosis and treatment for ornamental fish for the people who needs assistance and information on above.
16. Executive committee member – Sri Lanka Association for Fisheries and Aquatic Resources
17. Shrimp culture development committee – Wayamba Provincial Fisheries Authority

Other activities:

1. Undergraduate student supervision in Research projects, implant trainings and industrial trainings.
2. Supporting for procurement procedures, being members in Technical committees and Tender Boards. Supporting for Stock Verifications - .
3. Survey on Environmental and biological studies at Akurala.
4. Studies on dugong feeding habits
5. Contribution of collection and dissection of sperm whale
6. Contribution for collection of specimens of whales
7. Proposal made for community based aquaculture practices for Northern province
8. One officer actively participated to the sea weed culture program which was developed as an alternative livelihood method for the fisher community under the "Divi Neguma" programme.
9. Report on seaweed identification for Ceylon Estate Teas PVT Ltd.,
10. Also contributed to the sea weed resource survey program of IFAD project.
11. Rapid surveys for seaweed, sea cucumber and lobster resources all around the coast of Sri Lanka
12. Island wide rapid survey on seaweed, sea cucumber .
13. Survey on ecology and fisheries on giant tank systems.
14. Fish kill reports
15. Service rendered to Tsunami early warning center.
16. Contribution for sport fishing activities
17. Technical supports were given to the Research committee of Wildlife Conservation Department of Sri Lanka.
18. Participation in guideline preparation for environmental assessments for aquaculture projects which do not need to submit EIA reports or IEE reports according to the present CEA regulations

Awareness programs:

1. Conduct lectures on "bacterial diseases" for ornamental training programs.
2. Conduct practical classes on fish diseases, for ornamental training programs.
3. Conducted practical classes on ornamental fish culture for 35 university students of the Department of Agricultural and Plantation Engineering, Open University, Sri Lanka
4. Delivered lectures and conducted practical classes on "Bacterial, fungal and virus diseases in ornamental fish" and "Ornamental fish diseases" for the training programs on ornamental fish breeding and culture conducted at Kaluthara and Mathugama area.
5. Conducted practical classes on ornamental fish culture for 35 university students of the Department of Agricultural and Plantation Engineering, Open University, Sri Lanka.
6. Undergraduate supervision - 10 students from Uva Wellassa and University of Kelaniya were supervised on research and implant training programs
7. Three day training on Ornamental fish breeding , culture and Disease mgt. held on 10th March 2011 in AGA office Horana
8. Training program on Ornamental fish breeding, culture and Disease mgt. organized by Chamber of commerce, Monaragala on 25th Oct.2011.
9. Deliver the lecture on "Threats for Mangrove" for the government officers on 23rd Nov. 2011 organized by MPPA.

10. Deliver the lecture on Mangrove ecosystem for school teachers in Tangalle Educational zone on 27th Nov.2011.
11. Deliver the lecture on Mangrove ecosystem and field visit for the grade 08 students of Nagasena college, Angunakolapelessaon 30th Nov.2011.
12. Lectures on Aquatic biodiversity in Sri Lanka were delivered to the naval personals, school children visited to NARA from time to time.
13. Onsite awareness programs on mangrove ecosystems for several school groups, university students, other institutes and NGO's and other interested parties at mangrove park of Kadolkele RRC.
14. Lecture delivered on "Fisheries and Aquaculture " to the Navy officers of Trincomalee Naval Base.
15. Trainings on seaweed culture for Divi Neguma program
16. Committee member of the National Action Plan for Haritha Lanka program.
17. Resource personal to NIFINI , University of Uva Wellassa, University of Rhuhuna and Wayamba University

Publications:

(Abstracts)

1. Supply of astaxanthin and its varying combinations through live feed enrichment influences the growth, survival and fatty acid profile of *Macrobrachium rosenbergii* larvae (Parakarma, M.G.I,S., Rawat, K.D., Venkateshwarlu, G. Reddy, A.K., Madonna, T. and Shashidhar, K.) Proceedings in the Conference on Asian Pacific Aquaculture 2011 and Giant Prawn 2011 symposium, Cochin, India. 17th – 20th January, 2011 abstract no: 139

2. A comparative study on the influences in growth, survival and fatty acid profile of *Macrobrachium rosenbergii* juveniles fed with Cod Liver oil enriched formulated feed. (Parakarma, M.G.I,S., Rawat, K.D., Venkateshwarlu, G., Reddy, A.K., Madonna, T. and Shashidhar, K.) Proceedings in the Conference on Asian Pacific Aquaculture 2011 and Giant Prawn 2011 symposium, Cochin, India. 17th – 20th January, 2011 abstract no: 138

3. Can feeding astaxanthin enriched formulated feed effective for the growth performance and quality characters of *macrobrachium rosenbergii* juveniles? (Parakarma, M.G.I.S., Rawat, K.D., Venkateshwarlu, G., Xavior, B., Ramesh, R. and Das, S. K.) Proceedings in the Conference on World Aquaculture 2011 (*Macrobrachium* session), in Natal, Brazil. 6th - 10th June, 2011. Abstract no: 1233.

4. "Is feeding brood fishes of *Puntius reval* with astaxanthin enriched diets effective for the enhancement of fry survival" Parakrama M. G. I. S., H. M. P. Kithsiri and G. R. H. Rupika (2011) Proceedings of the seventeenth annual sessions of Sri Lanka Association for Fisheries and Aquatic Resources (SLAFAR) 19th – 20th May 2011, NARA Auditorium. Abstract 5pp.

5. Heenatigala P P M (2011). Bacterial isolations and Resistance development in the cultured freshwater ornamental fish in Sri Lanka. Proceedings of international workshop of Asian Pacific Aquaculture, 2011, Kochi, India: p 109.

6. G.H.D.V.Sewwandi,W.Rajapakshe and N.Y.Hirimuthugoda (2011) Determination of breeding performance of three guppy (*Poecilia reticulate*) varieties. Abstract published in the Proceedings of the seventeenth annual sessions of the SLAFAR , 19th -20th May 2011,NARA Auditorium

7. De Silva S.H.R.A. Pahalawattaarachchi, V. and Arunakumara, K.K.I.U. 2011 Utilization of agar-agar extracted from red seaweed as a gelling agent of tissue culture media Abstract presented at ISEA conference Nov.9th 2011 at Faculty of Agriculture, University of Ruhuna.

8. A.S.L.E. Corea and P.P.M. Heenatigala (2011) Conditions in shrimp broodstock holding facilities maintained by shrimp broodstock collectors. - Presented at the Sri Lanka Association for fisheries and aquatic resources 17th annual sessions.

9. A.S.L.E. Corea and C.D.A.M.P.A. Dissanayake (2011) Participation of women in shrimp aquaculture in the North western Province of Sri Lanka – 10th Asian Fisheries Forum –Shanghai – China – (not presented – Abstract published)

10. S. Ariyarathna 2011 Nursing freshwater prawn (*M. rosenbergi)* in backyard nurseries using the fish opel based aqua feed. Asia Conference 2011 – Jan 17-20 – Kochi, India.

11. S. Ariyarathna 2011 Feasibility of rearing of gift Tilapia (*Oreochromis niloticus*) fry in cages with community participation. Case study in Sri Lanka. 10th Asian Fisheries & Aquaculture 21-25 April 2011, Shanghi, China.

12. Economically feasible fish feeds for GIFT Tilapia*(Oreochromis niloticus)* food fish culture in Sri Lanka. 9th International Symposium in Tilapia Aquaculture 19 th ISTA 21-25th Shanghi, China.

Full papers/ Reports

1. A.D.W.R. Rajapakshe, K. Pani Prasad, S.C. Mukharjee, and K. Kumar (2011). *In – vitro* sensitivity of three bacterial pathogens of Koi carp (*Cyprynus carpio* L.) to 30 antibiotics.(Full paper Accepted in American Journal of Agricultural Science and Technology).
2. Report on frame survey on seaweeds, seacucumber and lobsters from Mannar to Jaffna
3. Report on frame survey on seaweeds, sea cucumber and lobsters from Colombo to Hambantota.
4. Report on frame survey seaweeds, sea cucumber and lobsters from Peliyagoda to Silavathura.
5. Report on ecological assessment of Kalpitiya Islands
6. Report on ecological assessment on mangrove, sea grasses as EIA for Indian oil exploration project at Gulf of Mannar
7. Report on development plan for Rekawa station

8. Proposal for development of mari-culture stations at Poonaryn and Kalmune.
9. Report on Environmental assessment of Akurala.
10. Feasibility report on seaweed culture
11. Report on feeding habit of *Dugong dugon* carcasses from Mannar
12. User conflicts of small scale fishery in Mannar lagoon requested by Divisional secretariat Mannar.
13. Fish kills in Thalan lagoon in Bentota
14. Quarterly disease report for the OIE.
15. Reports on current status of the fauna and flora of Sri Lanka were given on requested made by several institutions from time to time.

Books

1) Book on "Live feed", Publication in progress.
2) Supervised the dissertation on "Biomass estimation of economically important seaweeds which submitted to the Ruhuna University of Sri Lanka as a partial fulfillment of Bachelor of Science in Agriculture degree.
3). Supervised the dissertation on "Utilization of Agar-agar extracted from Red seaweed as a gelling agent of tissue culture media which submitted to the Ruhuna University of Sri Lanka as a partial fulfillment of Bachelor of Science in Agriculture degree.

Leaflets (2011)

1. Masun wagawata Mada pokunak hada ganne mehemay
2. Wedi adayamakata Koi carp mathsya wagawa
3. Fresh water prawn culture
4. Pokuna hedata athata mitata koi carp masun wawamu
5. Discus mathsya wagawa
6. Seaweed processing
7. *Eucheuma* culture

Posters

1. Fish feed enrichment
2. Yodha miridiya issan wawamuda
3. Poly culture practice of fish in home gardens
4. Obe gewaththe miridiya masun bahuropana wagawa karanne keseda?
5. Ornamental fish breeding and culture
6. *Cryptocorynes* in Sri Lanka
7. Seahorse
8. Bivalves in Sri Lanka
9. Endemic fishes of Sri Lanka
10. Most important crustacean parasites in ornamental fish

Workshops/Symposiums/Meetings

1. National committee for livestock fisheries and aquaculture at Council of Agriculture Research Policy (CARP).

2. *Annual Sessions of the Sri Lanka Association for Fisheries and Aquatic Resources*, June 20``, NARA Auditorium, Colombo, Sri Lanka.
3. Inter ministerial conference on food security and Aquaculture
4. Workshop on strengthening Quarantine Activities of ornamental fish exports and imports in NAQDA auditorium in 18th Nov. 2011.
5. Expert review workshop on IUCN final red list 2011-freshwater fishes, auditorium, Ministry of Environment and Natural Resources, Battharamulla, Sri Lanka.
6. Attending progress meetings on 'Divi Neguma' held at Parliament complex, Economic ministry, and ministry of fisheries and aquatic Resources.
7. Participation in workshop to develop criteria for lagoon and wetland monitoring for the Wild life Dept
8. Participation in workshops with NAQDA and the Indian team for improving Shrimp culture facilities.

Training (overseas)
Training program on "Aquatic plant tissue culture' May 2010 in Thailand.

International symposium

1. Conference on Asian Pacific Aquaculture 2011 and Giant Prawn 2011 symposium, Cochin, India.
2. Study Tour on Fisheries Development & related ponds in Thailand
3. 10th Asian Fisheries Forum –Shanghai – China

5.5 MARINE BIOLOGICAL RESOURCES DIVISION

Head of the Division: Dr. Rekha Maldeniya

Overview of the year

The Marine Biological Resources Division (MBRD) is responsible for carrying out research towards management, development and conservation of marine living resources. Three research projects were carried out by MBRD during 2011 under treasury funds. These include;

- Monitoring and assessment of finfish fisheries which including large pelagic (tuna, shark, billfish, seer fish etc.) small pelagic (sardines, herrings, anchovies, scads etc) and non finfish such as shrimp and seacucmber in the coastal and offshore waters.
- Survey on marine mammals in collaboration with IOMAC-CRIOMM (Center for Research on Indian Ocean Marine Mammals)
- Molecular studies on selected marine fish, stranded marine mammals and nonconventional resources such as jelly fish in Sri Lankan waters.

It was earlier proposed to study the behavioral pattern of flying fish as a separate project but as there was no considerable target fishery, it was studied under the small pelagic study program.

Apart from the treasury funded projects MBRD carried out two externally fund two research projects through the funding support of the International Funds for Agriculture Development (IFAD). The major project was the survey of deep water demersal finfish stocks in the south-eastern, east and northeast coastal waters from Rekawa to Mullativu. Further, a rapid assessment survey on seacucumber, lobsters and sea-weeds was conducted all around the island in order to map the distribution of the resources and their exploitation levels.

One senior officer in the division is holding responsibility as the Programme Coordinator of the Bay of Bengal Large Marine Ecosystem Management Programme (BOBLME)

In additionally MBRD attended a number of activities in advisory and consultant capacity. Most importantly responded a number of requests made by the Department of Fisheries and Aquatic Resources Development by providing recommendation to mitigate or resolve problems related to fisheries. MBRD is currently in the process of formulating a common mechanism to manage fisheries, targeting the export oriented major species such as sea cucumber, lobster and chank with the co-operation of the Department of Fisheries and Aquatic Resource Development. In addition, Sri Lanka Fisheries Atlas Volume I which contained species composition, spatial and seasonal distribution, and

abundance and fishery performances of the above resources was completed and is ready for publication.

Moreover, on court orders several fish samples were analysed to study the cause of death to find out whether it was made by the use of explosives and further the officers attended court cases in order to produce expert evidences in connection with the studies. Further, officers in the division were quite interactive with the fishing communities' right round the island and also supported the private sector by attending to the requests made by them. The division provided facilities and guidance to university students in undertaking industrial training and school students to carry out their projects.

Research staff of our division was actively engaged in updating the large pelagic and small pelagic data bases, analysing the statistics and preparing research papers on Trends and Prospects of large and small pelagic fisheries in Sri Lanka, with special reference to future development initiatives and review of Indian Ocean Tuna Fisheries: Impact of large scale fishing on coastal fisheries with special reference to Sri Lanka. In addition, information on large pelagic fisheries in 2011 has been disseminated to the Ministry of Fisheries and Aquatic Resources development and thereby disseminated to IOTC for local and regional management purposes.

In 2011, one officer Dr. C. Dissanayake returned after completing the doctoral degree and also two officers were newly recruited and thereby improving the research strength. Mr. Upul Liyanage, who was earlier, attached to the Inland Aquatic Resources Division studying lobster fisheries and lobster fattening at Kapparatota Regional Centre (RRC) was transferred to MBRD in November 2011.

Activities undertaken

Project	Allocation (Rs. Million)	Officer responsible	Period	
			From	To
1.1. Monitoring and assessment of finfish (small pelagic, large pelagic and demersal) and non finfish (shell fish, molluscs and sea cucumber) in the coastal and offshore waters	1.45	Dr. R. Maldeniya Dr. S.S.K. Haputhantri Dr. D.C. T.T. Dissanayake R.P.P.K. Jayasinghe	Continuous	
1.4. Marine Mammal surveys in collaboration with IOMAC-CRIOMM (Center for Research on Indian Ocean Marine Mammals)	4.2	R. Nanayakkara	2010	
1.6. Molecular studies on selected marine fish,	4.5	D.N. A. Ranmadugla D.R. Herath	2010	2012

stranded marine mammals and jellyfish				
1.9. Study on behavioral pattern of flying fish	2.0	K.H.K. Bandaranayake D.G.N. Hasarangi	2011	

Performance

Project 1: Monitoring and assessment of finfish (small pelagic, large pelagic and demersal) and non finfish (shell fish, molluscs and sea cucumber) in the coastal and offshore waters

Marine finfish and non-finfish landings were monitored at fishery harbours and major fish landing sites in the western, southern and the eastern coasts of Sri Lanka. This included collecting information such as details on fishing operations, recording the quantity of the landings by species and by different fishing vessel-gear combinations, measuring the lengths of key species and reporting the active fishing boats operated. Biological fish samples taken at landing sites were also analysed to study the reproductive biology of marine fish.

The commercial catch especially taken from the coastal waters comprises of a wide range of species. Only few species have significantly contributed for the marine production. Herring (*Amblygaster sirm*) which is found in the coastal waters is the third largest commercial species significantly contributed to the marine fish production (7.5%). The study revealed that the adverse impacts on the herring and sardine fish stocks are more likely due to the morning fishing operations conducted by gillnets of mesh sizes below 1" than the night fishing operations conduct during the spawning season by small mesh gillnets. There are no enough evidences to accept the current fishing practises of small pelagic species and factors other than fishery (depletion of the stocks due to other reasons) might have produced some severe changes in availability of the fish resources resulting in apparent over fishing but for limited duration of time.

Small-mesh gillnet fishing

Small pelagic fish catch

Large pelagic fisheries contribute over 45% to the total marine fish production in the country and it is conducted in the coastal, offshore and international waters. Over 95% of

the production comes through fishing made in offshore and international waters by multiday fishing fleet.

Catch consisted with tuna, seerfish, billfish and shark. Tuna itself contributed over 62% to the total large pelagic catch. Skipjack contributed the bulk followed by yellow fin tuna to the total tuna catch.

Offshore multiday fishing fleet

Coastal fishing for large pelagic

Skipjack fish catch

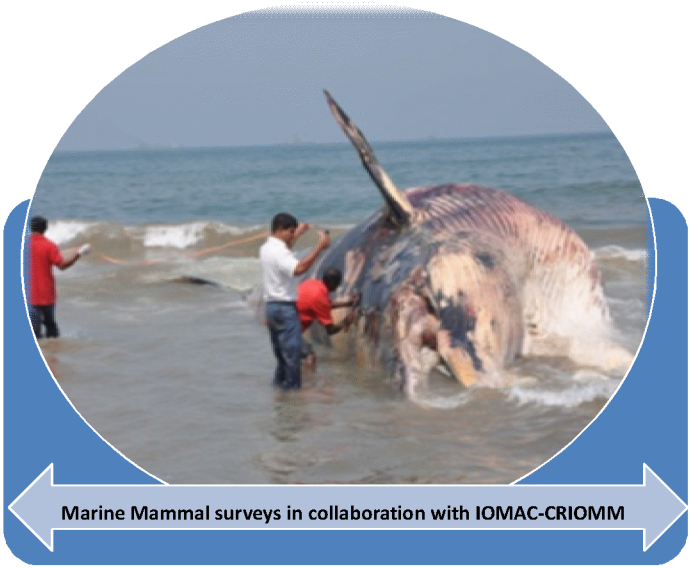
Monitoring of catch and effort data of sea cucumber fishery were started off the north coast of Sri Lanka since August 2011. Four sea cucumber species (*H. scabra, H. spinifera, S. naso,* and *B. marmorata*) are mainly targeted in this area and sea cucumber fattening practices are also carried out in some places. On the request of Department of Fisheries and Aquatic Resources, monitoring of the sea cucumber fattening programs were started since November 2011 and it will continue in 2012. There was active participation in the artificial breeding program carried out for Holothuria scabra at Kalpitiya Regional Research Centre and monitoring of growth and survival of these individuals have been started in different grow out systems including sea pens, outdoor fiberglass tanks and mud ponds.

Sea cucumber fishery and sea cucumber

Progress (%): Physical: 100% Financial: 100%

Project 2: Marine Mammal surveys in collaboration with IOMAC-CRIOMM (Center for Research on Indian Ocean Marine Mammals)

Marine mammal strandings were recorded throughout the island during year 2011. Thirteen strandings were reported in year 2011 and out of these thirteen strandings five were toothed whales and the rest were baleen whales. Some of the specimens were brought to NARA and buried in the NARA grounds in order to preserve and prepare the skeletal structures for display. A dugong skeleton buried previously was recovered and is being processed for display. The morphological attributes as well as the locations were incorporated in to newly developed database. NARA actively participated in the International marine mammal symposium held in December in Colombo organized jointly CRIOM and IOMAC. Onboard visual surveys for marine mammal were conducted in Trincomalee. Passive acoustic surveys for marine mammals were initiated in collaboration with foreign research scientists.



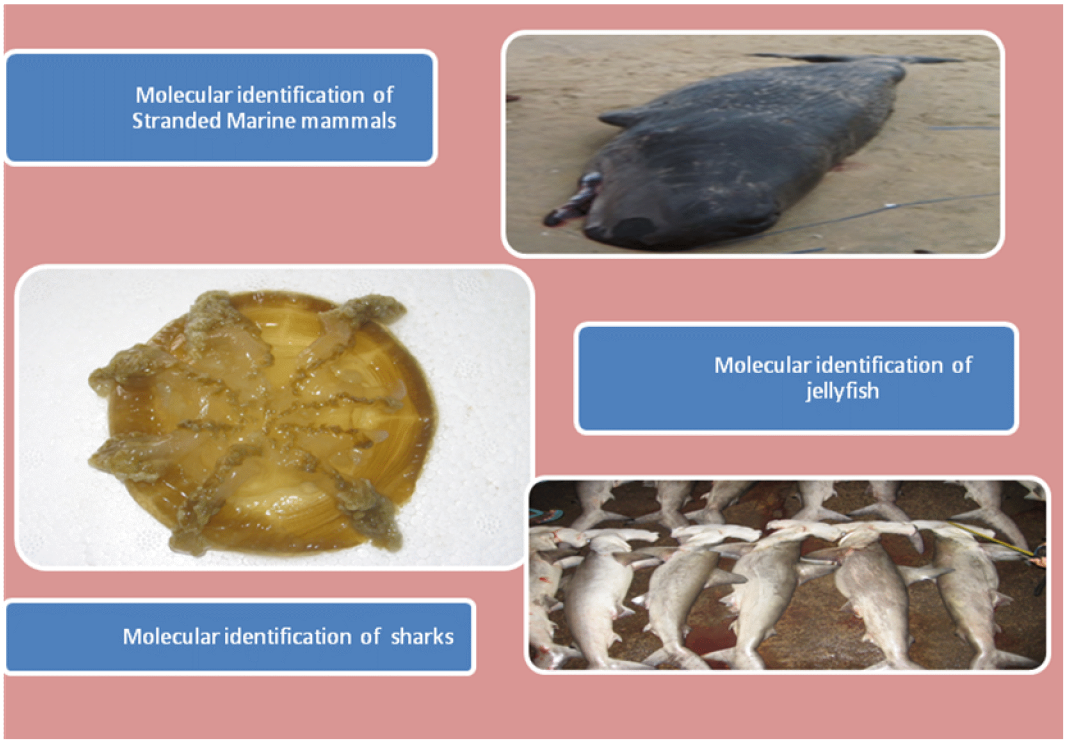
Progress (%): Physical: 95% Financial: 52%

Project 3: Molecular studies on selected marine fish species, stranded marine mammals and jellyfish

The main aim of the project was to develop a biotic inventory of DNA barcodes of selected marine fish including sharks, stranded marine mammals and jellyfish species from Sri Lanka and contribute to the discovery and formal recognition of new species. A DNA bar-code is a short DNA sequence taken from standardized portions of the genome used to identify species. It is a unique identifier, reduces ambiguity, unmasks sp's that looks alike, works well with fragments and works with all stages of life. DNA based species identification is a potentially powerful approach to both fill the gap and build on the taxonomic base already in place.

Shark samples were collected from Negombo, Chilaw, and Beruwala area. Jellyfish samples were collected from Negombo, chilaw, Kalpitiya, Trincomalee and Beruwala.

Muscle tissue samples from stranded marine mammals in Sri Lanka throughout the year were preserved in ethanol and were used in subsequent analysis. Morphometric characteristics of each and every sample were recorded and voucher specimens were prepared in formalin whenever possible. Identification of sharks and jellyfish were based on the COI gene from mitochondrial DNA. Molecular identification of stranded marine mammals were based on mitochondrial DNA control region. PCR products were given for sequencing. Abstracts on Barramundi, jellyfish and stranded blue whales were published.



Progress (%): Physical: 95% Financial: 100%

Project 4: Study on behavioral pattern of flying fish

Fishery for flying fish in Kandakuliya is an important seasonal fishery carried out in the North Western coastal waters of Sri Lanka. A preliminary analysis of the flying fish fishery off Kandakuliya has been carried out by NARA from 1991 to 1993 and *Hirudichthys oxycephalus* has been identified as the dominant flying fish variety seen among the catches. However there is a lack of information available about the biology and the behaviour of *Hirudichthys oxycephalus* in the region. The objectives were; to study the feeding behaviour and spawning behaviour of *Hirudichthys oxycephalus* and other flying fish species, to determine the seasonal migratory patterns of *Hirudichthys oxycephalus* and other flying fish species, to determine the correlation of *Hirudichthys oxycephalus* to temperature, turbidity, rainfall, salinity and plankton availability.

Progress (%): Physical: % Financial: 1%

Externally funded projects

Marine resource surveys and stock assessment in demersal fin fish fisheries in the coastal waters in Sri Lanka from Kirinda to Trincomalee was carried out under the project funded by International Funds for Agriculture Development (IFAD). The study was carried out in areas where demersal fishery exists at present. Based on surveys conducted in these areas potential fishing zones and species were identified and formulation of management plans was initiated.

Under this project a rapid survey for sea cucumber, lobsters and sea weeds were carried out island wide in order to map the resources and to estimate the present exploitation level.

Based on the resource surveys carried from 2009-2010 on stock assessments in selected fisheries/ resources such as sea cucumber, chank, lobster, shrimp and marine aquarium fish in the coastal waters in Sri Lanka, implementation of management plans for these fisheries were initiated with the Department of Fisheries. Further the compilation of "the fisheries atlas of Sri Lanka" was completed with the support of the Food and Agriculture organization (FAO) and the IFAD.

Other activities undertaken

- Organized two BOBLME national consultation meetings on "Policy directions in fisheries, coastal and marine environment and ICM in the BOBLME countries" held at Coast Conservation Department (CCD) on 1st February, 2011 and 1st March 2011.
- Organized the BOBLME National Trans boundary Diagnostic Analysis (TDA) consultation planning workshop of Sri Lanka held on 21st May 2011 at Colombo.
- Organized seven provincial workshops in relation to the national TDA consultation. These workshops were held on 31st May 2011, 4th June 2011, 11th June, 2011, 18th June 2011, 20th June 2011, 25th June 2011 and 27th June 2011 at Chilaw, Colombo, Matara, Batticaloa, Trincomalee, Mannar and Jaffna respectively.
- Organized the National TDA Consultation Workshop to validate, endorse and adopt the TDA. This workshop was held on 19th August, 2011 at Galle Face Hotel, Colombo.
- Reviewed a scientific paper on ´´Ecological role of minke whale in the Southwestern East Sea ecosystem during the post-commercial whaling moratorium period´´ submitted to the Journal of Marine Biological Association of the United Kingdom (an international journal) for possible publication
- Reviewed a scientific paper on ´´ Estimating animal abundance with a hierarchical catch-effort´´ submitted to the Journal of Applied Statistics (an international journal) for possible publication.
- Provided 6 weeks training in Biotechnology to one 2nd year undergraduate student from the Department of Botany of the University of Kelaniya(Industrial training).

- Provided 1 week training in basic Biotechnology tools to five 2nd year undergraduate students from the Department of Zoology of the University of Kelaniya as a part of their industrial training at NARA.
- Provided 6 weeks training in Biotechnology to one final year undergraduate students from the Department of Botany of the University of Sri Jayawardenapura (Industrial training).
- Examined and reported fish samples sent by various high courts for blast fishing.
- A survey was carried out at Thambalagamuwa Bay (Kakkamunai and Nadauthivu) to examine the dead shell deposits in order to allocate the quota for exploitation.
- A study was carried out in mannar to solve a dispute among squid fishers and gill netters as per a request made by the District secretariat in Mannar.
- Molecular identification of marine sponges were carried out in collaboration with the Institute of Post Harvest Techchnology (IPHT), NARA.
- Edited NARA journal volume 39 and 40.
- Reports on marine mammal strandings were prepared –Payagala 12th January 2011, Palliyawatta 6th April 2011, Kamburugamuwa 3rd August 2011, Panadura, Egodauyana 6th August 2011.

Publications

Research papers/Abstracts

D.C.T. Dissanayake and G. Stefansson (2011) Habitat preference of sea cucumbers: *Holothuria atra* and *Holothuria edulis* in the coastal waters of Sri Lanka. Journal of the marine biological association of the United Kingdom (in press) (ISSN 0025-3154)

D.C.T. Dissanayake and G. Stefansson (2011) Present status of commercial sea cucumber fishery in the coastal waters of Sri Lanka. Journal of the marine biological association of the United Kingdom (in press) (ISSN 0025-3154)

D.C.T. Dissanayake, Sujeewa Athukorala (2011). Abundance, distribution and some biological aspects of *Holothuria edulis* off the northwest coast of Sri Lanka. SPC Beche de mer Information Bulletin, **31:** 39 – 44

Haputhantri, S.S.K. and R. Maldeniya, 2011. A review on billfish fishery resources in Sri Lanka. IOTC–2011–WPB09–28.

Jayasinge, R.P.P.K., Samaraweera, E.K.V. and Perera, H.A.C.C. (2011). Coastal resources and marine protected areas (MPA) in Sri Lanka. Proceedings of seminar trans-boundary coastal and marine protected areas with special priorities for spawning grounds. 3-13 pp. Zoological survey department, Pakistan.

Ranmadugala D.N.A., Herath D.R., Amarakoon, G.U. and De Silva, K.N.S. (2011).Genetic analysis of cultured and wild Barramundi (*Lates calcarife*r) species based on mitochondrial DNA. Proceedings of the 17th annual sessions of the Sri Lanka Association for Fisheries and Aquatic Resources, 2011.

Herath D.R., Ranmadugala D.N.A., Amarakoon, G.U., De Silva, K.N.S. and Jayathilaka, R. A.M. Identification of jellyfish species found in Sri Lanka by molecular methods. Proceedings of the 17th annual sessions of the Sri Lanka Association for Fisheries and Aquatic Resources, 2011.

Reports

Maldeniya, R., Bandaranayake, K.H.K. and Hasarangi, D.G.N. Trends and Prospects of Tuna Fisheries in Sri Lanka, with special reference to future development initiatives. Presented at the IOTC consultation meeting, 7th- 11th February 2011.

Maldeniya, R., Bandaranayake, K.H.K. and Hasarangi, D.G.N. A Review of Indian Ocean Tuna Fisheries: Impact of large scale fishing on coastal fisheries with special reference to Sri Lanka. Presented at the IOTC consultation meeting, 7th- 11th February 2011.

Other publications

Presentations
Recent marine mammal strandings in Sri Lanka. International marine mammal symposium held in Mt Lavenia hotel, Colombo from 17th to 18th December , 2011.

Ranmadugala D.N.A. and Herath D.R., Mitochondrial DNA as genetic markers for the identification of Blue whales from Sri Lanka. International marine mammal symposium held in Mt Lavenia hotel, Colombo from 17th to 18th December , 2011.

Trainings/workshops attended

Regional consultation on Indian Ocean fisheries and tuna convened by Indian Ocean Maritime Affairs Co-operation (IOMAC) held on 7th – 12th February 2011 at Colombo, Sri Lanka.

Indian Ocean Tuna Commission (IOTC) 8th Session of the Compliance Committee (14 - 16 March 2011) and 15th Session of the Commission (18 -23 March 2011) at Colombo, Sri Lanka.

IOTC working party on Billfish held on 4th – 08th July, 2011 at Victoria, Seychelles. BOBLME Transboundary Diagnostic Analysis (TDA) National Consultation Workshop held on 19th August, 2011 at Galle Face Hotel, Colombo, Sri Lanka

Participated in the training programme on stock management and enhancement in the sea organized by the Japan international Cooperation Agency (JAICA), from 12th July 2011 to 23rd October 2011 in Japan.

Participated in the Regional training Course on Strengthening Fisheries Data Collection and Stock Assessment – 25th April to 7th May 2011, CMFRI, India.

Participated in the workshop on Regional work plan development 2011, under the Bay of Bengal Large Marine Project (BOBLME) in February 2011 in Thailand.

5.6 NATIONAL INSTITUTE OF OCEANOGRAPHY AND MARINE SCIENCES, (NIOMS)

Head of the Division: Dr. T.K.D Tennakoon (January-August)
Dr. K. Arulananthan (September- December)

Project No	Name	Responsible Officer	Progress (%)
1.8	Development of Satellite Based Fishery Forecasting System	J. K. Rajapakshe	Financial- 101% Physical – 100%
2.3	Integrated study of Trincomalee Bay and environs including Study of Trincomalee River plume	W.N.C. Priyadarshani	Financial- 123% Physical – 95%
5.1	Observation of Oceanographic Conditions for Ocean Based Disaster Early Warning - Operation of Ocean Observation Centre	Dr. K. Arulananthan	Financial- 83% Physical – 100%
5.2	Investigation of internal wave Propagation along the East Coast of Sri Lanka	S.U.P. Jinadasa	Financial- 86% Physical – 50%
5.3	Geological and geo-physical exploration of near shore placer mineral deposits (from Pullmodai to Sangamandanda)	S.U.P. Jinadasa	Financial- 93% Physical – 60%
5.4	Quantifying land loses in Dondra-Hambantota-Kirinda coastal stretch due to shore line changes	Dr T.K.D Tennakoon	Financial- 94% Physical – 30%
5.7	Exploration of shipwrecks on the continental shelf	S.U.P. Jinadasa	Financial- 73% Physical – 75%

Project 1: Development of Satellite Based Fishery Forecasting System

Yellow fin tuna fishery is the most important fishery for Sri Lanka's economy as it is the major export species to Japan and EU market. The Ministry of Fisheries and is expecting to double the fish production in 2014, therefore promotion of offshore fishery is timely needed to increase the production as well as to relieve the fishing pressure on the coastal resources. Offshore fishery involves high investment and operational cost. The promotion of this sector is hampered due to the uncertainty of fish catch. As a result sea time is increased to get the expected catch low quality fish landing. Export and income of fishermen is heavily affected due to low quality fish landings. To address the issue, satellite based fishery forecasting system was developed in 2008 and continue its research for further developments. The objectives of the project are to being minimize search time and operational cost of offshore fishing vessels and to increase the catch per unit of effort (CPUE).

Performance

1. Satellite data were processed for sea surface temperature, sea surface chlorophyll and sea surface heights. The data has been used to determine favorable parameters for fish aggregations to issue weekly fish forecast. The dissemination of such information to offshore fishing fleets was done via email to registered fishermen, by fax to major fishery harbors as well as to radio and telephone inquiries.

2. Positioned fishery data collection was continued from the vessels of tuna long line/Gillnets with distribution of fishery logbooks (Fishing Diary 2011). Data entry and uploading into a fishery MySQL database (tunaBase) was done.

3. Vertical temperature profiles from Argo-float data were processed and uploaded to MySQL database (ArgoBase). R-script was developed for this database to calculate approximate thermocline depth and added to the weekly forecast maps. This information is useful for the fishermen to determine hooking depth for tuna-longline.

4. Fishery logbooks (800) printed and distributed among multi-day fishing fleets to record fishery data in standardize format. It is helpful to collect data and information for forecast validation and further improvement of fish forecasting system.

5. Fishery information service via digital displays (Digital Signage) at major fishery harbors was proposed. A display was installed at Beruwala fishery harbor for testing. Another display at Oceanography Division was installed as a monitoring station. Software and player hardware for 10 stations were purchased with the budget limits in 2011. Display screens needed to be purchased in 2012 budget.

6. Supporting software for digital signage system (Adobe Photoshop and adobe flash) was purchased to prepare and edit display materials.

Project 2: Integrated study of Trincomalee Bay and environs including Study of Trincomalee River plume

Fresh water discharge from rivers into the ocean drives the dynamics in coastal areas. River discharge from land that includes chlorophyll a, sediment, nutrients and pollutants have been identified as one of the major causes of deterioration of the coastal water. Coastal zone adjacent to river systems plays an important role in Trade, agricultural, fisheries and tourism. Tricomalee Bay with adjacent sea in east coast is one of the most important coastal water bodies in Sri Lanka which has greater impact on country's economy, environmental value, and marine navigation. Seasonal changes in water characteristics of the bay are depended on fresh water discharges by Mahaweli river tributaries and Thambalagam Bay with agricultural runoff and sediments. Changes in water quality directly affect on its' aquatic fauna and flora of the bay ecosystem and spread towards adjacent sea as plume. Meantime it interferes with migratory pattern of marine mammals, (dolphins and whales). Thus, with the objective of investigating the ocean environmental gradient and distinctive microbial assemblages which are required

for marine resource estimation and stock management practices of the east coast, integrated study in Trincomalee Bay environs were conducted.

Thus, Selected 16 locations of the Bay and near shore waters, (Fig. 01) were subjected to carry out river plume monthly sampling program which covered physical (Temperature-T, Salinity-S), Biological, (Chlorophyll, phytoplankton and zooplankton) and chemical (Dissolved Oxygen-DO, Total Suspended solids (TSS) and Nutrients) parameters from January to December. Spatial salinity, temperature variations at 9 locations in Thambalagam bay were also measured to study fresh water influence on Trincomalee Bay and salt wedge which is important for understanding instant mussel culture destructions and blooms. Meantime runoff water samples for nutrients and plankton were collected to determine the coastal ecosystem alterations. Satellite imageries were also used to get a comparative idea about onsite plume condition and aerial distribution. However, continuous imageries with respect to field data are not available for the comparison.

According to the seasonal nutrient variations, maximum silicate amount (≈ 30mg/l) is recorded north east monsoon at middle of the Koddiar Bay which is the middle point of receiving all fresh waters from Mahaweli River branches and Thambalagam bay. Meantime, maximum nitrate (4.5mg/l) and nitrite (4.6mg/l) were recorded at location number 4 and 5, where water received by one of Mahaweli River branch and Thambalagam Bay water inlet in North East Monsoon respectively. However, Maximum phosphate concentrations was found around 6mg/l at location number five (Thambalagam Bay inputs) during the 1st inter monsoon; soon after the North East Monsoon. Those measurements could be resulted due to agrochemical run off from upper Mahaweli catchment and soil erosion.

Comprehensive data analysis of water parameters showed that river plume extended up to 5-7kms from the Bay mouth towards the northern side of the coastal water and had shown a remarkable seasonal variation of Bay environs.

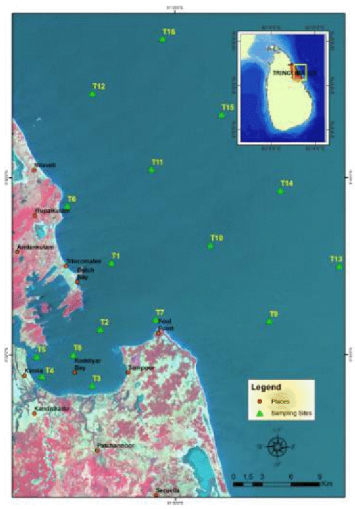


Figure 01 map of the sampling locations

Figure 02 satellite images showing river plumes generating a). December, 2010, b). March, 2011, and c). October, 2011

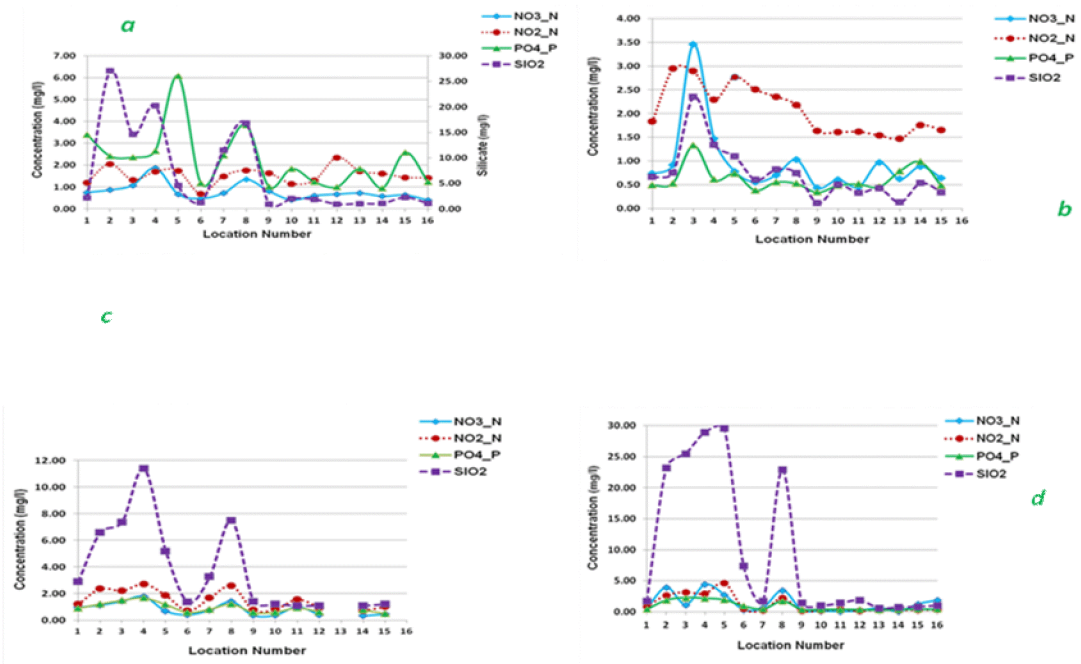


Figure 04 annual nutrient Fluctuation in different seasons; a. 1st Inter monsoon, b. South-West monsoon, 2nd Inter monsoon, d. North – East Monsoon

Project 3: Observation of Oceanographic Conditions for Ocean Based Disaster Early Warning - Operation of Ocean Observation Centr

Ocean Observation Centre has been established in 2007 for monitoring and gathering real time and near real time ocean physical environmental data around Sri Lanka waters. Data are analyzed and synthesized to generate new information, and information products are being designed to meet the needs of scientific community. Main goal is to implement an end-to-end system with the capability to detect, model, and ultimately forecast changes in the ocean conditions around Sri Lanka waters. The data, which are intended for use in oceanographic and other interdisciplinary scientific research, is freely available in OOC database.

With respect to ocean based disasters, the centre collaborates with the Ministry of Fisheries and Aquatic Resources (MFAR), Disaster Management Centre, (DMC) and Department of Meteorology to provide the necessary technical information and guidance for early warning and mitigation of impacts from natural ocean disasters. Centre is also maintaining a physical ocean environmental database for future needs.

Global climate change has become a worldwide concern. Ocean observations and researches are therefore becoming increasingly important to forecast abnormal weather and climate variability to prevent properties and human lives. Thus, Ocean Observation Centre (OOC), has been conducted the following activities;

- Maintained the developed data downloading panel for enhance daily OOC activities and display
- Data acquisition from the developed website to display real time and near real time Oceanographic and ocean weather
- Submission of weekly tide tables to relevant authorities including MFAR (Planning and monitoring Division)
- Supply of tide tables and prediction to Coast conservation Department and university students.
- Public awareness programs for school children and Sri Lanka Navy

Major earthquakes, Cyclones and tsunami warning information were disseminated to DMC.

Sea level data from 2008-2010 was disseminated to Coast Conservation Department, (CCD). Daily oceanographic Data was downloaded and stored in OOC server. Weekly Tide prediction reports were sent to the Ministry. 2008 - 2011 sea level data has been analyzed for understanding climatic changes specially sea level rise prediction. Manual reading of Colombo harbor tide gauge were obtained and UPS was repaired protected by newly purchased virus guard. Six awareness programs for school children and Sri Lanka Navy were carried out. Initial activities on building new Tide gauge at Jaffna peninsula were carried out.

Project 4: Investigation of internal wave propagation along the east coast of Sri Lanka

Internal waves (IW) occur due to the interior stratification of water column with strong density gradients in the sea. The periods of internal waves varies from a few minutes (corresponding to the buoyancy frequency) to tens of hours (near-inertial periods). The amplitudes of IW can exceed hundred meters (Susanto et al, 2005). The propagation speed of internal waves is relatively slower than the surface gravity waves. The internal waves play a major role in internal ocean mixing and affect chemical and biological processes. Thus, internal wave's activity may influence on formation of potential fishing grounds, transports of plankton and sediments.

The study was conducted using SAR Satellite imageries. However, in-situ measurements are required to confirm remote sensing measurements. The collaborative program with University of Notre Dame was established for future prospects of in-situ measurements.

Performance

(1) Study revealed that the internal waves are propagated from Nicobar Islands through Bay of Bengal to east coast of Sri Lanka
.

(2) The internal waves are more prominent during April to November in the Bay of Bengal.

(3) Collaboration program with University of Notre Dame was established for in-situ measurements and MOU has been signed.

(4) Instrument proposal has been submitted to the USAID.

Project 5: Exploration of offshore placer mineral deposits in the east coast.

East coast is strongly affected by the SW Monsoonal winds and creates more favorable conditions for formations of deposits. The stronger South West Monsoonal sea waves transport the sediments from the South Western beaches towards Southeastern coasts by means of long shore currents. Therefore east coast is an ideal place for concentrate economically voluble placer minerals.

Performance

Placer mineral survey was conducted systematically along the east coast of Sri Lanka from Kalmunai to Batticaloa with 1km line spacing. The objectives of the investigations were to study the sediment and placer mineral distribution in the area to identify the potential placer mineral sites for detail investigations.

The mean grain size of the bottom sediments ranges between 0.23 and 2.2 Ø with an average of 2.001 Ø Medium grain sand occupy the most part of the survey area and

represent 52 percent of the total samples. Also, fine grained sediments represent 41 percent and coarse grained 7 percent.

Using Folk's (1954) nomenclature for sorting 43% of the samples is moderately well, 19% poorly, 18% moderately, 17% well sorted and 3% very well sorted. The majority of sediments 74% are negatively skewed, indicating perhaps the removal of the finer grains by the action of the high energy waves. The majority of samples contain considerable amount of biogenic carbonates with average value of 27%.

Heavy mineral analysis was done and many locations show that the placer mineral concentrations close to 1 to 2 percent. Few locations were identified as potential sites where placer mineral percentage is close to 10 percent or over this limit to conduct detail studies for the mining purpose.

Project 6: Quantifying land loses in Dondra-Hambantota-Kirinda coastal stretch due to shore line changes

Shoreline change is a serious issue to Sri-Lanka as an Island nation. It causes many disturbances to the Coastal environment and to the coastal community, land loses, salt water intrusion to ground water, fishing and it's related industry, Tourism and it's related industry etc. Erosions may occur due to many reasons mainly anthropogenic and changes of environment. All that shows shore line changes is very sensitive issue should closely monitor. The monitoring of shore line changes should be a national scale continues program for several years.
Division commenced a project to monitor shoreline changes and quantifying land losses and accretions in Southern coastal belt and quantification was planned to continue from Hambantota to Kirinda during year 2011.

Performance

Collected data compilation was completed and no field work was carried out due to busy schedule on land survey.

Poject 7: Exploration of shipwrecks on the Continental shelf of Sri Lanka

The integrated Side Scan Sonar, Multi Beam Echo-sounding and underwater photographic surveys were conducted along the east coast (Trincomalee, Valachcheni and Kalmunai) of Sri Lanka for exploration of ship wrecks. In total of seven shipwrecks were located during the survey along the east coast of Sri Lanka.

Summary progress

Location	Number of shipwrecks	Remarks
Trincomalee	01	Floating dock, Found in inner Trincomalee harbour, Length and width are ~65m and ~18m respectively.
Valachchenei	03	(1) Recorded at Kalkudah at the water depth of 9m. Length and width are ~55m and ~16m respectively. (2) Recorded at Kayankeni. Length and width are ~108m and ~22m respectively. Located at the water depth of 24m. (3) Recorded at Valachcheni. Length and width are ~40m and ~5m respectively. Located at the water depth of 12m.
Kalmunai	03	(1) Recorded at Kalmunai. Length and width are ~21m and ~4.5m respectively. Located at the water depth of 12m. (2) Recorded at Kalmunai. Length and width are ~103m and ~13m respectively. Located at the water depth of 42m. (3) Recorded at Kalmunai at the water depth of 52m.

5.7 INSTITUTE OF POST HARVEST TECHNOLOGY

Head of the division: Dr. Sujeewa Ariyawansa

Overview

The Institute of Post Harvest Technology (IPHT) has implemented six research projects to fulfill the requirements of the trust area (reduction of post harvest losses and value addition) during the year 2011. Addition to the research programs the division offered several training programs to the fisher community to disseminate the knowledge in the areas of fish handling and processing.

In 2011 more than 2100 personnel from the fisher community were trained under Divinaguma program on fish based product development namely dried fish, Maldive fish, Jaddi and smoked fish. There were several leaflets prepared and also updated on fish based products. Several undergraduate/graduate students undertook implant trainings and research programs under the supervision of the research staff.

The quality control laboratory of IPHT provided testing service to the industry. Both microbiological and chemical analysis laboratories have been engaging with expanding the services as per ISO/IEC 17025 quality certification. 1365 samples received from the export fishery industry were analyzed and 397 test reports were issued. Total earnings from the test service were Rs. 4,020,125.00.

Projects

Project	Allocation (Rs Mn.)	Officer/s Responsible	Period From - To
3.1 Chemotaxonomy and Bioactivity of Sri Lankan sponges, Soft Corals and other Marine Living Resources	3.30	Dr.R. Edirisinghe	Continuous
3.2Minimization of post harvest quality losses in offshore fishery and costal fishery	2.05	Dr.S.Ariyawansa	2011
3.2 PCR detection, microbiological isolation and sources identification of food borne pathogens from fish supply chain	1.50	P.Ginigaddarage	2011
3.4Development of value added fish products	1.00	S. Ariyaratna	Continuous
3.5Assessment of food safety issues associated with fish and fishery products and development of biodegradable polymers	3.50	K. Jinadasa	2011
3.6Development of value added marketable products from commercially important seaweed species	4.20	P. Jayasinghe	2010-2013

Project 1: Chemo-taxonomy and bio-diversity of marine sponges and extraction of pharmaceutical chemicals from marine organisms

Objectives

- To identify species of sponges, tunicates, soft corals and marine algae occurring in the coastal waters of Sri Lanka using a combination of chemical composition and morphological characteristics
- To develop database based on chemotaxonomy, distribution and abundance
- To determine the bioactivity of marine resources
- To identify commercial value of these species
- To develop management strategies for the conservation and wise use of resources

Activities

Sample Collection

The samples of sponges (n=11) were collected from sea off Dehiwala (Degalmeda and Palagala Reefs in Mt. Lavinia), twenty samples of sponges were collected from sea off Kalmunai, Batticaloa and another 22 samples were collected from sea off Mandathivu, Jaffna by scuba diving at different depths.

Plates showing different sponges studied

Identification of Sponges

All samples are subjected to identification using morphological characters and DNA sequencing. Extraction of PCRs was conducted at NARA and action has been initiated to perform sequencing at the Uni. of Colombo.

Assessment of Biological activity

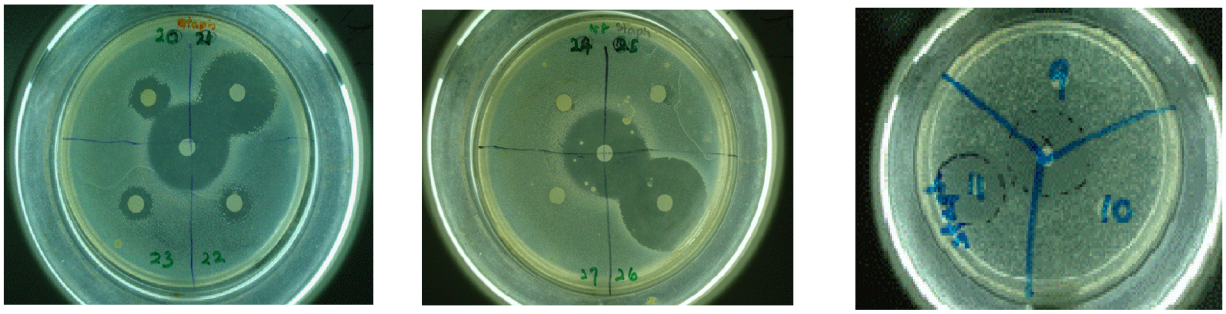
Analysis of Sponges for Antioxidant Activity

The antioxidant activity of 50 crude sponge extracts were measured using DPPH radical scavenging assay and the results were compared with references, Ascorbic acid and

BHT. Five sponge samples collected from Dehiwala, two from Kalmunai and one from Mandathivu were showed high antioxidant activity of more than 80 %. The sample No. 11 showed the highest activity of 97.78% when compared to the standards ascorbic acid and BHT which showed activity of 98.88 and 92.19% respectively.

Analysis of Sponges for Antibacterial Activity

All 50 samples were analyzed for antibacterial activity against reference cultures of *Escherichia coli, Salmonella* and *Staphylococcus aureus* with chloramphenical as reference antibiotic by disc diffusion method. Among the tested samples, sample nos 11, 21 and 26 showed a considerable activity and sample nos 5, 6, 8, 20 & 23 showed slight activity against *Staphylococcus aureus.*



Plates showing antibacterial activity

Analysis of Sponges for Antifungal Activity

All 50 sponge samples were analyzed for antifungal activity using disc diffusion method. *Aspergillus niger* ATCC 8739 (American Culture), *Penicillium sp* and *Fusarium sp*. were used as reference fungal cultures and Itraconazole used as an antifungal standard. Sample Nos 8 and 5 showed good activity followed by No. 11 against *Penicillium sp.* However no considerable activity showed against other fungus.

Conclusions

The present results concluded that five sponge samples collected from Dehiwala, two from Kalmunai and one from Mandathivu were showed high antioxidant activity of more than 80 %. Four sponge samples collected from Dehiwala and four samples collected from Kalmunai were showed considerable antibacterial activity against *Staphylococcus aureus*. Antifungal activity against Penicillium sp. was observed in three sponge samples collected from Dehiwala. Bioassay guided fractionation and structure elucidation of the active compounds is in progress.

Progress: Physical 100% Financial 100%

Project 2: Minimization of post harvest quality losses in offshore fishery and costal fishery

Objective:To reduce post harvest fish losses in order to improve food security, secure greater post harvest benefits and ensure sustainable livelihood

Activities carried out: Post harvest fish losses are a major concern and occur in most fish handling and distribution chain throughout Sri Lanka. Not only do losses constitute for lost income to fishers, processors and traders but they also contribute to food insecurity- a loss of fish means less fish available for the consumer. Awareness programs were conducted to improve the knowledge of fisher folk regarding good handling practices and sanitary requirements to be adapted during handling of fish. Programs were conducted for fisherman and fisherwomen in Jaffna, Mannar, Batticaloa, Killinochchi, Chilaw, Kaluthara, Tangalle, Matara and Kalmunei areas.

Results: Increased knowledge on post harvest handling practices.

Conclusions: It is required to carry out a comprehensive study to assess post harvest loss of different fish species

Progress: **Progress:** Physical 100% Financial 6%

Budget allocation for project 3.2 from January to October 2011 was Rs. 2.05 Million. Budget has been readjusted in October 2011and increased to Rs. 10.7Million by the management with the intention of distribution of fish boxes to the fisher community. Later that activity was given up and that was the reason for 6% financial progress.

Project 3: PCR detection, microbiological isolation and sources identification of food borne pathogens from fish supply chain

Objectives:To find out the prevalence and sources of *Salmonella* spp., *Listeria monocytogenes* and *E.coli* in the fish supply chain and to detect them using PCR based rapid detection methods.

Activities carried out: Beruwala fishery harbor was selected to collect samples. Samples were taken from fish hold, deck, fish (tuna) of multiday boats, trucks which transport fish and ice available in the harbor to check the presence of *Salmonella* spp. , *Listeria monocytogenes* and *E.coli*. PCR analysis was done to detect the above mentioned pathogens.

Results:

Point of the sample taken	Mean value of the amount of presumptive fecal coliform bacteria	Mean value of the amount of fecal coliform bacteria	Mean value of the amount of *E coli*	PCR results for *E coli*	Results for *Salmonella*	Results for *Listeria monocytogenes*	Mean of micro organisms per ml of the product cfu/g
Fish hold	1020 MPN/cm^2	395 MPN/cm^2	74.5 MPN/cm^2	Present	Absent	Absent	4.38×10^5
Deck	1058.33 MPN/cm^2	712.5 MPN/cm^2	80 MPN/cm^2	Present	Absent	Absent	1.76×10^4
Truck	1387.5 MPN/cm^2	1030 MPN/cm^2	23.5 MPN/cm^2	Present	Absent	Absent	2.77×10^4
Ice in the fish hold	866.67 MPN/100 ml	226.25 MPN/100ml	122 MPN/100ml	Present	Absent	Absent	1.07×10^4
Fish	20.17 MPN/g	7.4 MPN/g	0.3 MPN/g	Present	Absent	Absent	1.77×10^5

Conclusions:

According to obtained results *Salmonella and Listeria monocytogenes* were not present in the analyzed samples. But *E coli* and feacal coliforms were present in all the sampling points showing that there could be a possible feacal contamination within the fish supply chain.

Progress Physical 100% Financial 100%

Project 4: Development of Value -added fish products

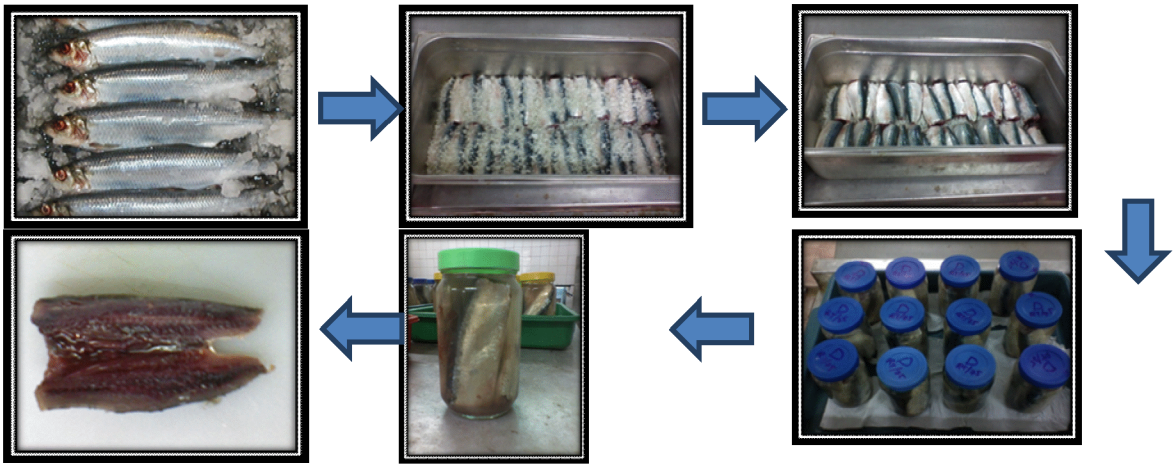
Component 1-
Preparation of fermented fish products using herrings (*Amblygaster sirm*).

Objectives:

To find out the optimum combination of salt to fish ratio for final product with acceptable sensory properties.
To determine the microbiological, chemical and sensory changes during fermentation.
To determine the shelf-life of fermented herrings.

Activities carried out

Trials were conducted using different combination of fish to salt ratio under different temperatures.
Salted fish were stored in glass bottles with brine solutions (saturated and 75 %)
Samples were analyzed for microbiological, chemical and sensory properties.



Results: Optimum combination of salt to fish ratio was 1:4. Sensory properties of the fermented product were in acceptable level until 3 months period.

Conclusions: Salting of herrings using 4:1 fish to salt ratio for 48h followed by immersing in saturated salt solution exhibited desired sensory qualities up to 3month storage at room temperature.

Component 2 - Preparation of smoked fish products using herrings (*Amblygastersirm*).

Objectives:

To identify the most suitable packing method and storage condition for smoked herrings.

To determine the shelf- life of smoked herrings based on packing method and storage conditions.

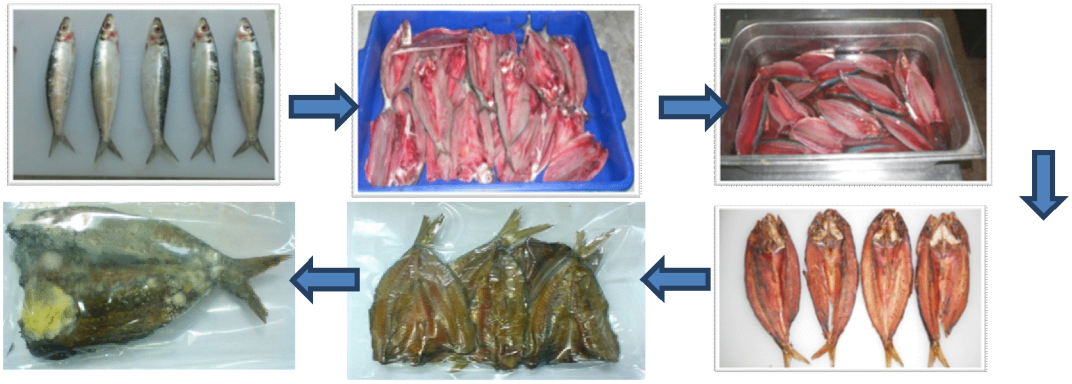
To determine the effect of preservatives on shelf- life of smoked herrings.

Activities carried out:

Herrings were smoked for3 ½ hours under the temperature of 70-80 ^{0}C.

Preservative was added during marinating.

Smoked fish were stored in different temperatures (room temperature, refrigerator and freezer) using different packing methods (non pack, polythene and vacuumed packed).



Results:

Vacuum packing and refrigeration help to increase the shelf-life of smoked herrings.Shelf-life of the smoked fish treated with preservatives were recorded long storage time under all packing method comparatively to smoked fish prepared without using preservatives.

Conclusions:

Based on storage temperature and packing methods, the best storage temperature for the smoked product is 4^{0}C and the best packing method is vacuum packing possible to prolong the shelf-life.

Progress Physical 100% Financial 77%

Project 5: Study of Trace Metals Levels on the Selected Fisheries Harbors; Sri Lanka

Objectives:

- Investigation of some trace metals in fishery harbor basin water

Activities carried out:

Purchasing of equipment glassware and chemicals
Collection of water samples from selected tanks and analysis
Preparation of database on initial findings and make recommendations to relevant authorities
Data analysis and preparation of reports

Results:

The trace metals generally, enter the harbor environment through atmosphere deposition, erosion or due to anthropogenic activities caused by industrial effluent, domestic and harbor generated sewage and oil spilling. The present study was carried out to assess the level of trace metals viz Hg, Pb, Cd, Cr, Zn, Cu and Ni in selected six fisheries harbor basin water from southern and western coast of Sri Lanka. Totally, 54 samples were collected which covered harbor jetty, harbor mouth and near the fuel station area. The level of total Hg was analyzed by cold vapor atomic absorption spectrometry (Varian VGA-77) whereas the other metals were analyzed by graphite furnace atomic absorption spectrometry (Varian GTA-120). Total trace metals in fisheries harbor basin water (n=54) showed a wide range. The concentration ± SD, (µg/L) of the metals of Hg; below the detection limit, Pb; 0.40± 0.61, Cd; 0.06±0.17, Cr; 0.49±0.80; Zn; 13.60±19.10, Cu;4.68±8.99 and Ni; 5.80±7.98. All the values are below the standard limits of EU/FAO harbor basin water guideline. The accuracy of the applied AAS technique was checked by recovery studies, and good recoveries were obtained.

Conclusions:

The concentration values of all metals were below the EU estuary and harbor basin water standards. It is important to undertake continuous monitoring of trace metals of fisheries harbor and open seawater.

National quality standard for fishery harbor and open seawater should be formulated and implemented.

The sewage treatment capacity and closely monitoring waste disposal system into the fishery harbor should be upgraded.

Progress Physical 100% Financial 100%

Project 6: Development of value added marketable products from commercially important seaweed species

Component 1

Objectives:

To find out total flavanoid, phenols and antioxidant activity and antimicrobial activity of five seaweeds of South west coast of Sri Lanka.

Activities carried out:

Five edible seaweeds and their extracts were collected from Matara, Trincomalee, killinochchi districts in Sri Lanka. Determination of total antioxidant capacity was done according to Prieto et. al. (1999) whereas the flavonoids content was determined according to the Folin-Ciocalteu method. Antimicrobial activity was done according to the disc diffusion assay method by Bansemir et.al. 2006: kuda et.al.2007: Shanmughapriya et.al., 2008.

Results:

The total phenolic content of methonolic extract was 1.23mg GAE and 0.61 mg GAE, the total phenolic content and and antioxidant activity was higher in *S. Wigiti* 1.54mg GAE. All these results indicated that flavonoids extracted from *S. wigiti* and *U. lactuca* could be an important source of antioxidant molecules. The capacity of their flavonoids to act as antioxidants depends upon their molecular structure. The position of hydroxyl groups and other features in the chemical structure flavonoids are important for their antioxidant and free radical scavenging activity.

Of the ten seaweed screen *S. wigiti* showed antimicrobial activity against *E. coli* which was significantly higher than standard antimicrobial agent sodium benzoate (200mg/ml). The inhibition of growth of *E. coli* reveals that it can be used as an antibacterial agent against *E. coli* causes vomiting diarrhea, fever, abdominal cramps which also spoils water, raw meat, and dairy products.

Conclusions:

The present study suggested that, among five seaweeds the *S. wigiti* extract possesses high antioxidant activity.

Component 2
Evaluation and characterization of alginate from brown seaweed (*S. wigiti* and *S. flendialis*)

Objectives: To determine the alginate yield, alginate viscosity, ash content and molecular weight and the effect of temperature on the alginate properties of two species of brown seaweeds commonly found in south costal belt from Beruwala to Matara.

Activities carried out:

Alginates were extracted using two methods namely hot method and cold method.

Results:

The average ash content was 11.6% in *S. wigiti* and 14.3% in *S. flendinalis*. It was found that hot method extracted were slightly more sodium alginate as compared to the cold method. The hot method extracted 26.7% of alginate from *S. wigiti* 23.9 of alginate extracted by cold method. The intrinsic viscosity of alginate from *S. wigiti* dropped drastically (83.3%) when it was extracted through the hot method, whereas the intrinsic viscosities of alginate from both *S. wigiti* and *S. flendinalis* were the least affected (13-14%) by heat, followed by (16%). Among two species alginate extracted from *S. wigiti* has highest molecular weight. Alginate extracted from *S. flendinalis* was very heat sensitive. The extent of depolymerisation of the alginate molecules for the other three species was less severe. Viscosity measurement is important for the determination of the molecular weight of alginate. The molecular weight of the two brown seaweed species was less significance. The molecular weight of two species is comparable to those obtain from other countries.

Conclusions:

Sri Lankan species has the potential to be used in relevant industries according to the viscosity.

Experiment 3

Evaluation of nutritional properties of ten different seaweeds and their extracts

Objectives:

To study the chemical constituents is of seaweeds

Activities carried out:

The specimens were collected from January to March 2011.These specimens represent six common seaweed species and their extracts belonging to the three major classes of algae in the Indian sea. Each specimen was cleaned-up from epiphytes and some were preserved in formalin (4%). The chemical analysis dealt with the following components; moisture, ash, sulphate, protein, fat, carbohydrate and fiber content and Mineral composition.

Results:

The protein content was ranged from 1.52% to 2.3% in the seaweeds and their extracted product. The highest protein content indicated in carrageenan from *Euchema cottani*, The highest carbohydrate content 75.68% also found in Carrageenan. All the species showed highest carbohydrate content. Protein is generally poor in algal species of the Indian Ocean inverse relation to the fat content. The sulphate content range from 7.9% to 12.5%. The sulphate content was highest in rhodophyceae species. The fundamental classifications among the calcified and the non-calcified algae is based on ash content, where the calcified algae comprise 20% ash, and the non-calcified comprises more than 80% ash content.

Progress	Physical 100%	Financial 100%

Test Services

The program has been designed to provide certification services in the fields of microbiological and chemical analysis to ensure the quality and safety of the export fishery products intended for human consumption and also for ornamental fish industry. Department of Fisheries & Aquatic Resources is the competent authority for the permitting of export of fishery products from Sri Lanka. Quality control laboratory of NARA has been approved by the competent authority to test samples of fish and fishery products, water, ice etc. (that are to be exported from fish processing establishments).

About 1365 samples of exportable fish, fishery products, water (fresh water, sea water, potable water and packing water used for ornamental fish) and ice from the industry were tested and quality certificates were issued. Quality control laboratory has obtained ISO/IEC 17025 accreditation in 2004 and improved thereafter. The scope of accreditation has been expanded (fresh water, sea water, chilled and frozen fish samples, oyster). Status of accreditation has been maintained.

- Number of samples analyzed : 1365
- Total earnings : Rs. 4,020,125.00
- No of test reports issued : 397
- Total number of parameters : 3228

In addition, necessary chemicals and media have been purchased. Laboratory equipment was calibrated by Sri Lanka Standards Institution. Internal audits and management review meetings were carried out. It has been planned to obtain accreditation for histamine in near future.

Divinaguma Programme-Fish Post Harvest Technology

Training of fisher community for preparation of fish based products (dry fish, Maldive fish, jaddi and smoked fish) as a livelihood for them.

Officers who involved in Divinaguma programme also participated to following mobilization programs.

Place	Date/Dates
Jaffna	20/06/2011
Batticaloa	02/03/2011 16/06/2011
Kaluthara	04/03/2011 18/08/2011
Negombo	11/07/2011
Beruwala	01/03/2011 03/03/2011
Tangalle	24/06/2011
Puttalam	28/06/2011
Matara	10/03/2011
Chilaw	09/06/2011
Trincomalee	01/03/2011 14/06/2011

Plates showing a training of participants under Divinaguma Programme

Fisherwomen and fishermen were trained (on dry fish, Maldive fish, jaddi and smoked fish) in two day technology transfer programs as mentioned below.

District/Place	Dates	Number of programs	Number of actual participants	Total number of actual participants
Galle	25/07-26/07	2	81	197
	01/08-02/08	2	83	
	28/11-29/11	1	33	
Jaffna	08/08-09/08	2	54	244
	10/08-11/08	2	42	
	01/10-02/10	4	54, 64	
	04/12-05/12	1	30	

Batticaloa	23/08-24/08	2	80	281
	25/08-26/08	2	80	
	11/09-12/09	2	75	
	13/09-14/09	2	46	
Kaluthara	27/08-28/08	3	43,98	310
	16/09-17/09	2	74	
	22/09-23/09	3	16,79	
Puttalam	27/09-28/09	1	32	32
Gampaha	12/10-13/10	1	53	100
	27/10-28/10	1	47	
Mannar	17/10-18/10	4	55,49	104
Mahawewa	21/10-22/10	2	80	216
	01/11-02/11	2	68	
	12/12-13/12	2	68	
Matara	06/11-07/11	4	79, 65	144
Hambantota	11/11-12/11	4	70,70	140
Kalmunai	17/11-18/11	4	55, 85	140
Killinochchi	02/12-03/12	4	50,110	160
Total		**59**		**2108**

A crate which can be used for drying of fish was designed for beneficiaries of Divinaguma programme.

Other Activities of IPHT during 2011

- Preparation of smoked fish for Dayata Kirula exhibition. Smoked fish was sold to a concessionary price at the exhibition. Other fish based products were displayed at the exhibition.
- Assistance provided for upgrading of canteen
- Attending several meetings on divinaguma programme, advisory committee meeting of export development board, and codex committee.
- Renovation work of IPHT laboratories and fish processing pilot plant has been completed.
- Dr. R. Edirisinghe works as the Editor-in-Chief of NARA Journal
- Establishment of chemical stores, NARA
- Participated in the survey on sea cucumber fishery in East soat of Sri Lanka.
- Participated in the sea cucumber processing activities in Kalpitiya.
- Attended Carp Post Harvest Technology council meetings (Dr. R. Edirisinghe)
- Attended 134th Coast Conservation Advisory council meeting on behalf of Chairman/ NARA (Dr. R. Edirisinghe)
- Designing of the laboratory has been done by Central Engineering Consultancy Bureau (CECB). CECB has submitted schematic drawings to NARA.

Research Publications

- J. Menaka, P.H.Ginigaddarage, K.W.S. Ariyawansa and C.V.L Jayasinge 2011. Detection of histamine forming Enterobacteriaceae bacteria in fish using polymerase chain reaction. Proceedings of the 7th annual sessions of the Sri Lanka Association for Fisheries and Aquatic Resources.

S.B.N. Ahmad, E.M.R.K.B. Edirisinghe and, E. Dilip de Silva.Screening for Antibacterial, Antifungal and Antioxidant Activities of some Local Marine Sponges.(Submitted for consideration for presentation at the Institute of Chemistry International Conference 2012)

- B.K.K.K.Jinadasa and E.M.R.K.B. Edirisinghe
- Assessment of Heavy Metals (Arsenic, Cadmium, Lead and total Mercury) in Tilapia sp. in Sri Lanka. (Submitted for consideration in publication in NARA Journal)

- B.K.K.K. Jinadasa, .W. Wickramasinghe, E.M.R.K.B. Edirisinghe
    - Assessment of Trace Metals Levels of Main Export Fish Species; Sri Lanka.
    - (Submitted for consideration for presentation at the Institute of Chemistry International Conference 2012)

Posters/leaflets prepared

- Amount of mercury content of selected export oriented marine fish species in Sri Lanka
- Test Services offered by Institute of Post Harvest Technology (IPHT) Nutrients from aquatic resources

- Preparation of leaflets on dry fish (small), dry fish (large), smoked fish and Maldive for Divinaguma programme.

Staff Training

- Suseema Ariyaratne - Quality of fish handling and processing-Iceland from September 2011-March 2012

Supervision of research students

Name of the student	Suseema Athauda
University	Dept of Food Science, Faculty of Agriculture,
University o	Peradeniya
Title of the thesis	Development of hot smoked fish products by Herrings (*Amblygaster sirm*)
Degree	B.Sc. (Food Science)
Year	2011
Name of the student	Renuka Kariyawasam

University	Dept of Food Science, Faculty of Agriculture,
University	Peradeniya
Title of the thesis	Optimization of processing conditions to develop salt fermented Herrings (*Amblygaster sirm*) to preserve its sensory qualities
Degree	B.Sc. (Food Science)
Year	2011
Name of the student	H P E De Zoysa
University	Dept of Food Science, Uni of Sri Jayawardenapura
Title of the thesis	Sources of faecal contamination of tuna harvested by multiday boats
Degree	B.Sc. (Food Science)
Year	2011
Super Name of the student	T. Jayawardena
University	Dept of Food Science, Sri Jayawardenapura
Title of the thesis	Study on Control of Post Harvest Shrimp Melenosis
by us	Metabisulfite
Degree	M.Sc. (Food Science)
Year	2011

5.8 SOCIO-ECONOMIC AND MARKETING RESEARCH DIVISION

Head of the Division –Mr K H M L Amaralal

The main functions of the division include social, economic and marketing studies in the fishing industry, including the welfare of fishermen and their dependants, analysis of different fish distribution patterns and its impacts on consumers.

Research projects conducted in year 2011

1. Fishery Industry outlook - 2010
2. Study on economic efficiency of deep sea multi- Day Fishing in Sri Lanka
3. Green mussel project in Thambalagamuwa bay

Activities:

Under the above three projects the following activities were carried out by the research team of the division.

Data collection
Data analysis
Community organizing
Workshops for community
Training sessions
Report writing/annual publications

Project	Allocation (Rs.)	Responsible Officer	Duration
1. Fishery Industry Out look- 2010 (Project 6.6)	500000.00	M.M.A.S Maheepala	One Year
2. Study on economic efficiency of deep sea multi- Day Fishing in Sri Lanka (Project 1.5)	500000.00	H.D. Wimalasena/ K.H.M.L Amaral/ M.M.A.S. Maheepala	One Year
3.Green mussel project in Thambalagamuwa Bay (project 1.14)		K.H.M.L Amaralal	One Year

Performance

Project 1 : Fishery Industry outlook - 2010

Publication of Sri Lanka Fishery Industry Outlook- 2010 is completed.

Project 2 : Study on economic efficiency of deep sea multi- Day Fishing in Sri Lanka

Deep Sea fishing which was introduced in late 1980s is a more important sub-sector in the current Sri Lankan fishery industry. The contribution of deep sea fish production to the total fish production is gradually increasing year by year (2009). In 2010 deep sea production was 129,840 mt and this is 15.1% of increase compared to the previous year. The uncontrolled new entries, high cost for fishing trip and different fishing methods affected for the profitability of the deep sea fishing. This study was conducted to identify the operational cost structure and income of the deep sea fishing according to the vessel length size and to identify the critical cost factors of the deep Sea fishing. The data was collected by administering a questionnaire in five selected fishery harbors.

According to the selected sample 23.08% of multiday boats practice only fishing nets, 17.95% of multiday boats practice only long line and 58.97% of multiday boat practice both lone line and the fishing nets. The average cost for the fishing gears (nets and hooks) are around Rs 1358409.00. Fishers have invested around Rs 5776467.00 for High seas fishing. The cost of hull, engine, radio, GPS, fishing gear, and compass is included for this investment. Modern fishing technological equipments such as fish finders and winches are used by the deep sea fishers. Winch is mainly two categories which are net haulers and line haulers. Especially winch is used by the lone line fishers. Since high cost for winch and fish finders (around Rs 350000.00) only few fishers have installed winch and fish finders for their boats.

Fuel is a main cost item of the multiday fishers that contain around 65.84 % from their total fishing cost. In addition food and ice are the significant cost items of the deep sea fishing. According to the sample data food and ice constitutes 19.15% and 13.66% of the total cost. The average fishing nets and hooks use per boat is around 41 pieces and 400 hooks respectively. Although, 100% of the nets use for the fishing, usage of the hooks depend on the availability of the fish baits.

Multiday boats should be registered at the department of fisheries. For the registration fishers do not need to pay any fee for the department. However, fishers have to pay monthly fees to the CHFC as bathing chargers. Likewise, all multiday boats should be insured before going to fishing. The insurance fee differs according to boat length and available equipment.

Cost for repair of the engine, hull and the fishing gear are also significant of the deep sea fishing. The repair of engine and the hull is a responsibility of the boat owner. However, cost of the fishing gear repair is borne from the fishing income and hence that is shared by both owner and crew. According to the sample information around Rs 184000.00 and Rs 180000.00 spend annually for engine,/ hull and the fishing gear

repairs respectively. Especially these amounts differ according the age of the fishing gear, the boat and the engine.

For each boat a caretaker is employed and he is responsible for the security of the boat. Wages of the caretaker differs from boat to boat. Daily and monthly payments as well as the percentage payment from the profit of the fishing are the main type of payments for caretakers. Those who get the percentage (most probably 5% to 6%) from profit responsible for the storage of the ice and the unload the fish.

According to the sample, 85% of fishers able to get profit from their last fishing trip. More than Rs.300000.00 has been earned after deducting the operational cost of fishing. The 50% of the profit goes to the boat owner and the rest share between the fishers. Some boats follow the 55% (boat owner) and 45% (Fishers) system. Under this profit sharing system, boat owner get the responsibility to repair of both boat and the fishing gear. According to the sample, on an average 27 days take for one fishing trip. Out of this 27 days, the actual fishing only in 18 days.

Fresh and quality fish can be consumed by the fishers, averagely 2 - 3 kg of fish consumed by the fishers per day. According to the sample, more than 50 kg of fish is consumed by the fishers within the fishing trip. In addition around 30 kg of fish brings to home for their family consumption. Further, around 30 kg of fish gives to their friends and others free of charge. Therefore more than 100 kg of fish per trip leaks out without taking into accounts. This mount does not enter in to the national fish production also.

Only one fisher received formal training related to the fishery sector which offered from a fish export company. However, 30% of fishers are willing to get formal trainings in deep sea fishing technology.

Multiday boats, length from 40 to 45 gain more profit from the high sea fishing. Especially both fishing nets and the hooks are used by these boats. Hence the boats that are use only hooks or nets get low profit than the both net and hooks used boats. Further the fishers who fish for dry fish making purposes have gain more profit compared to the other fishers. The multiday fishers engaged in dry fish production, mainly located in the southern coastal belts, especially they used both nets and the hooks for fishing.

Since, fuel is the critical cost factor in deep sea fishery, fishers request for a fuel subsidy scheme. Therefore it is important to introduce a form of fuel subsidy scheme for the deep sea fishery. Through the subsidized system government can intervene to the fish market in the country. Especially fishers are willing to sell fish to the government (CFC) to get better price for their fish. According to the fishers low fish price in both export and local market mainly effected for their income. According to the fishers, especially intermediates involvement causes to decline the fish price in the haboures.

Project 3: Green mussel project in Thambalagamuwa bay

Aquaculture is a booming sector in world Fisheries. As a tropical Island nation, Sri Lanka is bestowed with suitable environmental conditions for shell fish farming. Hence, NARA is conducting a pilot Mussel (Green Mussel - *Perna viridis*) farming project in Thabalagamuwa Bay in Kinnya. Mussels can be added to seafood soups, stews and rice dishes. In addition, mussels are an excellent source of protein, vitamins and minerals and low in fat.

Mussel can be cultivated under the lagoon environment which has temperature is between 26 C and 32 C and salinity is between 18 to 32. Bamboo, Plastic Barrels (for floating), Kura lone, Core ropes, and plastic basket are required materials to make a 8 x 20 feet raft which cost around Rs 18,500. Thee life time of this raft is around 2 years. 25,000 spats can be stored to the raft and can be harvested after 8 months. Fishers can earn around Rs 250,000.00 under the better maintain from a raft. Hence this is a really profitable investment. Technical know how can be obtain from NARA.

Plates showing project activities

As a pilot project, 50 rafts were deployed in the Thabalagamuwa bay and Dr Rajitha Senarathana, Minister of Fisheries declared open and handed over the rafts to fishers on 28th October 2010.NARA hopes to expand this project with the participation of fishers and Sri Lanka NAVY. This projects leads to help Ministry of fisheries to achieve its development objectives.

Reports

Report on Socio-economic aspects of North Colombo fishing community
Sport fishing in Sri Lanka
Fisheries industry analysis-2010

Training programs:

Not applicable

Other developments:

One research officer promoted to the grade AR-1.
One research officer requited to the Division
One research officer promoted to the grade HM-1

5.9 INFORMATION TECHNOLOGY DIVISION

Head of the Division: Mr. A.B.A.K. Gunaratne

Overview of the Year:

The mission of Information Technology Division is to provide the highest quality technology-based services, and support to the organization for its strategic goals and objectives as it applies to research activities and provide effective technology support for audio/visual, multimedia, desktop and web based applications and services. The Information Technology Division is responsible to provide all aspects of IT and systems implementation for information gathering, processing, sharing and dissemination among all stakeholders for management, conservation and development of aquatic resources. The Information Technology Division provides expertise in computing hardware and software support as well as LAN *(Local Area Network)* and WAN *(Wide Area Network)* connectivity to the staff and administrative support of computer networks. And also ITD maintains IT contracts and software licenses, and coordinates the procurement of IT related hardware and software.

Information Technology Division conducts research using Geography Information system (GIS) and Remote Sensing (RS) for identify suitable areas for aquaculture development. GIS technologies applies in the diverse fields and committed to delivering high-quality spatial and attribute data to the internal researches as to allow better decisions to be made based on the best available information.

Activities undertaken

Programme	Project	Allocation (Rs.M)	Officer Responsible	Period	
				From	To
Promotion of Sustainable aquaculture and inland fisheries production	Preparation of zonal plan for aquaculture development in Northern Province	8.00	A.B.A.K. Gunaratne Dilhari Weragodatenna	2011	
Open access to knowledge and dissemination of information	Internet services and online information system	3.0	A.B.A.K. Gunaratne	2011	
	Production of NARA publication	1.8	A.B.A.K. Gunaratne	2011	
	Extension services	2.8	A.B.A.K. Gunaratne	2011	

Performance

Project 1: Preparation of zonal plan for aquaculture development in Northern Province

Currently the development of fisheries sector is considered one of the major potential fields for expansion of the economy in Sri Lanka. Fish production has been dropped during the past years due to the civil unrest in the east and north areas. These two areas have potential to produce around 54% of the island's total fish catch but it dropped to 21% during the conflict period. The tsunami disaster also affected to the fish production since it was destroyed fishing gears along the coastal area.

Development of various types of aquaculture practices is one of the solutions to increase fish production as well as improve nutritional status and food security of the people. A number of aquaculture technologies are suitable for development in Jaffna area, which are, shrimp farming, seaweed farming, sea cucumber culturing, sea bass culturing, Oyster, grouper, milk fish, crab.

Proper site selection using zoning criteria for aquaculture practices is of paramount importance since it is fulfilled the key functions, conserving the existing environment, increasing the productivity, contributing to the social and economic welfare. Zonation is used to support resource management and hedge against management uncertainty providing buffer for management errors or unforeseen environmental issues or hazards. Mainly zoning is used to prevent of overlapping new development in specific areas. Therefore Zoning is an important planning tool used in the demarcation of geographic areas with specific combinations of features or properties.

Main objectives of preparing the zoning plan for Northern Province were, proper management of the coastal zone with the introduction of suitable sites for different aquaculture practices as an environmentally friendly, socially acceptable and market-driven industry, minimize the conflicts between different resource user groups, sustainable use of environmental resources, protect the environment, while allowing the development process to continue in a planned manner, promote local and foreign private sector investments on development of aquaculture and Encourage private sector investors to commence aquaculture projects with community participation.

Ecological parameters (Salinity, depth, temperature, pH, turbidity, dissolved oxygen, Tidal fluctuation, and Sea bottom) are varying for each species.

It was defined buffer zones for the potential aquaculture areas as well as environmental protected areas using spatial analysis tool. And also it was considered bathymetry, land use type, and soil information. Digital Elevation Model (DEM) was prepared as it is essential to illustrate river mouths, wetland and other floodable areas. Digital Elevation Model is required to identify potential areas to be caused for natural disasters. After analyzing the bathymetry, land contours (DEM), land use type, soil, river mouth,

wetlands or protected areas, number of potential areas identified for aquaculture and other development activities.

Final maps for the Jaffna, Kilinochchi and Mannar are completed. And also draft reports for the above districts are prepared.

Progress (%) : Physical : 90 Financial: 50

Project 2: Internet services and online information system

Main objective of the project is to disseminate the information via World Wide Web and to provide other Internet services for scientific staff of NARA and its stakeholder with a view of facilitating information sharing.

Web site and Mail servers were upgraded. Staff engaged with PC assembling, repairing and upgrading, 26 computers were assembled, 34 computers were repaired and 10 were upgraded. Web page updating was carried out and new web pages were created, total number of web pages updated count was 69 pages and 65 pages were created for the new design. Inform Database that used to evaluate research cost of the institutions engaged in CARP network, was submitted to CARP.

Expected target was achieved during the period.

Progress (%) : Physical : 100 Financial: 100

Project 3: Production of NARA publication

Volume 40 of the NARA Journal is ready for printing. All the translations required for annual reports from year 2008 to 2010 were finished

Project 4: Extension services

The unit carried out public awareness programs, providing auditorium facilitates, printing services for printing annual report, forms etc. 13 Requests had been received from various institutions to take part their exhibitions. However, only 03 exhibitions could be attended due to financial constraints. 10 educational visits consisting more than 100 students were noted during the year .

No	School /Institute	Address	Date
1	Darussalam Maha Vidyalaya	281, Jummah Majid Road, Maligawatte	08/03/2011
2	Viharahena Primary School	Deniyaya	24/03/2011

3	Nalanda College	Colombo 10	6/05/2011
4	Naval & Maritime Academy	Naval Base, Trincomalee	29/06/2011
5	Maliyadeva College	Kurunegala,	15/07/2011
6	Dambadeniya Vidyalaya	Maha Oya	04/08/2011
7	Kalugathenne Primary School	Delwita	05/08/2011
8	Institute of Pipena Kekukulu	Palampitiya	16/082011
9	Naval and Maritime Academy	Naval Base, Trincomalee	05/10/2011
10	St. Benedict's College	Colombo 13	04 /08/2011

Exhibitions

	Exhibition / School	Place	Period
1	Dayeta Kirula	Buttala	Feb 04th to 10th , 2011
2	St. Mary's Vidyalaya	Mattakuliya	Aug. 04th to 06th , 2011
3	St. Mary's College	Matugama	Dec .19th to 25th,2011

Progress (%) : Physical : 100 Financial: 100

Project Proposals

Two project proposals were submitted to the Ministry of Economic Development through the Ministry of Fisheries and Aquatic Development

1. Project proposal for Kalpitiya Tourism Development
2. Project proposal for Tourism Development of Mannar District

5.10 LIBRARY AND INFORMATION DIVISION

Head of the Division: B.G.S. Kariyawasam

Overview of the year

The main responsibility of the library and information division is to ensure the information need of the readers engaged in the study and research of aquatic resources through the collection, management and dissemination of new information in the field of aquatic resources.

As a special library, it is mainly focused in assisting the subject specialists to access the scientific knowledge disseminated from various information sources so that, they could be motivated in their innovative research studies.

At present, there are two professional librarians at the information division and vacancies exist for two more librarians and a data entry operator (English). Therefore the routine flow of effective services and the development activities of the library are curtailed due to the lack of staff.

Activities undertaken

Project	Activities	Allocation	Office Responsible	Period (from-to)
1. Collection of Library Resources	1.1 Procurement of books and Journals	3.00	B.G.S. Kariyawasam R.S. Liyanarachchi	
	1.2 Collecting Research Reports and Papers		B.G.S. Kariyawasam	Jan– December
	1.3 Obtaining Donation		B.G.S. Kariyawasam	
2. Management of Library Collection	2.1 Editing and updating of library catalogue 2.2 Subject Classification & filing of library resources 2.3 Fumigated and Re-arranged the library collection		B.G.S. Kariyawasam	Jan– December
3. Information	3.1 Current		B.G.S.	Monthly

retrieval	Awareness Services (CAS) 3.2 Selective Dissemination of Information Service (SDI) 3.3 Indexing Services 3.4 Information Re-packaging programme 3.5 Exchange Service 3.6 Compilation of digital collection		Kariyawasam R.S. Liyanarachchi B.G.S. Kariyawasam B.G.S. Kariyawasam R.S. Liyanarachchi -Do - B.G.S. Kariyawasam	Jan– December
4. Publishing Journal & Publicity Service	4.1 Distribution of NARA publication 4.2 Assisting for Publishing NARA journal		B.G.S. Kariyawasam R.S. Liyanarachchi B.G.S. Kariyawasam	Jan – December

Performance

Project 1: Acquisition of Library Resources

Subscription were made for journals and books were purchased & donation were received.

Statistics of journals and books acquired are given below.

Method of Acquisition	Quantity
Purchasing From publishers	08- Journals (Print+Online)
International Book Fair	97- Books
Donations	
NECCDEP	17 Reports
Dr. Sisira (MBRD)	04-Journal Vols.
Bio diversity Institution	04-Books
Worldfish Publication	56 Reports
FAO	86 Reports
Other	**36 Books**
Total	**308 Books, Journals &Reports**

List of purchased journals, books & Databases is given below Journals –

1. Aquaculture
2. Estuarine Coastal and Shelf Science
3. Fisheries Research
4. American J Journal of Sociology
5. Journal of Aquatic Food Product Technology
6. Ecotoxicology
7. National Geographic
8. Asian Fisheries Science (Online)

Books – 97

Databases – 05

JSTOR, EBSCOHOST, AGORA, AQUATIC COMMONS, DOAJ

Information Repackaging Programs

Sea Cucumber, Lobsters, Grouper, Seaweeds, Shrimps

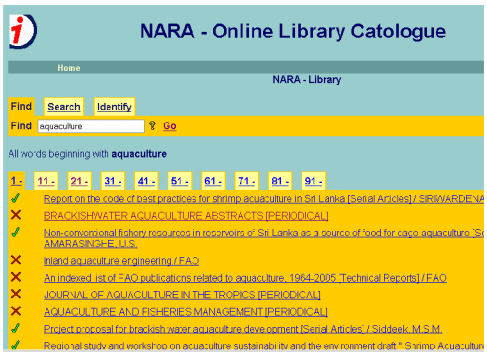
Research Reports and Theses

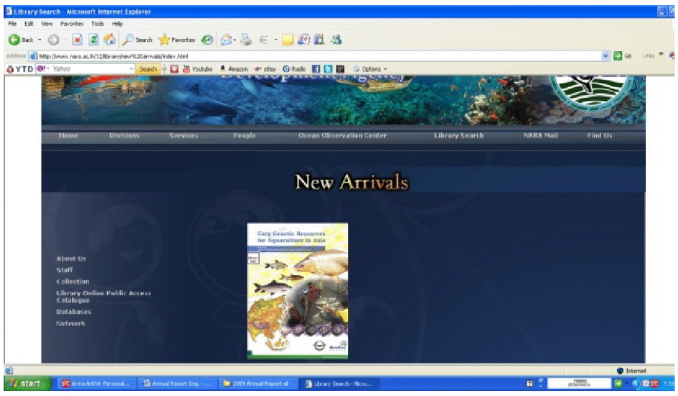
The collection of Sri Lanka, Ornamental fish, Reference and Lending were reorganized, 85 FAO

Research reports, 27 CD Roms, 01 postgraduate theses, 15 Travel reports have been collected.

Project 2: Resource Management

Open Public Access Catalogue (OPAC) was maintained, Journal Article Index (JAI) database was updated and NARA new arrivals is included to the NARA web.





Project 3: Information Retrieval

In order to retrieve from Journal articles, Postgraduate theses, Research Reports, Research articles and Newspaper clippings, IT was used and 05 databases were compiled using WINISIS software. Details of data entry for the year are given below.

Name of the Database	Quantity of Data
Journal Article Index (JAI)	701
Theses Database	001
Research Reports Index	-
Research Article Index	020
Newspaper Article Index	574

1.3.2 Electronic Articles database was compiled using GSDL software and collected 84 articles for the database.

1.3.3 Library has provided services for the under postgraduate, scientist and researchers who come from different institutions and universities. Total number of users was 141. Publication exchange program was also carried out with other institutions.

1.3.4 Library has jointed for the British Council Membership progr and Cooperate membership Service with ITI library.

Project 4: Library Management

1.4.1 Library conservation and preservation work was successfully completed.

1.4.2 Compiled a New Scheme of charging a fee for non returned books at the library.

1.4.3 Introduced a library membership charge for the outside researchers.

1.4.4 Collected newspaper articles in related subjects separately.

1.4.5 Started to collect related news articles through 'Vidusara" Newspaper too.

Project 5: Publication and Publicity Service

1.5.1 Sales of NARA publication were done by the library & the total amount received through sale during the year was Rs. 95,025\=

1.5.2 NARA journal Vo. 39 was published & distributed.

1.5.3 New information was given to update the institutional web page.

Project 6: Training Programme, Workshops & Committee Meetings attended.

Local - Workshop on using internet resources in libraries - Organized by SLLA
- National conference on library & information science - Organized by SLLA
- Higher Training course for library assistants - Organized by NILIS
- Participated AGRINET meeting at CARP
- Participated SLISTINET meeting at NSF

Other

- Data collected & forwarded to the Ministry to compile the 'Mahawansaya' for the period 1982-2009
- Compiled 06 posters for the 30th anniversary programme

Progress (%) Physical (100%) Financial (100%)

6. ANCILLARYSERVICES

6.1 SERVICE AND OPERATION

Head of the Division: N.B.P.Punyadewa

Over view of the Year 2011

Service & Operation Division (S & O) is the supportive division of the institution. S & O division provide and maintain all the services and develop the infra-structure facilities in line with work programs of the institution.

Activities:

In Service and operation division has several activities. They are categorized as follows.

1 Rehabilitation of building , roads, new buildings, (under civil supervision)

2 Repair and maintenance of Vehicles

3 Maintenance of Air conditioners and electronic appliances

4 Maintenance of electrical wiring of the institute

Above mentioned works was done by the service and operation division staff. For the year 2011 below mentioned work has been completed and some activities are continuous.

Project 1: Rehabilitation of building , roads, new buildings, (under civil supervision)

Some areas of the NARA main building were renovated; Library and NHO building area were renovated. The concrete beams and several columns were badly damaged by the sea breeze; therefore identified areas and brick walls were removed and reconstructed. The main water sump was badly damaged and it was found that there were leaks from the outside water to the sump. It was repaired. The access road to the NARA is badly damaged and it was repaired and it was done by the Colombo municipal council. The old garage of the NARA was renovated and new building was constructed.

Project 2: Rehabilitation of Vehicles (09 nos)

There are 29 vehicles in NARA fleet and 09 of them fleet taken for rehabilitation during the year at total cost of Rs 4.4 Million from capital budget. The vehicles under rehabilitation were 32-3417, 61-6251, 61-4803, 251-0577, 57-4052, 58-1378, 32-7028, 32-2951 and 50-4415

Project 3: Hiring of Vehicles

During the year four passenger van were hired without Drivers and fuel for the cushioning of transport activity for research & development work. This van was utilized for 39,632 km of running in research and related work.

Project 4: Maintenance of Air conditioners and electronic appliances

The identified ACs were repaired and some new ACs were installed. The several electronic appliances belongs to the research divisions were repaired.

Project 5: Maintenance of electrical wiring of the institute

Identified Electrical wiring systems were repaired and several new installations were done. The generator of the NARA also repaired and several maintenance and some parts were ordered from the relevant authorities.

Performance

Programme	Site area	Allocation	Period from	Physical Progress	Financial Progress
Rehabilitation of building , roads, new buildings	Main building area and premises of the institute	6 Million Rs	2011 January to December	T-100% P- 90%	T- 100 % P- 95 %
Rehabilitation of Vehicle	Head office	4.4 Million Rs		T-100% P-95%	T-100% P-90 %
Maintenance of Air conditioners and electronic appliances	Head office and RRCs	1 Million		T-100% P-90%	T-100% P-90 %
Maintenance of electrical wiring of the institute	Head office and RRCs	1 Million		T-100% P-90%	T-100% P-90 %

Physical Achievement: Cumulative target Cumulative Achievement (overall)

- Cumulative target
- 100 %
- Achievement
- 90 %

Financial Achievement: (overall)

- Financial target
- 100 %
- Achievement
- 90 %

Publications

Not relevant

Training /

Several trainings were given to the service and operation division staff..

Constrain

Lack of Human resources the scheduled work cannot completed

6.2 PURCHASING & SUPPLIES UNIT

Head of Division: Mrs. A.R. Wanigasekara

The premier function of the unit is to provide all necessary services and supplies in a formal and systematic manner in accordance with Procurement Guide Lines in order to carry out research & development activities of divisions of National Aquatic Resources Research & development Agency and Regional Research Centers.

Overview of the Unit

Purchasing and Supplies Unit was established with effect from 23/05/2007. The functions and responsibilities of the unit are as follows.

- Supply goods and services relevant to the all divisions.
- Handle all tender works.
- Procurement works relevant to all divisions
- Air freight and clearance of goods
- All insurance matters
- Administration of main stores
- Auction work relevant to disposal items.
- Provide details to all divisions on their requirements.

Performance

A. Mainly purchase of equipments & chemicals for on-going projects, acquisition of spare parts for vehicles and hiring of vehicles are performed by the unit according proper tender procedures.

   For the last year the registration & selection of suppliers is done by Ministry of Finance. But for the year 2011 this job is done by NARA, using the rainbow pages.

   Calling of tenders / quotations from local and foreign suppliers for goods / equipments / chemicals following tender procedures as per the given specifications.

   Purchase of goods for day to day use by utilizing a petty cash imprest and maintain records.

   For the year 2011, the unit has maintained about 175 tenders following the tender procedures.

B. Clearance of goods received as donations, purchase of goods from foreign sources or airfreight of goods for repairs. Take actions where necessary to obtain

tax relief when clearance of goods received from foreign sources are done & sending equipments for repair etc. abroad subject to normal mail and airfreight charges.

C. Insure all vehicles / motor – bicycles / equipment of NARA through proper tender procedures. Obtain insurance coverage for the personnel who perform duty at sea and land. (unsecured areas)

D. Distribution of goods ordered by this division to respective divisions after updating ledgers in the Main Stores.

Maintain buffer stocks of consumables in the main stores for day to day requirements of divisions, issue of goods receipt notes, produce documents for payments, submit report to respective divisions when requested are also performed by this division.

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கணக்காய்வாளர் தலைமை அதிபதி திணைக்களம்
AUDITOR GENERAL'S DEPARTMENT

මගේ අංකය / My No: AF/B/NARA/FA/11

ඔබේ අංකය / Your No:

දිනය / Date: 30 September 2012

The Chairman,
National Aquatic Resources Research and Development Agency.

Report of the Auditor General on the Financial Statements of the National Aquatic Resources Research and Development Agency for the year ended 31 December 2011 in terms of Section 14(2)(c) of the Finance Act, No 38 of 1971.

The audit of financial statements of the National Aquatic Resources Research and Development Agency for the year ended 31 December 2011 comprising the balance sheet as at 31 December 2011 and the income statement, statement of changes in equity and cash flow statement for the year then ended and a summary of significant accounting policies and other explanatory information , 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 and section 32(3) of the National Aquatic Resources Research and Development Agency Act. No.54 of 1981.My comments and 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 furnished to the Chairman of the Agency on 17 May 2012.

1.2 Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Sri Lanka Accounting Standards and for such internal control as the management determines is necessary to enable the preparation of financial statements that are free from material misstatements, whether due to fraud or error.

අංක 306/72 පොල්දූව පාර,
බත්තරමුල්ල , ශ්‍රී ලංකාව
No.306/72, Polduwa Road,
Battaramulla , Sri Lanka

දුරකථනය / Telephone: 2887028 - 34
ෆැක්ස් අංකය / Fax No.: 2887223
ඉලෙක්ට්‍රොනික් තැපෑල් / E-mail: oaggov@sltnet.lk

1.3 Auditor's Responsibility

My responsibility is to express an opinion on these financial statements based on my audit. I conducted my audit in accordance with Sri Lanka Auditing Standards. Those Standards require that I comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments , the auditor considers internal control relevant to the Agency's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances ,but not for the purpose of expressing an opinion on the effectiveness of the Agency's internal controls . An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness accounting estimates made by management, as well as evaluating the overall presentation of the financial statements. Sub – sections (3) and (4) of Section 13 of the Finance Act,No.38 of 1971 give discretionary powers to the Auditor General to determine the scope and extent of the Audit.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my qualified audit opinion.

1.4 Basis for qualified Opinion

My opinion is qualified based on the matters described in paragraph 2.2 of this report.

2. Financial Statements

2.1 Qualified Opinion

In my opinion,except for the effects of the matters described in paragraph 2.2 of this report ,the financial statements give a true and fair view of the financial position of the National Aquatic Resources Research and Development Agency as at 31 December 2011 and its financial performance and its cash flows for the year then ended in accordance with Sri Lanka Accounting Standards.

2.2 Comments on Financial Statements

2.2.1 Accounting Policies

The following matters were observed.

(a) In the department of income of the year under review relating to foreign assets grants, a sum of Rs.256,532 had been over transferred to the revenue account.

(b) A deferred revenue of Rs.115,017 to be transferred to the revenue of the year under review had been shown as non- current liabilities instead of being transferred to the revenue account.

2.2.2 Accounts Receivable and Payable

The following matters were observed.

(a) According to the debtors age analysis presented , the outstanding debtor balances as at 31 December 2011 amounted to Rs.40,314,143 out of which the value of balances remained unrecovered for more than 02 years amounted to Rs.1,988,507.

(b) Action had not been taken to recover a sum of Rs.89,542 paid erroneously as salaries, allowances and distress loan to an officer who had been dismissed from service during the year under review.

(c) According to the age analysis of creditors presented as at 31 December 2011,the payable balances amounted to Rs.15,682,943 and of which the balances of Rs.4,077,122 remained unsettled for the period of more than 4 years which represented 26% of the total creditors.

2.2.3 Non – compliance with Laws, Rules, Regulations and Management Decisions

The following non- compliances were observed.

Reference to Laws, Rules, Regulations etc.	Non – compliance
(a) Section 11 (b) of the Finance Act No.38 of 1971	A sum of Rs.91,112,747 had been invested in fixed deposits without the approval of the Board of Directors, the Minister in charge of the subject, with the concurrent of the Minister of Finance.
(b) Treasury Circular No.842 dated 19 December 1978	The register of fixed assets in respect of the value of Rs.1,106 million had not been updated.
(c) Treasury Circular No.IA1/2002/02 dated 28 November 2002	The register for computers and computer accessories valued at Rs.7,644,249 had not been updated.

2.2.4 Transactions of Contentions Nature

Despite the foreign sponsored organization had informed in writing that they would meet all expenditure of the tour, the Agency had spent a sum of Rs.111,970 to the Chairman for that foreign tour. The Chairman replied that this amount had been paid on the verbal instruction of the Secretary to the Ministry.

3. Financial Review

3.1 Financial Results

According to the financial statements presented the operation of the Agency had resulted in a deficit of Rs.41,313,223 for the year ended 31 December 2011 as compared with the deficit of Rs.39,167,043 for the preceding year,thus showing a determination in the financial results by Rs.2,146,180 .Increase in repair expenses,contracted services and research and development expenses had been the main reason for the decrease in financial results.

4 Operating Review

4.1 Performance

Grants received by the Agency in the year and past 4 years for research and development expenditure increased thereon are given below.

		2007	2008	2009	2010	2011
Total grants received	(Rs.M)	184	195	197	219	267
Research and development expenditure	(Rs.M)	37	39	36	37	46

The following observations are made in this regard.

(a) Even though the increase in total grants received during the year 2011 as compared with the year 2010 amounted to Rs.48 million, the total expenditure incurred on research and development had increased only by Rs.9 million.

(b) Out of the research and development grants received during the year under review, the expenditure incurred was only 17 percent.

4.2 Management Inefficiencies.

The following matters were observed.

(a) Without calling for market quotations for providing security services , the Agency had taken the security service from Fisheries Harbour Corporation from served years and a sum of Rs.5,346,111 had been paid for the provision of such service for the year under review services had been obtained in excess of the market prices and the security officers had been employed without asking for the requirement from the Agency.

(b) Out of the provision made for the purchase of a vessel for researches for the year under review a boat had been built on incurring a sum of Rs.8,459,010 and the total expenditure incurred there on amounted to Rs.13,192,703.

4.3 Operating Inefficiencies

A sum of Rs.366,325 had been spent for a party extraneous to the objectives of the establishment of the Agency.

4.4 Idle and Underutilized Assets

The following matters were observed.

(a) A sum of Rs.1,360,800 had been paid for the purchase of used rails to build an anchor ferry for the Kalpitiya research centre during the year under review. The stock of these rails had been retained in the centre for more than 01 year without being used for any purpose.

(b) A sum of Rs.120,000 had been paid for the purchase of a Thanduri furnace and it had remained in the canteen for more than 01 year without being used.

(c) Wall tiles value at Rs.225,000 had been purchased but they were in the stores for more than one year without being used.

(d) A some of Rs.272,160 had been spent for the purchase of a software to maintain the general ledger including the fixed assets and stores items but it had not been utilized for more than 2 years.

(e) Even though a sum of Rs.317,623 had been spent for the construction of a proposed food stores during the year under review the construction works had been stopped half way.

(f) A deep freezer valued at Rs.275,400 had been purchased in the year under review but it had been kept in the head office without being used.

(g) The boundary wall and the park valued at Rs.852,718 belonging to the Negambo Kadolkele Regional Research Centre had been identified as an idle asset by the Agency.

4.5 Personnel Administration

Cadre position as at 31 December 2011 is given below.

Particulars	Approved Cadre	Actual Cadre	No . of vacancies
Staff	141	67	74
Non- staff	282	234	48
Total	423	301	122

The percentage of vacancies represented 29% as compared with the approved cadre.

4.6 Resources of the Agency given to other Public Institutions

A sum of Rs.1,821,155 as salaries and a sum of Rs.173,837 as combined allowances and overtime had been paid by the Agency for the officers who had been released to external parties.

5 Accountability and Good Governance

5.1 Corporate Plan

Although a corporate plan for the period 2009 – 2013 had been prepared to fulfill the vision and mission of the Agency in terms of paragraph 5 of the Public Enterprises circular No. PED/12 of 02 June 2003 it had not been updated.

5.2 Action Plan

Even though an annual action plan had been prepared, it had not been approved by the Board of Directors and not updated after being reviewed periodically.A system of periodical examination of the progress achieved as per action plan had not been introduced by the Agency and only the financial values had been included in it.

5.3 Internal Audit

The following observations are made in respect of the establishment and implementation of an Internal Audit Division.

(a) A sufficient staff had not been recruited to the internal audit to perform the duties and functions of the Internal Auditor. The scheme of recruitment had not been approved so as to cover the functions of the Internal Audit Division of the Head office.

(b) Due to dearth of officers responsibilities of the Internal Audit Division could not be planned and operated as required.

(c)

5.4 Procurement Plan

A procurement plan had not been prepared.

6 Systems and Controls

Weaknesses in systems and controls observed during the course of audit brought to the attention of the Agency from time to time.Special attention is needed in respect of the following areas of control.

(a) Motor Vehicle Control
(b) Human Resource Management
(c) Control Administration
(d) Amounts Receivable and Payable
(e) Purchasing

H.A.S.Samaraweera.
Auditor General.

NATIONAL AQUATIC RESOURCES RESEARCH AND DEVELOPMENT AGENCY		
CONSOLIDATED CASH FLOW STATEMENT FOR THE YEAR ENDED 31 ST DECEMBER 2011		
	31.12.2011	**31.12.2010**
	RS.	**RS.**
CASH FLOWS FROM OPERATING ACTIVITIES		
SURPLUS (DEFICIT) FROM ORDINERY ACTIVITIES	(41,313,222.55)	(39,167,042.75)
ADJUSTMENT FOR:		
DEPRECIATION ON PROPERTY, PLANT AND EQUIPMENT	66,665,521.74	66,159,828.03
AMORTIZATION OF DEFERRED EXPENDITURE	(18,070,631.33)	(18,066,425.65)
PROVISION FOR RETIRING GRATUITY	7,614,942.34	5,701,078.60
RETIRING GRATUITY PAID	(3,814,213.84)	(3,809,974.33)
INVESTMENT INCOME	(13,651,102.87)	(11,151,679.42)
INTEREST EXPENSE	-	13,844.20
GAIN (LOSS) ON SALE OF PROPERTY PLANT AND EQUIPMENT		(746,152.50)
		-
OPERATING PROFIT/ (LOSS) BEFORE WORKING CAPITAL CHANGES	**(2,568,706.51)**	**(1,066,523.82)**
WORKING CAPITAL CHANGES		
(INCREASE)/DECREASE IN INVENTORIES	(768,237.67)	588,429.86
(INCREASE)/DECREASE IN TRADE & OTHER RECEIVABLE	7,710,133.71	24,706,599.36
(INCREASE)/DECREASE IN PREPAYMENTS	(345,331.38)	550,511.50
INCREASE/(DECREASE) IN ACCOUNTS PAYABLES	(8,663,196.30)	11,093,839.89
INCREASE/(DECREASE) IN ACCRUED EXPENSES	945,763.03	(993,310.13)
CASH GENERATED FROM/(USED IN) OPERATIONS	**(3,689,575.12)**	**35,946,070.48**
NET CASH GENERATED FROM / (USED IN) OPERATING ACTIVITIES	**(6,258,281.63)**	**34,879,546.66**
CASH FLOWS FROM INVESTING ACTIVITIES		
PURCHASE OF PROPERTY PLANT AND EQUIPMENT	(52,005,218.72)	(20,191,609.24)
RESEARCH VESSEL	(52,559,599.21)	
PROCEED FROM SALE OF PROPERTY PLANT & EQUIPMENTS	-	746,152.50
INTEREST ON TREASURY BILLS & FIXED DEPOSITS	8,248,604.16	11,151,679.42
NET CASH GENERATED FROM/ (USED IN) INVESTING ACTIVITIES	**(96,316,213.77)**	**(8,293,777.32)**
CASH FLOWS FROM FINANCING ACTIVITIES		
CAPITAL GRANTS RECEIVED	120,818,966.00	40,010,847.86
REPAYMENTS OF BORROWINGS		(597,288.00)
NET CASH GENERATED FROM/ (USED IN) FINANCING ACTIVITIES	**120,818,966.00**	**39,413,559.86**
NET INCREASE / (DECREASE) IN CASH AND CASH EQUIVALENTS		
DURING THE YEAR	18,244,470.60	65,999,329.20
CASH AND CASH EQUIVALENTS AT THE BEGINNING OF THE YEAR	182,511,461.71	116,512,132.51
CASH AND CASH EQUIVALENTS AT THE END OF THE YEAR	**200,755,932.31**	**182,511,461.71**
ANALYSIS OF CASH & CASH EQUIVALENTS AT THE END OF THE YEAR		
CASH AT BANK	13,568,926.95	25,249,009.62
SHORT TEARM INVESTMENTS	187,187,005.36	157,262,452.09
	200,755,932.31	**182,511,461.71**
THE SIGNIFICANT ACCOUNTING POLICIES AND NOTES ANNEXED FORM AN INTEGRAL PART OF THESE FINANCIAL STATEMENTS.		

NATIONAL AQUATIC RESOURCES RESEARCH AND DEVELOPMENT AGENCY

BALANCE SHEET AS AT 31 ST DECEMBER 2011

	Notes	31.12.2011 Rs. Cts.	31.12.2010 Rs. Cts.
ASSETS			
NON-CURRENT ASSETS			
PROPERTY, PLANT AND EQUIPMENT	**1 - 2**	1,106,428,325.10	1,115,488,628.12
CAPITAL WORK IN PROGRESS	**3**	73,311,022.17	2,902,424.13
		1,179,739,347.27	1,118,391,052.25
CURRENT ASSETS			
INVENTORIES	**4**	3,001,441.22	2,233,203.55
TRADE AND OTHER RECEIVABLES	**5**	47,530,340.72	55,240,474.43
PREPAYMENTS	**6**	619,790.41	274,459.03
SHORT TERM INVESTMENTS	**7**	187,187,005.36	157,262,452.09
CASH AND CASH EQUIVALENTS	**8**	13,568,926.95	25,249,009.62
		251,907,504.66	240,259,598.72
TOTAL ASSETS		**1,431,646,851.93**	**1,358,650,650.97**
EQUITY AND LIABILITIES			
ACCUMULATED FUNDS	**9**	1,190,018,335.72	1,073,360,628.25
RESERVES	**10**	140,628,903.63	180,373,705.37
		1,330,647,239.35	1,253,734,333.62
NON-CURRENT LIABILITIES			
DEFERRED INCOME	**11**	115,017.44	115,017.44
PROVISION FOR GRATUITY	**12**	58,425,369.50	54,624,641.00
		58,540,386.94	54,739,658.44
CURRENT LIABILITIES			
ACCOUNTS PAYABLES	**13**	16,219,117.87	24,882,314.17
ACCRUED EXPENSES	**14**	26,240,107.77	25,294,344.74
		42,459,225.64	50,176,658.91
TOTAL LIABILITIES		**100,999,612.58**	**104,916,317.35**
TOTAL EQUITY AND LIABILITIES		**1,431,646,851.93**	**1,358,650,650.97**

THE SIGNIFICANT ACCOUNTING POLICIES AND NOTES ANNEXED FORM AN INTEGRAL PART OF THESE FINANCIAL STATEMENTS.

.....

(Mrs) Preethika Ranasinghe
HEAD/FINANCE

APPROVED AND SIGNED ON BEHALF OF THE BOARD.

....

Dr.S.G Samarasundara
CHAIRMAN

DIRECTOR GENERAL

COLOMBO, 02nd March, 2011

NATIONAL AQUATIC RESOURCES RESEARCH AND DEVELOPMENT AGENCY			
INCOME STATEMENT FOR THE YEAR ENDED 31 ST DECEMBER 2011			
		31.12.2011	**31.12.2010**
	NOTE	***Rs.*** ***Cts.***	***Rs.*** ***Cts.***
OPERATING REVENUE			
GOVERNMENT GRANT	**15**	**191,982,237.54**	**179,078,652.78**
OTHER INCOME	**16**	**41,235,702.25**	**34,972,117.29**
TOTAL OPERATING REVENUE		**233,217,939.79**	**214,050,770.07**
OPERATING EXPENSES			
PERSONNEL EMOLUMENTS	**17**	127,402,151.60	120,500,110.40
TRAVELLING & SUBSISTENCE	**18**	823,047.75	897,479.15
SUPPLIES & CONSUMABLES USED	**19**	1,833,537.80	1,770,764.95
MAINTENANCE EXPENDITURE	**20**	14,272,686.93	10,549,315.67
CONTRACTUAL SERVICES	**21**	26,909,468.12	22,863,665.05
RESEARCH & DEVELOPMENT EXPENDITURE	**22**	45,666,861.02	38,727,358.46
DEPRECIATION & AMORTIZATION EXPENSES	**23**	66,665,521.74	66,159,828.03
OTHER OPERATING EXPENSES	**24**	3,229,134.25	2,650,180.38
TOTAL OPERATING EXPENSES		**286,802,409.21**	**264,118,702.09**
SURPLUS (DEFICIT) FROM OPERATING ACTIVITIES		**(53,584,469.42)**	**(50,067,932.02)**
NON OPERATING REVENUE / EXPENSES			
TOTAL NON-OPERATING REVENUE / EXPENSES	**25**	**12,271,246.87**	**10,900,889.27**
NET SURPLUS (DEFICIT) FOR THE PERIOD		**(41,313,222.55)**	**(39,167,042.75)**
THE SIGNIFICANT ACCOUNTING POLICIES AND NOTES ANNEXED FORM AN INTEGRAL PART OF THESE FINANCIAL STATEMENTS.			

Actions taken by the Management regarding facts stated in the Audit Report, in accordance with section 14(2) of the Finance Act No: 38 of 1971 regarding financial statements for the year ended 31st December 2011 of the National Aquatic Resources Research and Development Agency

2.2 **Comments on Financial Statements**

2.2.1. **Accounting Policies**

(a) The excess value of Rs 256,532/- transferred to the Income Account was rectified in the books of accounts in the year 2012

(b) Unable to agree with the audit observations

In the year under review, the relevant deferred income is transferred to income account after realization. Accordingly the accounting was correct.

2.2.2 Accounts Receivable and Payable

(a) The required approval has been granted by letter dated 24.07.2012 of the Department of National Budget to write-off an amount of Rs 2,624,626/-out of the value of debtors not recovered over a long time. Accordingly, the relevant adjustments to accounts have been made in the year 2012.

(b) The amount paid as wages and allowances is not Rs 89,542/- and should be corrected as Rs 58,834/-. The above amount paid as wages had been recovered by the Voucher No: 1716 when paying gratuity on 20.08.2012.

(c) These balances are monies received by the Institute on account of various projects and actually not creditors' balances payable. Accordingly, the balances so indicated as payables are balances of projects which have been completed as per agreements and not reported to the accounts section as payables. Steps will be taken to make payments no sooner the projects are completed.

2.2.3 **Non-Compliance with Laws, Practices, Regulations and Management Decisions**.

(a) The sum received as insurance cover on account of the Vessel Sayuri and machinery and equipment fixed in it, had been invested in Treasury Bills as per the Board decision taken at the 318th Board meeting held on 20.02.2007 and upon maturity of those investments, based on the re-investment concept, had been converted to fixed deposits with the knowledge of the former Director General for a higher return (for a higher interest rate).

The Board has granted the relevant covering approval for investing the money received as insurance payment, in Fixed Deposits.

The relevant officers were advised to act in conformity with the guidelines in Treasury circulars and financial regulations when investing excess funds.

(b) Fixed Asset Register is being prepared

(c) Fixed Asset Register is being prepared

2.2.4 **Transactions of Contentions Nature**

The sum due has been paid according to the circular. This sum has been paid by the Institute as per the verbal instructions of the Secretary to the Ministry advising that the institute should bear all expenses.

03 **Financial Review**

3.1 **Financial result**

Agree with the observations of the audit. Required steps are being taken to improve financial results through control of expenses.

04 **Operating Review**

4.1 **Performance**

(a) As the Treasury is not providing funds relative to the growth of the grants, the expenditure has been borne based on actual receipts from research and development. Steps have been taken to increase this quantum from 2012.

(b) Progress relating to research and development expenditure has been included in the annual report prepared for the year under review. Steps have been taken to increase the percentage of research expenditure borne out of research and development grants.

4.2 **Management Inefficiencies**

(a) Security services are provided to the Institute by CFHC, a brother organization. As per the currently accepted practice, there is a virtuous binding that security services should be obtained from that institution for the brother organization. Accordingly, institutes under and including the Ministry obtained security services from the relevant organization. However, in the future, action will be taken to obtain security services on open tenders.

(b) While Rs 8.550m had been allocated for special projects of the Chairman under vote No: 26.5 of 2010 Action Plan, an expenditure of Rs: 1,900,000/- had been made as an initial advance since the Chairman had commenced the construction of a Boat as a special project.

For obtaining provisions from remainders in expenditure headings to meet expenditure incurred in excess of provisions stated in the observations of the audit, the Action Plan has been amended during the 3rd quarter. According to that amendment Rs 15,000,000/= has been allocated for Vote No: 8.1.3. Payments have been made under those provisions. Relevant Officers have been advised to ensure that actions do not create these types of situations.

4.3 **Operating Inefficiencies**

While Price quotations have been obtained, purchasing have been carried out on recommendations of Technical and Tender Boards.

1 Purchase of food

Supplier - Dushan Caters Private Ltd
Value – 240,625/-
Date of purchase 2012.12.27

Out of the total sum of Rs 481,250/- in the invoice, 50% of that amounting to Rs 240,625/- has been paid to the supplier on the permission of the Director General. Price quotations have been obtained for this and the relevant payments have been made after obtaining approval of the Tender Board.

II Purchase of Food

Supplier – Mount Lavinia Hotel Private Ltd
Value - 29,100/-
Date of purchase – 17.12.2010

On the request of the Chairman and after approval of the relevant invoice by the Director General, the amount stated has been paid.

III Purchase of Food

Supplier – Opulent Catering
Value – 91,770/-
Date of purchase – 24.03.2011

Representative of the TEC, Tender Boards have been appointed by the Chairman and payments have been made after approval by the Director General on the recommendation of the supplier by the Chairman.

Accordingly, these payments have been made for the requirements of the Institute on decisions taken by the Chairman. Therefore, it cannot be treated as a payment made outside the objectives of the institute. However, steps will be taken to minimize similar situations in the future.

4.4 **Idle and Underutilized Assets**

(a) Although these rail tracks were planned to be used to improve infrastructure of that centre that was abandoned due to inadequate capital funds. However, only a rail track with a length of 30 feet and another two with a length of 5 feet each out of these rails tracks had been used for the project. Actions are being taken to call for quotations to sell the remaining rail tracks.

(b) True, the need for and the purchase of a Tandoori fire place for the canteen of NARA had been made on a decision by the Chairman. Since the Governing Board and the COPE have advised to sell it due to practical problems arising in the use, the required actions are being carried out for that.

(c) Out of the stock of tiles 20 have been used up to now and it has been planned to use the balance of 480 tiles in 2012.

(d) Due to the delay in supplying infrastructure required for accounting software, the installation of this software in the accounting section was delayed. However, taking required steps has already commenced in year 2012.

(e) Although it was planned to complete construction using approved provisions in 2012, carrying out that was delayed due to financial difficulties. It is planned to start construction in the year 2013.

(f) It was decided to dispose after calling for quotations. Actions are being taken accordingly.

(g) Do not agree with the observations of the audit.

4.5 **Personnel Administration**

The staff cadre of 423 for NARA has been approved on 15.08.2011.

Out of those positions, 82 are newly created positions. Recruitments for these could not be made up to now due to non receipt of approval for the procedure for recruitment and promotion prepared in conformity with the Management Services circular No 30. Similarly recruitment for these positions falling vacant is difficult due to non-approval of the recruitment and promotion procedures.

However, the relevant Recruitment and Promotion procedure has been referred for approval of National Salaries and Cadre Commission on 18.10.2012.

4.6 **Resources of the Agency given to other Public Institutions**

The salary of Ms D S Leelananda of the staff released to the President's Office has been reimbursed since 2006.

Reimbursement for the other two had been made for the period from 01.06.2011 upto31.12.2011.

Those who have been directed to the Ministry of Fisheries and Aquatic Resources are paid only the salaries and overtime and travelling expenses have been paid only in January 2011. NARA has not paid from the month of February onwards. However, necessary steps are being taken to minimize release of employees to outside institutions.

5 **Accountability and Good Governance**

5.1 **Corporate Plan**

Agree with audit observations

Actions are taken to forward an updated Corporate Plan in 2012.

5.2 **Action Plan**

Action Plan had been prepared and approved by the Governing Board and it has been amended in November 2011. Relevant Officers were apprised of the need to avert similar shortcomings in the future.

5.3 **Internal Audit**

(a) Up to 01.01.2006 the approved cadre comprising of Internal Auditor and two audit clerks served the Internal Audit division and as per the re-structuring plan carried out after 01.01.2006, the number of employees required to carry out duties of the Internal Audit division have been included in the re-

structuring plan. The Dept of Management Services has approved the following positions in the Re-Structuring Plan.

Chief Internal Auditor	01
Internal Audit Officer	01
Management Assistant	02

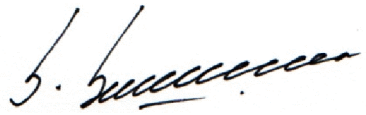
(b) The Recruitment and Promotion procedure for the above mentioned cadre is being prepared and recruitment will be made after obtaining that approval.

5.4 **Procurement Plan**

Agree with the observations of audit. However, Procurement plan for the year 2013 is currently being prepared.

6 **Systems and Controls**

As pointed out by you, arrangements have been made to pay special attention to matters (a) to (e).



Dr. S G Samarasundera
Chairman