Natural Resources, Energy & Science Authority
47/5, Maitland Place
Colombo 7.

1995.08.17

Hon. Minister of Science, Technology &
Human Resources Development,
Ministry of Science, Technology and
Human Resources Development,
320, T.B. Jaya Mawatha
Colombo 10.

Dear Sir,

Annual Report of the Natural Resources, Energy & Science Authority of Sri Lanka for the period 1st January to 31st December 1993

In terms of Section 16 (111) of the Natural Resources, Energy & Science Authority of Sri Lanka Act No. 78 of 1981, I have the honour to submit the Annual Report of the Natural Resources, Energy and Science Authority of Sri Lanka for the period 1st January to 31st December 1993 together with -

(a) A copy of the Audited Income and Expenditure Account
(b) A copy of the Audited Balance Sheet
(c) Auditor General's Report

Yours' sincerely,

Prof. Priyani E. Soysa
Director General
Natural Resources, Energy & Science Authority of Sri Lanka

C O N T E N T S

ANNUAL REPORT 1993

1.0 MEMBERS OF THE NATURAL RESOURCES, ENERGY & SCIENCE AUTHORITY OF SRI LANKA DURING THE YEAR

1.1 Board Members from 01st January 1993 - 31st December 1993

Prof. Priyani E. Soysa
Prof. Senaka Bandaranayake
Prof. C. Dahanayake
Prof. N. Kodagoda
Prof. R. Ramasamy
Dr D.J.T. Siyambalapitiya
Mr W.K. Wickramarachchi
Mr G.R. Gunawardena

2.0 PRINCIPAL STAFF

Director General	
Prof. Priyani E. Soysa	M.D.(Cey), D.Sc(Ruhuna) FRCP(Edin. & Lond) FCCP, DCH(Eng)
Deputy Director General	
Mr M.A.T. de Silva	B.Sc(Lond), M.Sc.(Lond)
Directors Scientific Affairs	
Mr D.E.F. Ferdinandez (Retired on 9.4.93)	B.Sc.(Lond), M.Sc.(Wales)
Mrs. S.P. Prelis	B.Sc.(Hons)(Cey), M.Sc.(S.L.)
Mr M. Watson	B.Sc.(Cey), M.Phil(Lond)
Scientific & Administrative Officer	
Dr S.E. Samarasinghe (on contract basis)	B.Sc(S.L.), M.Sc.(Leed) Ph.D.(Leeds)
Director Information	
Mrs L.D. Bandaranayake	B.Sc(Cey), ASLLA
Assistant Directors Scientific Affairs	
Mr D.P. Athulathmudali (Resigned on 2.6.93)	B.Sc.(S.L.), M.Phil(S.L.)
Mr R.M.W. Amaradasa	B.Sc.(S.L.), M.Sc.(S.L.)
Mrs W.R.M. Sandanayake	B.Sc.(S.L.), M.Sc.(S.L.)

Scientific Officers

Miss H.A.U. Amarasinghe	B.Sc.(S.L) [on study leave]
Mr B.M.C.K. Basnayake	B.Sc.(S.L)
Miss J.D.S. Dela	B.Sc.(S.L)
Mr A.W.J. Karunasinghe	B.Sc.(S.L) [on study leave]
Miss S.P. Spencer (on contract basis)	B.Sc.(S.L.)M.Sc.(London)
Mrs S.L. Tillekeratne	B.A. (Cey)
Mrs G.N. Ulluwishewa	M.Sc.(U.S.S.R.), M.Sc(Japan)
Mrs S.I. Wickramasinghe	B.Sc.(Hons) S.L), M.Sc.(S.L)
Mrs C.G. Yapa	B.Sc.(Hons)(S.L)
Mr W.B. Yapa	B.Sc.(S.L) [on study leave]

Documentalists

Miss R.P. Hathurusinghe	B.Sc(S.L)
Miss V.N. Perera	B.Sc(S.L)
Miss A.A.A. Vijayanthi	B.Sc(S.L)
Mrs R. Wijeratne	B.Sc(S.L)

Assistant Administrative Secretary

Mr S.P. Dissanayake	B.Sc(B.Adm.)(S.L)

Accountants

Miss K.C.J.T.K. Fernando	A.C.M.A
Mr M.H.M.S. Hameed	
Mr A.G.M. Denial	

Confidential Secretaries

Mrs. C. Fernandez
Mrs. S. Ratnayake
Mrs S.P. Wijesinghe

Staff Assistant (Adm.)

Mr S. Galketiya

Printing Superintendent

Mr K.P. Senanayake

When more than one officer is listed under a designation, the names appear in Alphabetical Order

3.0 MEASURES FOR ENHANCING SELF-RELIANCE IN SCIENCE AND TECHNOLOGY

Avenues for Training in Scientific research

Under the NARESA research grant scheme 15 young graduates were awarded research assistantships to assist recipients of research grants, and thereby receive a training in scientific research. Recipients of foreign-funded research grants, have recruited 3 research assistants to assist in their research programmes. Among these research assistants 7 have registered for post-graduate degrees.

Seminars and Workshops

The following workshop and seminars were held during the year 1993, to review activities, share experiences, and update knowledge, as part of the organizations effort to enhance self-reliance.

- A workshop to identify Biotechnology Research and Training Needs of Industry. The workshop was attended by 40 participants and included overview lectures on University undergraduate courses relevant to biotechnology, special aspects of biotechnology that might be developed by industry, and presentations by several public and private sector organizations. A directory of biotechnologists in Sri Lanka compiled by NARESA was distributed during the workshop.

- A National Seminar on Environment and Sustainable Development: Social Science Perspectives was held on 23rd January 1993 with the participation of 30 social scientists. Seven papers on Economic , Demographic, Litigation, Geographical, Sociological and Global Perspectives were presented.

- Two field workshops were organized in collaboration with the NGO March for Conservation, to train teachers on the importance of conservation and management of Sri Lanka's natural resources and environment.

- A workshop to upgrade teaching skills in environmental studies was held on the 13th and 14th of March 1993 at the Royal Botanic Gardens, Peradeniya in collaboration with March for Conservation. 35 teachers in the Central Province attended this workshop.

- A seminar on New Directions in Science and Technology in Sri Lanka was held in December 1993, to celebrate the 25th Anniversary of NARESA. The two-day seminar included a session in which foreign funding agencies gave presentations on their polices and priorities in funding research.

- A grantees seminar in the field of Agriculture and Animal Husbandry was held in March 1993 to review of progress of research. The seminar was attended by grantees and research assistants working on projects funded by NARESA.

4.0 SPONSORSHIP FOR SCIENTIFIC RESEARCH

As has been done in the past, applications were invited for research grants by advertisement in the National Press. The details regarding these, and present status of research grant are summarized in Tables 1,2 and 3.

5.0 RESEARCH AND CO-ORDINATION ACTIVITIES

SAREC Support for Research in Energy

NARESA has forwarded a project proposal on Renewable Energy and Energy Efficiency for SAREC funding. The proposal consists of sub-projects on Dry System for Biogas, Energy Efficiency in Tea Drying System, Solar Drying of Crepe Rubber, Pricing Structures in Electricity Sector, and Buildings Designs for Lighting Efficiency for Tropical Countries. A Swedish Energy expert is due to come to Sri Lanka for further discussions on the proposals.

Endangered Habitats

The management of the three mangrove islets in Negombo Lagoon (Kuda Molliya, Maha Molliya and Kakaduwa) vested in NARESA, was handed over to NARA for inclusion in the development of a mangrove park in Kadolkele that has been undertaken by them.

NARESA-March for Conservation Environmental Education Programme

The painting of the poster on coral reefs was completed and arrangements are being made to print 5,000 educational posters and 2,000 publicity posters. Three workshops for teachers were held at Sinharaja, Horton Plains and Peradeniya Botanic Gardens. A series of simple pictorial booklets for use in schools was under preparation.

Collection and Export of Fauna and Flora

A special committee was set up to study the problem of unauthorized collection and export of fauna and flora, in order to make recommendations regarding a solution to this important national problem, by funding a mechanism for the implementation of legislation.

The Department of Imports and Exports, Customs, Attorney General's Department, Department of Wild Life Conservation, Wild Life and Nature Protection Society. Export Development Board, IUCN are represented in the Committee in addition to senior scientists and NARESA Steering Committee members.

Biomass Gasifiers for Tea Drying

The Steering Committee on Energy recommended the use of biomass gasifiers for tea drying due to economic and environmental reasons and requested that the steam boiler operated system be tried out in parallel with gasifiers for its reliability and efficiency. This recommendation was made to the Tea Research Institute.

Flora of Ceylon Project (under the ODA Forestry Project)

Manuscripts were finalised for the printing of Volume 9 in the Flora of Ceylon Series, and sent to the printers in India by the Editor. The proof copy of Volume 8 was also corrected and returned to the printers.

The Editor received manuscripts of 13 families covering 105 species. Editorial work on these manuscripts, which will form part of Volume 10, is in progress.

Approximately 2000 specimens (including ferns) were collected during the year by visiting & local botanists and project staff. Among these are several rare species collected for the first time since the turn of this century, and several new species and varieties.

6.0 ACTIVITIES RELATING TO SCIENCE INFORMATION

Library Resources Development

The following were added to the library collection:

Books	10	Issues of periodicals	18
Pamphiets	50	Newspaper titles	13
Reprints	17	Theses	08
News letters	223	Annual Reports	38
		Final Reports	25

SLSTINET

An Electronic Mail Network System was installed at SLSTINET.

Documentation & Information Services

a) Sri Lanka Science Abstracts

Under the programme on Sri Lanka Science Abstracts, 250 were indexed, 150 abstracts were prepared and 175 records were entered.

(b) Literature Searches

Literature searches were undertaken on request on specific subjects using the Centre Collection, the Science Citation Index, NARESA Data Base and other local Data Bases. In 1993, 18 successful searchers were done.

Survey on S and T Institutions

* A survey was undertaken on science and technology institutions in Sri Lanka. A total of 294 questionnaires were distributed, and by December 1993, 150 replies had been received. The survey is being continued.

* On request, 06 questionnaires relating to the NARESA information Centre were completed and sent.

CDS/ISIS Activities:

Distribution and assistance in the setting up of data-base using UNESCO CDS/ISIS software package was provided to 16 institutions.

Mr N.U. Yapa assisted in the simplification of the CDS/ISIS Manual.

Training:

* Training and consultancy in the use of CIDS/ISIS package was provided to 07 institutions.

* Under staff training programmes, two workshops were held.

  1. Workshop on Project Formulation - conducted by Dr Malsiri Dias.

  2. Computer training programme - conducted by Mr W. Amaradasa.

Publicity:

A press conference on Coastal Ecology Programme was held at NARESA on 15th January 1993 in order to brief the press on present research activities carried out along the West Coast under the aegis of NARESA. Researchers and representatives from media including SLBC and SLRC were present.

7.0 REPORTS, PUBLICATIONS AND PROGRAMMES OF NATIONAL INTEREST

NARESA's 25th Anniversary, Commemoration

NARESA commemorated its 25th Anniversary (1968-1993) with several activities. A two day Seminar on "New Directions in Science and Technology in Sri Lanka", was held on 4-5 December, 1993. The first day of seminar was devoted to presentations on policies and priorities for research funding by international donor agencies. The programme for the second day included presentations by Merit Award Winners for scientific research.

The commemorative ceremonies also included the publication of a 50-page Souvenir containing a memoir of contributions by NARESA to science and research capability building in Sri Lanka.

NARESA also organized an Exhibition on Science and Technology from 1-5 December 1993, at which the activities of NARESA, as well as of a number of other scientific organisations were displayed.

Publications

(a) Regular Publications

- Journal of the National Science Council - Volumes 21(1), 21(2) were published in 1993

- Vidurawa - volumes 14(3 & 4), 15(1), 15(2) and 15(3 & 4) in English, and volumes 14(2), 14(3& 4) and 15(1) in Sinhala were published

- Science Education Series - SES No: 32 on the title Building Materials in Sri Lanka (English), SES No: 33 - Environmental Problems (Sinhala) and SES No: 34 - Natural Rubber Latex (Sinhala), were published

- Science Investigations - No. 6 was completed

- NARESA Newsletter - The issues for March 1993, June 1993 and December 1993 were published and issued

- Sri Lanka Journal of Social Sciences - Volumes 14 (1 and 2), 15 (1 and 2) were published and distributed

(b) Other Publications

- Publishing of the proceedings of the workshop on "Research and Training Needs of Biotechnology" held in May 1993 was in progress. 15 technical papers on various fields in Biotechnology were included.

- A series of simple pictorial booklets are being prepared by MFC on the following topics.

(1) Sri Lankan Mammals
(2) Sri Lankan Birds
(3) Sri Lankan Frogs and Toads
(4) Sri Lankan Reptiles
(5) Rain forests of Sri Lanka
(6) Wild plants of economic and medicinal importance
(7) Montane forests of Sri Lanka

8.0 AWARDS FOR SCIENTIFIC ACHIEVEMENTS

TWAS/NARESA Prizes for Young Scientists

The Third World Academy of Sciences - NARESA prizes for Young Scientists were awarded to the following. The prize consists of a certificate and a cash price of US $ 500.

1992 Prize for Chemistry - Dr J.M.H.U.L.B. Jayasinghe

1993 Prize for Biology - Dr U. S. Amarasinghe

1993 Prize for Chemistry - Dr K.M. Swarna Wimalasiri

The awards were given away by the Director General at the NARESA Silver Jubilee Seminar on 5 December '93, in the presence of a distinguished gathering.

NARESA-Merit Awards (Grants completed in 1991/1992)

Merit Awards for outstanding research for grants completed in 1991/1992 were awarded to the following scientists.

Physical, Engineering & Mathematical Sciences

Dr S.S.L. Hettiarachchi
Dr W.P.S. Dias
Department of Civil Engineering
University of Moratuwa

Research Grant No: RG/89/E/2

Project Title : Investigations on the performance of coastal structures armoured with natural rock and concrete armour units.

Chemical Sciences

Dr H.M.N. Bandara
Dr J.S.H.Q. Perera
Dr M.A.K.L. Dissanayake
Department of Chemistry
University of Peradeniya

Research Grant No: RG/88/C/9

Project Title : Study of solid electrolytes and cathode materials for solid state electrochemical cells.

Medical Sciences

Prof. W.D. Ratnasooriya
Department of Zoology, University of Colombo
Dr B.M.R. Fernandopulle
Department of Pharmacology, Faculty of Medicine
Kynsey Road
Colombo 8

Research Grant No: RG/90/M/3

Project Title : A pharmacodynamic evaluation of Momordica charantia (bitter gourd)

9.0 INTERNATIONAL SCIENTIFIC ACTIVITIES

SAREC

Delegates from SAREC, namely Mrs Ann Marie Fallenius, Dr Afzál Sher, Mr Anders Granlund and Mr Ronny Duell visited in Sri Lanka with a view to,

(a) review progress of research activities in the Buffalo Research Programme and the Coastal Ecology Research Programme.

(b) Discuss with relevant personnel on project proposals for the next agreement with the Sri Lanka Government. The proposals discussed were in the fields of Energy, Information Techhnology, Electrical Engineering, Natural Products Chemistry, Biotechhnology, Molecular Microbiology, Archaeology, Rice research and Ethnic studies.

UNESCO

Preparation for a Regional Seminar to commemorate UNESCO involvement in research in the vegetation of the humid tropics, to be held in Sri Lanka in 1996, was initiated under the Man and Biosphere National Steering Committee. UNESCO has agreed to provide partial support.

Visits of Foreign Scientists

(1) Mr Anders Wijkman, Director General, SAREC

(2) Dr Afzal Sher, Research Officer, SAREC, November 1993

(3) Mrs Anne Marie Fallenius, SAREC, November 1993

(4) Mr Ronny Duell, SAREC, December 1993

10.0 STAFF PAPERS AND REPORTS

1. Amarasinghe, H.A.U., Gunawardena, H.D. and Jayatunga, Y.N.A.- Correlation Between Biochehmical Oxygen Demand (BOD) and Chemical, Oxygen Demand (COD) for Different Industrial Wastes, J. National Science Council of Sri Lanka, 21(2), 259-267, (1993)

2. Amarasinghe, H.A.U., Gunawardena, H.D. and Jayatunga, Y.N.A.- Study on the Correlation Between Biochemical Oxygen Demand (BOD) and Chemical, Oxygen Demand (COD), Proceedings Sri Lanka Associ. Adv. Sci. Part 1, 182-183 (1993)

3. De Silva, M.A.T. - Technology Capability Building: A Case Study on Sri Lanka. Sri Lanka's contribution to UNCTAD's Bureau of the Adhoc Working Group on "Interrelationships Between Investment and Technology" NARESA, Colombo 1993.

4. De Silva, M.A.T. - Science and Technology Policy for Sri Lanka. Guest Lecture at the 87th Annual Session of the Institution of Engineers, Sri Lanka, (October 1993)

5. De Silva, M.A.T. - A Memoir of Contributions to Science and Research Capability Building in Sri Lanka - 1968-1993. A Historical Narration to Commemorate The Twenty-Fifth Anniversary of NARESA, NARESA, Colombo, (1993).

11.0 SUMMARY REVIEW OF SIGNIFICANT RESEARCH FINDINGS

* **Investigation of the biotechnologically important Bacillus species from different environments**

Experiments have been carried out at the Department of Microbiology, University of Kelaniya to isolate bacteria from various types of soil such as normal soil, mud soil, clay soil and seas and. Identifications of bacteria have been performed following biochemical tests.

Several species of Bacillus were isolated from the above normal soil and mud soil samples. These Bacillus species were gram (+) positive spore forming, rod shaped bacteria. Bacillus spp from clay soil isolated from Ashby medium were gram (-) negative and rod shaped. Preliminary studies indicated that clay samples contained species similar to Bacillus mucilginous reported by previous workers. In sea sand soil alkalophhillic Bacillus were found and further work is to be done to determine their ability to produce various surfactants and enzymes. (Grant No: RG/92/BT/01 - Dr S.I. Abygunawardene and Prof. G.S. Widanapathirana).

* **Optimising amyloglucosidase and citric acid production from Aspergillus niger**

The activity of the enzyme amyloglucosidase from Aspergillus niger (CFTRI 1105) in a solid state medium containing rice bran, corn flour, stock minerals solution and tap water was investigated at the Department of Biochemistry, University of Jaffna. It has been recorded that the activity was 39.8 u/g DMM. The activity of the amyloglucosidase had decreased when the rice bran in the medium was substituted with husk.

For maximum production of citric acid, the optimization of the medium was carried out in solid state fermentation. It was found that using natural strains, UV radiated strains (UV_1), a high yield of citric acid was obtained. By supplementing the liquid culture medium with methanol (3% V/V) and gingelly oil (0.2% V/V) citric acid production was increased.
(Grant No: RG/93/BT/1 - Prof. K. Balasubramaniam)

* **Litter production, leaf litter decomposition and associated fungal populations in the mangrove communities of Negombo Lagoon**

Litter production, decomposition, Carbon: Nitrogen ratio, and fungi associated with decomposing leaves were investigated in two locations in the Negombo lagoon.

The litterfall in the study sites were significantly correlated (P, 0.1) with the rainfall with a time lag of two months.

The litter decomposition rates in areas which were subjected to frequent tidal inundations were found to be greater than those in inland areas, and the predominant fungal species found in these areas were *Fusarium* sp, *Alternaria* sp and *Aspergillus* sp. (Grant No: RG/MAN/UNESCO/1 - Ms Mala Amerasinghe and Prof. S. Widanapathirana)

* **Biology and production of molluscs in Negombo lagoon**

A study on the commercially important and/or abundant molluscs were undertaken in the Negombo estuary.

The study indicated that the mortality of large - sized oysters in January is linked to the gametogenetic stresses associated with the reproductive cycle.

The following species , *Meretris lisoria, Mertrix meretrix* and *Striostrea margaritacea,* have been heavily exploited by man and reduction in their numbers have been observed in the recent past.
(Grant No: RG/MAN/UNESCO/88/03 - Dr S.U.K. Ekaratne)

* **Evolution and the geological significance of late pleistocene emerged shell beds on the southern coastal zone of Sri Lanka**

Deposits of coastal embayments contain high percentages of shell fragments and are therefore highly calcareous rather than silicaceous. Assemblance of bivalve and univalve mollusc occur due to the eustatic changes as well as by coastal hazards and they are a "well-known" geoscientific tool in the study of former sea-level stands. Present study attempts to analyze the geological significance of the Late Pleistocene shell beds on the southern coast of Sri Lanka. The study site lies within the "Dry Zone" between Tangalle and Bundala.

The bulk of the shell valves of these shell beds have been piled up by severe storm wave action on mounds, in lagoon and lake bottoms, on sand dunes and headlands. Present investigations prove further that the shell valves of lagoon, lade and channel beds (floors of marine and brackish pools) mostly accumulated as in situ consequently on the lowering of seal level.

The deposits had been intermittently covered by vast quantities of coral and/or shelly and various types of debris moved by severe monsoon waves. This is shown in Miniethhiliya, Hatagala, Nataata - Gurupokuna, Kalametiya, Hunukotumulla, Nelimpathvila, Nabadewa and around Malala Lewaya areas. The colour and constituents of the layers show that they are subjected to local weathering conditions. The deposition sequences of some shell patches of the mounds at Udamalala and on dune deposits help to infer that the valves have been discarded by early inhabitants and animals.

The shell beds are extensively mined for production of lime, chemicals and chicken grit by local people throughout the extension area along the southern coastal zone. As a result of desultory mining of shell in private lands, government lands and protected areas the certain negative environmental impacts and threat to human life have taken place. Therefore, public awareness is needed for sustainable use of these natural resources and for the protection of the environment and health of the people in the area. Public awareness for proper use, protection and management of the shell beds can be undertaken by Rural level Societies, Youth Clubs and with the help of secondary level school students. (Grant No: RG/92/E/01 - Dr J. Katupotha)

* **Study of solid electrolytes and cathode materials for solid state electrochemical cells**

Electricity conducting synthetic clay materials have been prepared. The clay is based on the hydroxides of aluminium and magnesium and the conducting ion can be Li^+, Na^+ or K^+ depending on the clay. The Na-clay has a room temperature conductivity of the order of 1 x 10-8 ohm-1 and 1 x 10-2 ohm-1 cm-1 at 3000C.

The conducting phase in the Na clay is sodium nitrate absorbed on to the clay particles. The conductivity is comparable to that of - alumina at elevated temperatures. They can be used in solid state ionic devices such as electrochemical cells and thermal sensors. (Grant No: RG/91/C/01 - Dr H.M.N. Bandara and Prof. M.A.K.L. Dissanayake)

* **Studies on the allelopathic potential of selected plant species and characterization of allelochemicals**

After preliminary investigations, two strongly allelopathic species, namely Gliricidia maculata (Fabaceeae) and Tithonia diveresifolia (Asteraceae) were selected for detailed study.

The leaf material applied as surface mulches an/or soil incorporated residues was tested in field experiments as well as glasshouse-based pot experiments for weed suppression ability and other effects. Pot experiments clearly established that surface applied residues, as well as incorporated residues stimulated the growth of crop species, and caused significant inhibition of seed germination and seedling growth of weed species. Bioassay-guided, activity-directed extraction and fractionation of bioactivity of the two species, and characterization of chemicals using standard spectroscopic methods. was carried out.

Coumarin was identified as the major allelochemical in Gliricidia fresh leaf residues, while the triterpene compound, 22 - epimer of Soyasapogenol was identified from dried leaf residues. Of the active allelochemicals isolated from dried leaves of Tithonia, Tagitinin A and Tagitinin C and a previously unknown compound (proposed name Tagitinin G) appeared to be the most important.

The findings indicate that Gliricidia and Tithonia leaf residues could be effectively used in field crop production for their combined effect of promoting the growth of crops and suppression of weeds.

This project was carried out at the Faculty of Science, University of Colombo under a grant from USAID through NARESA. (Grant No: RG/AID/11 - Prof. L.M.V. Tillekeratne and Prof. J.P.N.R. Chandrasena)

* **Collection and evaluation of sesame gerplasm**

This project based at the Faculty of Agriculture, University of Ruhuna, has resulted in germplasm collection of 1400 exotic and 5 local accessions. This is one of the largest genetic collections of sesame in the world, and the second largest collection of any species in Sri Lanka after rice.

A number of mutants with changed morphological, physiological and anatomical characters have been isolated and confirmed in high yielding locally adapted varieties. The results of two seasons' testing in multilocational trials indicated the superiority of MB29 and MB33 over the recommended cultivar. MB29 is a mutant with brittle seed coat whose seeds can be decorticated by rubbing between hands. Promising breeding lines have already got into the hands of farmers as a result of the village level testing in farmers' fields done in Moneragala and Hambantota Districts. Several farmer training workshops held in collaboration with Sarvodaya Rural Enterprises Development Services.

Initial work in the development of a protocol for using doubled haploid technology for increasing the efficiency of sesame breeding was undertaken. High rates of callus induction were achieved. A tissue culture facility at the Agricultural Biology Section of the Faculty of Agriculture, University of Ruhuna has been established. This project was funded by USAID through NARESA (Grant No: RG/AID/10 - Dr K. Pathirana)

* **Recording and analysis of traffic accidents in Sri Lanka: Application of micro-computer accident analysis package**

This paper examines the applicability of the Accident Analysis Package developed by the Transport Research and Road Laboratory (TRRL) in London to the local situation. The researcher suggests a re-drafting of the Police Data recording sheet, 'Police 297' based on the booklet designed by the TRRL. In addition, improvements to the techniques of data recording and training of the recording officers are suggested as priority areas to create a pleasant and comfortable road user environment. (Grant No : RG/90/SS/6 - Dr P.C.H. Ranasinghe)

* **Feasibility of women's participation in rural development, Matara District**

Investigations have been carried out regarding women's ability to involve themselves in income generating activities, savings and investments. Their ability to participate in decision making, implementation, benefits and evaluation process too has been studied. (Grant No: RG/92/SS/6 - Mr S.W. Amarasinghe)

* **Evaluation of school clusters (Sri Lanka 1991) through pilot projects**

A study was carried out to assess the extent to which the objectives of the school cluster systems has been realized under the new educational reforms during the decade 1980-1990. The success achieved as well as the weaknesses have been evaluated and useful suggestions and recommendations arising from the study have been presented. (Grant No: RG/92/SS/1 - Miss D.A.L. Ranasinghe)

* **A research study on perceptions of students, principals, teachers and parents on private tuition in comparison with formal education in schools in Sri Lanka**

This research has yielded a detailed report based on a study on the tendency of students in year 13 in government schools to attend tuition classes. The report contains specific conclusions and suggestions and also identifies areas for future studies. (Grant No: RG/92/SS/2 - Mr Godwin Kodituwakku)

* **Growth, adaptability and the economics of the crossbred buffaloes in Kurunegala District**

The study of the growth, adaptability and the economics of the crossbred buffaloes in Kurunagala District shows that milk production from buffaloes is not economical due to various constraints and practical problems prevailing in the area of study. It can be concluded that genetic potential of the crossbred F_1 progeny (M x L) is not fully exploited in the study area. There is strong evidence of heat stress in young animals. To estimate live weights of animals under field conditions the empirical formula which have been developed can be used. Correlations between growth parameters can be used in research activities such as breed characterization.

Following recommendations can be made to over come the existing problems in management of buffaloes.

A. Breed improvement programme which has been implemented in an ad-hoc manner should be reorganized. Bull calves issued for breeding should always be of superior genetic merit. Replacement stock also should be selected only from superior cows in the herd.

B. There is a very effective worming schedule for buffalo calves. It seems that the farmers are unaware of useful new research findings. An efficient extensions service is needed to disseminate research findings to the grass root level.

C. Farmers' knowledge on breeding, management, health care etc. is poor. Therefore farmer education programmes a essential in the study area.

D. Feed resource base for buffaloes should be efficiently utilized. Reduction of herd size by culling unproductive animals.

E. The existing system of sale of milk is not satisfactory. Involvement of middle men in the process of collection of milk and handing over to the processing units has exploited the rural milk producers very badly. There is only one collecting organization available in the area. Competition among milk collectors could have solved this problem to some extent. Establishment of small scale local milk processing units such as for curd and yoghurt will certainly help to increase more market avenues for the dairy producers. When there is a competition to purchase milk by different organizations definitely producers will be paid reasonable price for their milk.

F. Since non availability of land for grazing is the main constraint of farmers, action should be taken to declare sufficient areas as communal grazing lands.

G. The simple and effective management techniques to overcome the bad effect of high ambient temperature should be made available to the farmers.

H. Record keeping system has to be improved.

I. The formula developed in this study can be used in the programmes like bread characterization. (Grant No: SAREC/09/BF-38 - Dr A.D.N. Chandrasiri)

* **The incidence and occurrence of Helminth species of the classes, Trematoda, Cestoda and Nematoda of swamp and other exotic buffaloes and their significance in buffalo rearing**

The prevalence of helminths in buffaloes was studied. It was observed that the helminth fauna in buffaloes was similar to those in cattle and goats.

Two foetuses from buffalo cows showed Setaria spp. which had developed to near adult stage. Buffaloes in general showed a high rate of infection of bile ducts with Explanatum explanatum. Schistosoma nasalis seems to be highly prevalent in buffaloes. The infected animals did not show any clinical signs. From some water snails of Indoplanorbis species cercaria of paramphistomes and those other species which do not form cysts were noted. Attempts are being made to identify the species of paraphistome cercaria.
(Grant No: SAREC/09/BF-32 - Prof. S.T. Fernando)

* **Body fluid compartments and electrolyte balances in indigenous buffaloes**

The study on "Body fluid compartments and electrolyte balances in indigenous buffaloes" shows that there are remarkable differences in handling water by buffalo and other species of animals. Sri Lankan local buffaloes can stand dehydration by conserving water via gastrointestinal tract and hiding. Also buffaloes are well adapted to wet tropical conditions when the climate is characterized by wet seasons with abundant water and dry seasons with scare water. (Grant No: SAREC/09/BF-37 - Dr A.A.J. Rajaratne)

* **Phagocytic efficiency of buffalo neutrophils for common mammary pathogens**

Studies on phagocytic efficiency of buffalo neutrophils for common mammary pathogens shows that the low incidence of staphylococcal mastitis in buffaloes could be attributed to the high phagocytic ability of their blood neutrophils for that bacteria. Also it justified the fact that the Buffaloes are more resistant to Staphylococcal mastitis. (Grant No: SAREC/09/BF-30 - Dr Indira de Silva)

* **Chemotherapy and pharmacokinetics of benzyl penicillin in buffaloes**

Study on chemotherapy and pharmacokinetics of Benzyl penicillin in buffaloes shows that P.multocida isolates were highly sensitive to penicillin, cephalothin, enrofloxacin, chloramphenicol and nitrofurantoin. Also most of the isolates were resistant to Fucidine, Sulphamethaxozole, Spiramycin and Clindamycin. Therefore field practice of using sulphadimidine adminstration to chemically affected animals is discouraged. Also, the study of disposition kinetics of penicillin provide the basic information of pharmacokinetics of penicillin in Sri Lanka buffaloes. It is useful in predicting therapeutic schedules for treatment of systemic infections, sensitive to penicillin. (Grant No: SAREC/09/BF-31 - Dr(Ms) P. Abeynayake)

* **Further studies on the carrier status in H.S. in buffaloes**

The observations, indicated that factors other than vaccine has influenced the immune response of calves.

With regard to the assessment of performances of the serological tests, it was found that ELISA was more sensitive in detecting antibodies in that when both IHA and PMPT were negative the ELISA gave positive results. Also, the study confirmed that PMPT is not an appropriate test to assess protection against HS in buffaloes. The results indicated that there is no correlation between serological tests and protection levels as determined by the direct challenge test.

The investigation shows that the tissue distribution of the organism in HS carries is confined to the lumen of the tonsillar crypts.

The studies demonstrated that the tonsil as reservoir site for HS causing pasteurellae. Tissue locations of the organism was also observed. However, evaluation of the validity of these experimental findings in the natural disease in order to fully appreciate the role of the tonsil of carriers in the epidemiology of HS is needed.

With regard to the study on activity of carries to secretory phase of HS, it was noted that the single adminstration of dexamethasone has provided the baseline information for future experiments in terms of dosage. Methylprednisolone acetate, the long acting preparation of corticosteroid provides the long term suppression of immunity. Neostigmine having cholinergic effect has increased the usual and salivary secretions while delating the tonsillar sinus. It was thought that there should be secretions of any organisms lying in tonsillar crypts under these physiological changes. Since there were no change in antibody levels as reflected by IHA titres, the immunosuppressive dose of methylprednisolone acetate has to be established in buffaloes, in order to activate "latent carriers". (Grant No: SAREC/09/BF-54 - Dr M.C.L. de Alwis)

* **Economics of buffalo management for curd production under small farm conditions in Sri Lanka**

The changes of traditional buffalo husbandry have brought negative impacts on buffalo management and curd production. Shortage of grazing lands, growing conflicts between dairymen and the public, inadequate supporting services such as veterinary, breeding, marketing and credit facilities have impeded the development of buffalo husbandry. Curd production and marketing are also constrained by seasonal fluctuation of market, declining quality of milk as well as curd, growing scarcity of fuelwood and its increasing price. Government policies for the dairy sector are directed towards bringing about a change fro the traditional extensive form of production to a more intensive and commercialized system. Such a transformation requires a substantial reduction of herd size and enhancement of herd productivity.

Any attempt at such a transformation will encounter major constraints such as findings suitable animals for intensive system, inadequacy of land for pasture cultivation, and prevailing low price of milk. Under these circumstances, forcing the dairymen to shift from the existing extensive system to an intensive system without removing these constraints would result in the sale of total stocks for beef and seeking alternative employment. In fact, this now taking place in the area.

A long term plan is necessary for the promotion of buffalo husbandry and curd production. Results of this study suggest the following recommendations to be considered when such a plan is prepared.

Recommendations:-

The dairymen are increasingly inclined to sell their animals and to seek alternative employment. Therefore, some immediate measures should be adopted to sustain the buffalo husbandry and curd industry. The measures which are recommended to be adopted immediately are as follows.

1. Establishment of an Association, for dairymen and small scale curd producers
2. Allocation and management of grazing lands
3. Protection of dairymen legally
4. Standardization of curd
5. Provision of credit facilities to curd producers

Medium Term Measures

The medium-term measures are recommended to increase the quality and productivity of buffaloes to reduce the herd size of the jungle base and migrating dairymen and to popularize the buffalo husbandry more among the small farmers. To achieve these objectives, the following measures are recommended to be taken in the medium term.

1. Promotion of Animal Breeding
2. Supply of Quality Animals
3. Establishment of study centres
4. Establishment of Buffalo Insurance Scheme
5. Promotion of Veterinary Services

6. Supply of fuel for curd producers

7. Establishment of Community Veterinary Services

8. Exploration of possibilities to use the curd left unsold as row material for different marketable products.

9. Establishment of cooperatives to be involved in collection and transformation of curd to the market and to maintain sales centres.

Long term measures

Once the herd size is reduced and the herd quality is improved, then measures should be adopted to transform the existing extensive system of buffalo husbandry to an intensive system, and to integrate buffalo husbandry with crop cultivation.

1. Feed improvement

2. Provision of incentives for intensification such as credit facilities

3. Pricing

4. Establishment of demonstrative intensive farm

5. Experimentation, selection and improvement of non-conventional feed resources.

6. Development and popularization of dairy base industries

7. Research for improving dairy products

(Grant No: SAREC/09/BF-40 - Prof. R. Ulluwishewa)

TABLE I : GRANTS SPONSORED BY NARESA

Status Summary During 1993

Discipline Status	Agriculture & Animal Husbandry	Biological Sciences	Chemical Sciences	Energy	Information Sciences	Medical & Veterinary Sciences	Physical & Engineering Sciences	Social Sciences	Biotech-nology	Science Education
Total No. of grants operating during 1993	07	21	20	02	08	29	17	31	02	02
Grants awarded - 1993	-	03	02	01	-	04	03	01	03	02
Amount allocated for 1993 (New and ongoing Rs.)	217.200	484,112	308,350	102.400	-	314,400	255,360	47,900	342,500	-
Grants completed - 1993	01	03	04	01	02	05	02	04	-	01
Grants withdrawn - 1993	-	-	-	-	-	-	-	05	-	-
Grants terminated - 1993	-	-	02	-	-	-	02	01	-	-
RA's appointed - 1993	-	-	06	-	-	-	-	07	01	-
Registered for PG - 1993	-	-	-	-	-	-	-	02	01	-
Thesis PG - 1993	-	-	01	-	-	02	-	01	-	-
Communications & Publications 1992	01	-	03	01	-	-	05	-	-	-
New Applications - 1994	-	05	18	01	-	06	08	17	09	02
Funds requested for 1994 (Rs.)	-	-	-	-	-	-	-	-	-	-
Grants approved for - 1994	-	-	-	-	-	-	-	-	01	-

TABLE II : GRANTS SPONSORED BY FOREIGN AGENCIES

Status Summary During 1993

Foreign Agency/Discipline Status	SAREC Buffalo Research Programme	SAREC Coastal Ecology Research Programme	Zoology Survey of Sri Lanka	IUCN/NORAD * Mangroves	UNESCO Mangroves	USAID	ODA - Flora of Sri Lanka Project
Total No. of grants operating during 1993	53	06	01	02	02	01	01
Grants awarded - 1993	-	-	-	02	-	-	-
Amount allocated for 1993 (New and ongoing Rs.)	10.35 Million	7.13 Million	-	373.200	-	-	** 1.6 Million
Grants completed - 1993	17	06	01	*** 4	01	01	-
Grants withdrawn - 1993	-	-	-	-	-	-	-
Grants terminated - 1993	01	-	-	-	-	-	-
RA's appointed - 1993	01	-	-	3	-	-	-
Registered for PG - 1993	-	-	-	3	-	-	-
Thesis PG - 1993	01	-	-	-	-	-	-
Communications & Publications 1993	-	-	-	-	-	-	-
New Applications - 1994	-	-	-	-	-	-	-
Funds requested for 1994 (Rs.)	4.5 Million	5.6 Million	-	-	-	-	-
Grants approved for - 1994	24	06	-	-	-	-	-

* Through Forest Department
*** Final Report due for 2 projects
** Including the Herbarium Component

Table III - New Grants Awarded in 1993

Discipline - Biological Sciences

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/93/B/01	Dr (Ms) S. Piyasiri Department of Zoology University of Sri Jayawardenapura Nugegoda	The fish plankton interactions and controlling of algal blooms in Kotmale reservoir 3 years	Rs. 171,000.00
RG/93/B/02	Dr P.H. Amarasinghe Dr E.P. Amarasinghe Department of Botany University of Peradeniya Peradeniya	Multiple feeding in two vectors of Malaria in Sri Lanka 2 years	Rs. 100,000.00
RG/93/B/03	Dr(Ms) T.D. Silva Department of Botany University of Colombo Colombo	Induction and invitro selection of valuable mutations in the genus psophocarpus 2 years	Rs. 100,000.00

Discipline - Biotechnology

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/93/BT/1	Prof. K. Balasubramaniam Department of Biochemistry University of Jaffna Jaffna	Optimizing amyloglucosidase and citric acid production from Aspergillus niger 1 year	Rs. 102,000.00
RG/93/BT/2	Dr(Mrs) Maya B. Gunasekera Department of Chemistry University of Colombo Colombo 3	Characterization of Anopheles culicifacies complex in Sri Lanka: Identification of sibling species using DNA probes, studies on vectorial competance 3 years	Rs. 177,000.00
RG/93/BT/3	Dr S. Amarasiri Fernando Department of Chemistry University of Colombo Colombo 3	Modelling of Immunological Reactions 1 1/2 years	Rs. 100.000.00

Discipline - Chemical Sciences

Grant No:	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/93/C/1	Dr H.R.W. Dharmaratne Dr H.M.T.B. Herath Institute of Fundamental Studies Hantana Road Kandy	Chemical Investigation of family convolvulaceae 3 years	Rs.145,000.00
RG/93/C/2	Dr J. Wimalasena Department of Chemistry University of Sri Jayawardenapura Nugegoda	Development of a Kinetic Analytical Method for the determination of trace amounts of Mercury 1 year	Rs. 49,150.00

Discipline - Energy

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/93/EP/1	Dr T.K.D. Tennakoon Department of Oceanography NARA	Laboratory model study and a survey to select a suitable area for ocean wave energy plant in the South and South-West coast of Sri Lanka 1 1/2 years	Rs 121,000

Discipline - Medical & Veterinary Sciences

Grant No	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/93/M/1	Dr G.T.A.K. Atauda Depat of Community Medicine Faculty of Medicine University of Colombo	Influence of employment status of the mother on the physical growth, development and behaviour of pre-school children 1 year	Rs. 35,000.00
RG/93/M/2	Dr D.I. Amaratunga Dr L.C.L. Peiris Faculty of Dental Sciences University of Peradeniya	An experimental study of the posterior composite restorations during static and dynamic compression 2 years	Rs. 90,000.00
RG/93/M/3	Dr Shamini Jayasekera M.R.I. Prof. S.N. Arsecularatne Dept of Microbiology Faculty of Medicine University of Peradeniya	Effect of Palmyrah mediated immunosuppression on immune mediated diseases in rodents 1 year	Rs. 68,000.00
RG/93/M/4	Dr(Ms) M.P. Kumarasinghe Dr J.W.B. Senaratne Faculty of Medicine University of Colombo	Atherosclerotic Arterial Diseases in a cross section on Sri Lankans 3 years	Rs. 50,000.00

Discipline - Physical, Engineering and Mathematical Sciences

Grant No:	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/93/E/01	Dr K.I.M. Ranasoma Dept of Civil Engineering Open University of Sri Lanka Nugegoda	Measurement on cross-shore profile development and on-off shore sediment transport 2 years	Rs. 19,000.00
RG/93/E/02	Dr S.S.L. Hettiarachchi Dept of Civil Engineering University of Moratuwa Moratuwa	Development of an integrated shoreline management framework for coastal protection in Sri Lanka 2 years	Rs. 200,000.00
RG/93/E/03	Dr A.P. de Alwis Dept of Chemical Engineering University of Moratuwa Moratuwa	Energy & process costing of fruit and vegetable processing in Sri Lanka using developed process models 2 years	Rs. 15,210.00

Discipline : Social Sciences

Grant No:	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/93/SS/1	Mr K.M. Sepala Samarasekera Assistant Lecturer Department of Sociology & Anthropology University of Sri Jayawardenapura Nugegoda	An Anthropological study of the Kinnarayas of Sri Lanka 2 years	Rs. 45,000.00

TABLE IV - PARTICIPATION AT CONFERENCES, SEMINARS AND WORKSHOPS OVERSEAS - DURING 1993

ON NOMINATION BY NARESA

	Project and Period	Awarding Agency	Nominee
1.	Scientific visit to University of Tsukuba and other research institutes in Tsukuba, Japan 11-20 April 1993	USAID	Prof. J.P.N.R. Chandrasena Mr K.D.P. Hemalal Under Research Grant No. RG/AID/11
2.	Seminar on 10th Biennial Conference of the Association of Asian Social Science Research Councils, Toyko, Japan 5-12 September 1993	AASSREC	Dr Nimal Sanderatne Member, Streering Committee on Social Sciences
3.	STEPAN Regional Workshop on Managing Information for Commercialization of Research Manila, Philippines 6-8 September 1993	UNSESCO and DOST Phillippines	Mrs S.P. Prelis Director - Scientific Affairs

NATURAL RESOURCES ENERGY & SCIENCE AUTHORITY OF SRI LANKA

Balance Sheet as at 31.12.93

As at 31.12.92				
	Funds Employed			
40,172,739.91	NARESA Fund	(5,504,764.83)		
400,000.00	Add: Drawings from Treasury	240,000.00		
40,572,739.91			5,264,764.83	
46,077,504.74	Less: Excess of expenditure over Income		4,428,053.19	
(5,504,764.83)				(9,692,818.02)
5,317,693.23	Documentation Unit Capital Fund	5,401,119.53		
1,100,000.00	Add: Drawings from Treasury	700,000.00		
6,417,692.23			6,101,119.53	
1,016,573.70	Less: Net Expenditure - Note 1.1		814,359.85	
5,401,119.53				5,286,759.68
5,419,556.94	Research Grants Fund	6,166,850.00		
6,125,000.00	Add: Drawings from Treasury	2,004,252.00		
11,544,556.94			8,171,102.00	
5,377,706.94	Less: Net Expenditure - Note 1.2		1,955,490.05	
6,166,850.00				6,215,611.95
1,884,262.82	Man & the Biosphere Fund	1,902,562.57		
50,000.00	Add: Drawings from Treasury	110,000.00		
1,934,262.82			2,012,562.57	
31,700.25	Less: Net Expenditure - Note 1.3		105,996.90	
1,902,562.57				1,906,565.67
1,156,018.37	Miscellaneous Fund	1,265,163.78		
1,150,000.00	Add: Drawings from Treasury	617,000.00		
2,306,018.37			1,882,163.78	
1,040,854.59	Less: Net Expenditure - Note 1.4		1,043,416.07	
1,265,163.78				838,747.71

Contd.....

153,497.94	Scientific Manpower Project Fund	153,497.94		
-	Add: Drawings from Treasury	-		
153,497.94			153,497.94	
-	Less: Expenditure		-	
153,497.94				153,497.94
1,010,622.36	Working Committees Fund	1,016,145.68		
175,000.00	Add: Drawings from Treasury	170,000.00		
1,185,622.36			1,186,145.68	
169,476.68	Less: Net Expenditure - Note 1.5		168,102.78	
1,016,145.68				1,018,042.90
46,290,824.29	Foreign Aid Fund	60,800,761.38		
5,345,830.00	Add: Drawings from Treasury	10,106,273.78		
16,619,696.98	Treasury Deposit	-		
2,812.00	Foreign Aid held by NARESA			
68,259,163.27			70,907,035.16	
7,458,401.89	Less: Net Expenditure - Note 1.6		16,498,440.71	
60,800,761.38				54,408,594.45
42,250,000.00	Capital Reserves			42,250,000.00
	Current Liabilities			
417,006.73	Creditors		562,189.33	
1,498,024.84	Accrued Charges		2,978,533.42	
3,725,481.60	Provisions		3,143,687.07	
5,613.41	Store-Keepers refundable Security Deposit		7,292.01	
5,450.00	Tender Deposits		10,950.00	
5,651,576.58				6,702,651.83
119,102,912.63				109,087,654.11

NATURAL RESOURCES ENERGY & SCIENCE AUTHORITY OF SRI LANKA

Balance Sheet as at 31.12.93

As at 31.12.92		Cost as at 01.01.93	Additions/ Disposals	Accumulated Depreciation	Net Balance
	Represented by				
	Fixed Assets				
42,256,400.00	Land	42,256,400.00	69,115,453	-	42,325,515.45
1,206,076.69	Buildings	2,946,002.19	192,695.55	1,849,736.50	1,288,961.24
			(20,170.00)		
885,661.03	Office Equipment & Furniture	4,116,817.03	208,435.00	3,663,186.00	641,896.03
1,406,709.32	Motor Vehicles	5,674,379.53	(293,494.85)	4,578,715.40	802,169.32
94,689.18	Motor Bicycles	294,139.18	-	238,995.00	55,144.18
2,523.50	Bicycles	8,395.50	375.00	7,227.00	1,543.50
-	Sports Equipment	1,504.00	-	1,504.00	-
48,342.30	Accessories & Miscellaneous	203,114.35	22,792.00	180,132.05	45,774.30
1,326,940.96	Library Books	1,326,940.96	31,322.23	-	1,358,263.19
			(4,073,501.89)		
14,505,852.41	Scientific & Laboratory Equipment out on Loan	33,193,201.91	2,997,093.42	19,735,777.15	12,381,016.29
961,773.62	Documentation Equipment	4,740,177.62	260,957.50	3,988,473.00	1,012,662.12
62,694,969.01		94,761,072.27	(1,043,580.55)	34,243,746.10	59,912,945.62
13,953.64	Telephone Installation				13,953.64
	Current Assets				
589,720.93	Stocks			555,058.12	
2,035,004.28	Debtors			2,121,867.03	
775,613.33	Prepayments			959,648.85	
41,109.45	Deposits			61,609.45	
42,936,601.29	Treasury Deposit			33,133,784.16	
2,611,592.63	Balance at Bank - A/C No. 4530800224		1,004,839.19		
2,564,596.39	A/C No. 4530800232		1,378,849.67		
	A/C No. 4530801514		6,136.51		
	A/C No. 4530124768		12,400.00		
	A/C No. 4530204966		175,611.07		
10,000.00	Petty Cash		10,000.00		
-	Petty Cash Imprest - Sales outlet		1,000.00		
4,824,138.27	Cash in Hand		9,732,658.79		
5,613.41	National Savings Bank A/C		7,292.01		
				12,328,787.24	
56,393,989.98					49,160,754.85
119,102,912.63					109,087,654.11

NATURAL RESOURCES ENERGY & SCIENCE AUTHORITY OF SRI LANKA

Income & Expenditure A/C for the year ended 31.12.93

As at 31.12.92				
8,610,000.00	Drawings from Treasury			10,356,500.00
	Income for the year			
96,602.15	Interest received		96,820.49	
30,707.90	Sundry Income		18,051.70	
216,920.18	Sale of publications		233,050.08	
22,780.50	Photocopy receipts		10,368.50	
2,231.50	Receipts from printing outside jobs		65,648.35	
12,205.00	Profit on sale of fixed Assets		278,500.00	
534,583.00	10% Foreign Aid Administration Cost 10% Administration Cost - Mangrove Conservation Project	1,990,909.09 37,320.00	2,028,229.09	2,730,668.21
9,526,030.23				13,087,168.21
	Less: Expenditure for the year			
	Authority Expenditure			
24,300.00	Travelling & Allowances for Authority members	28,100.00		
16,905.55	Entertainment	22,525.28		
41,205.55			50,625.28	
	Staff Emoluments			
4,171,983.74	Salaries & Allowances	5,088,087.55		
585,587.20	Employees Provident Fund	713,970.79		
117,170.55	Employees Trust Fund	142,979.59		
155,247.50	Retiring Gratuity	206,795.00		
124,803.93	Provisions for Retiring Gratuity	459,735.79		
508,296.57	Incentive	558,100.00		
184,722.98	Overtime	151,570.29		
39,402.38	Holiday payment	15,238.23		
-	Uniforms	15,330.00		
	Staff Training	33,221.37		
5,887,214.85			7,385,028.61	

Contd.....

	Office Administration			
3,030.25	Travelling (Official)	12,382.80		
335,567.12	Stationary & Consumables	352,425.58		
250,548.53	Electricity	343,665.23		
222,276.40	Telephone	227,383.59		
75,007.61	Postage	74,550.99		
90,000.00	Audit fees	75,000.00		
16,250.00	Legal fees	-		
15,308.39	Bank Charges	11,478.10		
17,513.95	Medical Expenses	27,835.00		
132,980.00	Advertising	92,840.00		
462,107.63	Maintenance of Motor vehicles	488,827.38		
188,943.63	" " Office Equipment & Furniture	205,221.70		
53,131.25	" " Building	302,125.21		
20,000.00	Staff Welfare	20,000.00		
33,391.90	Insurance	104,409.76		
51,040.00	Water consumption charges	68,606.00		
202,338.43	Security Services	219,908.52		
4,687,188.00	Depreciation	4,230,214.00		
235,423.87	Sundry Expenses	64,830.65		
191,573.62	SAREC/Gen, CIDA/Gen, SAREC/19/Gen 17,991.00 + 995.13 + 233,938.18 + 7,663.50	260,587.81		
114,508.94	Gum Udawa	4,828.02		
-	Cost of the Assets handed over to Universities	2,334,725.54		
-	Science & Technology Exhibition - 25th Anniversary	493,820.24	10,015,666.12	
13,328,549.92				17,451,320.01
(3,800,519.69)	Excess of Expenditure over Income			(4,364,151.80)
42,276,985.05	Add: Prior Year Adjustments			63,901.39
46,077.504.74				4,428,053.19

Fund Flow Statement

Sources			
External Sources			
Contribution from Government			3,841,252.00
Grants from foreign Agencies		12,097,183.00	
Less: 10% Administration cost		1,990,909.00	10,106,274.00
			13,947,526.00
Add: Adjustments for items not involving movement of funds			
Depreciation		4,230,214.00	
Net increase in provisions		581,795.00	
Disposal of fixed assets dssets during 93	4,387,167.00		
Less: Depreciation written off	2,052,571.00	2,334,596.00	7,146,605.00
			21,094,131.00
Application			
Excess of expenditure over income		3,904,416.00	
Adjustments in respect of previous year		46,154.00	
Accquisition of fixed Assets	3,782,787.00	3,782,787.00	
Expenditure re. Research Grants		21,645,084.00	29,378,441.00
			(8,284,310.00)

Change in Working Capital

	Increase	Decrease	
1. Stocks	-	34,663.00	
2. Debtors	86,863.00		
3. Prepayments	184,036.00		
4. Deposits	20,500.00		
5. Treasury Deposit	-	9,802,817.00	
6. Creditors	-	145,183.00	
7. Accrued Charges	-	1,480,509.00	
8. Provisions	581,795.00		
9. Other Liabilities		7,179.00	
10. Cash & Bank Balances	2,312,847.00		
	3,186,041.00	11,470,351.00	(8,284,310.00)

NOTES ON ACCOUNTS

1. General Accounting: The financial statements have been prepared in accordance with generally accepted accounting principales on a historical cost basis. The fundamental accounting assumptions and policies relevant in accounting have been adhered to on a consistent basis as in the previous year.

The ten percent of foreign donor funds received, which is for covering overheads, has been taken credit in the Income and Expenditure statement.

1.1 Documentation Unit Capital Fund Expenditure

1.	SLSTIC	Equipment	260,957.50
2.	"	Maintenance & Repairs	102,497.10
3.	"	Books & Periodicals	317,928.73
4.	"	In House printing & Binding	98,156.59
5.	"	Consumables	219,901.33
6.	"	Miscellaneous	23.00
7.	"	Services	1,666.67
8.	"	Publications & Publicity	105,168.66
			1,106,299.58
Less		Cost of Documentation Equipment & Library books 260,957.50 + 30,882.23	291,839.73
			814,459.85
Less		Prior year adjustments (Net)	100.00
			814,359.85

1.2 Research Grants Expenditure

Actual Expenditure for the year		1,006,337.03
Less	Cost of Scientific Equipment acquired during the year	39,219.00
		967,118.03
Add	Provisions for balance funds	853,601.38
		1,820,719.41
Add	NARESA/MFC Grant Expenditure	144,313.59
		1,965,033.00
Less	Prior year adjustments (Net)	9,542.95
		1,955,490.05

1.3 Man & The Biosphere Expenditure

1.	MAB/86/01	39,600.00
2.	MAB/88/01	2,000.00
3.	MAB/93/01	45,000.00
4.	MAB National Committee	17,822.90
5.	Mangrove Committee	1,574.00
		105,996.90

1.4 Miscellaneous Fund Expenditure

1.	Awards for outstanding Research Work	28,568.00
2.	Participation in International Sci. work	121,560.40
3.	Seminars & Symposias	108,380.17
4.	Subscriptions to International Scientific Unions	757,310.08
		1,015,818.65
Add	Prior year adjustments (Net)	27,597.42
		1,043,416.07

1.5 Working Committees Fund Expenditure

1.	Agriculture & Animal Husbandry S/C	9,946.44
2.	Biological Sciences S/C	14,016.00
3.	Bio - Technology S/C	29,596.69
4.	Chemical Sciences S/C	10,494.00
5.	Editorial S/C	3,652.00
6.	Medical & Vet Sciences S/C	8,326.00
7.	Natural Resources S/C	9,345.00
8.	Physical & Engineering Sciences S/C	5,770.00
9.	Social Science Research S/C	8,984.00
10.	Science Education S/C	51,111.25
11.	Science Information S/C	8,575.40
12.	Energy S/C	8,486.00
		168,302.78
Less	Prior Year adjustments (Net)	200.00
		168,102.78

1.6 Foreign Aid Expenditure

1.	CIDA Expenditure	151,728.25
2.	RG AID Expenditure	1,585,568.49
3.	RG/MAN/UNESCO Expenditure	5,009.75
4.	SAREC Expenditure	17,795,940.86
		19,538,247.35
Less	Cost of Scientific Equipment 1,023,927.49 + 1,933,946.93	2,957,874.42
		16,580,372.93
Less	Prior year adjustments (Net)	35,501.72
		16,544,871.21
Less	Money received from sale of buffaloes	46,430.50
		16,498,440.71

2. Assets & the basis of their valuation

Depreciable assets & Depreciation:

Depreciation has been provided on original cost or at valuation on a straight line basis consistent with that of the previous years and is calculated to write off the assets over their estimated useful lives.

2.1 Debtors

	Total debtors	2,140,318.60
Less	Provision for Doubtful debts	18,451.57
		2,121,867.03

3. Liabilities

3.1 Creditors

Creditors amount to Rs. 562,189.33 represents monies held by NARESA on behalf of 10 projects given below:

1.	CSC A/C	121,676.07
2.	Sundry Creditors	17,623.82
3.	Flora Project	6,136.51
4.	Genetic Resources	104,815.00

Contd.....

5.	RG/89/IS/03	65.75
6.	APCTT Steering Committee	15,046.50
7.	STEPAN Workshop A/C	97,937.21
8.	Workshop on Tropical Forests&Coral Reefs	16,077.40
9.	Mobile Science Exhibition A/C	175,611.07
10.	94 Subscriptions received for NSC Journal	7,200.00
		562,189.33

These sums will be expended as the programme advance.

3.2 Employees' Benefit

All employees are Covered by EPF and ETF except the National Apprenticeship Board Trainees. An appoved medical scheme is provided in addition to the normal welfare facilities avilable.

3.3 Retiring Gratuity

Provision has been made in the accounts in respect of liability for retiring gratuity.

4. Publications for the value of Rs. 1,597,206.50 (valued at selling price) is available with us.

5. NARESA Vehicles

NARESA owns 23 vehicles. They are located as follows;

With NARESA

Two Cars
Two Double Cabs
One Jeep
One Van
Two Motor Bicycles

With Ministry of Science & Technology

One Double Cab
One Car

With Research Grantees

Seven Double Cabs
One Tractor
Five Motor Bicycles

දුරකථනය Telephone } 691151
ෆැක්ස් අංකය Fax No. } 697451
මගේ අංකය My No. } EC/R/NARESA/F.A/93
ඔබේ අංකය Your No. }

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හිදහස් චතුරශ්‍රය, කොළඹ 7, ශ්‍රී ලංකාව
கணக்காய்வாளர் தலைமை அதிபதி திணைக்களம்
சுதந்திர சதுக்கம், கொழும்பு 7, இலங்கை
AUDITOR-GENERAL'S DEPARTMENT
INDEPENDENCE SQUARE, COLOMBO 7, SRI LANKA

දිනය/திகதி/Date : 25 May 1995

Director General,
Natural Resources, Energy and
Science Authority of Sri Lanka.

Report of the Auditor General on the accounts of the Natural Resources, Energy and Science Authority of Sri Lanka for the year ended 31 December 1993 in terms of Section 14(2)(c) of the Finance Act No. 38 of 1971.

The audit of accounts of the Natural Resources, Energy and Science Authority of Sri Lanka for the year ended 31 December 1993 was carried out under my direction in pursuance of provisions in Article 154(1) of the Constitution of the Democratic Socialist Republic of Sri Lanka read in conjunction with Section 13(1) of the Finance Act No. 38 of 1971. My observations which I consider should be published with the annual report of the Authority in terms of Section 14(2)(c) of the Finance Act appear in this report. A detailed report in terms of Section 13(7)(a) of the Finance Act was forwarded to the Director General of the Authority on 4 November 1994.

1:2 Scope of Audit

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

2. Accounts

2:1 Opinion

Subject to my comments appearing in this report, I am of opinion that the accounts presented have been satisfactorily prepared on the basis of generally accepted accounting principles applied on a basis consistent with that adopted in the preceding year.

2:2 Financial Results

The activities of the Authority are operated under General Fund and six Special Fund Accounts. According to the accounts furnished, the financial results arising out of the activities of the Authority's general fund for the year ended 31 December 1993 was a deficit of Rs. 14,720,652 as compared with the deficit of Rs, 12,410,520 for the previous year, before taking into account the government grant for recurrent expenditure. The deficit for the year had decreased to Rs. 4,364,152 after taking into account the government grant of Rs. 10,356,500 received for recurrent expenditure of the year under review. The deficit for the previous year had decreased to Rs. 3,800,520 after taking into account the government grant of Rs. 8,610,000 received for recurrent expenditure.

The financial results arising out of the special funds was a deficit of Rs. 20,585,807 before taking into account the government grant as against a surplus of Rs. 1,527,795 in the previous year. The deficit for the year had decreased to Rs. 6,878,281 after taking into account the government grant (including foreign aid) of Rs. 13,707,526 for the year under review as compared with the government grant (including foreign aid) of Rs. 13,945,830 received for the activities of the special fund during the previous year resulting in an increase of surplus to Rs. 15,473,625.

2:2:1 General Fund

A summary of the financial results of the General Fund for the year under review and the previous year is given below.

	Year ended 31 December			
	1993		1992	
	Rs.	Rs.	Rs.	Rs.
Income				
Receipts on account of Foreign Aid Administration Cost	2,028,229		534,583	
Sale of publications	233,050		216,920	
Interest on Loans	96,820		96,602	
Provision of Printing Services to Outside Parties	65,648		2,232	
Photocopy Receipts	10,369		22,780	
Miscellaneous	18,052		30,708	
Profit on Sale of Fixed Assets	278,500	2,730,668	12,205	916,030
Expenditure				
Office Administration	10,015,666		7,398,130	
Staff Salaries	7,385,029		5,887,215	
Board of Control	50,625	17,451,320	41,205	13,326,550
Deficit before taking into account the Government Grant		(14,720,652)		(12,410,520)
Less: Government Grant for Recurrent Expenditure		10,356,500		8,610,000
Deficit for the year		(4,364,152)		(3,800,520)
Fund balance brought forward	(5,504,765)		40,172,740	
Prior period items	(63,901)		(42,276,985)	
Grant received from Treasury	240,000	(5,328,666)	400,000	(1,704,245)
Fund balance carried forward		(9,692,818)		(5,504,765)

2:2:2 Special Fund

A summary of the financial results of the special fund for the year under review and the previous year is given below.

	Year ended 31 December			
	1993		1992	
	Rs.	Rs.	Rs.	Rs.
Research Grants Fund				
Government Contribution	2,004,252		6,125,000	
Less: Expenditure	1,955,490		5,377,707	
Surplus		48,762		747,293
Documentation Unit Capital Fund				
Government Contribution	700,000		1,100,000	
Less: Expenditure	814,360		1,016,574	
Surplus/(deficit)		(114,360)		83,426
Foreign Aid Fund				
Government Contribution	10,106,274		5,345,830	
Treasury Deposits	-		16,619,697	
Foreign Aid retained	-		2,812	
	10,106,274		21,968,339	
Less: Expenditure	16,498,441		7,458,401	
Surplus/(deficit)		(6,392,167)		14,509,938
Man and Biosphere Fund				
Government Contribution	110,000		50,000	
Less: Expenditure	105,997		31,700	
Surplus		4,003		18,300
Miscellaneous Funds				
Government Contribution	617,000		1,150,000	
Less: Expenditure	1,043,416		1,040,855	
Surplus/(deficit)		(426,416)		109,145
Working Committee Fund				
Government Contribution	170,000		175,000	
Less: Expenditure	168,103		169,477	
Surplus		1,897		5,523
Net (deficit)/surplus from Special Funds		(6,878,281)		15,473,625

2:3 Financial Structure

According to the accounts presented, the financial structure of the Authority as at 31 December 1993 as compared with that as at 31 December 1992 is given below.

	As at 31 December	
	1993	1992
	Rs.	Rs.
Resources		
Capital Reserve	42,250,000	42,250,000
General Fund of the Authority	(9,692,818)	(5,504,765)
Special Funds		
Foreign Aid Fund	54,408,594	60,800,761
Research Grants Fund	6,215,612	6,166,850
Documentation Unit Capital Fund	5,286,760	5,401,120
Man and Biosphere Fund	1,906,566	1,902,563
Miscellaneous Funds	838,748	1,265,164
Working Committee Fund	1,018,043	1,016,146
Scientific Manpower Project Fund	153,498	153,498
	102,385,003	113,451,337
Utilization		
Fixed Assets (at written down value)	59,926,899	62,708,923
*Net Current Assets	42,458,104	50,742,414
	102,385,003	113,451,337

Note: * Provision for payment of gratuity to employees had been shown under current liabilities.

2:4 Source and Application of Funds

The source and application of funds of the Authority during the year under review as compared with that of the preceding year is given below.

	1993			1992	
	Rs.	Rs.	Rs.	Rs.	Rs.
Source					
Other sources			Nil		Nil
Government Contribution for Special Fund and General Fund			3,841,252		9,000,000
Proceeds from sale of Fixed Assets			2,613,096		25,677
Receipt of Foreign Aid for Research Activities			10,106,274		21,968,339
			16,560,622		30,994,016
Application					
Deficit for the year		4,364,152		(3,800,520)	
Add: Adjustments for items not including movement of funds					
Depreciation	4,230,214		4,687,188		
Provision for Retirement Gratuity	459,736	4,689,950	124,804	4,811,992	
		325,798		1,011,472	
Adjustments for profit on sale of Fixed Assets		(278,500)		(12,205)	
Adjustments for Foreign Funds		-		(178,774)	
		47,298		820,493	
Add/(less) : Adjustments for prior period items	(63,901)		42,276,985		
Transfer to Reserve	-	(63,901)	42,250,000	26,985	
		(16,603)		847,478	
Purchase of Fixed Assets		(3,782,786)		(2,296,044)	
Expenditure on Research Activities		(20,585,807)	(24,385,196)	(15,094,712)	(16,543,278)
(Decrease)/Increase in Working Capital as analysed below			(7,824,574)		14,450,738

	Effect on Working Capital Increase/(Decrease)	
	1993	1992
	Rs.	Rs.
Debtors	86,863	(265,826)
Prepayments	184,036	(82,965)
Deposits	20,500	5,000
Cash in Hand	4,908,521	4,822,421
Petty cash imprest	1,000	-
Provisions	1,041,531	(127,195)
Treasury Deposits	(9,802,817)	16,619,697
Bank balance	(2,596,674)	(6,051,950)
Stock	(34,663)	18,246
Creditors	(145,183)	(65,900)
Accrued Expenses	(1,480,509)	(423,727)
Tender and Security Deposits	(7,179)	2,937
	(7,824,574)	14,450,738

2:5 Comments an Accounts

2:5:1 Accounting Policies

(a) Though a sum of Rs. 18,452 had been provided for bad debts it had not been disclosed by way of an estimation.

(b) Depreciation had not been provided for books valued at Rs. 1,358,263.

2:5:2 Accounting Deficiencies

Following accounting deficiencies were observed.

(a) Travelling expenses and subsistence totalling Rs. 14,478 paid in respect of disciplinary inquiries had been accounted to miscellaneous expenditure account instead of being accounted as legal fees.

(b) Reimbursement of expenditure relating to previous year, amounting to Rs. 31,880 had been accounted as expenditure for the year under review.

2:5:3 Unexplained Variations

The value of Treasury deposits had been shown as Rs. 33,133,784 in the financial statements. However, the balance certified by the Treasury was Rs. 30,839,418. The difference of Rs. 2,294,366 had not been explained.

2:5:4 Lack of Evidence for Audit

The following instances where evidence were not available were observed.

A proper board of survey report in respect of fixed assets valued at Rs. 14,426,949 and confirmations from creditors amounting to Rs. 573,139 had not been furnished.

2:5:5 Non-compliance with Laws, Rules, Regulations and Management Decisions

Following instances of non-compliance were observed.

Reference to laws, rules and regulations	Particulars
(a) Finance Act Section 13(5)(d)	Minimum internal audit programme had not been prepared with the concurrence of the Auditor General.
(b) Stamp Duty Act No. 43 of 1982 and gazette extraordinary no. 323/31 of 15 November 1984.	A sum of Rs. 275 had to be recovered as stamp duty at the rate of Rs. 1.00 per Rs. 1,000 in respect of a contract for colour washing the building of the institution. However, it had not been done so.
(c) Section 50 of Turnover Tax Act No. 69 of 1981 and the gazette No. 714/13 of 14 May 1992.	The Department of Inland Revenue had lost a sum of Rs. 13,765 as a result of not recovering the turnover tax of 5% from the contractor for a contract of Rs. 275,295 for colour washing the building of the institution.
(d) Public Administration Circular No. 41/90 of 10 October 1990.	The institution had not maintained a list of garages proficient in repairing vehicles.
(e) Financial Regulation 785(3)(a)	There were instances where the vehicles belonging to the institution had been repaired at private institutions though it is required to call for quotations from many business enterprises and select the most favourable quotation when repairing motor vehicles, machinery and other equipment.

(f)	Sri Lanka Accounting Standards No. 18	Certain fixed assets such as office equipment, furniture and motor vehicles had been fully depreciated. But, they were being used at the institution. Action had not been taken to enter them at a fair value in the accounts.

3. Financial and Operating review

3:1 Financial Results

According to the accounts presented, the activities of the Authority during the year under review had resulted in a deficit of Rs. 4,364,152 as compared with a deficit of Rs. 3,800,520 in the previous year thus showing a deterioration in financial results by Rs. 563,632. It could be enalysed as follows.

	Variance		
	Favourable	Adverse	
	Rs.	Rs.	Rs.
Income			
Receipts on account of the Cost of Administration of Foreign Aid	1,493,646	-	
Sale of publications	16,130	-	
Interest on Loans	218	-	
Provision of Printing Services to outside Parties	63,416	-	
Photocopy Receipts	-	12,411	
Miscellaneous	-	12,656	
Profit on Sale of Fixed Assets	266,295	-	
Government Grant for Recurrent Expenditure	1,746,500	-	
	3,586,205	25,067	3,561,138
Expenditure			
Office Administration	-	2,617,536	
Staff Salaries	-	1,497,814	
Board of Control	-	9,420	
	-	4,124,770	(4,124,770)
Net deterioration in financial results			563,632

3:2 Performance

Assistance is rendered for individuals and institutions for research activities of the Authority. Information relating to research activities carried out by such assistance during the pervious year was incomplete and as such it could not be furnished. Details of research activities carried out during the year under review alone is given below.

	1993
Number of research that were in progress at the commencement of the year	88
Number of research newly commenced during the year	16
	104
Number of research completed during the year	17
Number of research that were in progress at the end of the year	87

The total expenditure incurred upto the end of the year on 87 research projects that were in progress at the end of the year under review amounted to Rs. 8,196,147.

3:3 Provision for Payment of Gratuity

Though a provision of Rs. 1,943,018 had been made for payment of gratuity to employees of the Authority at the end of the year under review, a fund had not been originated to meet future payments. The Director General had replied me in February 1995 that investment of government funds could not be made as the Authority's recurrent expenditure depends on the government grant.

3:4 Transactions not concerned with the objectives

The following assets of the Authority totally valued at Rs. 2,007,652 had been released to the Ministry of Industries, Science and Technology. The expenditure for maintenance of those assets too had been borne by the Authority.

(a) Two motor vehicles valued at Rs. 1,380,123.
(b) Three airconditioners valued at Rs. 102,090.
(c) A camera, a cassette, a video equipment and a television valued at Rs. 248,567.
(d) Office equipment valued at Rs. 276,872.
(e) The cost incurred on the first floor of the main building, the extent of which is 5,520 sq.ft. and the electricity, water, telephone and maintenance of the building are all borne by the Authority.

3:5 Non-utilized assets

Stock items valued at Rs. 14,203 had not been utilized for the last four years.

3:6 Identified Losses

Loss of Rs. 14,716 caused as a result of an accident to a vehicle had been written off as expenditure of the year.

3:7 Cost of Personnel

Particulars of personnel, average salary, cost of overtime and average cost per employee for the year under review compared with that of the previous year is given below.

Type of personnel		Number		Cost of salary				Average cost per employee			
				Normal Time		Overtime		Normal Time		Overtime	
		1993	1992	1993	1992	1993	1992	1993	1992	1993	1992
				Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
i.	Executive	30	30	2,156,036	1,656,011	15,238 *	39,402	71,868	55,200	508	1,313 *
ii.	Clerical and allied grades	42	42	1,938,351	1,702,720	132,888	85,208	46,151	40,541	3,164	2,029
iii.	Minor employees	18	17	679,111	562,928	18,682	99,515	37,728	33,113	1,038	5,854
		90	89	4,773,498	3,921,659	166,808	224,125	53,039	44,064	1,853	2,518

* Holiday pay

3:8 Vehicle Utilization

The Authority had 23 vehicles during the year under review. Two vehicles had been released to the Ministry of Industries, Science and Technology. Thirteen vehicles had been transferred to research projects. Of those vehicles transferred, 4 vehicles had not been utilized during the year and particulars of 6 vehicles had not been furnished to audit. Certain significant statistics relating to the utilization of 11 vehicles as compared with that of the previous year is given below.

			1993	1992
(a)	Distance travelled:			
	Petrol	Km.	57,466	41,622
	Diesel	Km.	104,392	84,288
(b)	Fuel consumed :			
	Petrol	Litres	6,203	not furni-
	Diesel	Litres	10,509	shed to Audit
(c)	Average distance travelled per litre of fuel :			
	Petrol	Km.	9.26	-
	Diesel	Km.	9.93	-
(d)	Total expenditure on fuel:			
	Petrol	Rs.	217,123	161,765
	Diesel	Rs.	157,643	102,974
(e)	Total expenditure on repairs:			
	Petrol	Rs.	194,716	102,926
	Diesel	Rs.	312,904	162,924
(f)	Average expenditure on repairs per kilometre :			
	Petrol	Rs.	3.39	2.47
	Diesel	Rs.	3.00	1.93
(g)	Average expenditure on fuel per kilometre:			
	Petrol	Rs.	3.78	3.89
	Diesel	Rs.	1.51	1.22
(h)	Average expenditure on fuel and repairs per kilometre:			
	Petrol	Rs.	7.17	6.36
	Diesel	Rs.	4.51	3.15

3:9 Budgetary Control

Significant variations were observed between the budgeted and actual income and expenditure thus showing that the budget had not been made use of as a tool of management control.

4. Systems and Controls

The deficiencies observed during the course of audit were brought to the notice of the Director General of the Authority by my report in terms of Section 13(7)(a) of the Finance Act. Special attention is needed in respect of the following areas of control.

(a) Debtors and creditors

(b) Cash

(c) Running charts of vehicles

(d) Assets

(S.M. Sabry)
Auditor General.

/mt ECRNA93