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

25th May 1995.

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 1991

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 1991 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 truly,

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

C O N T E N T S

TABLES

ANNUAL REPORT 1991

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

1.1 Board Members from 01st January 1991 - 31st December 1991

Dr R.P. Jayewardene
Prof. S. Balasubramaniam
Prof. V. Basnayake
Prof. W.R. Breckenridge
Prof. P.C.B. Fernando
Prof. S.A. Gunasekera
Dr S.D.I.E. Gunawardena
Dr E.R. Jansz
Prof. N.S. Karunaratne
Dr A.M. Mubarak
Miss A. Sabanayagam

2.0 PRINCIPAL STAFF

Director-General

Dr R.P. Jayewardene	M.D.,F.R.C.P.(Lond),D.Sc.

Deputy Director-General

Mr M.A.T. de Silva	B.Sc.(Lond), M.Sc.(Lond)

Directors Scientific Affairs

Mr D.E.F. Ferdinandez	B.Sc.(Lond), M.Sc.(Wales)
Mrs S.P. Prelis	B.Sc.(Hons) (Cey), M.Sc. (Sri Lanka)
Mr M. Watson	B.Sc.(Cey), M.Phil (Lond)

Assistant Directors Scientific Affairs

Mr D.P. Athulathmudali	B.Sc.(Sri Lanka), M.Phil (Sri Lanka)
Mr R.M.W. Amaradasa	B.Sc.(Sri Lanka), M.Sc. (Sri Lanka)

Scientific Officers

Miss H.A.U. Amarasinghe	B.Sc.(Sri Lanka) [on study leave]
Mr B.M.C.K. Basnayake	B.Sc. (Sri Lanka)
Miss J.D.S. Dela	B.Sc. (Sri Lanka)
Mrs W.R.M. Sandanayake	B.Sc. (Sri Lanka), M.Sc. (Sri Lanka)
Mrs S.L. Tillekeratne	B.A. (Cey)

Mrs G.N. Ulluwishewa	M.Sc.(U.S.S.R.)
Mrs S.I. Wickramasinghe	B.Sc.(Hons) (Sri Lanka) M.Sc. (Sri Lanka)
Mrs C.G. Yapa	B.Sc.(Hons) (Sri Lanka)
Mr W.B. Yapa	B.Sc.(Sri Lanka) [on study leave]

Staff Assistants

Mr A.W.J. Karunasinghe	B.Sc.(Sri Lanka) [on study leave]

Documentalists

Miss R.P. Hathurusinghe	B.Sc. (Sri Lanka)
Mr B.G.N. Kumarasinghe	B.Sc. (Cey)

Assistant Administrative Secretary

Mr S.P. Dissanayake	B.Adm. (Sri Lanka)

Accountants

Miss K.C.J.T.K. Fernando
Mr M.H.M.S. Hameed
Mrs S. Udugama

Graduate Translator

Miss N.C. Peiris	B.A. (Ceylon)

Confidential Secretaries

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

Staff Assistant (Adm.)

Mr S. Galketiya

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 grants scheme 10 young graduates were awarded Research Assistantships to obtain research training in fields such as Biological Sciences, Social Sciences, Science Education, Chemical Sciences, Physical and Engineering Sciences.

- 15 graduates were awarded research assistantships on grants funded by foreign agencies. During the year 1991, 7 research assistants registered for higher degrees in the Universities. Post graduate degrees were awarded to 9 students in the fields of Biological Sciences, Social Sciences and Physical Sciences.

* Seminars and Workshops

Following workshops and seminars were held during the year 1991 inorder to share and update new findings and enhance self-reliance.

- A one day seminar on the contribution of social sciences to the development of human resources was held for about 40 participants at the NARESA Auditorium. Leading social scientists, eminent intellectuals and research workers from relevant institutions exchanged useful ideas at the seminar at which 7 papers on different aspects of the theme were presented. The issues discussed led to a feature article, an editorial as well as readers' discussions in the press. Copies of the papers presented were sent to relevant organizations on their request. A country paper to be presented on this theme at the 9th Biennial Conference of the AASSREC in Quezon City, Philippines, by the representative for Sri Lanka was prepared on the basis of the discussions at the seminar. This country paper is available to policy planners as a state of the art document.

- A workshop was held on 22nd March at Anula Vidyalaya, Nugegoda to assess the implementability of the beginning science teacher guide. Twenty teachers participated in the workshop which was jointly organized by NARESA and National Institute of Education (NIE). A report, on the recommendations made, was prepared by NIE.

- A seminar on Energy Efficiency in Transport was held on 15th February. This was attended by 24 participants including 8 resource persons. Arrangements have being made to publish the proceedings of the seminar.

- A grantees seminar was held on 11th and 12th February for grantees of the Potash Fertilizer Research Programme. The progress of projects was evaluated by a consultant to CIDA. This programme which was started in 1983 has 29 ongoing research projects. At this seminar, which is the 4th in a series of progress review seminars, 24 grantees presented papers. The abstracts have been bound for future reference.

- A seminar to evaluate the progress made by grantees of the Buffalo Research Programme was held on the 12th of March. All grant recepients made presentations at the seminar. Prof. I. Settigren, Consultant to SAREC on Buffalo Research, also participated.

- A workshop on "The Role of Information in Technology Development" jointly organized by NARESA and Centre for Industrial Technology Information Service (CITIS) was held on 19th June. The main objective of this workshop was to create an awareness among the information personnel on "Technology Information". Subjects such as technology transfer, technology transfer from a user point of view, sources of technology information and acquisition, were discussed. Follow up action is being taken by CITIS: which is the focal point for TECHNINET (Technical Information Network).

- A seminar was held on the 15th July on the theme "Strategy for Developing Bio-active compounds from Sri Lankan plants". The aim of the seminar was to prepare a document to seek funding from SAREC to develop a research programme on this theme. The recommendations made, have been forwarded to SAREC.

- A seminar on "Graphite" was held on the 20th July at Bogala Graphite Mine premises. There were several interesting presentations on different aspects of graphite, followed by a guided tour of the mines. The proceedings have been published.

- A seminar was held on 16th August for grantees of Social Science research projects, completed/ongoing during 1990. Eminent social scientists participated in this seminar where valuable ideas were exchanged and problems related to projects were discussed.

- An advanced training workshop on CDS/ISIS was held from 29th July - 2nd August for a selected number (20) of library personnel.

- A training workshop on computer awareness for NARESA staff was held on 29th August.

- A workshop was held on 6th September on Scientific writing. There were 15 participants. The aim of the workshop was to improve the writing abilities of the participants.

- A training workshop on wetlands was held on 5th October. 32 participants including resource persons took part.

- NARESA participated in an Environmental Workshop in Badulla on 15th November. Several schools in the Badulla district participated in this workshop.

- Two workshops on Science Citation Index were held for scientists/research workers.

4.0 SPONSORSHIP FOR SCIENTIFIC RESEARCH

In accordance with the normal practise, applications were invited for Research Grants, by advertisement in the National Press. Details regarding these and the present status of the Research Grant Scheme is given in Tables 1, 2 and 3.

5.0 RESEARCH AND CO-ORDINATION IN THE NATURAL RESOURCES

* Man and Biosphere Programme

- The completed manuscript on the revision of the family Meliaceae of Sri Lanka, prepared by Dr D.J. Mabbery for the Revision of Flora of Sri Lanka has been received.

- MAB Committee visited the forest reserve at Dolukanda as there were reports of illicit felling of timber from this reserve and to find out the effect of this on the bio-diversity of the reserve. The Committee noted that the reserve is floristically very rich with a large component of medicinal plants in it. The Commitee recommended that a project be commenced to inventorise the flora at Dolukanda forest reserve.

- Under the flora project, Dr W.D. Clayton, the co-principal researcher in U.K. had discussions with the Advisory Committee.

- The publication, Natural Resources of Sri Lanka, Conditions and Trends, has been distributed to schools with A/L classes, through Provincial Directors of Education.

* **Genetic Conservation**

- Environmental Education for Schools

It has been noted that although environmental education has been incorporated into the school curriculum over a decade ago, the importance given to it in the formal education system is not reflected in the knowledge and attitudes of the present school going population. Therefore NARESA jointly with March for Conservation (MFC) and National Institute of Education (NIE) held workshops in three provinces (Colombo, Galle & Badulla) to (a) assess the effectiveness of environmental/conservation education in schools (b) identify the problems and constraints barring effective dissemination of environmental/conservation education at school level, with the assistance of school teachers, experienced environmental educationists and officials of the Ministry of Education and (c) obtain practical recommendations which could be used for upgrading environmental education in Sri Lankan schools.

Three individual workshop reports and also a combined report on the workshop series had been prepared giving recommendations to improve the level of environmental education in schools.

* A manuscript of "Population and Manpower-Resources of Sri Lanka, was received to be published under the Natural Resources series.

* On the recommendation of the Working Committee on Natural Resources, a letter was sent to the Chairman of the Presidential Task Force on National Land Utilization and Distribution recommending that forest land should not be considered for clearing and alienation.

* **Endangered Habitat-Sinharaja Rain Forest**

In Sri Lanka threat to genetic resources and environment are due to a number of factors, such as deforestation, pollution, soil erosion, over exploitation of natural resources, etc. Therefore, today more than ever before, it is important to sensitize general public and specially school children on environment related issues.

Therefore, to make the public and school children aware of these issues, NARESA jointly with March for Conservation prepared posters on an endangered habitat, Sinharaja rain forest which is the last remaining tract of virgin forest in Sri Lanka. It also harbours more than 757 of the endemic fauna and flora of Sri Lanka. Out of the posters, one is

specially aimed at school children which gives information on the endemic and rare animals and plants in Sinharaja. It also depicts why the rain forest should be conserved. These posters are being sent to all schools with O/L classes. The 2nd poster is also on Sinharaja but consists of only the painting. This is being sent to various institutions for displaying to the public.

6.0 ACTIVITIES RELATING TO SCIENCE INFORMATION

* Training

- A training programme was carried out at NARESA, on CDS/ISIS for a Technical Assistant on SAREC project titled "Preparation of a Bibliography on Buffalo Research".

- In-service training was provided on UNILIST and UNICAST 2 during three half-day sessions to personnel of the Medical Library, University of Colombo.

* Accessions

No. of books and pamphlets	-	53
No. of periodicals and titles	-	62

* CDS/ISIS Activities

- Distribution

  Two new institutions were given the ISIS system. A number of other institutions (who possessed version 1.0) were given new version of ISIS.

- Consultation Services

  Number of member libraries visited NARESA to clarify problems encountered in using ISIS. Some libraries were visited by staff of NARESA Information Section to provide guidance.

- Development of a Turn-key System

  At the request of the University Libraries Automation Committee, a turn-key system for the computerisation of University Libraries was defined. This was done based on MIBIS system developed by IDRC.

* **AGRINET**

  - 560 content pages were distributed to libraries.

  - At the request of NARESA, the Council for Agricultural Research Policy (CARP) agreed to be the focal point for AGRINET (Agricultural Information Network), with CRI as the co-ordinator.

* **SLSTINET Newsletter**

  - SLSTINET Newsletter Vol. 10 Nos. 1, 2 and 3 were printed and distributed among members.

* **CD-ROM Reader**

  - A number of demonstrations were held to popularise CD-ROM (Compact Disk - Read Only Memory) equipment donated by UNESCO. An information note on this facility available at NARESA was sent to relevant institutions.

* **ASTINFO**

  - Acting Director Information, Mrs S.P. Prelis represented the Director-General at the 8th ASTINFO Consultative meeting and workshop held in Tokyo.

* Memorandum titled "Scientific and Technological Information in a National Science and Technology Policy" was submitted to the Task Force on S & T by NARESA Working Committee on S & T Information.

7.0 RESEARCH AND CO-ORDINATION IN ENERGY

* A field visit was made to Morawaka on 8th March for a demonstration of gasifiers for tea drying. Representatives from SLSPC, JEDB, TRI, NERD Centre and the private sector participated in the demonstration and discussions. As a follow up to this visit and on a specific request made, NARESA has recommended to the Energy Conservation Fund of the Ministry of Power and Energy to provide financial support to install a gasifier at a State Plantation Corporation factory.

  - A grant was awarded for identifying an improved design as a substitute for commonly used bottle lamp (Mr G.K. Upawansa).

  - The Working Committee on Energy, identified castor seed oil as a potential substitute for kerosene for lighting purposes, and arrangements

were made to initiate work on this at the Department of Chemical Engineering, University of Moratuwa. (Mr H.D.J. Silva, Mr S.A.S. Perera)

8.0 REPORTS AND PROGRAMMES OF NATIONAL INTEREST

* **Ethical Review Committee**

A Committee has been set up by NARESA to draft a general code of ethical conduct in scientific research and to make recommendations for its implementation. The Committee selected the following areas for the preparation of a draft document ; Educational and teaching, medicine, engineering, scientific research. social sciences, zoology and botany.

* **Gam Udawa - 1991**

NARESA took part in the Gam Udawa exhibition 1991, held in Kamburupitiya. A model showing intensive and extensive buffalo farming systems supported by 10 informative posters, and a model of Sri Lanka to show the status of the biological control of salvinia, were among the exhibits of NARESA. Special effort had been taken to create an awareness among the public on conservation of our natural resources by way of posters. This participation enabled NARESA to reach a wide segment of the people and to disseminate useful information on activities co-ordinated by NARESA.

* **Presidential Mobile Service**

- NARESA was represented at the Presidential Mobile Service - Anuradhapura held from 5-7 April. The exhibits included models on salvinia control and a mineral block designed to be used in cattle/buffalo farming which were useful and informative for many of the people who visited the stall. The people were also interested in obtaining the bio-control agent for salvinia control, from NARESA.

- NARESA also participated in the science exhibition at the Presidential Mobile Service in Badulla from 15 - 17 August. The emphasis was on the conservation of genetic resources and conservation of the environment. In addition to several posters, a slide show on many endangered and endemic animals and plants including, endangered habitats like Sinharaja rain forest and Horton plains were shown. It was noted that school children were very keen to collect supplementary reading material on science which NARESA has been able to provide.

* The second issue of the publication, 'Vidyaven Apata' was printed. This news magazine is meant to disseminate information on basic technologies which could be adopted by "Janasaviya" beneficiaries.

* **Bibliography on Parasitology**

  A bibliography of Scientific Publications on Parasitology was compiled by Dr J.S. Edirisinghe of the University of Peradeniya on a request made by the Working Committee on Medical and Veterinary Sciences. All research publications in the field of Medical Parasitology from 1887 to 1988 are included in this document.

* **Bibliography on Buffalo Research**

  A bibliography on Buffalo Research was prepared for the use of scientists and students working on the Buffalo Research Programme. All the research work on buffalo carried out in Sri Lanka and in the region was included in this bibliography.

* **Biological Control of Salvinia**

  In response to a letter sent by the Hon. Minister of Science and Technology (on a request made by NARESA), the Department of Agriculture has informed that the introduction of the weevil to the required water bodies will be undertaken by the Plant Protection Service of the Department of Agriculture.

* **Vidurava**

  Following issues of the science bulletin 'Vidurava' were published and distributed to schools.

  Vol. 12 (1), (2), (3) and (4) - both Sinhala & English

  Vol. 13 (1) - English

* **Journal of the National Science Council**

  Vol. 17 (2) & 18 (1) - Copies were distributed locally and to foreign countries.

* **Man and Biosphere publications**

  MAB 18 - The Marine Angiosperms of Sri Lanka
  MAB 19 - An illustrated Manual of Rice Field weeds in Sri Lanka

* A memorandum to the National Education Commission on "A policy for Development of Science Education in Sri Lanka" is in progress.

9.0 AWARDS FOR SCIENTIFIC ACHIEVEMENTS

* National Awards

In keeping with the objectives of fostering science and technology in the country, NARESA offers two awards every three years for the most significant achievements in science. The first of these is the "President's Award for Scientific Achievement" and the second is the NARESA Award for Scientific Achievement.

NARESA initiated this scheme of awards in 1982, with the concurrence of His Excellency the President, to honour scientists and technologists for their achievements in various fields of science. The President's Award for scientific achievement was given for the first time in 1982 and the second presentation of the President's Award was made in 1985. The National Award for 1990 was shared by the following scientists.

1. Prof. C.B. Dissanayake
2. Prof. K.A.A.S. Warnakulasuriya
3. A twelve member research team headed by Dr. A.D.S. Liyanage
   The other members of the research team are;
   Mr S.W. Karunaratne
   Dr N. Yogaratnam
   Dr (Mrs.) C. Samaranayake
   Dr N.W.E.M. Jayasekera
   Dr D.M. Fernando
   Dr L.M.V. Tillekeratne
   Dr P.A.J. Yapa
   Dr A. Coomaraswamy
   Dr M.K.S.A. Samaraweera
   Dr W.S.E. Fernando
   Dr M.C.S. Perera

* Merit Awards

This scheme of awards was instituted in order to bestow on researchers who have attained a high level of excellence in their research work, the recognition they deserve for their contribution to the advancement of science. These awards are also meant to motivate recepients of research grants from NARESA to achieve and maintain high standards of scientific research.

The NARESA merit award ceremony was held on the 15th of November 1991. The following grantees whose research projects were completed during 1989/1990, were the recipients of these awards.

1.	Prof. I.A.U.N. Gunatilleke Mr K.V.P.M. Perera	]]	Agriculture
2.	Dr L. Pinto Ms. N.N. Punchihewa	]]	Biological Sciences
3.	Dr J. Jinadasa Ms S.C. Jayamanne	]]	Biological Sciences
4.	Prof. L.M.V. Tillekeratne Prof. W.D. Ratnasooriya Mr. G.K. Liyanage	]]]	Chemical Sciences
5.	Dr (Mrs) M.C. Atapattu	]	Medical & Vet. Sc.
6.	Dr (Ms) P. Abeynayake Prof. S.T. Fernando	]]	Medical & Vet. Sc.
7.	Dr. N. Jayewardena	]	Physical & Eng. Sc.
8.	Prof. G.L. Peiris	]	Social Sciences
9.	Prof. C. Wickramagamage	]	Social Sciences

* **TWAS/NARESA Awards for Young Scientists**

The above scheme of awards was instituted by NARESA for the annual award of prizes for young scientists in the fields of biology, chemistry, mathematics and physics with financial assistance from the Third World Academy of Sciences. The prizes are intended to give recognition to talented young scientists who have attained a high level of excellence in their research work. The following scientists were awarded the prize in 1990.

Mr. K.P.S.C. Jayaratne - (Physics)
Dr R. Senaratne - (Biology)

10.0 INTERNATIONAL SCIENTIFIC ACTIVITIES

* **SAREC**

- Presently, two major programmes of research are being supported on SAREC grants; one for upgrading the indigenous buffalo of Sri Lanka and the other on Coastal Ecology.

Both these research programmes are multi disciplinary in nature implemented by multi institutional research teams. Following the successful completion of research under the first phase of the SAREC/NARESA Buffalo Research Programme, a total of 32 grants were awarded under the phase 2, in December 1989. The research work of these projects was initiated in early 1991. Under the Coastal Ecology Research Programme, the Research and Advisory Committee recommended 6 new proposals for the 2nd phase of the research programme. These proposals were forwarded to the Director General, SAREC to be considered for funding.

- Under the SAREC International Contacts Fund, which provide partial assistance for Sri Lankan Scientists who present papers at International meetings, 25 scientists benefitted.

- Under the SAREC Urgent Spare Parts Funds, which supplies urgently needed spare parts by researchers for repair of scientific equipment, several institutions benefitted.

* **CIDA**

- The CIDA funded Potash Fertilizer Research Programme commenced its activities in 1984. 29 projects were funded under this programme. Out of these 29 projects, one is purely a training project where a research officer from the Department of Agriculture was trained at Ph.D. level in Canada and another project is purely an extension programme to popularise the use of fertilizer on cocoa, pepper, coffee and cinnamon. The rest of the projects are research projects. Five projects have already been completed and the other projects are due for completion by March 1992. At the end of the programme a book on the use of potash in agriculture in Sri Lanka based on the results of the research project will be published.

* **Science Statistics and Indicators**

The field studies in respect of phase IV of the programme on Science Statistics and Indicators was completed with a technomatic evaluation of the computer assembly industry of Sri Lanka. Based on the Technology Context Assessment of nine industries, an evaluation report is being compiled.

* **USAID**

Under the USAID funded programme for innovative research, 12 preproposals were selected and forwarded to USAID for consideration.

* **Visits of Foreign Delegates**

1.	Dr Olof Linden	-	Sweden
2.	Dr C.G. Thronstrom	-	SAREC
3.	Prof. I. Settigren	-	SAREC
4.	Dr G. Kovelanco	-	CIDA
5.	Prof. R.G Soper	-	CIDA
6.	Dr Keith Valentine	-	CIDA
7.	Dr Lisa Vickbar	-	SAREC

11.0 Staff Papers/Reports Presented

(1) **M.A.T. de Silva** - Indicators Through the Technometric study of Technology - Paper presented at the Training Workshop on Science and Technology for Development and S & T Information Management in Asia, New Delhi, 14-22 October 1991.

(2) **M.A.T. de Silva** - Typology of S & T Statistics and Methods for Data Collection for Output and Input Indicators - Paper presented at the Training Workshhop on - Science and Technology for Development, & S & T Information Management in Asia, New Delhi, 14 - 28 October 1991.

(3) **W. Amaradasa** - "Impact of Man Power training towards research out put of Scientific Research" - Project report submitted to the University of Colombo 1991.

12.0 Summary Review of Significant Research Findings

* **Mass Propagation of Selected Papaya Plants by Tissue Culture**

Investigations were undertaken to develop the technology for the <u>invitro</u> propagation of papaw plants.

Apical end and axillary bud explants were used to develop the protocol for mass propagation of plants. The best media for shoot proliferation and for induction of rooting and re-establishment of apical dominance were determined. Rooted plants were acclimatized to soil under controlled humidity temperature and water. The plants propagated through organogenesis gave plantlets similar to their mother plants.

The findings of this project could be used for the laboratory propagation of selected papaw plants which carry desired characteristics.
The project was carried out at the CISIR. (Dr K.G. Gunatilaka & Dr P.M. Jayatissa).

* **Studies on the effects of Sri Lankan soft Corals, sponges & marine algae on fertility in animals**

In this study, significant post-coital interceptive effects were shown by extracts from four species of soft corals. Four active compounds were isolated from the soft coral *Sinularia crispa*. Male antifertility activity was detected in extracts of *S. abrupta* and *S. crispa* and extracts of *Lobophytum cristagelli*. Two active compounds were isolated from *Sinularia abrupta*, one of which was shown to be $\Delta^{8(15)}$ africanene. The anti sperm mortality activity of another species, *S. crispa* was shown to be due to a steroidal glycoside. This study suggest that secondary metabolites of soft corals may provide a potential source for the development of effective and reliable contraceptive drugs (Prof. L.M.V. Tillekaratne, Prof. W.D. Ratnasooriya, Mr G.K. Liyanage).

Research Assistant of this project has registered for a Ph.D degree at the Univ. of Colombo.

* **Intergrated Control of water hyacinth (concurrent use of 2 4-D (Hedonol 55), *Myrothesium roridum* and *Neochetina eichhorniae* is envisaged in this project).**

The objective of this project was to study the feasibility of intergrating three control agents on water hyacinth, namely: 2 4-D Hedonol 55 (Weedicide), *Neochetina Eichhorniae* (weevil) and *Myrothecium roridum* (fungus) with a view to formulating an effective system for control of water hyacinth.
It was observed that the weevil is tolerant to both the fungus and the weedicide (at the concentrations tested).

Results showed that the weevil is ineffective in controlling water hyacinth plants. The use of the fungus proved ineffective in controlling the water hyacinth plants. Intergrated use of both weedicide and the fungus too proved ineffective in controlling water hyacinth. On the contrary, use of the weedicide (2 4-D) has been very effective in controlling water hyacinth and even at 1/10th concentration of the recommended dose for weed control. However the use of the 2 4-D cannot be recommended for water hyacinth control on account of its tendency to accumulate in ground water (Prof. S.A. Gunasekera and Dr I.V.S Fernando).

* **Access Mobility in Industrial Location**

This research work is a detailed investigation of the complex inter-relationships regarding industrial location, access, mobility, population and other factors.

A conceptual model was built to illustrate the relationships. The methodology was formulated based on the development of the model.

The work involved extensive literature search, large scale data collection, processing and analysis and the application of statistical, mathematical and network analysis in an original manner. Several graphical, tabular and pictorial methods were applied to illustrate the research findings and the geographical analysis of industrial location problems particularly in urban areas of developing regions.

The Colombo Metropolitan Region was chosen for the study as it is the most urbanized, dynamic and high potential region in the country. The hypothesis set out in the methodology regarding industrial location and access, mobility and other factors were confirmed by analysis and thereby established the very close relationships that exist between the location of industry and access-mobility. The analysis has highlighted the levels of growth of industry in the Colombo Metropolitan Region, the concentration of industry in the City of Colombo and the severe detriment to development and the poor employment opportunities for people in the AGA divisions to the North-East, East and the South-East of Colombo.

The study has shown that all major industries are located within a kilometer of an A or B class route in the highway network, the use of over 87% of the Public Transport System by industrial workers with over 85% of them being able to walk less than half a mile either to their homes or work places thus illustrating the crucial importance of the infrastructure and energy usage in the location of industry.

From the results of the research it has been possible to formulate a multi-sectorial lead project comprising of the restructuring and modernization of the Kelani Valley Railway Line as a transit mode for goods and people, development of urban complexes around the rail stations, co-ordinated road-rail travel, with a major southern road linking Gampaha, Homagama, Mathugama, Akuressa to Dickwella and connecting it to container stations on the K.V. and the Coastal railways.

The project expected to last over 10 years would not only create large scale employment but spin off other activities. This of course will have to be financed and managed by the private sector. The infrastructure development would be the critical step both in inducing industrial growth in the areas mentioned and providing increasing employment with higher productivity to take us through a quantum leap into the 21st century (Dr N. Jayewardene).

* **A critical study of the Administrative Role of Principals in Sinhala Medium Central Colleges and Maha Vidyalayas in Sri Lanka**

A study was conducted with a view to improve the quality of the administrative aspect of the Principals role in Sri Lanka. It is considered important as there has been no earlier research in this area in Sri Lanka, while in developed countries it has been proved that the principal is the main factor contributing to the success of schools.

The following findings have been highlighted as conclusions derived from the research.

The need to involve the principal in the formulation and management of the curriculum and therefore the need to generate necessary skills in them; the need to give the principal the opportunity to obtain personnel management, supervisory and teacher training skills in order to optimise staff utilization; to provide for interaction between older principals and younger persons holding this position; the need for principals to spend more time on the improvement of the quality of teaching than on routine administrative functions; the need to have a common code of conduct for admission, discipline administration etc. for all schools; the importance of acquiring skills relating the planning, securing management and maintenance of physics and financial assets and the maintenance of a high standard in parent-teacher relations, ability to have cordial and fruitful relations with political authorities (Mr S. Mataraachchi).

* Cerebrospinal nematodiasis (CSN) is a neurological disease found in sheep and goats in Sri Lanka. The disease is caused by the migration of larval stages of setarial worms in the central nervous system.

Cattle infected with setarial worms act as the main source of infection. Epidemiological studies revealed that 69.8% of dry zone cattle population were infected with setarial worms. However, only 45.9% of cattle with setariasis showed setarial microfilariae in their

blood. These results suggest that the local cattle population remains a ready reservoir of infection for sheep and goats. The incidence of CSN in sheep and goats was found to be 2.2% and 4.9 % respectively.

Parasitological studies revealed that there were two distinct species of setaria viz. *S. digitata* and *S. labiato* papillosa occuring in the peritoneal cavity of cattle in Sri Lanka. Clinical manifestation of CSN in sheep and goats was characterised by neurological signs. Ataxia, paraplegia, quadriplegia, head tilt and circling were the common clinical signs observed in affected animals. Neurological examination revealed abnormalities in some of the reflexes of the body, locomotor system and the cranial nerves.
Patnological examination did not reveal gross lesions in the CNS of sheep and goats with CSN. However, specific histological lesions were found in the CNS of diseased animals. Early histological lesions were characterised by focal areas of encephalomalacia and/or myelomalacia with variable number of eosinophilic infiltration.
Proliferation of astrocytes and fibrillary gliosis were seen in the CNS animals with long standing CSN. (Prof. W. Wettimuny)

* Studies on the production of monoclonal antibodies (MABs) against the larval stages of *Wuchereria bancrofti* for the characterisation of filarial antigens (somatic) and development of immunodiagnostic techniques has been carried out.

During the project, the grantees' have been successful in obtaining a panel of anti-mf MABs which are stage specific for microfilariae (mf) *W. bancrofti*. Their usefulness in designing diagnostic assays, finding isolate differences within the species of *W. bancrofti* in Sri Lanka,characterisation of important filarial antigens and in transmission blocking immunity has been investigated.
The second panel of anti-mf MABs seem to react against somatic components of mf of *W. bancrofti*.
As regards the anti-L3 MABs, though several MABs were obtained, they do not seem to be specific for L3s of *W. bancrofti* and cross reacts with other filarial antigens. Therefore, their usefulness in studies on bancroftian filariasis for diagnosis or any other procedure is limited. (Dr U.N. Premaratne)

* **Epidemiology of Nematodiasis in *Bos indicus* calves in two different agroclimatic zones in Sri Lanka**

In this project, epidemiological studies of nematodes affecting *Bos indicus* cattle in Sri Lanka have been carried out.

The study revealed that five species of nematodes namely *Strongyloides sp. Haemonchus sp. Mecistocirrus digitatus, Oesophagostomus sp.* and *Toxocara vitulorum* were identified. *Strongyloides sp.* was found in calves as young as five days and was the common species upto four months of age. *Haemonchus sp.* appeared about the 50th day of life and was prominent in calves over 5 months of age. The intensity of nematodes infestation was influenced by climatic changes with calves born during the wet season showing higher faecal egg counts than those born in the dry season. However, the egg counts increased upto about the 60th day of life and began to drop thereafter. Calves over 12 months of age had low faecal egg counts.

The damage due to nematodes was difficult to assess since all calves became infected with haemoprotozoans such as *Anaplasma marginale, Babesia bigemina* and *Theileria sp.* These parasites were seen to cause anaemia in these calves and the natural transmission of these parasites appeared to be high. Treatment with anthelmintics, however, was found to be economically feasible in calves below 6 months of age. There was a marked gain in body weight among anthelmintic treated calves. Of the anthelmintics tested, Nilverm was found to be the most effective followed by Valbazen and Rintal. Attempts to study the longevity of nematode larvae in pasture paddocks were unsuccessful due to poor recovery rate of infective larvae from pastures. (Dr D.J. Weilgama)

* A study was designed to determine the *in vitro* and *in vivo* larvicidal activity of benzimidazole anthelmintics. *Toxocara vitulorum* is a roundworm of cattle and buffaloes highly pathogenic to buffalo calves within the first four weeks of life. The embryonated infective eggs are ingested by the cows and the larvae are encyst in various organs without undergoing a substantial development beyond the infective stage. But these larvae are mobilized during early lactation into the mammary glands and the milk, and cause infection of the suckling calves. Thus attempts have been made to treat the dams at a suitable time before parturition in order to cleanse them of the encysted larvae and prevent infection of lactagenic origin in calves. The results seem to be satisfactory and opens a field for further study. (Dr (Mrs) P. Abeynayake & Prof. S.T. Fernando)

* **Seasonal utilization of mangroves and seagrasses by the juvenile fish and crustaceans of the Negombo Lagoon**

This study consisted of an attempt to prepare a check list of fish and crustaceans in mangrove and sea grass habitats, to compare their relative abundance and the effect of environmental factors on the populations, to study the type and rate of food consumption and to illustrate the importance of preserving the mangrove habitats.

During the study which lasted two years, 62 juvenile fish species and 20 crustaceans were identified from the seagrass beds and mangroves.

The seagrass beds were evidently highly productive and a case is stated for their conservation and protection by damage from boats and degrading operations.

The mangroves were also an important habitat. During the course of the study two mangrove sites were wilfully denuded. This provided the useful information that such destruction leads to an increase in catches in the short term, followed by a sharp reduction.

The monsoon periods were seen to be important periods for increased occurence of juvenile fish and crustaceans.

Several human activities such as housing and industrial schemes are perceived as threats to the lagoon as are also the increased recreational and commercial aquaculture projects, mechanisation of fishing craft, uncontrolled felling of mangroves and excessive exploitation of the lagoon fauna.

The Northern parts of the lagoon show signs of pollution by oil, diesel and kerosine from fishing crafts although the level of pollution is not yet irreversible. (Dr L. Pinto)

* **Bionomics of mud crab fishery in Negombo Lagoon**

Scylla serata is included among the 6 species of crabs which are most important in world trade. It is found in almost all of the lagoons in Sri Lanka and is abundant in the Negombo Lagoon. It is estimated that about 100 fishermen are engaged in the Negombo crab fishery.

The study aimed at identifying the current status of the crab fishery in Negombo lagoon, the feeding habits and reproductive biology of *S.serata* and the economics of the mud crab fishery.

The report on this study gives a comprehensive list of references, a wealth of data, tables and graphs indicative of a great deal of work. High prices have tended to encourage fishermen to capture crabs of progressively smaller size. The unmanaged exploitation of the fishery has led to dangerous destruction of the recruitment stocks. The workers recommend that some measures should be introduced to avert the danger of over exploitation of the crab fishery.

The authors recognize that their work is of a preliminary nature and requires further development (Dr J. Jinadasa, Mrs C. Jayamanna).

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

Cuprous sulphate has been shown to be a good solid electrolyte with a conductivity of 5.6×10^{-4} ohm^{-1} at 25°C. It is predominanly a Cu^{+} ion conductor with negligible electronic conductivity.

A synthetic clay material based on Al and Mg has been prepared and this shows a high ionic conductivity at elevated temperatures. The conductivity at 350°C is 0.10 ohm^{-1} cm^{-1} which is higher than that of well known sodium B-alumina. The activation energy for conduction is 0.91 eV.

The actual conducting phase is a form of sodium aluminate formed on the surface of clay particles. Solid state electrochemical cells have been fabricated using the above solid electrolytes. Sodium persulphate and vanadium bronzes have been used as electrode materials.

The performance of some of the cells investigated in this work has been found to be comparable or even better than that of some of the commercially available button cells intended for miniature electronic devices (Dr H.M.N. Bandara, Dr. J.S.H.Q. Perera & Dr M.A.K.L. Dissanayake)

* **Monitoring of sediment movement patterns in cultivated lands of Victoria reservoir catchment area**

The predominant land use in the Victoria resevior catchment area is vegetables and potato cultivation. Rain fall, soil loss, run off, suspended bed material load of this catchment were measured over a three year period. The total sediment load and the total run off flow were also measured. It has been calculated that the bed material load was about 45% of the total

sediment load and the total sediment delivery load is about 35%. Thus this study demonstrates that only 35% of the eroded soil is moved into first and second order streams as sediments. (Mr L.A. Wickremasinghe)

* **Identification of insect pests of stored paddy and study of their population build-up pattern in different agro-climatic zones of Sri Lanka**

The study was carried out in the storage period of twelve months in different agro-climatic areas viz. dry zone, intermediate zone, mid country wet zone and low country wet zone. Eight farm level stores and two commercial level stores were randomly selected to collect samples of stored paddy at intervals of 30 days during that storage period. The investigators were able to identify nine species of insects from those zones. The population build up pattern was also identified. (Mr K.B. Palipana, Mr M.D. Fernando)

* **Genetic analysis of rice quality with a view to selecting and breeding for varieties superior in quality**

For this study five varieties were selected from Batalagoda (C.R.B.S.). Those were Bg 400-1, Bg 380, H4, Bg 350 and Bg 3-5. Those varieties were crossed in all possible combinations in the Diallel fashion so as to produce F1 hybrids for the first time in Sri Lanka. The objective of this was to produce F1 hybrid that would combine the superior characters of the parents.

The possibility of producing superior recombinant inbred lines by using this technique has been demonstrated by this study. (Dr A.L.T. Perera)

* **The influence of study habits on enrichment of educational performance**

This research project focussed on the study habits of Secondary School children in Sri Lanka and was carried out with a view to assisting students to increase their capability of acquiring and utilizing knowledge. A number of important factors, which would contribute to the fruitful improvement of study habits have been identified based on the findings of the research. (Dr (Mrs) S. Senadheera)

* **Investigations on toxic, Anti feedant and repellent properties of defensive secretions of *Cordius janus* and *Leptocorisa acuta*.**

Effectiveness of defensive secretions of *Coridius janus, Leptocorisa acuta* and the mixture of t-2-hexenal and n-tridecane (60:40 w/w), the two major volatiles of the former defensive secretion were compared as topical applicants, fumigants, antifeedants, irritants and repellents against seven insects belonging to six different insect orders, viz. *Periplaneta americana, Sitophilus oryzae, Tribolium castaneum, Musca domestica, Oecophylla smaragdina, Eurema hecabe* and *Dysdercus cingulatus*. It was found that effectiveness of the toxicant depends to a large extent on its mode of application as well as the species of test insect. A remarkable variation in effectiveness was thus observed through the series.

The defensive secretion of *C. janus* was found to be more effective in all modes of applications against all insects tested whilst that *L. acuta* remained the least active except as a repellent. It was also shown that there was a parallelism in the activities of the defensive secretion of *C. janus* and the synthetic mixture of its major volatiles.

As topical applicants, all three toxicants performed poorly. An exception was however shown by the defensive secretion of *C. janus* against adults of *S. oryzae* and *M. domestica* with LD_{50} values of 0.4 ug and 0.8 ug respectively. Fumigant properties of toxicants were found to be rather poor with LD_{50} values ranging from 5.7 ppm to 26.1 ppm where defensive secretion of *L. acuta* was found to be the least effective. As antifeedants the defensive secretion of *C. janus* and its corresponding volatile chemicals were shown to be remarkably effective against three pests viz. *S. oryzae, E. hecabe* and *D. cingulatus* while that of *L. acuta* was shown to be the least effective.

The defensive secretion of *C. janus* and the synthetic mixture proved equally active as irritants against *P. americana*, while the secretion of *L. acuta* was less active. However, all three toxicants were shown to be equipotent as repellents to *D. cingulatus* and *O. smaragdina*.

The toxicity data from above tests coupled with the volatile nature of components involved in toxicants, only two practical applications were thought plausible viz. the use of mixture t-2-hexenal and n-tridecane (60:40 w/w) against *S. oryzae* and *P. americana* as an antifeedant and as an irritant respectively. (Dr (Mrs) S. Piyasiri)

* **Studies on cytogenetics of Lanka buffaloes**

The species *Bubalus bubalis* has a rather rare cytogenetic status as it includes two cytotypes differing in their habitat. The River type (2n=50) which prefers clear water for wallowing is found in India and adjacent regions. In contrast, the Swamp type (2n=48) which wallows in muddy water is indigenous to South East Asia and China.

The indigenous buffalo of Sri Lanka is an exception in that it is reported to have a chromosomal constitution of 2n=50 although it resembles swamp type in appearance and behaviour. Therefore, the project was initiated to study the chromosomal constitution of indigenous domestic buffaloes of Sri Lanka, from a wide geographical distribution of the country.

Samples analysed, showed a diploid chromosome number of 50. The observations made during this study suggest that the indigenous domestic buffalo in Sri Lanka belongs to the river type. In Sri Lanka, when buffaloes were extensively used for draught during paddy cultivation, the animal may have lost its dairy characteristics and acquired swamp habits. However, further investigations on the cytogenetic status of wild buffaloes have to be made. (Dr(Mrs) P. Abeynayake, Prof. B.M.A.O. Perera, Dr V.Y. Kuruwita)

* **Collection and evaluation of sesame germplasm for breeding adapted, high yielding cultivars**

Field experiments were conducted at Kengalla (mid-country intermediate zone), Mapalana (low country intermediate zone), and Kurunegala (low country dry zone) to evaluate the advanced breeding lines and early generation selections for their adaptability and yield. In the major yield trial several breeding lines outyielded the white-seeded variety MI3 released by the Agriculture Department, and one of these lines has the added advantage of easy dehulling due to a brittle seed coat character induced by gamma-rays. Work is in progress. (Dr R. Pathirana)

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

Chemical extraction and biassay guided fractionation of extracts of *Gliricidia maculata* and *Tithonia diversifolia* leaves was carried out. Through extensive chromatographic separation the bio-active compound in extracts of Gliricidia leaves was isolated and identified as coumarine. Structure elucidation and bioassay of the active principles from Tithonia

leaf extracts which exhibited inhibitory activity on seed germination and seedling growth is in progress. (Prof. L.M.V. Tillekeratne, Prof. J.P.N.R. Chandrasena)

* **Understanding the maintenance of tree species richness for silvicultural and conservation management**

Experiments were carried out on the growth performance of *Shorea* seedlings in response to fertilizer, soil type (ie. forest ridge, forest slope, forest vally and Pinus plantation soils), light and water regimes. The trends observed show that *Shorea* species have very specific microhabitat requirements under which they perform well. If these species are to be used in mixed species plantations the micro-requirements of each of them would have to be met. Studies are in progress. (Prof. I.A.U.N. Gunatilleke, Prof. C.V.S. Gunatilleke)

* **Creation of a database on the Chemistry and activity of endemic plants of Sri Lanka**

A factual database on the Chemistry and Activity of the Endemic Plants of Sri Lanka, SLPLAN, has been constructed using CDS/ISIS Mini-micro version 2.3 software provided by UNESCO. The database, which contains 11,214 records, contains bibliographical references, the compounds reported to be present and the results of any activity studies carried out on the endemic plants and related species. If genus has an endemic Sri Lankan species, chemical and activity information on all the different species of that genus including those not found in Sri Lanka have been entered in the database.

The database contains eighteen fields, ten of which contain information on the botanical characteristics and the local, sanskrit and common names of the plant, while eight contain information from chemical and activity studies and bibliographical references to the sources of this information.

Using six display format files, it is possible to access information in the database on the published work on these plants, local names and botanical characteristics of the plants, the names of plants having a specified local name, work done by a particular author on these plants and the names of plants showing a particular activity and those containing a particular type of compound or a specific compound. (Prof. V. Kumar)

* **Database on on-going research and Sri Lanka Publications on Medicinal and Aromatic Plants**

A database had been created on Sri Lankan scientists, research institutions, on going research and publications in the field of medicinal and aromatic plants. This data will be updated this year.
The database is available for reference at the Information Centre of the Ceylon Institute of Scientific and Industrial Research (CISIR). (Miss C.L.M. Nethsinghe)

* **Buffalo Research Programme**

- Diseases and Animal Health

Normal haematological and biochemical profiles of buffaloes were studied using the indegenous buffaloes at the Narangalla Buffaloe Research Station. Most haematological parameters were similar in cattle and buffaloes. MCV and MCH was slightly higher than cattle. The ESR was significantly high in buffaloes.

The results did not indicate age-related haemotological changes in buffalo blood between 1 month to 12 months age.

Urea, albumin and total protein were similar in cattle and buffaloes. The ALT levels were markedly increased in buffaloes. The significance of this finding merits further investigation, as ALT is usually very low in ruminants. (Dr U.N. Horadagoda)

- The phagocytosis assay for the buffalo neutrophils was perfected. Results obtained for twenty Lanka buffaloes showed that the percent phagocytosis was highest for *Staphylococcus aureus*, lowest for *Escherichia coli* and intermediate for *Streptococcus agalactiae*. (Dr Indira de Silva)

- Studies connected with the immunohistochemical localisation of *P. multocida* in the tonsils of HS carrier have been conducted. The findings indicate that, in HS carriers, the pasteurellace present in the tonsils are confined to the lumen of tonsillar crypts. This location may have contributed to the persistence of the organism by allowing it to evade the immune mechanisms of the host and the effect of antibiotics. The clinical course of HS was studied following experimental infection of Buffalo calves.

The incubation period and the clinical course varied from 24h to 66h, and from 14h to 110h respectively, depending on the route of infection. The general

sequence of clinical signs in the order of their appearance were, increased rectal temperature, anorexia, dyspnoea, salivation, oculo-nasal discharge and recumbency. In calves that died following a short clinical course, only a generalised congestion of the lungs and other visceral organs was observed. Animals that died after a longer illness had varying degrees of pneumonic consolidation.

Pasteurella multocida organisms, located by the immunoperoxidae labelling, were found in the cytoplasm of alveolar macrophages and the interlobular septae of the lungs and within the blood vessels of other visceral organs. Using standard bacteriological methods, the organism was demonstrable in venous blood for only a few hours before death. However, at necrospy, *P. multocida* was consistently recovered from heart blood. (Dr M.L.C.de Alwis, Dr N.U. Horadagoda)

- In a study on virus associated diarrhoea in buffaloe calves, 97 faecal specimens were examined by the indirect ELISA screening test. 7 samples were positive for the rota virus group A antigen, of which 5 were from buffalo calves and two were from neat cattle calves.

The faecal samples which were positive were subjected to electrophoresis, after the viral RNA was extracted. Only 4 of them gave the 11 bands, characteristic of rota virus genome. (Dr S. Mahalingam)

- A study was conducted to determine the suitable dose rate of 'Domosedan' for buffaloes. Twenty eight animals of 08 months to 08 years were used for testing the dosages of 1% Domosedan. The physiological parameters such as rectal temperature, respiratory rate, pulse rate and heart rate were made before administering the agent intramuscularly.

According to the results the dosages of 0.2 ml/100 kg and 0.4 ml/100 kg were useful to produce desirable sedation for clinical examination, minor surgical interference, preanaesthetic medication and transportation. Since, the dosage of 0.8 ml/100 kg was always associated with recumbency, that dosages could be used for complete immobilization of the animals. (Dr (Mrs) D.D.N. de Silva)

Reproduction

Preliminary results of a trial on postpartum ovarian activity and calf performances indicated that limited suckling does not appear to affect performance of calves and complete weaning by day 60 as well as day

90 appear to result in loss of body weights and the animal takes few weeks to regain positive weight gain. (Dr V.Y. Kuruwita, Dr H. Abeygunawardhane, Dr V. Mohan)

Buffalo Dairy Industry/Curd Production

On the basis of data collected and observations made so far in a study of the Buffalo Dairy Industry in Sri Lanka it is possible to conlude tentatively that dairy production is largely a subsidiary or a secondary form of employment. The production and marketing process has not undergone any form of modernization.

Therefore, if buffalo industry is to be improved modern production techniques and efficient marketing networks have to be introduced. (Prof. W.J. Siriweera, Dr P.V.J. Jayasekera, Mr M.D. Nelson, Mr Vijitha Nanayakkara)

TABLE I : GRANTS SPONSORED BY NARESA

Status Summary During 1991

DISCIPLINE / STATUS	Agriculture & Animal Husbandry	Biological Sciences	Chemical Sciences	Energy	Information Sciences	Medical & Veterinary Sciences	Physical & Engineering Sciences	Science Education	Social Sciences	Biological Control of Azuatic Weeds Water Hyacinth	Mangroves
Total No. of grants operating during 1991	15	09	27	02	06	13	14	04	32	03	02
Grants awarded - 1991	02	05	03	02	03	08	08	01	13	-	-
Amount allocated for 1991 (New and ongoing Rs.)	375,520	750,000	870,560	43,850	-	750,000	418,850	31,400	211,450	-	-
Grants completed - 1991	09	05	10	-	02	06	06	01	03	01	01
Grants withdrawn - 1991	-	0	01	-	-	01	01	-	01	-	-
Grants terminated - 1991	-	04	03	-	-	01	-	-	-	-	-
RA's appointed - 1991	-	03	02	-	-	-	03	01	01	-	-
Registered for PG - 1991	-	02	01	-	-	-	01	-	05	-	-
Thesis PG - 1991	01	02	-	-	-	01	03	-	01	-	-
Communications & Publications 1991	-	03	18	-	-	02	12	-	03	-	-
New Applications - 1992	15	06	08	-	-	07	08	03	14	-	-
Funds requested for 1992(Rs.)	2,756,083	1.0 m	652,500	-	-	1.3 m	521,700	189,385	762,385	-	-
Grants approved for - 1992	03	01	03	-	-	02	05	01	06	-	-
Amount approved for 1st year (1992) for new grants (Rs.)	282,349	141,000	238,500	-	-	200,000	268,700	10,000	127,940	-	-
Total amount approved for new grants - 1992 (Rs.)	443,049	225,000	316,500	-	-	216,000	352,700	10,000	130,840	-	-

TABLE II : GRANTS SPONSORED BY FOREIGN AGENCIES

Status Summary during 1991

FOREIGN AGENCY / DISCIPLINE / STATUS	NARESA-SAREC Research Co-operation			IDRC Information Sciences	CIDA fertilizer	UNESCO Mangroves	US-AID	University of Exeter
	Buffalo Research Programme	Coastal Ecology Research Programme	Zoological Survey of Sri Lanka					
Total No. of grants operating during 1991	32	06	01	-	26	02	03	01
Grants awarded 1991	-	-	-	-	-	-	-	-
Amount allocated for 1991 (new & ongoing Rs.)	5,330,700	4,476,000	-	-	1,818,000	-	-	-
Grants completed - 1991	02	-	-	-	01	-	-	-
Grants withdrawn - 1991	-	-	-	01	-	-	-	-
Grants terminated - 1991	-	-	-	-	-	-	-	-
RA's appointed - 1991	07	04	-	-	04	-	04	-
Registered for PG - 1991	04	01	-	-	01	-	-	-
Thesis PG - 1991	-	-	-	-	01	-	-	-
Communications & Publications 1991	06	-	-	-	04	-	02	02
New applications - 1992	25	06	-	-	-	-	-	-
Funds requested for 1992(Rs.)	6,669,480	6,865,400	-	-	-	-	-	-
Grants approved for 1992	-	-	-	-	-	-	-	-
Amount approved for 1st year (1992) for new grants (Rs.)	-	-	-	-	-	-	-	-
Total amount approved for new grants 1992 (Rs.)	-	-	-	-	-	-	-	-

TABLE III New Grants Awarded in 1991

Discipline Agriculture and Animal Husbandry

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/91/Ag/1	Dr A. Sumanasinghe Dept. of Agric. Biology Univ. of Peradeniya Peradeniya.	Isozyme analysis and compatability of Dioscorea (2 years)	Rs. 132,000/=
RG/91/Ag/2	Dr K.G.A. Goonasekera Dr B.F.A. Basnayake Dept. of Agric. Engineering Univ.of Peradeniya Peradeniya.	Design, testing and evaluation of an industrial prototype of a grain stripping, cleaning and bagging attachment for a 2-wheel tractor (2 years)	Rs. 177,600/=

New Grants Awarded in 1991

Discipline : Biological Science

Grant No	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/91/B/1	Dr(Mrs) A. Pathiratne Prof. G.S. Widanapathirana University of Kelaniya	Investigation of the causative agent(s) of the Ulcerative Fish Disease in Sri Lanka (2 years)	79400
RG/91/B/2	Dr(Miss) Thusitha Peiris Open University	The effect of fenthion (Baytex E.C.) spraying on the mosquito populations in urban areas (2 years)	160000
RG/91/B/3	Dr P.A.J. Yapa University of Sri Jayawar-denepura	Use of Eichornia crassipes in treatment systems for textile mill effluents (2 years)	146700
RG/91/B/4	Mr H.N.P. Wijayagunasekera University of Peradeniya Mr R.W.K. Punchihewa Agric. Research Station Makandura	Morphometrical characterization of Sri Lankan honey bee, Apis cerana to facilitate selection and breeding for productivity improvement (2 years)	82200
RG/91/B/5	Dr(Mrs) H. Ranasinghe University of Sri Jayawar-denepura	The study of the tolerance of different forest tree species to varying degrees of substrate salinity (1 year)	30760

New Grants Awarded in 1991

Discipline

Chemical Sciences

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/91/C/01	Dr H.M.N. Bandara Dept. of Chemistry University of Peradeniya Prof. M.A.K.L. Dissanayake Dept. of Physics Univ. of Peradeniya	"Study of solid electrolytes and cathode materials for solid state electrochemical cells" 02 years	90,400
RG/91/C/02	Dr Kamal Bandara Gunaherath Dept. of Chemistry Open University Nawala	"Synthesis of N-alkynyl-9-aridnamines with cytostatic activity" 02 years	128,500
RG/91/C/03	Dr H.D. Gunawardhana Dr Y.N.A. Jayatunge Dept. of Chemistry Dept. of Zoology Univ. of Colombo	"Study on the correlation between biochemical oxygen demand (BOD) and chemical oxygen demand (COD) for different industrial waste waters" 01 year	64,100

New Grants Awarded in 1991

Discipline - Energy

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/91/EP/01	Mr G.K. Upawansa	Design Improvement to the Bottle Lamp. 8 months	20750.00
RG/91/EP/02	Mr H.D.J. Silva Mr S.A.S. Perera Univ. of Moratuwa	Castor oil as an illuminant. 6 months	23100.00

New Grants Awarded in 1991

Discipline - Information Sciences

Grant No.	Name of Grantee and Institution	Title & Duration	Total Allocation
RG/IS/91/01	Ms W.G.S. Wimalasena C.E.A. Maligawatte	Bibliometric study on the output of the Scientific Community of Sri Lanka 01 year	Rs. 9640.00
RG/IS/91/02	Mrs N.P. Wanasundera Flat 4, 96/1 5th Lane Colombo 3	Compilation of an annotated, evaluative bibliography of Sri Lankan reference materials - Sinhala, Tamil and English 01 year	Rs.26500.00
RG/IS/91/03	Ms. P. Perera Fac. of Graduate Studies University of Colombo Colombo	The role played by libraries and their parent institutions in using and propagating information technology in Sri Lanka; a comparative study with special reference to academic and special libraries 01 year	Rs.17591.00

New Grants Awarded in 1991

Discipline : Medical & Veterinary Sciences

Grant No	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/91/M/1	Dr Ravindra Fernando Prof. N. Kodagoda University of Colombo	Determination of time of death using sarcosaprophagous insects as forensic indicators (3 years)	123400
RG/91/M/2	Dr Charith Fonseka Eye Hospital Colombo 10	A study of Acquired Macular disease in a Sri Lankan population (1 year)	23385
RG/91/M/3	Dr Susirith Mendis University of Ruhuna	Electroneurographic assessment of patients with carpal tunnel syndrome (1 year)	31000
RG/91/M/4	Prof(Mrs) E. Wickramanayake University of Peradeniya	Survey of sex chromosomal aberrations in the inmates of the mental hospital at Mulleriyawa and Angoda (1 year)	77760
RG/91/M/5	Dr(Miss) V. Thevanesan University of Peradeniya	Bacterial aetiology of pneumonia in children with special reference to the prevalence of Staphylococcus aureus infection (1 year)	106045
RG/91/M/6	Dr(Mrs) P. Angunawela University of Colombo	Immunohistochemical study of non-Hodgkin's Lymphomas in Sri Lanka (2 years)	80500

Grant No	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/91/V/1	Mr S.P. Gunaratne Veterinary Research Institute	Generation of data on nutritive value of poultry feeding stuffs to augment the national feed inforamtion (1 year)	57000
RG/91/V/2	Dr M. Bahirathan Dr D.J. Weilgama Veterinary Research Institute	Helminthiasis in goats, epidemilogy and its control (1 year)	27500

Discipline

New Grants Awarded in 1991

Physical & Engineering Sciences

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/91/P/01	Dr M.A.Careem Dept. of Physics University of Peradeniya Peradeniya	"Study of electrical conductivity and phase transitions of solid electrolytes suitable for solid state device applications" 03 years	143,100
RG/91/P/02	Prof. M.A.K.L. Dissanayake Prof. O.A. Ileperuma Dr G.P. Thambirasa Dept. of Physics University of Peradeniya Peradeniya	"Determination of flat band potentials of semiconductors using impedance measurements and their correlation of photocatalytic activity" 02 years	74,400
RG/91/P/03	Dr B.S.B. Karunaratne Dept. of Physics University of Peradeniya Peradeniya	"Mechanical properties and micro-structure of ceramic materials" 03 years	149,100
RG/91/E/01	Mr Upali Weerakkody Dept. of Geography Univ. of Ruhuna Matara	"Landslides of Sri Lanka - A study on masswasting process and remedies to minimize damages" 01 Year	49,550

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/91/E/02	Mr B.P.S. Peiris Dept. of Materials Eng. Univeristy of Moratuwa Moratuwa	"Heat treatment of gems with special emphasis on stones belonging to the corundum family" 01 Year	54,000
RG/91/E/03	Dr H.C. Kariyawasam Dept. of Civil Engineering University of Moratuwa Moratuwa	"Assessment of surface water resources in the dry zone of Sri Lanka" 01 year	42,000
RG/91/Ar/01	Mr V. Sri Nammuni Dept. of Architecture University of Moratuwa Moratuwa	"Formulation of a typology of Sri Lankan houses - A study of the correlation between house type and income group in Colombo" 01 year	51,200
RG/91/Ar/02	Prof. D.N.L. Alwis Mr M.P.R. Emmanuel Mr S.G. Weerasuriya Dept. of Architecture Univ. of Moratuwa Moratuwa	"Assessment of Thermal Comfort in dwelling Houses in Sri Lanka 01 year	78,000

New Grants Awarded in 1991

Discipline Science Education

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/SE/91/01	Prof. S.N. Arsecularatne Dept.of Microbiology Fac. of Medicine Univ.of Peradeniya Peradeniya. Dr Nimal D. Kasturiarachchi Medical Education Unit Fac. of Medicine Univ.of Peradeniya Peradeniya.	Scientific illiteracy in Sri Lanka's population groups, prevalence, social, educational and administrative significance. (2 years)	Rs. 84,200/=

New Grants Awarded in 1991

Discipline - Social Sciences

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation Rs.
RG/91/SS/1	Miss Ramani Karunanayake Dept.of Economics Univ.of Ruhuna Matara.	The constraints confronting small and medium scale industries in Sri Lanka with special reference to Matara district. (1 year)	18300.00
RG/91/SS/2	Mr R.M. Ratnayaka Dept.of Economics Univ.of Ruhuna Matara.	The role of formal and non-formal financial agencies in rural development with special reference to Moneragala and Kegalle districts. (2 years)	25000.00
RG/91/SS/3	Dr(Mrs.) N.A.I. Sriyani Dias Dept.of Geography Univ.of Sri Jayewardene-pura Nugegoda.	Environmental consequences of the development of manufacturing industries and their prevention in planning and development - A study of the Biyagama area. (1 year)	30000.00
RG/91/SS/4	Mr S. Rupasinghe Fac. of Education Univ.of Colombo Colombo.	Equity of Education in a disadvantaged environment in the municipality of Colombo. (1 year)	25000.00

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation Rs.
RG/91/SS/ 5	Mr Jayaratne Pinikahana Dept. of Sociology Univ.of Ruhuna Matara.	Lay interpretations on illness in rural Sri Lanka. (1 year)	30000.00
RG/91/SS/6	Mr Mangala de Zoysa Dept.of Agric. Economics Univ.of Ruhuna Mapalana Kamburupitiya.	The status of agricultural insurance schemes in Southern Sri Lanka: A case study of the agricultural insurance schemes in the Matara district. (1 year)	30000.00
RG/91/SS/8	Mr W.S. Hettiarachchi 62/8, Old Kottawa Road Mirihana, Nugegoda. (M.Sc. Research Student)	Surface remains of Maha Vihara in Anuradhapura (1 year)	15000.00
RG/91/SS/9	Mr Arjuna de Zoysa Division of Computer Studies Open University P.O.Box 21 Nugegoda.	Technology-Social Interaction in Industrial Development (1 year)	30000.00

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation Rs.
RG/91/SS/10	Mrs Mahesha Subashini Pelpola Hapitigama College of Education Mirigama.	An evaluation of the effect of professional training on the effectiveness of the teaching function (1 year)	13300.00
RG/91/SS/11	Mr M. Ratnayake Dept.of Geography Univ.of Ruhuna Matara.	Problems in Regional Development Planning in Sri Lanka (With reference to the Hambantota District) (1 year)	30000.00
SAREC/RG/91/SS/12	Prof. Kusuma Gunawardena Dept.of Geography Univ.of colombo colombo.	Analysis of internal migration data from the census of Sri Lanka 1981 on a sub-district level. (1 year)	44000.00

TABLE IV: PARTICIPATION AT CONFERENCES, SEMINARS AND WORKSHOPS OVERSEAS DURING 1991

ON THE NOMINATION OF NARESA

Subject and Period	Awarding Agency	Nominee/s
1. 8th ASTINFO Consultative meeting and Seminar/Workshop Tokyo - Tsukuba, Japan 24 - 29 September 1991	ASTINFO and the University of Library & Information Sciences, Tskuba, Japan	Mrs S.P. Prelis Acting Director (Information)
2. Training Workshop on Science & Technology for Development and S & T Information Management in Asia New Delhi 14 - 28 October 1991	Science & Technology Policy Asian Network University of Wollongong, Australia	Mr W. Amaradasa (Asst. Director) Mr B.M.C.K.Basnayake (Scientific Officer)

NATURAL RESOURCES ENERGY & SCIENCE AUTHORITY OF SRI LANKA

Balance Sheet as at 31.12.91

As at 31.12.90					
	Funds Employed				
2,691,842.00	NARESA Fund		853,281.74		
800,000.00	Add Drawings from Treasury	200,000.00			
-	Valuation of Assets (Land)	42,250,000.00	42,450,000.00		
3,491,842.00				43,303,281.74	
2,638,560.26	Less Excess of expenditure over Income			3,130,541.83	
853,281.74					40,172,739.91
3,629,420.62	Documentation Unit Capital Fund		4,512,214.40		
1,500,000.00	Add Drawings from Treasury	1,550,000.00			
-	Treasury Deposit	-			
55,637.40	Funds received from UNESCO & SAREC	-	1,550,000.00		
5,185,058.02				6,062,214.40	
672,843.62	Less Net Expenditure - Note 1.1			744,521.17	
4,512,214.40					5,317,693.23
5,076,417.48	Research Grants Fund		5,310,150.86		
3,225,000.00	Add Drawings from Treasury	3,660,000.00			
125,000.00	Funds received from other sources	-			
-	Treasury deposit	-	3,660,000.00		
8,426,417.48				8,970,150.86	
3,116,266.62	Less Net Expenditure - Note 1.2			3,550,593.92	
5,310,150.86					5,419,556.94
1,634,493.08	Man & the Biosphere Fund		1,709,421.84		
200,000.00	Add Drawings from Treasury	300,000.00			
23,058.80	Funds received from other sources	-			
-	Treasury Deposit	-	300,000.00		

1,857,551.88				2,009,421.84	
148,130.04	Less Net Expenditure - Note 1.3			125,159.02	
1,709,421.84					1,884,262.82
642,292.49	Miscellaneous Fund		664,134.02		
675,000.00	Add Drawings from Treasury	1,380,000.00			
-	Treasury Deposit		1,380,000.00		
1,320,292.49				2,044,134.02	
656,158.47	Less Expenditure - Note 1.4			888,115.65	
664,134.02					1,156,018.37
153,497.94	Scientific Manpower Project Fund		153,497.94		
-	Add Drawings from Treasury	-			
-	Treasury Deposit	-	-		
153,497.94				153,497.94	
-	Less Expenditure			-	
153,497.94					153,497.94
898,139.41	Working Committees Fund		891,083.32		
225,000.00	Add Drawings from Treasury	300,000.00			
-	Treasury Deposit	-			
-	Money received from other sources	3,364.00	303,364.00		
1,123,139.41				1,194,447.32	
232,056.09	Less Net Expenditure - Note 1.5			183,824.96	
891,083.32					1,010,622.36
38,070,467.17	Foreign Aid Fund		40,333,127.82		
8,112,113.47	Add Drawings from Treasury	13,272,727.27			
-	Treasury Deposit	1,571,227.47			
151,874.84	Foreign Aid held by NARESA	-			
306,170.00	Funds received by other sources (Asset)	14,000.00	14,857,954.74		
46,640,625.48				55,191,082.56	
6,307,497.66	Less Net Expenditure - Note 1.6			8,900,258.27	
40,333,127.82					46,290,824.29

	Current Liabilities				
323,405.23	Creditors				
396,974.50	Accrued Charges			351,107.16	
2,075,293.10	Provisions			1,074,297.30	
31,603.80	Endowment Fund			3,598,286.48	
50,000.00	Refundable Deposit			-	
3,850.00	Store-Keepers refundable security deposit			-	
16,500.00	Tender Deposit			4,000.00	
57,324,538.57				10,000.00	5,037,690.94
					106,442,906.80

NATURAL RESOURCES ENERGY & SCIENCE AUTHORITY OF SRI LANKA

Balance Sheet as at 31st Dec. 91

As at 31.12.90		Cost as at 01.01.91	Additions /Disposals	Accumulated Depreciations	Net Balance
	Represented by				
	Fixed Assets				
-	Land	-	42,250,000.00	-	42,250,000.00
1,413,926.61	Buildings	2,862,371.11	31,249.76	1,593,275.50	1,300,345.37
1,387,993.03	Office Equipment & Furniture	3,658,102.03	119,470.00	2,734,019.00	1,043,553.03
2,940,357.49	Motor Vehicles	5,635,849.70	71,450.00 (32,920.17)	3,479,847.21	2,194,532.32
109,267.18	Motor Bicycles	216,139.18	78,000.00	159,511.00	134,628.18
-	Bicycles	6,710.00	5,045.50	7,971.00	3,784.50
-	Sports Equipment	1,504.00	-	1,504.00	-
44,506.00	Accessories & Miscellaneous	155,337.05	22,353.30	132,310.05	45,380.30
1,309,399.16	Library Books	1,309,399.16	(11,477.60) 20,118.55	-	1,318,040.11
13,209,906.43	Scientific & Laboratory Equipment out on Loan	26,308,732.93	5,113,350.88	15,823,718.50	15,598,365.31
1,532,708.62	Documentation Equipment	4,677,952.62	27,500.00	3,494,496.00	1,210,956.62
21,948,064.52		44,832,097.78	47,694,140.22	27,426,652.26	65,099,585.74
13,953.64	Telephone Installation				13,953.64
21,962,018.16					65,113,539.38
	Current Assets				
566,869.86	Stocks			571,475.20	
2,582,351.98	Debtors			2,300,830.50	
2,793,160.70	Prepayments			858,578.67	
77,539.45	Deposits			36,109.45	
24,184,669.70	Treasury Deposit			26,316,904.31	
3,572,243.15	Balance at Bank A/C No. 4530800224		7,435,946.66		
403,657.04	Balance at Bank A/C No. 4530800232		3,793,805.86		
10,000.00	Petty Cash		10,000.00		
1,136,574.73	Cash in Hand		1,716.77		
31,603.80	Fixed Deposit		-		
3,850.00	National Savings Bank A/C		4,000.00	11,245,469.29	
35,362,520.41					41,329,367.42
57,324,538.57					106,442,906.80

Director General
Natural Resources, Energy & Science Authority of Sri Lanka
47/5, Maitland Place, Colombo 7

NATURAL RESOURCES ENERGY & SCIENCE AUTHORITY OF SRI LANKA

Income & Expenditure A/C for the year ended 31st December 1991

As at 31.12.90				
7,410,000.00	Drawings from Treasury			7,980,000.00
	Income for the Year			
51,190.00	Interest received		90,049.52	
143,458.29	Sundry Income		11,164.80	
71,203.16	Sale of Pulbications		198,229.05	
5,686.05	Photocopy receipts		11,181.05	
41,584.26	Receipts from Printing out-side jobs		16,038.40	
485.00	Profit on sale of fixed assets		-	
1,110,266.00	10% Foreign Aid Administration Cost		1,327,272.73	1,653,935.55
8,833,872.76				9,633,935.55
	Less Expenditure for the year			
	Authority Expenditure			
33,095.78	Travelling & allowances for Authority & Committee members	30,810.80		
16,351.45	Entertainment	15,288.85	46,099.65	
49,447.23				
	Staff Emoluments			
3,784,403.18	Salaries & allowances	4,357,781.08		
559,074.78	Employees Provident Fund	541,192.90		
112,363.09	Employees Trust Fund	107,597.99		
218,972.50	Retiring Gratuity	173,127.50		
39,308.65	Provisions for retiring Gratuity	173,636.42		
75,438.06	Overtime	211,915.38		
1,800.00	Holiday Payment	57,802.57	5,623,053.84	
4,791,360.26				

	Office Administration			
1,181.74	Travelling (Official)	1,347.35		
357,914.60	Stationary & Consumables	442,739.17		
200,000.00	Electricity	150,000.00		
196,126.23	Telephone	255,460.04		
57,876.65	Postage	85,905.25		
42,735.00	Audit Fees	42,735.00		
5,837.75	Bank Charges	12,873.98		
38,389.65	Medical Expenses	18,568.59		
33,858.00	Advertising	238,040.00		
164,828.85	Maintenance of Motor vehicles	221,537.66		
88,881.71	Maintenance of Office Equipment & Furniture	114,921.32		
65,069.06	Maintenance of Building	52,846.85		
5,000.00	Staff Welfare	10,000.00		
100,343.90	Insurance	82,213.74		
5.90	Water consumption charges	60.00		
1,040.08	Bad Debts	-		
-	Provision for Doubtful debts	-		
439,188.13	Loss of fixed assets (tfr to Univ. of Peradeniya)	-		
-	Loss of Stocks	-		
150,354.00	Security Services	186,783.84		
4,443,698.00	Depreciation	4,355,637.00		
62,420.50	Sundry Expenses	134,280.15		
69,366.16	SAREC/Gen, SAREC/19/Gen, CIDA/Gen, SAL/Gen, RG/AID/Gen	127,297.70		
70,842.29	Gam Udawa	101,606.28		
	Un Useable items	414.80	6,835,268.72	
11,435,765.69				12,304,422.21
(2,601,892.93)	Excess of expenditure over income			(2,870,486.66)
	Add Prior year adjustment (net)			260,055.17
				3,130,541.83

7/Jul/92

FUND FLOW STATEMENT 1991

SOURCES			
External Sources			
Contribution from Government			7,390,000.00
Grants from Foreign Agencies		16,171,227.00	
Less 10% Administration cost		1,327,273.00	14,843,954.00
Funds received from other sources			17,364.00
			22,251,318.00
Add Adjustments for items not involving Movement of funds			
Depreciation		4,555,637.00	
Net decrease in provisions		(1,522,993.00)	
Disposal of fixed assets during 91	44,398.00		
Less Depreciation written off	13,018.00	31,380.00	3,064,024.00
			25,315,342.00
APPLICATION			
Excess of expenditure over income		2,696,850.00	
Adjustments in respect of previous year		(328,262.00)	
Acquisition of fixed assets		5,488,538.00	
Expenditure re. Research Grants		13,631,433.00	21,488,559.00
Increase in working capital as analysed below			3,826,783.00

Change in Working Capital

		Increase	Decrease	
1.	Stocks	4,605.00	-	
2.	Debtors	-	281,522.00	
3.	Prepayments	-	1,934,582.00	
4.	Deposits	-	41,430.00	
5.	Treasury Deposit	2,132,235.00		
6.	Creditors	-	27,702.00	
7.	Accrued Charges	-	677,323.00	
8.	Provisions	-	1,522,993.00	
9.	Other Liabilities	87,954.00	-	
10.	Cash & Bank	6,087,541.00		
		8,312,335.00	4,485,552.00	3,826,783.00

NOTES ON ACCOUNTS - 1991

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	27,500.00
2.	"	Maintenance & Repairs	145,566.53
3.	"	Books & Periodicals	123,838.94
4.	"	In House printing & binding	141,645.19
5.	"	Consumables	143,548.68
6.	"	Miscellaneous	20,539.50
7.	"	Services	-
8.	"	Publications & publicity	180,498.89
			783,137.73
Less:		Cost of Documentation Equipment & Library Books (27,500 + 20,118.55)	47,618.55
			735,519.18
Add:		Prior year adjustment	9,001.99
			744,521.17

1.2 Research Grant Expenditure

Actual Expenditure for the year		1,622,083.62
Less	Cost of Scientific Equipment acquired during the year	66,441.50
		1,555,642.12
Add:	Provisions for Balance funds	2,037,916.38
		3,593,558.50
Less:	Prior year adjustments	42,964.58
		3,550,593.92

1.3 Man & the Biosphere Expenditure

1.	MAB/85/02	3,000.00
2.	MAB/86/1	76,186.36
3.	MAB/91/01	4,425.50
4.	MAB National Committee	38,036.36
		121,648.22
	Add: Prior year adjustments	3,510.80
		125,159.02

1.4 Miscellaneous Fund Expenditure

1.	Awards for outstanding Research Work	231,805.50
2.	Participation in International Scientific Work	77,046.71
3.	Seminars & Symposias	2,880.75
4.	Subscriptions to International Scientific unions	571,141.33
5.	Special Research Projects	
	Mangrove Committee	1,496.20
6.	Janasaviya	3,745.16
		888,115.65

1.5 Working Committees Fund Expenditure

1.	Agriculture & Animal Husbandry W/C	9,661.75
2.	Biological Sciences W/C	5,914.30
3.	Chemical Sciences W/C	11,332.43
4.	Ethical Review W/C	5,855.20
5.	Editorial W/C	10,029.70
6.	Genetic Resources W/C	6,053.80
7.	Medical & Vet. Sciences W/C	21,143.70
8.	Natural Resources W/C	6,897.00
9.	Physical & Engineering Sciences W/C	14,158.24
10.	SSR W/C	19,291.31
11.	SER W/C	41,467.75
12.	Science Information W/C	9,557.78
13.	W/C on Energy	22,362.00
		183,724.96
	Add: Prior year adjustments	100.00
		183,824.96

1.6 Foreign Aid Expenditure

1.	Advisory & Buffaloe Research W/C	34,056.33
2.	ACIAR Project expenditure	18,116.39
3.	CIDA expenditure	3,992,144.20
4.	Natural Resources Profile A/C	489,292.50
5.	RG/87/AG/03	103,762.90
6.	RG AID Expenditure	3,559,111.69
7.	RG/MAN/UNESCO Expenditure	42,536.16
8.	SAREC Expenditure	6,399,647.25
9.	UNESCO/86/PP/01	99,688.76
10.	MAB/UNESCO/4	25,484.78
		14,763,840.96
	Less: Cost of Scientific Equip. & Motor vehicles (2,417,671.80 + 140.00 + 1,815,064.67 + 965,972.91)	5,198,849.38
		9,564,991.58
	Less: Prior year adjustments	557,965.31
		9,007,026.27
	Less: Money received from sale of Buffaloe calves	106,768.00
		8,900,258.27

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	2,313,282.07
Less: Provision for Doubtful debts	12,451.57
	2,300,830.50

3. Liabilities

3.1 Creditors

Creditors amount to Rs. 351,107.16 represents monies held by NARESA on behalf of 10 projects given below:

1.	Sundry Creditors	7,988.55
2.	Mini/Micro CDS/ISIS Workshop	9,408.00

Contd.....

3.	RG/89/IS/03	7,500.00
4.	RG/89/IS/02	31,642.00
5.	SLATAI	7,780.00
6.	Steering Committee	15,046.50
7.	Suspense A/C	9,886.00
8.	STEPAN Workshop	97,937.21
9.	TWAS Contribution	43,026.50
10.	Workshop on Tropical Forests & Coral Reefs	16,077.40
11.	Genetics Resources (CSC funds)	104,815.00
		351,107.16

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 approved medical scheme is provided in addition to the normal welfare facilities available.

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. 1,749,561.50 (valued at selling price) is available with us.

5. We have valued the land owned by NARESA in 1991. Accordingly we have taken the value of the land to our books of accounts in the year 1991.

6. Motor vehicle no. 16/1318 was purchased in 1989. A refund of Rs. 32,920.17 has been received in 1991 in respect of this purchase.

7. Amount of Rs. 150,000.00 paid on an estimated basis is included in the Electricity account.

8. Amount of Rs. 7,500/= due from Data Serve Ltd. was written off during the year 199: as per the board minute no. 91-13-164. This entry will be reversed during the year 1992 according to the board minute no. 2.3 of 1992.

දුරකථනය
தொலைபேசி
Telephone } 691151

ෆැක්ස් අංකය
பக்ஸ் இல.
Fax No. } 697451

මගේ අංකය
எனது இல.
My No. } EC/R/NARESA/FA/91

ඔබේ අංකය
உமது இல.
Your No. }

විගණකාධිපති දෙපාර්තමේන්තුව
නිදහස් 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 : 05 November 1993

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 1991 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 1991 was carried out under my direction in pursuance of provisions in Article 154(1) of the Constitution of the Democratic Socialist Republic of Sri Lanka read in conjunction with Section 13(1) of the Finance Act No.38 of 1971. My observations which I consider should be published with the annual report of the 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 furnished to the Director General of the Authority on 27 May 1993.

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-section (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.

Contd....2/-

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 a General Fund and six Special Fund Accounts. According to the accounts presented, the operating result of the General Fund of the Authority for the year ended 31 December 1991 was a deficit of Rs. 10,850,487 before taking into account the Government Grant for recurrent expenditure as compared with the corresponding deficit of Rs. 10,011,893 for the preceding year. After taking into account the Government Grant of Rs.7,980,000 received for recurrent expenditure for the year under review, the deficit for the year was reduced to Rs. 2,870,487. After taking into account the Government Grant of Rs.7,410,000 for the preceding year, the deficit for that year had reduced to Rs. 2,601,893.

The operating results of the Special Funds, before taking into account the Government Grant for Special Fund activities was a deficit of Rs. 12,803,882 as compared with a corresponding deficit of Rs.10,471,212 for the preceding year. After taking into account the Government Grant of Rs. 20,462,727 received during the year under review for Special Fund activities, the deficit for the year was converted into a surplus of Rs.7,658,8 After taking into account the Government Grant of Rs.13,937,113 received in the preceding year, the deficit for that year was converted into a surplus of Rs.3,465,901.

2:2:1 General Fund

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

Contd...3/-

	Year ended 31 December			
	1991		1990	
	Rs.	Rs.	Rs.	Rs.
Income				
Receipts on account of Foreign Aid Administration Cost	1,327,273		1,110,266	
Sale of Publications	198,229		71,203	
Interest on Loans	90,049		51,190	
Provision of Printing services to Outside Parties	16,038		41,584	
Photocopy Receipts	11,181		5,686	
Sundry	11,165		143,459	
Profit on Sale of Fixed Assets	-	1,653,935	485	1,423,873
Less:Expenditure				
Office Administration	6,835,269		6,594,959	
Staff Emoluments	5,623,054		4,791,360	
Council	46,099	12,504,422	49,447	11,435,766
Deficit before Government Grant		(10,850,487)		(10,011,893)
Less:Government Grant for Recurrent Expenditure		7,980,000		7,410,000
Deficit for the year		(2,870,487)		(2,601,893)

Contd.....4/-

2:2:2 Special Funds

The following statement shows the financial results of each special Fund for the year under review and the preceding year.

	Year ended 31 December			
	Rs. 1991	Rs.	Rs. 1990	Rs.
Research Grants Fund				
Government Contribution	3,660,000		3,225,000	
Receipts from other Sources	-		125,000	
	3,660,000		3,350,000	
Less: Expenditure	3,550,594		3,116,267	
Surplus		109,406		233,733
Documentation Unit Capital Fund				
Government Contribution	1,550,000		1,500,000	
UNESCO and SAREC Grants	-		55,637	
	1,550,000		1,555,637	
Less: Expenditure	744,521		672,844	
Surplus		805,479		882,793
Foreign Aid Fund				
Government Contribution	13,272,727		8,112,113	
Treasury Deposits	1,571,227		-	
Receipts from other sources	14,000		306,170	
Foreign Aid retained	-		151,875	
	14,857,954		8,570,158	
Less: Expenditure	8,900,258		6,307,498	
Surplus		5,957,696		2,262,660
Man and Biosphere Fund				
Government Contribution	300,000		200,000	
Receipts from other Sources	-		23,059	
	300,000		223,059	
Less: Expenditure	125,159		148,130	
Surplus		174,841		74,929

Contd..... 5/-

Miscellaneous Fund				
Government Contribution	1,380,000		675,000	
Less:Expenditure	888,116		656,158	
Surplus		491,884		18,842
Working Committee Fund				
Government Contribution	300,000		225,000	
Receipts from other Sources	3,364		-	
	303,364		225,000	
Less:Expenditure	183,825		232,056	
Surplus/Deficit		119,539		(7,056)
Net surplus from Special Funds		7,658,845		3,465,901

2:3 Financial structure

According to the accounts presented, the financial structure of the Authority as at 31 December 1991 as compared with that as at 31 December 1990 is given below.

	As at 31 December	
	1991 Rs.	1990 Rs.
Resources		
General Fund of the Authority	40,172,740	853,282
Special Funds		
Foreign Aid Fund	46,290,824	40,333,128
Research Grants Fund	5,419,557	5,310,151
Documentation Unit Capital Fund	5,317,693	4,512,214
Man and Biosphere Fund	1,884,263	1,709,422
Miscellaneous Fund	1,156,018	664,134
Working Committee Fund	1,010,622	891,083
Scientific Manpower Project Fund	153,498	153,498
	101,405,215	54,426,912
Utilization		
Fixed Assets(at written down value)	65,113,539	21,962,018
Net Current Assets	36,291,676	32,464,894
	101,405,215	54,426,912

Contd...6/-

The land belonging to the Authority had been assessed at Rs.42,250,000 and the assessed value had been credited to the general fund of the Authority during the year under review.

2:4 Source and Application of Funds

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

Source	Rs.	Rs.
Deficit of the General Fund for the year		(2,870,487)
Less: Adjustments in respect of previous year		328,262
		(2,542,225)
Less: Adjustments in respect of items not involving movement of funds:		
Depreciation	4,555,637	
Provision for Pension Gratuity	173,636	
Adjustments in respect of disposal of assets	31,380	4,760,653
		2,218,428
Other Sources		
Government Grant for Capital Works	7,390,000	
Foreign Aid for Research Works (Net)	14,843,954	
Other Receipts for Research works	17,364	22,251,318
		24,469,746
Application		
Purchase of Fixed Assets	5,488,538	
Expenditure on Research Works	13,631,433	19,119,971
Increase in Working Capital as analysed below		5,349,775

Contd....7/-

	Effect on Working Capital		
	Increase	Decrease	
	Rs.	Rs.	
Bank Balance	7,253,853	-	
Treasury Deposits	2,132,234	-	
Refundable Deposits	50,000	-	
Scholorship Fund	31,604	-	
Tender Deposits	6,500	-	
Stocks	4,605	-	
National Savings Account	150	-	
Pre-payments	-	1,934,582	
Cash in Hand	-	1,134,858	
Accrued Expenses	-	677,323	
Debtors	-	281,522	
Miscelleneous Deposits	-	41,430	
Fixed Deposits	-	31,604	
Creditors	-	27,702	
Security Deposits	-	150	
	9,478,946	4,129,171	5,349,77

2:5 Comments on Accounts

2:5:1 Accounting Policies

Value of library books had been accounted for as assets immediately after the payments are made and before the books are physically received by the Authority.

2:5:2 Accounting Deficiencies

Expenditure incurred in respect of previous year aggregating Rs.657,982 had been accounted for as expenditure for the year under review. In this connection, the Director General informed me in September 1993 that the claims had been received in 1991 and the payments for research grants had been made on reimbursement basis and as a matter of policy the year in which the expenditure had been incurred is not taken into consideration when the reimbursements are made.

Contd....8/-

2:5:3 Non - compliance with Laws, Rules, Regulations and Management Decisions

Reference to Laws, Rules, Regulations etc.	Details
(a) Finance Act Section 13(5)(d)	Minimum Internal Audit Programme had not been settled by the authority in consultation with the Auditor General.
(b) Treasury Circular No. 842 of 19 December 1978	Accounting records had not bee maintained in terms of schedul 9 of the circular in regard tc fixed assets valued at Rs. 2,167,882 released to the Ministry of Science and Technology.
(c) Treasury Circular No. PED/52 of 10 June 1989	Prior year adjustments amounting to Rs. 328,262 had not been intimated to the Board o Directors before making such adjustments in the accounts for the year under review.
(d) Instructions issued by the Director General in July 1987 relating to the purchase of equipment and consumables for Research Grants.	Although a minimum of three quotations should be obtained for purchases, instances were observed where this requirement had not been complied with.

Contd...9/-

3. Financial and Operating Review

3:1 Financial Results

According to the accounts presented, the working of the Authority for the year under review had resulted in a deficit of Rs. 2,870,487 as compared with the deficit of Rs. 2,601,893 in the preceding year, thus showing an adverse variance of Rs. 268,594. This adverse variance can be analysed as follows.

	Variance		
	Favourable Rs.	Adverse Rs.	Rs.
Income			
Receipts on account of the Cost of Administration of Foreign Aid	217,007	-	
Sale of Publications	127,026	-	
Interest on Loans	38,859	-	
Provision of Printing Services to Outside Parties	-	25,546	
Photocopy Receipts	5,495	-	
Miscellaneous	-	132,294	
Profit on Sale of Fixed Assets	-	485	
Government Grant for Recurrent Expenditure	570,000	-	
	958,387	158,325	800,062
Expenditure			
Council	3,348	-	
Office Administration	-	240,510	
Staff Emoluments	-	831,694	
	3,348	1,072,004	(1,068,656)
Net adverse variance			268,594

3:2 Identified Losses

Motor vehicle insurance claims receivable amounting to Rs. 2,890, miscellaneous debts amounting to Rs. 11,500 and deposits amounting to Rs. 1,626 considered to be irrecoverabl had been written off from the accounts.

Contd...10/-

3:3 Assets given to other Institutions

The following assets belonging to the Authority had been released for use at the Ministry of Industries, Science and Technology and the expenditure on maintenance of these assets had been borne by the Authority.

(a) 2 Motor Vehicles
(b) 3 Air Conditionning Plants
(c) Cameras, Cassettes, Video equipment and Televisions.
(d) Office Equipment.
(e) First floor of the main building,
Electricity, Water, Telephone and cost of maintenance of the building.

3:4 Budgetary Control

Significant variations were observed between the budget and actual income and expenditure thus indicating that the budget had not been made use of as an instrument of control.

3:5 Vehicle Utilization

The Authority had a fleet of 27 vehicles during the year under review. Two vehicles had been released to the Ministry of Industries, Science and Technology, whilst particulars relating to three vehicles had not been furnished to audit. Some of the significant data relating to the utilization of 22 vehicles are given below.

(a)	Distance performed		
	Petrol	- Kilometres	120,673
	Diesel	- Kilometres	280,816
(b)	Fuel consumed		
	Petrol	- Litres	16,294
	Diesel	- Litres	24,095
(c)	Average performance per litre		
	Petrol	- Kilometres	7.40
	Diesel	- Kilometres	11.65
(d)	Total expenditure on fuel		
	Petrol	- Rs.	138,395
	Diesel	- Rs.	242,816

Contd..11/-

(e) Total expenditure on repairs

Petrol	- Rs.	51,197
Diesel	- Rs.	243,934

(f) Average expenditure on fuel per kilometre

Petrol	- Rs.	1.15
Diesel	- Rs.	0.86

(g) Average expenditure on repairs per kilometre

Petrol	- Rs.	0.42
Diesel	- Rs.	0.87

(h) Average expenditure on fuel and repairs per kilometre

Petrol	- Rs.	1.57
Diesel	- Rs.	1.73

4. Systems and controls

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) Cash
(b) Stocks
(c) Accounting
(d) Vehicles
(e) Granting loans to employees.

Sgd:-
(S.M.Sabry)
Auditor General.

m/-

Comments on the Audit report for the financial year ended 31st Dec. 1991

2:5:1 Accounting Policy

In future payments for the purchase of library books will be shown in a separate account and once the publications are received the relevant amount will be transferred to our library books account.

2:5:2 Deficiencies in Accounting

CIDA/83/6	Rs.	25,244	These claims have been received by NARESA in 1991.
CIDA/83/7	-	7,561	We do the payments for research grants on reimburse-
SAREC/18		622,844	ment basis. As a practice we do not consider the financial year in which the expenditure has been incurred when reimbursements are made for foreign funded grants.
Salaries & allowances		2,333	We make payment for annual leave only if an
		657,982	employee leaves the services of NARESA. Therefore this payment became due only in 1991.

2:5:3 Deviations from rules practices, regulations and Management decisions

(a) To be considered after the reorganization of this Institute, since separate staff will be required.

(b) We have not transferred the ownership of the equipment to the Ministry of Science & Technology.

(c) It is being done now.

(d) SAREC/19/CE/03 - Rs. 5050/= While reimbursing the expenditure incurred, we have requested the grantee to follow the NARESA regulations.

RG/91/SS/04 Rs. 8500/= We have written to the grantee that at least 03 quotations should be obtained for the purchase. Grantee has explained to us why he did not obtain 3 quotations, considering the facts the payment has been approved.

Contd..... 2

3:2 Identified Losses

Rs. 2,890/= This was reported to the Insurance Corporation for a refund. Since this is a Motor Bicycle, they have informed us regarding the inability of refunding this amount.

Rs. 11,500/=

Data Serve	Rs. 7,500	Written off with Authority approval
National Milk Board	Rs. 2,000	
Sri Lanka Rupavanini Co.	Rs. 2,000	
Sri Lanka Ports Authority	Rs. 1,626	

3:3 Assets Invested Outside

(a) Motor vehicles - We have made the payment for Insurance, Licence fee, repairs for Motor Vehicles on reimbursement basis.

(b) Air Conditioners - We have paid the maintenance charges on reimbursement basis.

(c) Ministry of Science & Technology has informed that they can pay Rs. 25,000/= annually for the use of Common facilities. Rs. 25,000/= has been paid to NARESA in 1993.

3:4 Budgetory Control

As far as possible we use the Budget as an instrument of control.

4. Systems & Control

The systems and controls are maintained satisfactorily with the resource personnel and time factor available at the disposal of the Institution.

Prof. Priyani E. Soysa
Director General