C O N T E N T S

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ANNUAL REPORT 1994

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

1.1 Board Members from 01st January 1994 - 26th September 1994

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

1.2 Board Members from 27th September - 31st December 1994

Prof. Priyani E. Soysa
Prof. C. Dahanayake
Prof. N. Kodagoda
Dr. Tissa Vitarana
Dr. R.O.B. Wijesekera
Dr. C.R. Panabokke
Dr. A.S. Induruwa
Dr. Upali Pilapitiya
Mr. Godfrey Gunatilleke
Mr. D.G. Senadhipathy

2.0 PRINCIPAL STAFF

Director General

Prof. Priyani E. Soysa	M.D.(Cey), D.Sc(Ruhuna) FRCP (Edin. & Lond) FCCP, DCH(Eng)

Directors Scientific Affairs

Mrs. S.P. Prelis	B.Sc. (Hons)(Cey), M.Sc.(S.L.)
Mr. M. Watson	B.Sc.(Cey), M.Phil(Lond)

Assistant Directors Scientific Affairs

Mr. R.M.W. Amaradasa	B.Sc.(S.L), M.Sc(S.L)
Mrs. W.R.M. Sandanayake	B.Sc.(S.L), M.Sc(S.L)

Scientific Officers

Miss. H.A.U. Amarasinghe	B.Sc.(S.L), M.Sc.(S.L.)
Mr. B.M.C.K. Basnayake	B.Sc. (S.L.)
Mr. A.W.J. Karunasinghe	B.Sc. (S.L.)
Miss. S.P. Spencer	B.Sc.(Hons)(S.L.), M.Sc.(London)
Mrs. S.L. Tillekratne	B.A. (Cey)
Mrs. G.N. Ulluwishewa (on no pay leave)	M.Sc. (U.S.S.R.), M.Sc.(Japan)
Mrs. S.I. Wickramasinghe (on no pay leave)	B.Sc.(Hons)(S.L.), M.Sc.(S.L.)
Mrs. R. Wijeratne	B.Sc.(Hons)(S.L.)
Mrs. C.G. Yapa	B.Sc.(Hons)(S.L.)
Mr. W.B. Yapa (on study leave)	B.Sc.(S.L.), M.Phil(S.L.)

Documentalists

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

Assistant Administrative Secretary

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

Accountants

Miss. K.C.J.T.K. Fernando	A.C.M.A.
Mr. M.H.M.S. Hamid	
Mr. A.C.M. Danial	

Confidential Secretaries

Mrs. S. Ratnayake
Mrs. S.P. Wijesinghe

Staff Assistant (Adm.)

Mr. S. Galketiya

Printing Superintendent

Mr. K.P. Senanayake

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

3. MEASURES FOR ENHANCING SELF-RELIANCE IN SCIENCE AND TECHNOLOGY

* Seminars and Workshops

Following workshops and seminars were held during 1994 in order to share and update new findings and enhance self reliance.

* A theme seminar on Geographical Information systems was held on 2 December 1994. 6 resource persons presented their work carried out with the assistance of GIS. 80 persons participated in this seminar.

* The following public awareness seminars were held.

- "Food and Nutrition", 5th November 1994 at National Institute of Health Sciences, Kalutara.
  3 presentations were followed by discussions. 260 persons participated in this seminar.

- "Aids & Social Issues", 10th December 1994, National Institute of Health Sciences, Kalutara.
  There were 5 presentations and each presentation was followed by a discussion. 300 persons participated in this semianr.

- "Food & Nutrition" - 11th December 1994, Free Trade Zone, Katunayaka.
  There were 3 presentations followed by discussions and 176 participants.

- "Social Problems" - 31st December 1994, Ananda Maha Vidyalaya, Elpitiya.
  3 presentations were followed by discussions. 250 persons participated in this semiar.

* A theme seminar on "Aspects of Research" was held on 25/11/94. 5 presentations on various aspects of research were made. 65 persons including the NARESA scientific staff participated. This seminar was highlighted in the press.

* A field workshop for teachers in Environmental Education was held from 12th - 16th December 1994 in collaboration with March for Conservation (MfC). There were 21 teachers and 8 resource persons involved in the workshop. The participants were also given educational material, such as booklets and posters.

* Three national seminars in Social development on the following themes of current significance were held with distinguished participation.

  - Social Integration
  - Poverty
  - Unemployment

* Seminars were held by the Steering Committees for the recipients of NARESA grants to present their work. This was to provide a forum for discussion in addition to the monitoring aspect.

4.0 SPONSORSHIP FOR SCIENTIFIC RESEARCH

In accordance with the normal practice, applications were invited for research grants, by advertisement in the national press. Details regarding the research grant scheme are given in Tables 1,2 and 3.

5.0 RESEARCH AND CO-ORDINATION ACTIVITIES

* Two project proposals were selected by NARESA for submission to the ICGEB collaborative Research Programme.

* **Unauthorized Collection and export of Fauna and Flora**

  At the request of Steering Committee members, NARESA undertook to study the problem of unauthorized collection and export of flora and fauna. All aspects of this issue, including the plant protection ordinance etc. were studied in detail. A memorandum was prepared and submitted to H.E. the President and the Hon. Prime Minister through the Ministry of Industries, Science & Technology and the State Ministry of Science & Technology in July 1994. In December 1994, this was submitted to the Hon. Minister of Science & Technology and Human Resources Development and to H.E. the President, through the Minister of Science & Technology and the Human Resources Development. Copies were sent to the Ministry of Environment. Discussions are continuing regarding the updating of the lists in the plant protection ordinance.

* On a request by Reckitt and Colman of England, NARESA compiled a report on plants with possible pharmaceutical effects.

* **Recommendations were made to the government on the following.**

- Placement of the Wild Life Department under an appropriate Ministry

- Precautions to be taken to avoid landslides and to educate the public on this issue.

* **Environmental Education Programme**

Educational and publicity posters on coral reefs were printed. This was done in collaboration with March for Conservation, to increase public awareness on the importance of preserving our coral reefs.

6.0 REPORTS, PUBLICATIONS AND PROGRAMMES OF NATIONAL INTEREST

* **Regular Publications**

- Journal of the National Science Council -Volumes 22(1) and 22(2) were published. Also a supplementary issue of the workshop proceedings on Research and Training needs on Biotechnology was published (Vol. 22 supplement A).

- Vidurawa - volumes 15, (2),(3 & 4) and volumes 16(1&2) and (3&4) were published in sinhala. Volumes 16(1&2) and (3&4) were published in English.

- NARESA News letter - The issues for March, June, September and December 1994 were published.

- Sri Lanka Journal of Social Sciences - volume 16 No: 1 & 2 were published.

* **Other Publications**

- Bibliography of Turtles
- Check-list of Woody Perennial Plants of Sri Lanka (printed by the Forest Department).

- Initiated the preparation of the report on Medical Ethics. Recommendations of SLMA were incorporated into the report and the report was edited.

- Bibliography of the Water Buffalo in Sri Lanka

- Index to Minerals of Sri Lanka

Index to Minerals of Sri Lanka was undertaken by the Natural Resources Committee in order to preserve all the valuable data which would otherwise have remained inaccessible to most people or even be lost irretrievably due to the physical deterioration of records with time. The damaged reports were repaired with the assistance of the Archives Department and data were collected and compiled for publication by Mr. L.K. Seneviratna, a former Director of the Geological Survey Department.

* **Participation at Exhibitions**

- S & T Exhibition at Anuradhapura organised by the Ministry of S & T in March.
- S & T Exhibition at Mihintale organised by the Ministry of S & T in March/April.
- S & T Exhibition at Kadugannawa organised by the Ministry of S & T in June.
- S & T Exhibition at University of Colombo organised by SLAAS in December.
- Exhibition to mark the 20th Anniversary of the NERD Centre at the NERD centre in December.

7.0 ACTIVITIES RELATING TO SCIENCE INFORMATION

* **CDS/ISIS Software**

NARESA continued to be the national distributor for this package. During 1994, this package was distributed to 15 institutions. 135 institutions have now received this package. Free demonstrations on the use of the package were given to 15 institutions, while special 3-day training courses were organized for 4 institutions. On the advice of the Steering Committee on S & T Information the simplified version of the CDS/ISIS manual, was published in September 1994.

* **S & T Survey**

Scientific and library staff assisted in data collection and data analysis for the above survey and also identified the S & T institutions and departments of universities in Sri Lanka. 598 entries in this database were indexed.

* **Science Citation Index**

Use of the science citation index was promoted. Students and lecturers from various universities were among those trained in the use of this index.

* **Co-operative Programmes, Networks**

NARESA library participated in the following. AGRINET, ENLINET, HELIS, National Library Union Catalogue. The library staff participated in the training courses, workshops and seminars, in addition to the regular meetings organized by these networks and co-operative programmes.

* **Collection**

- About 250 books, pamphlets and reports were added.

- About 70 periodical titles and 125 newsletters were received of which the majority received were free or in exchange for the NARESA periodicals.

- Lists of periodicals and newsletters, indicating the current issues available in the library were prepared and distributed to the members of the Steering Committee on S & T information.

* **Databases**

- The following databases were maintained.

NARESA collection - 1650 records
Science abstracts - 283 records
CDS/ISIS users - 135 records

- New databases were created for
Sri Lanka Science Index
Periodical Holdings.

8.0 INTERNATIONAL SCIENTIFIC ACTIVITIES

* **SAREC (ongoing activities)**

- **Buffalo Research Programme**

Final phase of the research activities on the buffalo research programme progressed satisfactorily despite delays in some of the sub projects. 10 sub projects were completed during 1994.

Pilot project on intensive buffalo farming systems commenced at Thambuththegama. Nine farmers were trained on intensive farming. Monitoring of the farmer units were in progress.
Four research scientists participated at the IVth world conference on Buffaloes held in Brazil during July 1994.

- **Coastal Ecology Programme**

Progress of the six projects of the coastal ecology programme was satisfactory.

- **International Contacts Fund**
36 travel grants were awarded for scientists to participate in international conferences.

- **Urgent Spare Parts Fund**
Nine requests for spare parts were approved.

* **SAREC (New Programmes)**

A new agreement on bilateral co-operation between SAREC and the Sri Lankan Government was signed in September 1994. Eight projects which are co-ordinated by NARESA are supported under this agreement. Activities under this new programme commenced during the latter part of 1994. NARESA received a grant to set up the National Information Network for Exchange of Scientific and Technical Information via E-mail with NARESA as a pilot co-ordinating site. Tenders were called for the purchase of equipment. Information with respect to the CD-ROM database was gathered.

* **Commonwealth Science Council**

Eleven nominations were made for seminars/workshops overseas.

* **Third World Academy of Sciences (TWAS)**

The TWAS/NARESA prizes for young scientists in Biology, Chemistry, Mathematics and physics were notified to universities and research institutions. However there were no suitable applicants for selection in 1994.

* Association of Asian Social Science Research Councils (AASSREC)
NARESA continued to function as the focal point of AASSREC in Sri Lanka and represented Sri Lanka in the AASSREC Special Regional Symposium in Philippines, preparatory to the U.N. Social Development conference in Copenhagen.

9.0 SIGNIFICANT RESEARCH FINDINGS

* **The effect of Fenthion (Baytex 50 E.C.) spraying on the mosquito population in urbon areas**

The study on the effect of fenthion (Baytex 50 EC) spraying on the mosquito populations breeding in soakage pits, a common breeding site of Culex quinquefasciatus, vector of Bancroftian Filariasis in Sri Lanka was determined along with the fenthion concentration in the soakage pit water during the spraying cycles.

The total number of life stages found in the sprayed pits were significantly low compared to the unsprayed pits except on the last day of the spraying cycle. The sprayed pits also contained significantly lower numbers of life stages, larval instars and pupae, indicating that the spraying reduce the numbers of adult vectors emerging from the sprayed pits.

There was a good correlation between the days after spraying and the larval and pupal population densities in the sprayed pits as opposed to the unsprayed pits. The concentration of Fenthion (Baytex 50EC) declined approximately 1000- fold between the day of spraying and the sixth day after spraying.

Both the larvae and adults of Culex quinquefasciatus vectors showed resistance to all insecticides except to temephos and permethrin. (Grant No: RG/91/B/02 - Dr. H.T.R. Peiris)

* **Immunohistochemical study of non Hodgkin's lymphomas in Sri Lanka**

This was a retrospective study done in the Department of Pathology, Faculty of Medicine, Colombo. Lymphnode biopsies received between 1983 to 1991 were examined. All inflammatory lesions, secondary deposits and Hodgkin's lymphomas were excluded from this study.

All non- Hodgkin's lymphomas were examined by routine histological methods. From paraffin blocks, new sections were made and immunological stains were performed using Avidin-Biotin Complex Method. Markers used to identify B and T cells were L_{26} and $UCHL_1$ respectively. The age of the patient, sex and site of the lymphnode biopsy were also recorded.

Out of 38 non-Hodgkin's lymphomas studied, the largest number (47%) presented with cervical lymphadenopathy. None of these patients had cutaneous lymphoma. There were 22 males and 16 female patients and the mean age of patients with non Hodgkin's lymphoma was 48 years. Histologically the majority (60%) were in the intermediate grade of malignancy. Immunologically out of 38 , 31 were B cell lymphomas and 6 were T cell lymphomas. One lymphoma was not classified. From this study it is concluded that 12% of non - Hodgkin's lymphomas are of T cell origin. (Grant No: RG/91/M/06 - Dr. P. Angunawela)

* **Bioavailability of Fluoride from Tea**

Fluoride (F) bio-availability from tea was evaluated in relating to that of NaF. Eighteen healthy male volunteers aged 23-26 years, maintained on the same standardized diet, low in F, were given test doses of 1 mg F orally either as a tea infusion or as NaF. They received an equal volume of distilled water on control days. Each subject acted as his control for three regimens, each lasting for a period of three days.

Comparison of plasma and whole mouth salivary F levels before and one hour after the administration of F doses showed significant differences. Profiles of plasma and salivary levels achieved following NaF were comparable to that of tea. Urine analysis also showed a rise in F concentration which was sustained up to seven hours. Over 24 hours, 75% F administrated as NaF was excreted, while only 60% F was recovered following ingestion of tea.

We conclude, that following ingestion, F from tea is distributed in body fluids to levels comparable to NaF. Results support the contention that in developing countries encouraging tea as a dietary supplement for caries prevention among children in low-F areas may be a useful measure; however, F in tea may also contribute to fluorosis in susceptible children living in moderate - F areas where tea drinking is common. (Grant No: RG/89/M/03 - Prof. P.A.J. Perera and Prof. K.A.A.S. Warnakulasuriya)

* **Haematological studies of cattle, sheep and goats in Sri Lanka**

Examination of the cellular components of blood constitutes one of the most important laboratory investigative procedures in the diagnosis for animal diseases. In Sri Lanka, however, the lack of reference values of many domesticated species has greatly limited the interpretation and use of clinical haematological data as an aid in disease diagnosis. This study has established normal blood values for the Lanka Boer goats, sheep and some of the breeds of cattle which could be used as baseline values for interpretation of data from diseased animals.

Haematological analyses were performed in 121 clinically healthy Lanka Boer goats (53 female; 86 males) of different ages (1-3 m; 4-12m; 2-3y; 4-8y) managed at the Goat Breeding Station, Kotukachchiya. The packed cell volume, number of erythrocytes haemoglobin, mean corpuscular volume, and mean corpuscular haemoglobin were higher in the neonates compared to animals of other age groups. On the other hand, the mean corpuscular haemoglobin concentration remained relatively constant showing no age-related changes. In goat kids between 0 and 3 months of age the lymphocyte and neutrophil counts were almost identical; in animals between 4 and 12 months and the males between 4 and 8 years the neutrophil count was predominant over the lymphocytes. The esonophil counts were highest in animals between 4 months and 3 years. In general, the findings of this study mirrored many of age-related hematological changes reported for this species in the literature.

The study on sheep haematology was performed on 41 clinically healthy female sheep (2-4 years) managed at the national livestock board farm in Bingiriya. The values obtained in this investigation were parallel to those reported in the literature although there were differences in the absolute values. The erythrocyte counts were spread over a wide range with a mean of $12x10^{12}/1$. Haemoglobin content and the packed cell volume also varied but they did show a normal distribution. The erythrocyte sedimentation was negligible when measured over one hour. The leukocyte picture was similar to that reported in the literature in which the lymphocytes predominated over the neutrophils. The esnophils were also high and this may reflect some parasitism in the animals studied although they were regularly drenched with anthelminths and appeared clinically healthy on physical examination.

Studies on bovine haematology were conducted on a total of 238 cows of three breeds (94 Friesian; 115 Ayrshire and 28 European cross-bred animals) managed in three livestock farms. In the Friesian and Ayrshire breeds of cattle the age-related haematological changes were examined in four groups of animals based on age which varied from 0-6 months, 6-12 months, 1-3 years and 3-8 years. All European cross-bred cattle studied were lactating and were between 3 and 7 years of age. The erythrocyte counts were highest in the calves between 0-6 months with a gradual decline in the counts with advancing age. Similar alterations were present in the haemoglobin concentration and packed cell volume but the variations was less obvious. The mean corpuscular haemoglobin concentration varied considerably in the European cross bred lactating cows compared to those recorded with the other two breeds. The leukocyte counts obtained for all breeds were within the range reported for the species. In the differential counts, the lymphocytes predominated over the neutrophils and the esonophils showed an increase with age. (Grant No: RG/87/V/05 - Dr. N.U. Horadagoda)

* **Determination of time since death using sarcosaprophagous insects as forensic indicators**

Studying the invasion pattern of dipteran succession on a corpse and the estimation of age of immature stages of different fly species found on a corpse are the important leads to entomological methods in the estimation of time since death.

17 monthly field carcass studies on dipteran succession were conducted in Colombo from 1991 -1993. In addition, 05 trials in three low country areas (Anuradhapura, Hambantota and Kataragama) 04 trials in two mid country areas (Ratnapura and Kandy) and 03 trials in two hill country areas (Hatton and Nuwara-Eliya) were also conducted during this period.

Dipteran succession on exposed corpses was studied using 36 samples of eggs/larvae/pupae collected from human corpses found in different parts of the country.

The observed species composition on rabbit carcasses in three different altitudes are as follows.

Altitude level	Species composition
Low country	Calliphora vicina, Chrysomyia megacephala Chrysomyia rufifacies, Sarcophaga sp. Ophyra sp, Muscina sp (not found in corpses)
Mid country	Calliphora vicina, Chrysomyia megacephala, Chrysomyia rufifacies, Chrysomyia pinguis, Sarcophaga sp, Ophyra sp.
Hill country	Calliphora vicina, Chrysomyia megacephala Chrysomyia pinguis, Sarcophaga sp, Ophyra sp Muscina sp (not found in corpses)

The mean time taken for the first appearance of eggs/ larvae on rabbit carcasses was 22.5hrs in favorable weather, 28.3hrs, 43.41hrs were recorded respectively where moderate and heavy rain experienced before starting the succession. In other low country areas the recorded time was 19.7hrs. 12.4hrs, 20hrs and 45hrs, were recorded in Ratnapura, Kandy and Hatton, and Nuwara-Eliya respectively.

A similar fly composition was recorded from corpses except Muscina sp. Time taken for the first appearance of different waves were also similar to that recorded from rabbit carcasses.

Age of eggs/larvae/pupae of Calliphora vicina, Chrysomyia megacephala, Chrysomyia rufifacies and Sarcophaga sp were estimated under laboratory conditions. Fecundity, viability and longevity in relation to different nutritional conditions of Chrysomyia megacephala, Chrysomyia rufifacies, Chrysomyia pinguis were also studied.

Differences observed in the species composition are helpful to predict the locality (originality) of a corpse in crime detection.
Age determination of immature stages of different species, can be used to estimate the time since death. (Grant No: RG/91/M/01 - Dr. R. Fernando, Prof. N. Kodagoda)

Investigations on the field use of the natural attractants for Leucinodes orbonalis and Rhynchophorus ferrugineous

The effect of (E)-11-hexadecenol, the minor component of the sex pheromone gland on (E)-11-hexadecenyl acetate, the female sex pheromone of the brinjal shoot and pod borer Leucinodes orbonalis Guenee (Lepidoptera: pyralidae) was evaluated. By a Y-tube olfactometer laboratory choice test, a combination of (E)-11-hexadecenol and E-11-HDA in the ratio of 9:1 (v/v) was chosen for the field work. Field work with the above mixture of pheromones caused in an increased trap catch with a mean of [illegible].0 males/trap/night. In contrast individual (E)-11-HDA caught only a mean of 1.8 males/trap/night. Under the same conditions three live virgin females as the bait however caught more male L. orbonalis (mean trap catch, 3.55 males/trap/night).

Several potential attractants were investigated in view of developing an attractant baited trap for the monitoring/ control of the red weevil, Rhynchophorus ferrugineous, a major pest on the coconut palm in Sri Lanka. Pentanol and n-propanol, known EAG stimulants for the red weevil, two attractants identified from the coconut bark steam distillated, 4-hydroxy-3-methoxystyrene (S) and nonanoic lactone (L), also EAG stimulants, and 4-methyl-5-nonanol (ferrugineol) the more active component of the aggregation pheromone of the Rhynchophorus ferrugieus were selected for the investigation. In a laboratory assay using the Y-tube olfactometer binary choice test, synthetic (S) and (L) in a 1:1 (v/v) combination elicited more response in the weevils than individual (S) or (L) in a dose range of 30-750 µg (e.g. 80% vs 50.0% and 55.6% weevils attracted to the baited arm at 125 µg dose)

In an activity comparison (dose 50 µg, binary choice test) of the above potent attractants viz pentanol, propanol, combined S and L (1:1, v/v) and ferrugineol, the two short chain alcohols, pentanol and propanol elicited high responses in the red weevils (79% and 80% weevils attracted to the baited arm respectively) and indicated short range attractant properties. In contrast, weevil response was moderate for the combined S and L (1:1) and ferrugineol (62% and 69% respectively).

In a field assay of the above attractants only ferrugineol and the 1:1 (v/v) combination S and L lured the red weevil into the bucket trap with soap water (mean trap catches of 0.23 and 0.013 weevils/trap/day, n=6 respectively). The potency of ferrugineol as a field attractant was further assayed in combination with the short range attractants recognized above, pentanol and propanol. The combined ferrugineol and pentanol (1:1 v/v) caused in an enhanced trap catch of 0.40 weevils/trap /day (n=6). This mixture was field active for more than 60 days.

Thus, the use of a mixture of ferrugineol and pentanol (1:1, v/v) offer an economical (cost, approximately, Rs. 30/- baited trap), environmentally sound, long lasting bait for the control/ monitoring of the adult red weevil population in Sri Lanka. (Grant No: RG/92/C/02 - Dr. N.E. Gunawardena)

* **Chemical investigation of some plants belonging to Family Ebanaceae**

The isolation and identification of chemical constituents present in some plants belonging to the family Ebanaceae is reported. During the research programme, seven Diospyros species, namely, D. Ferrea, D. insignis, D. insignis var. parvifolia, D. malabarica, D. Montana, D. racemosa and D. walkeri have been chemically studied and compounds belonging to lupane series, naphthoquinones, coumarins and sitosterol were isolated of these compounds, the isolation of rare coumarin, umckalin constitutes the first report of a tri oxygenated coumarin from Diospyros species. (Grant No: RG/90/C/04 - Dr. G.M.K.B. Gunaherath)

* **Electrical Characterization of semiconductor Heterojunctions using Current-Voltage (IV) and Capacitance - Voltage (CV) techniques.**

With the development of advanced material preparation techniques such as Molecular Beam Epitaxy, Metal Organic Chemical Vapour Deposition etc. research in semiconductor physics has progressed tremendously during the last decade or two. Among these new materials semiconductor heterostructures have a very special place because of their potential for practical applications such as semiconductor lasers, quantum well infrared detectors, resonant tunneling diodes etc.

Among many heterostructures, GaAs/AlGaAs system has drawn the widest attention of the scientists because of its promising electronic properties for practical applications. The band gap discontinuity and the interfacial charge density at the heterojunction are two vital parameters in the modelling of electronic and optical devices based on heterostructures.

Various optical and electrical techniques have been employed to determine the junction parameters of hetero-junctions including the GaAs/AlGaAs system. However, there are considerable differences among the band offset values obtained from different techniques. Our aim was to employ combined Current- Voltage (I-V) and Capacitance Voltage (C-V) techniques to study the junction parameters of the GaAs/AlGaAs heterojunction charge distribution and the conduction band offset at GaAs/Al_x Ga_{1-x} As (x=0.3) heterojunctions. I-V and C-V measurements were carried out on n-N heterojunctions made by molecular beam epitaxy. The carrier concentrations were in the range of 10^{17} cm^{-3}. The conduction band offset E_c and the interface charge density were determined to be 250 meV and 2 x 10^{10} cm^{-2} respectively. The diffusion potential on the high band gap side of the heterojuction was found to be 217 meV from I-V measurements. (Grant No: RG/90/P/02 - Dr. K. Premaratne)

* **Determination of flat band potential of semiconductors using impedance measurements and their correlation to photocatalytic activity and electrochemical studies on polyaniline thin films**

Under this project two different types of investigations have been carried out. The first one was focussed on the measurement of flat-band potential and carrier concentration of the semiconductors $CuInSe_2$ and CuCNS. The second investigation focussed on the synthesis and electrical properties of Polyaniline.

The ternary compound semiconductor $CuInse_2$ is a very promising photovoltaic material because of its unique electronic properties. This material has a direct band gap of about 1.0 eV at room temperature which is very near the optimum value for efficient solar energy conversion. The absorption coefficient of $CuInSe_2$ has been reported to be around 10^5 cm^{-1} at photon energies 1.5 eV. This value is one of the highest among the values reported for practically useful semiconductors. One of the other advantages of this material is that it can be made p-type or n-type using suitable growth conditions in order to create Cu or In vacancies. These remarkable electronic properties of $CuInSe_2$ have led to a number of practical applications such as thin film solar cells, Proto electrochemical cells and many more. However, further basic research has to be done in order to fully understand the optoelectronic properties of this system. On the other hand cuprous thiocyanate CuCNS is a non conventional semiconductor material having a band gap of about 3.6 eV. This material has been satisfactorily used in dye-sensitized photo-conversion systems. Electrical characterization of these systems provides valuable information needed in the fabrication of device structures based on these materials.

In this work we have employed Mott-Schottky plots to determine the flat band potentials and thereby to estimate the band gap and carrier concentrations at the semiconductor/ electrolyte interface. The energy gaps were estimated to be 1.12 eV for $CuInSe_2$ and 3.5 eV for CuCNS.

Polyaniline belongs to the class of conducting polymers showing promising electrical and optical properties required for various practical applications such as electrochromic devices, information memories, electrocatalyzers, battery electrodes etc. This material can easily be prepared through electropolymerization using electrochemical cells under potentiostatic conditions. The electrolytic medium can be either aqueous or non-aqueous.

In this work polyaniline films were prepared using electropolymerization of aniline in aqueous media. Our aim was to investigate the formation and electrical behaviour of polyaniline films under different preparation conditions such as background electrode and the pH of the electrolytic medium. Also we investigated the transient behaviour of polyaniline films under the application of a potential step.

In experiments, 1.0 ml of aniline was dissolved in 50ml of 0.1M background electrolytes. The selected background electrolytes were 0.1M solution of $NaClO_4$ and Na_2So_4. The voltammograms obtained for the three cases showed strong dependence of the conductivity of the polyaniline films on the nature of the background electrode. Also it was observed that the conductivity is strongly dependent on the pH of the electrolyte solution. The conductivity dropped to insignificant values when pH was increased above 3. Also it was observed that the colour of the film changes with the applied potential showing electrochromic behaviour. The transient measurements indicated that the decay of current with time (t) under the application of a step potential follows a power law of t^{-n} with n-values ranging from 0.4 to 1.0 . However ideal cottrell conditions indicate a power law of n=0.5. This deviation could be due to existence of non-faradic currents in addition to diffusion limited current during a potential step. (Grant No: RG/91/P/02 - Prof. M.A.K.L. Dissanayake, Dr. K. Premaratne)

* **An evaluation of an institutional innovation : farmers' pension & social security benefit scheme of Sri Lanka**

This study focussed on the farmer's pension and Social Security Benefit Scheme (1987) implemented in the Sri Lankan rural sector. The investigation methodology included secondary data collection, exploratory studies and desk studies. It was found that the benefits rest on the enrolment age and higher benefits are attributed to the members who enrol in the scheme at older ages. The scheme is much similar to a life insurance scheme rather than to a welfare programme organized in the context of a pension scheme. The payment intensity elucidates a declining trend over time showing low retention capacity. Generally, this scheme can be viewed as an insurance mechanism even though the benefits were distributed as a pension. The findings can be utilized to make relevant adjustments in the costs and benefits of the scheme.

The formal description of the FPSSB scheme makes an effort to explain its benefits on par with the benefits rendered to the employees of government sector, a pension. But in real terms, this scheme can be regarded as a life insurance programme launched in the agricultural society which forces farmers to make a compulsory saving. In fact, a pension is a periodic payment offered by government or any other employer in consideration of the past service of the employee, at his retirement or when disabled. Hence it is a kind of reward given for the service extended during the past. The half yearly income received as a pension through the FPSSB scheme can be regarded as an income (benefit) generated by the investment (cost) made from the day a farmer enrolled in the scheme. Hence, the scheme is much closer to a life insurance programme but it makes a valuable contribution to agricultural development as it encourages rural savings.

The study demonstrates that the older farmers receive more benefits over the younger ones. In fact, on visual observation, the benefits explained through undiscounted measures are very handy for young farmers. However, the economic indicators, are directed towards the farmers who join the scheme at the older ages. The farmers confined to the age groups of 20, 30, 40, 50, and 55 years receive an IRR of 12%, 12%, 14%, 15% and 18%, respectively. The retention capacity of the scheme is not so encouraging as payment intensity shows a declining trend over time. Even though the total enrolment to the scheme has increased on one hand, drop-out rate also has increased, on the other. Hence, when evaluating the progress, both factors have to be considered. At the local level many constraints limit the farmers' participation in the scheme. (Grant No: RG/92/SS/10 - Dr. M. Wijeratna)

* **Creep Deformation of Silicon Carbide Fibre Reinforced Lithium Aluminosilicate (LAS) & Calcium Aluminosilicate (CAS) Glass Ceramic Composites**

In the present work, high temperature creep behaviour of Silicon Carbide (SiC) fibre reinforced Lithium Aluminosilicate (LAS) glass ceramics and SiC fibre reinforced Calcium Aluminosilicate (CAS) glass ceramics was investigated over a wide range of stresses and temperatures.

The LAS glass ceramic composite is uni-axially reinforced and CAS glass ceramic composite is bi-axially reinforced.

To carry out four-point bending creep tests a creep machine was designed and built in our laboratory. The tests were carried out under an ambient air atmosphere in the temperature range 950-1200^{0}C and stress range 70-250 MPa. It was found that the creep resistance of the Sic fibre is higher than that of the LAS matrix. It was clearly observed that the creep resistance of LAS glass ceramic has enhanced by reinforcing with continuous Sic fibres. The creep rate (e) was measured by varying the temperature (T) while keeping the stress (O) constant or vice versa. The stress exponent n and the activation energy Q for creep deformation were obtained by plotting of In e Vs ln O and ln e Vs 1/T respectively.

The activation energies calculated from the temperature variation tests on SiC/LAS and SiC/CAS composites were 140 and 200 KJ mol^{-1} respectively. However it was observed that the activation energies of these materials were significantly increased after further heat treatments.

The stress exponent values calculated from the stress variation tests for the heat treated samples of both LAS and CAS composites were close to one. This indicates that a diffusion assisted mechanism is responsible for the creep deformation of these composite materials. Activation energy difference between the as-received and the heat treated samples is most likely due to the change of interface between the fibres and the matrix materials during the heat treatment.

Scanning Electron Microscopy (SEM) studies of as-received samples were conducted and it was observed that the fibre volume percentage is about 30%. Average diameter of a fibre is about 10 μm and the grain size of LAS glass-ceramic is much small (or less than 1 μm). However, in order to have a thorough understanding of the deformation mechanism it is important to carry out high resolution Transmission Electron Microscopy (TEM) of the deformed samples.

Some researchers have observed in the SiC/LAS system that two distinct interfacial zones were apparent between the fibre and matrix. The zone adjacent to the fibre was established as amorphous carbon by Electron Energy Loss Spectroscopy (EELS). The next layer consisted of small grains of about 20 to 100 nm. Analysis of this layer by EELS and by Energy Dispersive X-ray Analysis (EDAX) has indicated that the grains are primarily NbC. In addition to the microstructure, the crystallization behaviour of LAS glass ceramics was studied indirectly using electrical conductivity measurements. These measurements were made in the temperature range from 200^0 to 750^0 C. A sharp variation of resistivity is observed at about 625^0 C. This temperature is expected to be the glass-transition temperature of the material. During the conversation of this material from a glass to glass-ceramic, an increase in the activation energy from 0.68 to 1.05 eV is observed. The associated decrease in conductivity is an indication of crystallization of the glass.

When the composite samples are heat treated, the original carbon layer at the fibre/matrix interface is replaced by silica from the matrix. Hence the interface sliding resistance increases. Therefore, the composite material can behave very similar to a monolithic ceramic owing to the high sliding friction. The diffusion process however will be controlled by the slowest diffusing species in the composite. In addition to this, the heat treatment can also lead to a grain growth and to the crystallization of residual glassy phase. Activation energy difference between the as-received and heat treated samples is most likely due to these microstructural changes in the composites. In conclusion, our study shows that there is a significant improvement in creep resistance caused by incorporating fibres in to the LAS and CAS glass ceramics. A diffusion assisted mechanism is the most probable deformation process associated at high temperature creep in these ceramic composite materials.(Grant No: RG/91/P/03 - Dr. B.S.B. Karunaratne)

* **Marketing Institutions for Coastal Fishing in Sri Lanka (wholesale and retail marketing of coastal fisheries: with special reference to Matara, Galle, Kalutara and Kandy districts)**

The decline in fish production in the mid 1980's was mainly due to the civil unrest and security situation in the north eastern part of the country. The total production of marine fish is below demand and the balance required to be imported from other countries. The Fisheries Development Plan consisting of East Coast Fishery Development Projects seeks to improve the domestic fish consumption up to 9 percent between 1990-1994. This would require the improvement of coastal fish production by nearly 25 percent.

The general objective of this study is to evaluate the degree of imperfection in the fisheries market in Sri Lanka and to determine the impact of such imperfections on the fish producer's earning.
Nearly 98 percent of coastal fish production, storage transportation and distribution to the consumers was handled by the private sector.

There is a considerable degree of monopsony or oligopsony in fish assembling, wholesaling and retailing trade in fish marketing which makes private sector fisheries imperfectly competitive with high profit margins to the wholesalers and retailers. This would result in low prices for the coastal producers and high prices for consumers.

The following policy suggestions are made on the results of the study.

Sri Lanka Fisheries Corporation requires to be better organised with adequate and efficient staff, sufficient purchasing points better linkage with Fisheries Cooperatives for purchases, adequate storage facilities (such as cool chambers) to store fish at the points of purchases, main wholesale and retail markets, ice supply plants transportation facilities to reduce spoilage etc. It needs to be developed to form a competitive market for the fisheries sector with adequate capital. In order to facilitate pricing efficiency a better market information network for fisheries sector should be developed in the country.

Fisheries Cooperatives in the coastal districts require to be developed with adequate capital, staff, storage facilities cool chambers, ice supplies and transport facilities to provide a healthy competition to the highly efficient private sector. The Fisheries Corporation can be involved in offshore and deep sea fishing and their harvests can be directed to smaller wholesale and retail businesses at reasonable prices.

It may be required to encourage dry fish production during peak production seasons to cater to consumer demand during the off seasons, and prevent lower retail prices during peak seasons.

Constraints in fish wholesaling (e.g. transport facilities, purchasing facilities, storage) require to be removed for better competitive market for fish wholesaling particularly in the non producing districts. Spoilage of fish in transport resulted in higher wholesale and retail margin. This cost could be reduced by developing suitable technologies required in transportation of fish from the producing areas, such as adequate ice supplies, optimal quantity transported, method of transport, better roads and speedy despatch that would ensure minimum time between coastal producer and consumers. Adequate facilities should also be provided to the consumers in the central wholesale and retail markets.

The secondary data required for analysis of fisheries sector is lacking. A continuous and comprehensive data base of the fisheries sector would require data on demographic characteristics of coastal districts, land use patterns, details of fisheries cooperatives, production of fresh fish, dried fish in coastal districts, coastal producer prices, wholesale prices and retail prices in coastal districts, and outstation, consumption of fresh fish in the districts, imports exports, export and import prices.

The data from inland fisheries sector may be useful. Such data is required for policy planning for the fisheries sector. (Grant No: RG/92/SS/07 - Prof. C. Bogahawatte)

* **An Evaluation of an Institutional Innovation Farmers' Pension & Social Security Benefit Scheme of Sri Lanka**

This study focused on the farmer's pension and Social Security Benefit Scheme (1987) implemented in the Sri Lankan rural sector. The investigation methodology included secondary data collection, exploratory studies and desk studies. It was found that the benefits rest on the enrolment age and higher benefits are attributed to the members who enrol in the scheme at older ages. The scheme is much similar to a life insurance scheme rather than to a welfare programme organized in the context of a pension scheme. The payment intensity elucidates a declining trend over time showing low retention capacity. Generally, this scheme can be viewed as an insurance mechanism even though the benefits were distributed as a pension. The findings can be utilized to make relevant adjustments in the costs and benefits of the scheme.

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* **Determination of virulence factors in food isolates of Listeria**

The contamination of milk foods by Listeria monocytogenes has been founded. Listeria cause listeriosis in human which is an infection or an illness with a wide range of clinical symptoms such as abortion, still births, septicemia and meningitis. The secretion of hemolysin as a virulence factor of L monocytogenes is being studied under this research. (Grant No: RG/93/BT/01 - Dr. C.P. Kodikara and Prof. S. Widanapathirana)

* **Characterization of Anopheles culicifacies complex in Sri Lanka - studies on vectorial competence**

Field investigations carried out for A. culi mosquitoes (n=1910) in Gomadiyawela (n=364), Halmillawa (n=273), Elvitiya (n=182), Polgahawela (n=91) and Anuradhapura (n=100) have not shown any evidence for the existence of species A. The highly repetitive DNA sequences Rp 36, Rp 217, Rp 234 have been isolated from A. culicifacies. Rp 217 DNA probe was ideal for the field detection of species A using squash-blot assays with mosquito heads. Further investigation will be carried out to rule out to investigate its possible existence in Sri Lanka.

Assays were carried out with species A,B, and C using diluted DNA samples as well as squash blots of mosquito heads. (Grant No: RG/93/BT/02 - Dr. M.B. Gunasekera)

* **Laboratory model study and a survey to select a suitable area for Ocean Wave Energy plant in the south and south-west coast of Sri Lanka**

Out of more than 20 sites surveyed from Galle to Palatupana on the coastal stretch three (03) places Unawatuna, Bundala, Palatupana have been selected according to the conditions of coastal morphology, sediment transport, accumulation and erosions.

Based on further detailed studies on wave speed, wave height, wind velocity, tides and coastal morphology, Unawatuna was selected as the most suitable location to install the wave energy plant.

The Wave Energy Plant consists of a oscillation water column. The mechanical conservation of the wave power to electricity will be tested using a model of an oscillation water column in the laboratory. The data obtained from the potential sites will be applied to the oscillations water column to determine the maximum possible output. (Grant No: RG/93/EP/01 - Dr. T.K.D. Tennakoon and Mr. E.M.S. Wijeratna)

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

Aspergillus sp strain P_1 was identified as the best citric acid producer among different Aspergillus strains isolated. Moreover, the production of the citric acid has been increased by using mutants and by supplementing the medium with methanol and gingilly oil or glucose. It was also found that the organic nitrogen decreased the citric acid production while promoting the fungus growth but NH_4NO_3 increased the citric acid production while the fungus growth remaining constant. (Grant No: RG/93/BT/01 - Prof. K. Balasubramaniam)

TABLE 1 : GRANTS SPONSORED BY NARESA
Status Summary During 1994

Discipline Status	Agriculture & Animal Husbandry	Biological Sciences	Chemical Sciences	Energy	Information Sciences	Medical & Veterinary Sciences	Physical & Engineering Sciences	Social Sciences	Biotechnology	Science Education
Total No. of grants operating during 1994	06	21	14	02	-	14	16	25	07	02
Grants awarded - 1994	-	02	03	02	01	03	03	04	02	-
Amount allocated for 1994 (New and ongoing Rs.)	-	713,385	636,300	168,600	30,000	554,520	392,590	100,200	221,400	31,000
Grants completed-1994	03	01	04	-	01	10	07	05	-	-
Grants withdrawn - 1994	-	-	-	-	-	-	-	02	-	-
Grants terminated - 1994	-	-	-	-	-	-	-	01	-	-
RAs' appointed - 1994	-	-	03	-	-	-	02	-	01	-
Registered for PG-1994	-	-	-	-	-	-	-	01	01	-
New Applications - 1995	08	08	10	02	-	08	09	05	08	1
Funds requested for 1995 (Rs.)	2,637,885	1,471,556	584,250	168,000	-	927,835	1,203,780	661,780	1,138,000	20,000
Grants approved for - 1995 (up to March)	-	02	06	-	-	03	01	-	-	-

TABLE 2 : GRANTS SPONSORED BY FOREIGN AGENCIES
Status Summary During 1994

Foreign Agency/Discipline Status	SAREC Buffalo Research Programme	SAREC Coastal Ecology Research Programme	SAREC Renewable Energy & Energy Efficiency	IUCN/ NORAD* Mangroves	ODA - Flora of Sri Lanka Project
Total No. of grants operating during 1994	40	06	02	02	01
Grants awarded - 1994	01	01	02	-	-
Amount allocated for 1994 (New and ongoing Rs.)	4.5m	3.5m	2,059,000	592,000	1,600,000
Grants completed - 1994	08	-	-	-	-
Grants withdrawn - 1994	-	-	-	-	-
Grants terminated - 1994	03	-	-	-	-
RA's appointed - 1994	01	-	-	-	-
Registered for PG - 1994	-	01	02	-	-
Thesis PG - 1994	-	-	-	-	-
New Applications - 1995	01	01	-	-	-
Funds requested for 1995 (Rs.)	5m	2.7m	-	-	-
Grants approved for - 1995 (up to March)	01	01	-	-	-

* Through Forest Department

Table 3

New Grants Awarded in 1994

Discipline: **Biological Sciences**

Grant No.	Name of the Grantee/ Institution	Title and Duration	Total Allocation Rs. cts
RG/94/B/1	Prof. K. Abeynayake Department of Botany University of Colombo Colombo.	A study of the diversity of some wetlands in the Colombo and greater Colombo area. 2 years	101,000/=
RG/94/B/2	Dr(Ms) G.I. Seneviratne Prof. K. Abeynayake Department of Botany University of Colombo Colmbo.	Floristic composition on vegetation structure of the Kalatuwawa forest reserve. 2 years	160,000/=

NEW GRANTS AWARDED IN 1994

Discipline :- Biotechnology

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation (Rs.)
RG/93/BT/1	Prof. K Balasubramaniam Faculty of Medicine University of Jaffna Kokuvil.	Optimizing amyloglucosidase & citric acid production from Aspergillus niger (2 years)	70,000.00
RG/94/BT/1	Dr. C P Kodikara Prof. S Widanapathirana Department of Microbiology University of Kelaniya Kelaniya.	Determination of virulance factors in Food isolates of Listeria (1 year)	50,000.00
RG/94/BT/2	Dr. N Iddagoda Mr. K D N Jayawardana Mr. G R Wahalatantrige Institute of Fundamental Studies, Kandy.	Validity of an in-vitro screening method for potato cyst nematode infection using different potato strains (3 years)	20,000.00

New Grants Awarded in 1994

Discipline :- Chemical Sciences

Grant No:	Grantee/Institution	Title & Duration	Total Allocation
RG/94/C/1	Dr Namal Priyantha Dept of Chemistry University of Peradeniya Peradeniya	Metalloporphyrin coated electrodes as sensors for pesticides 3 years	Rs.162,000/-
RG/94/C/2	Dr E.D. de Silva Department of Chemistry Open University of Sri Lanka Nawala Nugegoda	Enzyme regulators from Sri Lankan medicinal plants 2 years	Rs.108,000/-
RG/94/C/3	Dr(Mrs) K.P. Abeywickrema Dept of Botany Dr(Ms) D.T.U. Wijayaratne Dept of Chemistry University of Colombo Colombo 3	Isolation and charcterization of antifungal and antibacterial compounds from thermophilic fungi 1 year	Rs. 56,000/-

NEW GRANTS AWARDED IN 1994

Discipline :- Energy

Grant No.	Name of Grantee and Institution	Title & Duration	Total Allocation (Rs.)	
			Phase I	**Phase II**
RG/94/EP/1	Dr. M A R V Fernando Consultant/Researcher, (Proprietor-RSSR Consultants 8-A, 2nd Lane, Kuduwamulla Road, Katubedda, Moratuwa.	Improvement of mini/micro hydro turbines (for Local Manufacture) (1 year)	67,000.00	40,000.00
RG/94/EP/2	Dr. G M Fonseka Visiting Scientist Institute of Fundamental Studies, Kandy.	Geological & geophysical investigation for geothermal energy in Sri Lanka - Study of Maha Oya and Mahapellassa thermal springs (2 years)		205,500.00

New Grants Awarded in 1994

Discipline: Information Sciences

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/IS/94/1	Mr. H.V.S. Ariyasinghe Postgraduate Institute of Pali & Buddhist Studies	The effectiveness of the role of National Information Networks in the development of library & information services in Sri Lanka 6 months	Rs. 30,000/=

New Grants Awarded in 1994

Discipline :- Medical & Veterinary Sciences

Grant No	Grantee/Institution	Title & Duration	Total Allocation
RG/94/M/1	Prof. Dayasiri Fernando Faculty of Medicine Kynsey Road, Colombo 8 Dr T.G. Amal Priyantha Ward 19, General Hospital Ragama	Infective oesophagitis in renal transplant patients in Sri Lanka 1 year	Rs. 85,000/-
RG/94/M/2	Dr Sujatha Samarakoon STD/AIDS Programme Colombo 10	Some epidemiological aspects of infertility in the district of Colombo 1 year	Rs. 40,000/-
RG/94/M/3	Prof. C.de F.W. Goonaratna Dept of Physiology Faculty of Medicine, Kynsey Road, Colombo 8 Dr Pushpa Fonseka Dept of Community Medicine University of Ruhuna, Galle Dr K.A.K.K. Wijewardena 30/1, Samudra Devi Mawatha Etul Kotte	Prevalence and nature of perimenopausal symptoms in Sri Lankan women 1 year	Rs. 15,800/-

PHYSICAL ENGINEERING & MATHEMATICAL SCIENCES

Grants Awarded in 1994.

Grant No.	Grantee/Institution	Project Title/Duration	Total Allocation (Rs.)
RG/94/P/01	Mr. K.R. Abayasinghe Bandara Dept. of Meteorology Bauddhaloka Mw. Colombo-7.	To develop a method to forecast extreme weather systems over Sri Lanka during winter monsoon period. 01 year	64940.00
RG/94/P/02	Dr. M.K. Jayananda Dept. of Physics Univ. of Sri Jayewardenepura Gangodawila Nugegoda.	Use of iterated function systems in sound compression and speech recognition and synthesis. 01 year	18400.00
RG/94/P/03	Dr. W.P. Siripala Dept. of Physics University of Kelaniya Kelaniya	Electrodeposited Cuprous Oxide for Solar Cell Applications. 02 years	133000.00

New Grants Awarded in 1994

Annexure 3

Discipline: Social Sciences

Grant No.	Name of Grantee & Institution	Title & Duration	Total Allocation
RG/94/SS/1	Mr. T.L. de Alwis Asst. Director and Provincial Director (Fisheries) Western Province Dept. of Fisheries & Aquatic Resources Colombo 10.	Patron-client relationships in Beruwela fishing community 1 year	Rs. 27,700/=
RG/94/SS/2	Mr. A.M. Kularatne Lecturer Technical College Badulla.	The tendency of the Veddha Community in Dambana to be socially integrated under the new economic policies 1 year	Rs. 36,000/=
RG/94/SS/3	Mrs. M. Ganewatta Graduate Sc. Teacher Central College Piliyandala.	A study to map the environment to learn science in the Junior Secondary Schools in Sri Lanka and assess how it affects the teaching learning situation in Years 9-11 1 year	Rs. 19,500/=
RG/94/SS/4	Mr. A. Gnanaratne Teacher 168, Budugewatta Arambe Gama Pilimatalawa.	A study of the sociological factors influencing school children's inclination towards science education 1 year	Rs. 17,000/=

New Grants Awarded in 1994

SAREC

Grant No.	Name of the Grantee & Institution	Title & Duration	Total Allocation
SAREC/BF/ Phase 111	Dr. Abeygunawardena Univ. of Peradeniya	Buffalo research information dissemination programme 2 years	730,000, SEK
SAREC/CE/ Phase 111	Dr. P. Dayaratne NARA	Marine science programme 2 years	685,000, SEK
SAREC/EP/2	Mr. Shavi Fernando SLEMA	Energy efficiency in buildings 2 years	80,000, SEK
SAREC/EP/1	Mr. C. de Silva TRI	Solar energy in tea drying process 2 years	275,000, SEK
SAREC/S&T. INF/2	DG NARESA	National information network for exchange of scientific and technical information via E-mail	1,250,000,SEK

NATURAL RESOURCES ENERGY & SCIENCE AUTHORITY OF SRI LANKA

Balance Sheet as at 31.12.94

As at 31.12.93				
	Funds Employed			
(5,504,764.83)	NARESA Fund	(9,692,818.02)		
240,000.00	Add : Drawings from Treasury	348,000.00		
(5,264,764.83)			(9,344,818.02)	
4,428,053.19	Less : Excess of expenditure over income		5,169,008.29	
(9,692,818.02)				(14,513,826.31)
5,401,119.53	Documentation Unit Capital Fund	5,286,759.68		
700,000.00	Add : Drawings from Treasury	470,000.00		
6,101,119.53			5,756,759.68	
814,359.85	Less : Net Expenditure - Note 1.1		409,398.54	
5,286,759.68				5,347,361.14
6,166,850.00	Research Grants Fund	6,215,611.95		
2,004,252.00	Add : Drawings from treasury	2,718,000.00		
8,171,102.00			8,933,611.95	
1,955,490.05	Less : Net Expenditure - Note 1.2		2,700,856.25	
6,215,611.95				6,232,755.70
1,902,562.57	Man & the Biosphere Fund	1,906,565.67		
110,000.00	Add : Drawings from Treasury	255,000.00		
2,012,562.57			2,161,565.67	
105,996.90	Less : Net Expenditure - Note 1.3		208,537.45	
1,906,565.67				1,953,028.22
1,265,163.78	Miscellaneous Fund	838,747.71		
617,000.00	Add : Drawings from Treasury	569,000.00		
1,882,163.78			1,407,747.71	
1,043,416.07	Less : Net Expenditure - Note 1.4		566,507.57	
838,747.71				841,240.14
153,497.94	Scientific Manpower Project Fund	153,497.94		
-	Add : Drawings from Treasury	-		
153,497.94			153,497.94	

	Less : Expenditure			
153,497.94				153,497.94
1,016,145.68	Working Committee Fund	1,018,042.90		
170,000.00	Add : Drawings from Treasury	200,000.00		
1,186,145.68			1,218,042.90	
168,102.78	Less: Net Expenditure - Note 1.5		184,017.70	
1,018,042.90				1,034,025.20
60,800,761.38	Foreign Aid Fund	54,408,594.45		
10,106,273.78	Add : Drawings from Treasury	8,439,561.82		
	Treasury Deposit	8,974,585.00		
70,907,035.16			71,822,741.27	
16,498,440.71	Less : Net Expenditure - Note 1.6		12,432,262.42	
54,408,594.45				59,390,478.85
42,250,000.00	Capital Reserves			42,250,000.00
	Current Liabilities			
562,189.33	Creditors		245,446.83	
2,978,533.42	Accrued Charges		881,341.28	
3,143,687.07	Provisions		2,887,096.00	
7,292.01	Store - keepers refundable security deposits		2808.94	
10,950.00	Tender Deposits		9450.00	
6,702,651.83				4,026,143.05
109,087,654.11				106,714,703.93

As at 31.12.93		Cost as at 01.01.94	Additions Disposals	Accumulated Depreciations	Net Balance
	Represented by				
	Fixed Assets				
42,325,515.45	Land	42,325,515.45	--	--	42,325,515.45
1,288,961.24	Buildings	3,138,697.74	100,661.88	1,964,262.50	1,275,097.12
641,896.03	Office Equipment & Furniture	4,305,082.03	638,585.00	4,145,715.00	797,952.03
802,169.32	Motor Vehicles	5,380,884.72	(742,922.15)	4,233,908.25	404,054.32
55,144.18	Motor Bicycles	294,139.18	--	278,540.00	15,599.18
1,543.50	Bicycles	8,770.50	--	8,582.00	188.50
--	Sports Equipment	1,504.00	--	1,504.00	--
45,774.30	Accessories/Miscellaneous	225,906.35	(420.00) 25,499.30	202,989.05	47,996.60
1,358,263.19	Library Books	1,358,263.19	(2,109.00) 2,674.96	--	1,358,829.15
12,381,016.29	Scientific & Laboratory Equipment out of loan	32,116,793.44	(3,145,173.06) 473,337.15	21,059,165.15	8,385,792.38
1,012,662.12	Documentation Equipment	5,001,135.12	58,300.00	4,203,220.00	856,215.12
59,912,945.62		94,156,691.72	(2,591,565.92)	36,097,885.95	55,467,239.85
13,953.64	Telephone Installations				13,953.64
	Current Assets				
555,058.12	Stocks		943,858.47		
2,121,867.03	Debtors		2,364,082.97		
959,648.85	Prepayments		596,851.46		
61,609.45	Deposits		65,109.45		
33,133,784.16	Treasury Deposits		39,814,003.42		
1,004,839.19	Balance at Bank – A/C No. 4530 800 224	1,661,078.62			
1,378,849.67	A/C No. 4530 800 232	5,496,441.50			
6,136.51	A/C No. 4530 801 514	--			
12,400.00	A/C No. 4530 124 768	76,927.52			
175,611.07	A/C No. 4530 204 966	7,991.46			
10,000.00	Petty Cash	10,000.00			
1,000.00	Petty Cash Imprest - sales outlet	--			
9,732,658.79	Cash in Hand	194,376.63			
7,292.01	National Savings Bank A/C	2,808.94	7,449,624.67		
49,160,754.85					51,233,510.44
109,087,654.11					106,714,703.93

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 31.12.94

As at 31.12.93				
10,356,500.00	Drawings from Treasury			10,271,000.00
	Income for the year			
96,820.49	Interest received		206,479.98	
18,051.70	Sundry Income		147,067.81	
233,050.08	Sale of Publications		282,999.08	
10,368.50	Photocopy receipts		9,968.25	
65,648.35	Receipts from printing outside jobs		165,103.97	
278,500.00	Profit on sale of fixed Assets		420.00	
1,990,909.09	10% Administration cost - Foreign Aid	843,956.18		
37,320.00	10% Administration Cost - Mangrove Conservation Project	53,810.00	897,766.18	1,609,805.27
				11,880,805.27
	Less: Expenditure for the Year			
	Authority Expenditure			
28,100.00	Travelling & Allowances for Authority members	31,926.00		
22,525.28	Entertainment	20,502.60	52,428.60	
	Staff Emoluments			
5,088,087.55	Salaries & Allowances	5,467,386.48		
713,970.79	Employees Provident Fund	765,186.21		
142,979.59	Employees Trust Fund	153,060.37		
206,795.00	Retiring Gratuity	226,650.00		
459,735.79	Provisions for Retiring Gratuity	125,168.87		
558,100.00	Incentive	-		
151,570.29	Overtime	163,211.80		
15,238.23	Holiday Payment	24,127.09		
15,330.00	Uniforms	47,347.00		
33,221.37	Staff Training	9,725.00	6,981,862.82	

	Office Administration				
12,382.80	Travelling (Official)		2,854.50		
352,425.58	Stationary & Consumables		333,497.70		
343,665.23	Electricity		360,306.50		
227,383.59	Telephone		177,218.34		
74,550,99	Postage		45,893.60		
75,000.00	Audit fees		75,000.00		
-	Legal fees		-		
11,478.10	Bank Charges		5,566.67		
27,835.00	Medical expenses		36,497.52		
92,840.00	Advertising		239,922.00		
488,827.38	Maintenance of Motor Vehicles		424,644.65		
205,221.70	" " Office Equipment & Furniture		360,040.84		
302,125.21	" " Building		135,668.56		
20,000.00	Staff Welfare		170,000.00		
104,409.76	Insurance		101,264.42		
68,606.00	Water Consumption Charges		81,700.00		
219,908.52	Security Services		236,502.00		
4,230,214.00	Depreciation		3,705,292.00		
64,830.65	Sundry Expenses		57,780.29		
260,587.81	SAREC/Gen & SAREC/19/Gen,598,558.05+2434.00		600,992.05		
4,828.02	Gum Udawa		-		
2,334,725.54	Cost of the Assets handed over to Universities		2,037,363.06		
493,820.24	Science & Technology Exhibition - 25th Anniversary		-		
-	Exibitions		77,000.79		
-	Damaged Stock A/C		6,236.25		
-	Bad Debts A/C		8,500.00		
-	Membership fees A/C		355,396.96		
-	Surcharges A/C		581.36		
17,451,320.01				9,635,720.06	16,670,011.48
(4,364,151.80)	Excess of expenditure over Income				(4,789,206.21)
63,901.39	**Add:** Prior Year Adjustments (Net)				379,802.08
(4,428,053.19)					(5,169,008.29)

NOTES ON ACCOUNTS

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

The ten precent 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	58,300.00
2.	" Maintenance & Repairs	18,684.33
3.	" Books and Periodicals	84,289.09
4.	" In house Printing & Binding	39,191.50
5.	" Consumables	166,388.56
6.	" Miscellaneous	2,000.00
7.	" Services	3,000.00
8.	" Publications & Publicity	98,480.52
		470,334.00
	Less Cost of Documentation Equipment & Librarybooks 58,300.00 + 2635.46	60,935.46
		409,398.54

1.2 Research Grants Expenditure

Actual Expenditure for the year	1,899,091.16
Add Provisions for balance funds	818,908.84
	2,718,000.00
Less Prior year adjustments (net)	17,143.75
	2,700,856.25

1.3 *Man & The Biosphere Expenditure*

1.	MAB/86/01	51,600.00
2.	MAB National Committee	155,129.95
3.	Mangrove Committee	1,807.50
		208,537.45

1.4 *Miscellaneous Fund Expenditure*

1.	Participation in International Scientific work	26,641.84
2.	Seminars & Symposias	115,249.31
3.	Subscriptions to International Scientific Unions	418,216.17
		560,107.32
Add	Prior year adjustments (Net)	6,400.25
		566,507.57

1.5 *Working Committees Fund Expenditure*

1.	Agriculture & Animal Husbandry S/C	5,658.00
2.	Biological Sciences S/C	12,140.63
3.	Bio - Technology S/C	8,896.00
4.	Chemical Sciences S/C	16,859.62
5.	Editorial S/C	5,110.50
6.	Medical & Vet. Sciences S/C	10,193.06
7.	Natural Resources S/C	46,925.00
8.	Physical & Engineering Sciences S/C	8,142.60
9.	Social Science Research S/C	18,475.00
10.	Science Education S/C	25,706.29
11.	Science Information S/C	20,659.00
12.	Energy S/C	5,252.00
		184,017.70

1.6 *Foreign Aid Expenditure*

1.	SAREC Expenditure	10,714,684.91
	Less Cost of Scientific Equipment	473,337.15
		10,241,347.76
	Less Money received from sale of Buffaloes	80,221,75
		10,161,126.01
	ADD Prior year adjustments (Net)	2,271,136.41
		12,432,262.42

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	2,382,534.54
Less: Provision for doub tful debts	18,451.57
	2,364,082.97

3. *Liabilities*

3.1 *Creditors*

Creditors amount to Rs. 245,446.83 represents monies held by NARESA on behalf of 5 projects given below.

1.	Sundry Creditors	10,898.55
2.	Genetic Resources A/C (CSC funds)	104,815.00
3.	Mobile Science Exhibition A/C	7,991.46
4.	RG/89/IS/03	65.75
5.	CSC A/C	121,676.07
		245,446.83

3.2 *Employees' Benefit*

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

3.3 *Retiring Gratuity*

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

4. *Publications for the value of Rs. 1,604,734.00 (valued at selling price) is available with us.*

5. *NARESA owns 21 vehicles. They are located as follows:*

with NARESA	*09*
With Ministry of S & T	*01*
With Research Grantees	*09*
Condemmened	*02*
	21

Schedule No.1

Provisions :-

1.	Provisions for Research Grants	818,908.84
2.	Provisions for Retiring Gratuity	2,068,187.16
		2,887,096.00

Schedule No. 2

Accrued Charges

1.	Audit fees 92, 93, & 94	240,000.00
2.	RG/MAN/UNESCO/1	9.75
3.	Staff Welfare	20,000.00
4.	Office Equipment(SAREC/GEN)	9,000.00
5.	Salaries & Allowances - sick leave	332,790.39
6.	Overtime	23,993.45
7.	Research Grants	114,500.00
8.	SAREC/9/GEN	2,310.00
9.	Exibition A/C	340.50
10.	Maintenance of office Equipment	686.75
11.	Telephone	51,454.67
12.	Maintenance of motor vehicles	30,973.90
13.	SLSTIC Publications & Publicity	500.00
14.	Maintenance of Building	550.00
15.	Electricity	54,231.87
		881,341.28

Schedule No. 3

Stocks

1.	Stationary & Consumables - stores	879,223.47
2.	" " - Printing	28,260.00
3.	Chemicals - Research Grants	36,000.00
4.	Stamps	375.00
		943,858.47

Schedule No. 4

Sundry Debtors

1.	Research Grants Cash Imprests (Schedule No. 4.1)	13,745.00
2.	SAREC " " " (Schedule No 4.2)	171,974.34
3.	Miscellaneous " (Schedule No. 4.3)	4,664.95
4.	SERC " (Schedule No. 4.4)	1,573.00
5.	Loans to Staff- Distress Loans(Schedule NO. 4.5)	1,575,981.37
6.	Loans to staff- Motor Bicycle loans (Schedule NO.4.6)	27,442.00
7.	Loans to staff- Vehicle loans (Schedule No. 4.7)	83,302.00
8.	Festival Advances (Schedule No. 4.9)	28,050.00
9.	Sundry Debtors	459,971.80
10.	Staff Debtors	15,819.43
11.	Suspense A/C	10.65
		2,382,534.54
	Less: Provisions for doubtful debts	18,451.57
		2,364,082.97

Schedule No. 5

Prepayments

1.	SAREC	12,212.90
2.	Miscellaneous & Accessories	720.00
3.	SLSTIC - Books	9,714.50
4.	Franking machine deposit balance	93,596.35
5.	Insurances Charges	15,171.30
6.	Maintenance of motor vehicles	13,264.11
7.	Maintenance of office equipment	25,242.60
8.	Subscriptions for International Scientific Unions	27,203.47
9.	Membership fees A/C (CSC)	355,396.95
10.	SLSTIC Periodicals	44,309.28
		596,831.46

Schedule No. 6.

Deposits

1.	Government Publications Bureau	929.45
2.	Ceylon Oxygen Ltd.,	4,000.00
3.	Felix Perera & Sons	42,000.00
4.	Postmaster General	1,730.00
5.	Ministry of Industries	1,000.00
6.	Director of Telecommunications	450.00
7.	Telecom	5,000.00
8.	C.E.B	10,000.00
		65,109.45

Schedule No. 7

Depreciations

1.	Building	5%	114,526.00
2.	Office Equipment & Furniture	20%	482,529.00
3.	Miscellaneous & Accessories	20%	23,277.00
4.	Bicycles	25%	1,355.00
5.	Motor Bicycles	20%	39,545.00
6.	Motor Vehicles	20%	398,115.00
7.	Documentation Equipment	10%	214,747.00
8.	Scientific, Equipment out on loan	10%	2,431,198.00
			3,705,292.00

දුරකථන
தொலைபேசி
Telephone } 691151

ෆැක්ස් අංකය
பக்ஸ் இல.
Fax No. } 697451

මගේ අංකය
எனது இல.
My No. } EC/R/NARESA/F.A/94

ඔබේ අංකය
உமது இல.
Your No. }

විගණකාධිපති දෙපාර්තමේන්තුව
නිදහස 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 : 18 March 1996.

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 1994 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 1994 was carried out under my direction in pursuance of provisions in Article 154(1) of the Constitution of the Democratic Socialist Republic of Sri Lanka read in conjunction with Section 13(1) of the Finance Act No.38 of 1971. My observations which I consider should be published with the annual report of the Authority in terms of Section 14(2)(c) of the Finance Act appear in this report. A detailed report in terms of Section 13(7)(a) of the Finance Act was forwarded to the Director General of the Authority on 2 November 1995.

1:2 Scope of Audit

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

2. Accounts

2:1 Opinion

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

2:2 Financial results

The activities of the Authority are operated under General Fund and six Special Fund Accounts. According to the accounts furnished, the financial results arising out of the activities of the Authority's General Fund for the year ended 31 December 1994 was a deficit of Rs.15,060,206 as compared with the deficit of Rs.14,720,652 for the previous year, before taking into account the Government Grant for Recurrent Expenditure. The deficit for the year under review had decreased to Rs.4,789,206 after taking into account the Government Grant of Rs.10,271,000 received for Recurrent Expenditure. The deficit for the previous year had decreased to Rs.4,364,152 after taking into account the Government Grant of Rs.10,356,500 received for Recurrent Expenditure.

The financial results arising out of the special funds was a deficit of Rs.17,776,130 before taking into account the government grant and foreign aid for activities of the special fund as compared with a deficit of Rs.20,585,807. The surplus for the year had become Rs.5,124,568 after taking into account the government grant (including foreign aid) of Rs.12,651,562 meant for the activities of the special fund for the year under review as against a deficit of Rs.6,878,281 of the previous year, after taking into account the government grant of Rs.13,707,526 meant for the activities of the special fund for the previous year.

2:2:1 General Fund

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

	Year ended 31 December			
	1994		1993	
	Rs.	Rs.	Rs.	Rs.
Income				
Receipts regarding foreign aid administration cost	897,766		2,028,229	
Sale of publications	282,999		233,050	
Interest on loans	106,480		96,820	
Provision of printing services to outsiders	165,104		65,648	
Receipts from photocopies	9,968		10,369	
Miscellaneous	147,068		18,052	
Profit on sale of fixed assets	420	1,609,805	278,500	2,730,668
Expenditure				
Office administration	9,635,720		10,015,666	
Staff Salaries	6,981,863		7,385,029	
Board of control	52,428	16,670,011	50,625	17,451,320
Deficit before government grant		(15,060,206)		(14,720,652)
Less: Government grant for recurrent expenditure		10,271,000		10,356,500
Deficit for the year		(4,789,206)		(4,364,152)
Fund balance brought forward	(9,692,818)		(5,504,765)	
Prior period items	(379,802)		(63,901)	
Grant received from Treasury	348,000	(9,724,620)	240,000	(5,328,666)
Fund balance carried forward		(14,513,826)		(9,692,818)

2:2:2: Special Fund

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

	Year ended 31 December			
	1994		1993	
	Rs.	Rs.	Rs.	Rs.
Research grants fund				
Government grant	2,718,000		2,004,252	
Less: Expenditure	2,700,856		1,955,490	
Surplus		17,144		48,762
Documentation Unit Capital Fund				
Government grant	470,000		700,000	
Less: Expenditure	409,399		814,360	
(Surplus/Deficit)		60,601		(114,360)
Foreign aid fund				
Receipts of foreign aid	8,439,562		10,106,274	
Treasury deposits	8,974,585		-	
Foreign aid retained	-		-	
	17,414,147		10,106,274	
Less: Expenditure	12,432,262		16,498,441	
(Surplus/Deficit)		4,981,885		(6,392,167)
Man and biosphere fund				
Government grant	255,000		110,000	
Less: Expenditure	208,537		105,997	
Surplus		46,463		4,003
Miscellaneous Fund				
Government grant	569,000		617,000	
Less: Expenditure	566,508		1,043,416	
(Surplus/Deficit)		2,492		(426,416)
Working Committee Fund				
Government grant	200,000		170,000	
Less: Expenditure	184,018		168,103	
Surplus		15,982		1,897
Net Surplus/(deficit) from special funds		5,124,567		(6,878,281)

2:3 Financial Structure

According to the accounts presented, the financial structure of the Authority as at 31 December 1994 as compared with that as at 31 December 1993 is given below:

	As at 31 December	
	1994	1993
	Rs.	Rs.
Resources		
Capital reserve	42,250,000	42,250,000
General fund of the Authority	(14,513,826)	(9,692,818)
Special funds		
Foreign aid fund	59,390,479	54,408,594
Research grants fund	6,232,756	6,215,612
Documentation Unit		
Capital Fund	5,347,361	5,286,760
Man and biosphere fund	1,953,028	1,906,566
Miscellaneous funds	841,240	838,748
Working committee fund	1,034,025	1,018,043
Scientific manpower project fund	153,498	153,498
	102,688,561	102,385,003
Utilization		
Fixed assets (at written down value)	55,481,194	59,926,899
*Net current assets	47,207,367	42,458,104
	102,688,561	102,385,003

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

2:4 Source and application of funds

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

	Year ended 31 December					
		1994			1993	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Source						
Other Sources			Nil			Nil
Government contribution for Special funds and general fund			4,560,000			3,841,252
Proceeds from sale of fixed assets			420			2,613,096
Receipt of foreign aid for research activities			17,414,147			10,106,274
			21,974,567			16,560,622
Application						
Deficit for the year		(4,789,206)			(4,364,152)	
Adjustments for items not involving movement of funds						
Add:						
Depreciation	3,705,292			4,230,214		
Provision for retirement gratuity	125,169	3,830,461		459,736	4,689,950	
		(958,745)			325,798	
Adjustments for profit on sale of fixed assets		420			(278,500)	
		(959,165)			47,298	
Add:/(Less): Prior period items		379,802			(63,901)	
		1,338,967			(16,603)	
Net decrease in fixed assets		(740,413)			(3,782,786)	
Expenditure regarding research activities		16,501,580	17,100,134		(20,585,807)	(24,385,196)
Increase/(Decrease) in working capital as analysed below:			4,874,433			(7,824,574)

Effect on Working Capital

Increase/(Decrease)

	1994	1993
	Rs.	Rs.
Debtors	242,216	86,863
Stock	388,300	(34,663)
Prepayments and deposits	(359,317)	204,536
Treasury deposits	6,680,219	(9,802,817)
Bank balances	4,660,120	(2,596,674)
Cash imprest	(1,000)	1,000
Cash in hand	(9,538,282)	4,908,521
Creditors	316,742	(145,183)
Accrued expenses	2,097,192	(1,480,509)
Provision	381,760	1,041,551
Security and tender deposits	5,983	(7,179)
	4,874,433	(7,824,574)

2:5 Comments on accounts

2:5:1 Accounting policies

Following observations are made.

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

(b) Depreciation had not been provided for books valued at Rs.1,358,829.

2:5:2 Accounting deficiencies

Following accounting deficiencies were observed.

(a) Fixed assets valued at Rs.2,037,363 purchased for research projects are vested to the Universities conducting the relevant research once the research is over. While doing so, instead of removing the cost vested from the fixed assets account and charging it to each research project expenditure account, it had been treated as a recurrent expenditure of the year under review and had been set off against the profit.

(b) The expenditure of Rs.75,083 incurred on curtaining the building of the institution had not been accounted under the stock account. Instead, it had been charged to the building maintenance account.

(c) Payment of retirement gratuity had been charged to the income and expenditure account instead of charging it to the provision for payment of gratuity account.

2:5:3 Unexplained Differences

The value of treasury deposits had been shown as Rs.39,814,003 in the financial statements. However, the balance certified by the Treasury was Rs.39,840,317. The difference of Rs. 26,314 had not been explained.

2:5:4 Lack of evidence for audit

Creditors and deposits amounting to Rs.254,897, expenditure of Rs.33,950 and expenditure on maintenance of vehicle amounting to Rs.424,645 could not be satisfacorily vouched or accepted in audit due to non availability of confirmation of balances, bills, log books of vehicles and running charts of 5 vehicles.

2:5:5 Non compliance with laws,rules, regulations and management decisions.

Following instances of non compliance were observed in audit.

Reference to laws,rules, regulations etc.	Particulars
(a) Finance Act	
(i) Section 13(5)(d)	Minimum internal audit programmes had not been prepared by the Authority with the concurrence of the Auditor General.
(ii) Section 13(6)	Annual accounts together with the report on accounts should be forwarded to the Auditor General within four months of the expiry of the year. However, the report on accounts had not been forwarded

		together with the accounts for the year 1994.
(b)	F.R. 1646	Daily running charts and monthly summaries pertaining to vehicles should be forwarded to the Auditor General. However, running charts and monthly summaries of 5 vehicles had not been forwarded to audit. Vehicle log books too had not been maintained.
(c)	Treasury Circular No.742 and F.R. 371	Balance remaining out of the advances paid shall be immediately returned to the institution. However, it had not been done so in the following instances.
		(i) A sum of Rs.100,000 had been released to the Department of Wild Life Conservation in 1991 for renovating the research centre at Hortan Plains. Of this, a sum of Rs.99,010 had been settled in 1994. The balance sum of Rs.990 had not been settled even as at 30 November 1995.
		(ii) Imprest advances of Rs.11,678 released to the research project officers remained unsettled for a period of 1 to 5 years.
(d)	Public Administration Circular No.41/90 of 10 October 1990.	Quotations should be called for from garages in the Municipal limits of

	Colombo, Dehiwela and Mount Lavinia garages and the U.C.limits of Kotte in respect of repairs to vehicles in Colombo. However, it had not been done so. A list of proficient garages too had not been maintained.
(e) Sri Lanka Accounting Standards No.18	Certain fixed assets such as office equipment, furniture and motor vehicles had been fully depreciated. But, they were being used at the institution. Action had not been taken to enter them at a fair value in the accounts.

3. Financial and operating review

3:1 Financial results

The activities of the Authority during the year under review had resulted in a deficit of Rs.4,789,206 as compared with a deficit of Rs.4,364,152 in the previous year thus showing a further deterioration in financial results by Rs.425,054. It could be analysed as follows.

	Variance		
	Favourable	Advense	
	Rs.	Rs.	Rs.
Income			
Receipts regarding foreign aid administration cost	-	1,130,463	
Sale of publications	49,949	-	
Interest on loans	9,660	-	
Provision of printing services to outsiders	99,456	-	
Receipts from photocopies.	-	401	

Miscellaneous	129,016	-	
Profit on sale of fixed assets	-	278,080	
Government grant for recurrent expenditure		85,500	
	288,081	1,494,444	(1,206,363)
Expenditure			
Office administration	379,946	-	
Staff salaries	403,166	-	
Board of control	-	1,803	
	783,112	1,803	781,309
Net deterioration in financial results			(425,054)

3:2 Performance

Assistance is rendered for individuals and institutions for research activities of the Authority. According to the information furnished, the particulars of research projects done with assistance during the year under review compared with that of the preceding year is given below.

	Sponsored by NARESA		Sponsored by foreign institutions.	
	1994	1993	1994	1993
Projects in progress at the commencement of the year	87	120	47	64
Newly commenced researches during the year.	20	19	04	02
	107	139	51	66
No. of research projects concluded during the year	31	23	08	30
Projects abandoned during the year	1	5	3	1
Projects withdrawn during the year	2	5	-	Nil
Research projects in progress during the end of the year.	73	106	40	35

The Authority had granted Rs.1,899,091 and foreign institutions had granted Rs.11,819,606 in respect of the research projects for the year under review.

3:3 Formation of a fund in respect of provision for payment of gratuity.

A provision of Rs.2,068,187 had been made for payment of gratuity to employees of the Authority as at the end of the year under review. However, a fund had not been formed to settle future liabilities.

3:4 Transactions not concerned with the objectives.

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

(a) Two motor vehicles valued at Rs.1,380,123.
(b) Three air conditioners valued at Rs. 102,090.
(c) A camera cassette, video equipment and television sets valued at Rs.248,567.
(d) Office equipment valued at Rs.276,872.

In addition, the cost incurred on the first floor of the main building, the extent of which is approximately 5,520 sq.ft and the electricity, water, telephone and maintenance of the building are all borne by the Authority.

3:5 Identified losses

Following losses were observed.

(a) The institution had to pay a fine of Rs.581 as a result of non payment of contributions to Employee Provident Fund

(b) A sum of Rs.8,500 had been written off as bad debts as a result of not settling the imprest advance of Rs.8,500 given for a research.

(c) Stock of Stationery valued at Rs.6,236 had been damaged by flood and it had been written off.

3:6 Uneconomice transactions

Following uneconomice transactions were observed.

(a) There was a balance of Rs.27,596 in the postal franking machine as

at 31 December 1994. However, the Authority had again paid a sum of Rs.66,000 on 31 December 1994 as deposit in advance though there was no written requests from the Postal department.

(b) An advance of Rs.100,000 had been released to the Department of Wild Life on 7 November 1991 for renovation of Horton Plains Research station. Following matters were observed during the course of examination of payments relating to this advance.

(i) The file containing the agreement relating to the work had not been forwarded to audit.

(ii) According to a letter of the Director General, it was observed that the work had not been concluded as per conditions agreed with the institution.

(c) Following deficiencies were observed at a test check carried out in regard to research projects operated by the Authority.

(i) Certain officers in charge of projects who had not concluded research activities as per research agreement had gone abroad.

Project number	Period	Amount sponsored	Amount spent
		Rs.	Rs.
RG/90/E/1	1 year	51,690	1,800
RG/90/E/3	2 years	21,450	2,830
RG/90/C/5	6 months	17,500	-
RG/89/C/5	1 year	8,500	5,427
		99,140	10,057

(ii) The period of ending the research activities in regard to Projects had exceeded. The research officers should forward the final report in terms of 3(1) of the contract agreement. However, the final report in regard to one project had been submitted in April 1995, as shown below. The final reports of other projects had not been submitted even upto December 1995.

Project Number	Amount allocated Rs.	Date of submission
RG/92/c/1	196,000	April 1995
RG/92/p/5	91,200 / 92,200	Not submitted even as at December 1995.

3:7 **Cost of personnel**

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

Type of Personnel	Number		Cost of Salary				Average Cost per employee			
			Normal time		Overtime		Normal time		Overtime	
	1994	1993	1994	1993	1994	1993	1994	1993	1994	1993
			Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Executive	28	30	2,282,629	2,156,036	-	* 15,238	81,522	71,868	-	508
Clerical and allied grades	44	42	2,096,966	1,938,351	29,340	132,888	47,658	46,151	667	3,164
Minor employees	17	18	729,531	679,111	133,872	18,682	42,914	37,728	7,875	1,038
	89	90	5,109,126	4,773,498	163,212	166,808	57,406	53,039	2,676	1,853

* Holiday Pay.

3:8 Vehicle Utilization

The Authority had 21 vehicles during the year under review. Of these, 2 vehicles had been released to the Ministry of Industries, Science and Technology and 9 to research projects. Two vehicles were not in running condition. According to information furnished, significant statistics of 8 vehicles consisting of 6 passenger vehicles and 2 motor bicycles compared with that of the preceding year are given below.

	1994		1993	
	Passenger vehicles	Motor bicycles	Passenger vehicles	Motor bicycles
(a) Distance travelled				
Petrol k.m.	34,355	4,449	86,115	5,572
Diesel k.m.	35,583	-	48,150	-
(b) Fuel consumed				
Petrol litres	4,720	181	5,469	245
Diesel Litres	3,868	-	5,423	-
(c) Average distance travelled per litre of fuel				
Petrol k.m.	7.28	24.58	15.75	22.74
Diesel k.m.	9.19	-	8.88	-
(d) Total expenditure on fuel				
Petrol Rs.	162,108	5,220	190,273	8,503
Diesel Rs.	53,008	-	81,592	-
(e) Total expenditure on repairs				
Petrol Rs.	125,195	3,458	120,425	877
Diesel Rs.	97,344	-	178,453	-
(f) Total expenditure on drivers' salaries, batta and overtime				
Petrol Rs.	1,875	-	4,850	-
Diesel Rs.	1,300	-	6,275	-

(g)	Provission for depreciation				
	Petrol Rs.	-	198,622	-	-
	Diesel Rs.	398,115	-	405,918	-
(h)	Total cost				
	Petrol Rs.	289,178	207,300	365,548	9,380
	Diesel Rs.	549,767	-	672,238	-
(i)	Average expenditure on fuel per kilometre				
	Petrol Rs.	4.72	1.17	2.21	1.53
	Diesel Rs.	1.49	-	1.69	-
(j)	Average expenditure on repairs per kilometre				
	Petrol Rs.	3.64	0.78	1.98	0.16
	Diesel Rs.	2.74	-	3.71	-
(k)	Average expenditure on drivers' salary, batta and overtime				
	Petrol Rs.	0.05	-	0.06	-
	Diesel Rs.	0.04	-	0.13	-
(l)	Average expenditure on depreciation per kilometre				
	Petrol Rs.	-	44.64	-	-
	Diesel Rs.	11.19	-	8.43	-
(m)	Overall average expenditure per kilometre				
	Petrol Rs.	8.42	46.59	4.24	1.68
	Diesel Rs.	15.45	-	13.96	-

3:9 Budgetary Control

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

4. Systems and Controls

Deficiencies observed during the course of audit were brought to the notice of the Director General of the Authority by my detailed 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) Accounts

(c) Debtors and Creditors

(d) Vehicles

(e) Assets

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

Comments on the Auditor General's Report on the accounts for the year ended 31.12.94.

2:5 Comments on Accounts

2:5:1 Accounting Policies

(a) Provision for doubtful debts - Rs. 18,452- We will disclose the basis in our Accounts in the future. We have given the basis in our notes on Accounts for the year 1995.

(b) Depreciation for Library books - We have made the necessary entries and depreciated the library books at the rate of 5% in our 1995 Accounts.

2:5:2 Accounting Deficiencies

(a) Assests Transferred to Universities - We have been practising the procedure of accounting the Cost of the Scientific Equipments under fixed assests. Depreciation is charged to the Income & Expenditure account. Therefore Assests transferred to Universities are accounted in the Income & Expenditure Account.

(b) Maintenance of Building -
Cost of Curtains - We have been accounting cost of curtains under maintenance of Building for the last so many years. From 1995 We are accounting Curtains under stock as requested.

(c) Gratuity - We have been following this procedure from the start.In 1995 we charged the gratuity payment to the provision for gratuity account, as requested.

2:5:3 Unexplained Differences

We have written to the treasury to inform the Auditors the correct figure with a copy to us.

2:5:4 Lack of Evidence for Audit

1. Creditors- Rs. 245,447 - Out of the Rs. 245,447 creditors to the value of Rs. 226,491/= are foreign organizations. It is practically not possible to obtain confirmation from foreign organizations.

2. Tender Deposits Rs. 9,450 - We will comply from 1996.

Rs. 254,897

3. Expenditure - Rs. 33,950 - If the relevant voucher Nos are given we could comment.

4. Expenditure on Maintenance of vehicles - Rs. 424,645.00
Rs. 424,645 is the total vehicle maintenance expenditure

The relevant vehicles(5) have been released to the grantees for their Research work. Hence stationed at outstations. Arrangements were made to transfer 3 vehicles to the institutions of grantees. Required information of other vehicles have been received from the grantees, after the Audit and now they are available for inspection. Separate files are maintained for each vehicle to record and collect necessary informations.

2:5:5 Non compliance with rules, regulations & management decisions

a).
1) I. Internal Audit Programme.
An Internal Audit Unit has been established

2) II. Report on accounts - The 1994 report has already been sent to the Ministry of Science , Technology & Human Resource Development.

b). Running Charts -

The relevant vehicles(5) have been released to the grantees for their Research work. Hence stationed at outstations. Arrangements were made to transfer 3 vehicles to the institutions of grantees. Required information of other vehicles have been received from the grantees, after the Audit and now they are available for inspection. Separate files are maintained for each vehicle to record and collect necessary informations.

c). Advances - i. We have written to the Dept. of Wild Life Conservation to settle the out Standing balance.

ii.Action is being taken to recover the unsettled Cash Imprests.

d). **Garages** - We are unable to register garages since the Authority has only 7 vehicles. However we request for quotations from several garages to repair the vehicles. We are considering Board approval for referral of maintenance to the agents. Though it may be more expensive, repair will be more effective in the long run.

e). **Valuation of Fixed Assets** - Action is being taken to value the assests.

3:3 Formation of a fund in respect of provision for payment of gratuity.

Our recurrent expenditure is made on a government grant. We are unable to invest government Funds.

3:4 Transactions not Concerned with the objectives.

Assests released to the Ministry of Science & Technology.

Maintenance Cost of the items given to the Ministry of Science & Technology were paid by NARESA on reimbursement basis.

Ministry of Science Technology & Human Resources Development shifted to another building in 1994. They have returned to us all office furniture fittings & Equipment except for the Sony Micro Cassette Recorder Mod M5 purchased for Rs. 2603.00. The two Motor Vehicles have been returned to NARESA.

Rs. 25,000/- has been paid to NARESA in 1993 for the use of common facilities.

Board approval was obtained to write off the money not paid by the previous Ministry of Science & Technology.

3:5 Identified Losses

a). ETF - Rs. 581/-

We were issued with a notice of surcharge by the ETF Board for March 93. We appealed to the ETF Board to waive off the above surcharge considering the following facts.

The volatile environment prevailed after the Sinhala New Year in April 93. Provincial Council Elections were called at that time. During the Election Campaign Mr. Lalith Athulath Muddali was assassinated on 24th April 1993. The funeral path was along the road close to NARESA. Tension was very high. This being a Thursday and the following day Friday the 30th April 93 the office had only a skeleton staff. To add to this problem on 1st May 93 (Saturday) Former President of Sri Lanka was assassinated. Monday the 3rd May 93 officers reporting to work was very poor. Payment was made on 04.05.93. According to the number of working days there was only one day delay.

Even on the above facts ETF Board did not Waive off the surcharge. We were informed of their decision in 1994. The subject clerk paid this amount to the ETF Board & later NARESA reimbursed this amount to him.

b). Bad debts - Rs. 8500/-

Total Rs. 8500/- is not Cash Imprest Rs. 7500/- is on account of renting the floor space at the Science & Technology exhibition held in 1985 organized by NARESA. We wrote several letters to Data serve & also visited them. But there was no response. Also attorney General's Dept. had advised us that it will cost more than Rs. 7500/- for legal action.
Rs. 1000/- Cash Imprest.

We have written since 1988 regarding these Cash Imprests. Since we did not have any response we had to write it off.

c). Stock of Stationary

We have written off with Board Approval

3:6 Uneconomical Transactions

a). Postal charges -

Postal Dept. never inform us to make the deposit and it is our responsibility to make available the machine to despatch the mail without any delay. Hence arrangements were made to deposit the money with the Post Master Gen. according to our requirements.

b). Renovation of Horton Plains Research Station

I). The relevant file & the documents are available & it could be inspected.

II). We have taken up the matter with the Ministry concerned,but we have had no reply nor a payment.

c). Research Projects

I). RG/90/E/01 - Project Terminated Researcher blacklisted
RG/90/E/03 - Project Terminated Researcher blacklisted
RG/90/C/05 - } Both projects terminated in Octob
RG/89/C/05 - } 1993 as the Final reports were n received

II). RG/92/C/01 - Final Report received in April 95 - After the completion of a research project 03 months are generally given to submit the final report. This report was only 02 weeks overdue.
RG/92/P/05 - Final report received in May 1996

3:9 Budgetary Control

As far as possible we use the Budget as an Instrument of Control.

4. Systems & Control

Auditor General's comments in terms of section 13(7)(a) of the Finance Act received our attention. Our reply to these comments were forwarded to the Auditor General by our letter dated 02.01.96.

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

Prof. Priyani E. Soysa
Director General