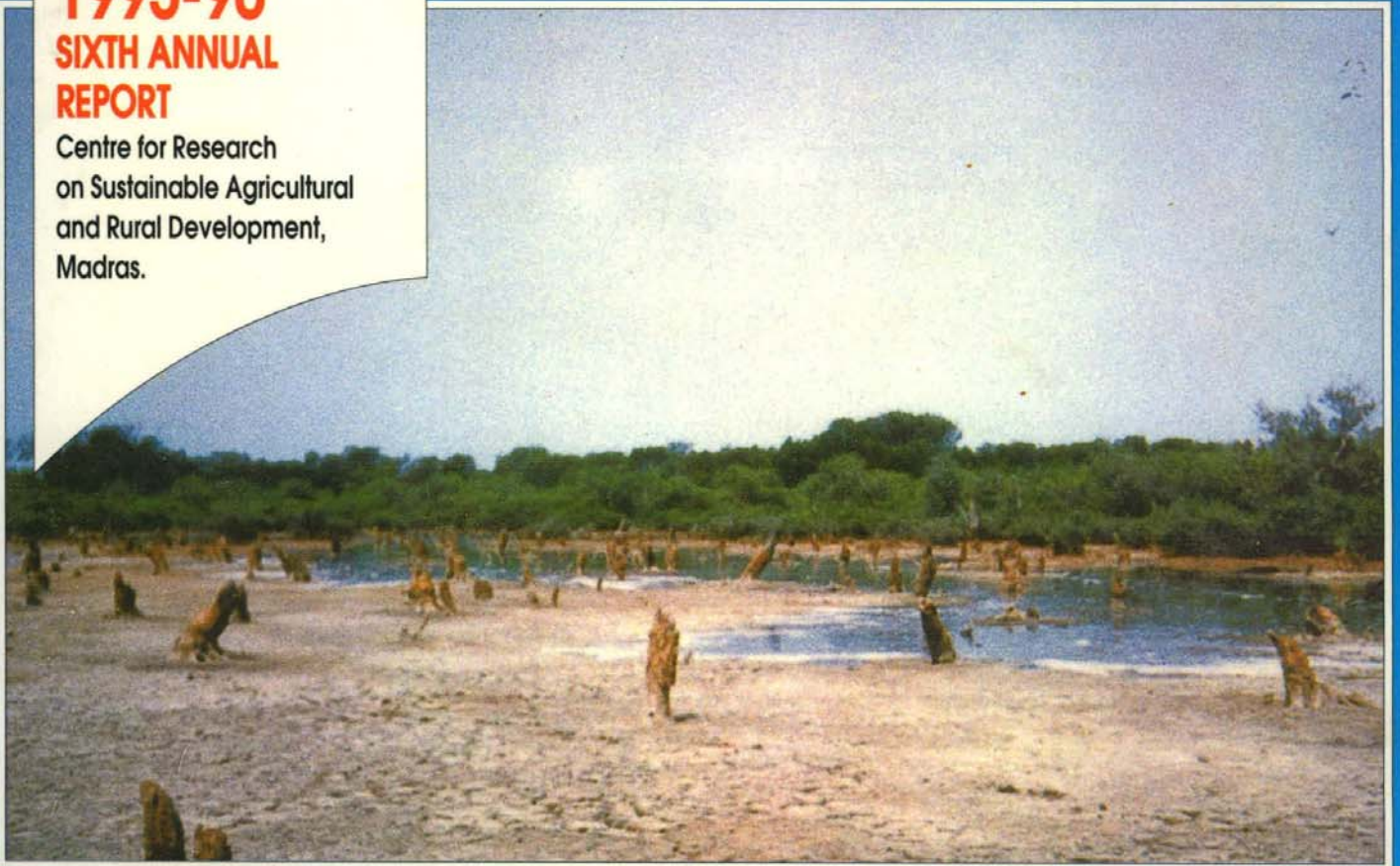


M. S. SWAMINATHAN RESEARCH FOUNDATION

1995-96
SIXTH ANNUAL
REPORT

Centre for Research
on Sustainable Agricultural
and Rural Development,
Madras.



Front Cover : Restoration of degraded mangrove wetlands at Pichavaram.

Top : A view of the degraded area selected for restoration (May 1994).

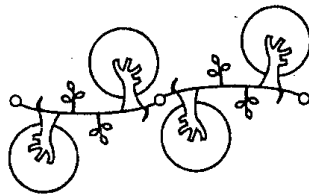
Bottom : The same area after restoration (February 1996).
The species are *Rhizophora mucronata* and *R. apiculata*.

Back Cover : A patch of *Pandanus* on Great Nicobar Island :
the fruits are staple food to the indigenous people.

Multi-media database on the Ecological Farmers of
Tamil Nadu.

Women's multiple roles - income generation and child care.

Sixth Annual Report 1995 - 96



M.S. Swaminathan Research Foundation
*Centre for Research on Sustainable Agricultural
and Rural Development*

Madras, India

M.S. Swaminathan Research Foundation

Centre for Research on Sustainable Agricultural and Rural Development

3rd Cross Road

Institutional Area

Taramani, Madras 600 113

Telephone: +91 (44) 2351229

+91 (44) 2351698

Fax: +91 (44) 2351319

Email: mssrf.madras@sm8.sprintpg.ems.vsnl.net.in

MDSAAA51@giasmd01.vsnl.net.in

Visit us on the World Wide Web at <http://www.mssrf.org>

Cover Design: The *Frontline*, Madras

Bottom photo, back cover: V. Naveen Raj

All other photos were taken by MSSRF staff

Edited and Designed by: Shanaz Padamsee and Michael Harley

Coordinator, Editorial Committee: Dr. V. Balaji

Printed at: Reliance Printers, Madras

Citation: Sixth Annual Report, 1995-96. M.S. Swaminathan Research Foundation, Madras, 1996.

Table of Contents

The Year in Review:

Report from the Chairman _____ 4

Programme Area 100:

Coastal Systems Research _____ 15

Programme Area 200:

Biodiversity and Biotechnology _____ 21

Programme Area 300:

Ecotechnology and Sustainable Agriculture _____ 29

Programme Area 400:

Reaching the Unreached _____ 37

Programme Area 500:

Education, Communication, Training & Capacity Building _____ 43

Publications _____ 49

About the Foundation _____ 58

Programme Areas and Staff _____ 67

List of Donors _____ 76

Sources of Project Support _____ 78

The Year in Review

Report from the Chairman

1996 Blue Planet Prize

It was with great pride and joy that MSSRF staff members received the news on 5 June 1996, designated World Environment Day, that the Foundation had been chosen for the *1996 Blue Planet Prize*. This prize was instituted by the Asahi Glass Foundation of Japan, chaired by Mr. Jiro Furumoto, on the occasion of the UN Conference on Environment and Development held at Rio

in June 1992. It recognises the work of individuals, groups and organisations whose achievements have contributed to the resolution of global environment problems. MSSRF is the first Blue Planet Prize winner from Asia.

This award will further encourage and inspire the scientists and staff of the Foundation in their efforts to promote sustainable livelihoods in rural areas and the conservation of natural resources.

The rationale for the selection of MSSRF for the 1996 Blue Planet Prize has been described in a press release issued by the Asahi Glass Foundation:

“One of the Research Foundation’s major achievements has been the study and conservation of coastal ecosystems, particularly mangrove wetlands. Based on its research into vegetation, soil salinity, and other aspects of mangrove habitats, the Research Foundation has taken steps to restore degraded wetlands.

The Research Foundation conducts a community biodiversity program to rescue endangered plant species from extinction, identifies microorganisms to serve as bioindicators of ecosystem health, and conserves genetic diversity of plant species used as food or in medicinal and other applications.

In addition, the Research Foundation promotes the Biovillage model of sustainable rural development. By helping to conserve the natural environment of developing countries while supporting the economic viability of rural communities the M.S. Swaminathan Research Foundation is playing an important role in the search for solutions to global environmental problems.”

Programme Highlights

The past year has provided multiple opportunities to assess the long term sustainability of our overall research strategy of initiating projects jointly with farming families. At the time of planning MSSRF's infrastructure in 1989-90, it was decided that the Foundation would not own farm land for its research, but instead use farmers' fields as experimental stations, working with farm families in an interactive and participatory mode.

Programme Area 100: Coastal Systems Research

The first of such participatory research projects was established in the area of coastal systems research, and was designed to link the livelihood security of coastal communities with the ecological security of coastal areas in a mutually supportive manner. This project was started in the coastal village of Vettaikaran Iruppu in the Nagai-Quaide Milleth district of Tamil Nadu in 1991, with financial support from the Sir Dorabji Trust and the International Development Research Centre of Canada.

While planning such projects, a *withdrawal strategy* based on the self-mobilisation of local farming families is built into the project design. The direct involvement of MSSRF in Vettaikaran Iruppu ended on June 12, 1996. At the closing function held on that day, the farmers of the village announced

their decision to organise a *Farmers' Society for Sustainable Agriculture* to continue the work and maintain links with the Foundation. Mr. A. Thirunavukarasu, the leader of the group, announced that the Society would popularise the agroforestry and other land use and water conservation techniques developed under the project, and that it would assist all farmers in taking to the path of sustainable agriculture. This spontaneous decision of the Vettaikaran Iruppu farmers to impart a self-propelling momentum to the activities initiated jointly with MSSRF during the past five years gave confidence that the work will continue after the external technical and financial inputs are withdrawn. In this way, sustainable opportunities for progress and meaningful learning partnerships between farmers and scientists can be created.

This past year, MSSRF continued to study the impact of the activities of local communities on the Bhitarkanika and Pichavaram mangrove ecosystems of Orissa and Tamil Nadu respectively. The insights gained from such studies on the felt needs of mangrove forest dependent communities will be used in the implementation of the project, "Coastal Wetland-Mangrove Ecosystems," approved for financial support by the India-Canada Environment Facility (ICEF). The ICEF-supported project will cover the Pichavaram and Muthupet mangrove wetlands of Tamil Nadu, the Krishna and Godavari mangroves of

Andhra Pradesh, the Mahanadi and Bhitarkanika mangroves of Orissa and the Sundarbans wetlands of West Bengal. This is a significant action-research project undertaken with the following four major goals:

1. Analyse the soil, water quality, hydrologic and anthropogenic factors responsible for the degradation of mangrove wetlands, and prepare GIS maps for the purpose of facilitating scientific land and water management.
2. Initiate steps to restore degraded wetlands and reduce adverse human impact by promoting agroforestry systems near the mangrove areas, in order to help the local communities meet their needs for wood and non-wood products.
3. Promote the establishment of Joint Mangrove Forest Management Committees to foster a shared concern, commitment and involvement of the mangrove forest dependent communities and the officers of Forest Departments, for the conservation and sustainable management of mangrove wetlands.

The Coastal Wetland-Mangrove Ecosystems Project, financed by the India-Canada Environmental Facility, aims to standardise technologies and management practices necessary for promoting integrated conservation and development projects in coastal areas.

4. Undertake preparation of training modules and local level mangrove atlases, and help in building the capacity of local communities and Forest Departments in the sustainable management of coastal wetlands.

This new project will build on the experience gained during the last six years on the conservation of genetic diversity in mangrove wetlands. The major output of the project will be the standard-

isation of technologies and management practices necessary for promoting integrated conservation and development projects in coastal wetland areas.

Programme Area 200: Biodiversity and Biotechnology

In Programme Area 200, the most significant development during the year was the consolidation of the various projects under the N.I. Vavilov Centre for Research and Training in Sustainable Management of Biological Diversity in the form of a Technical Resource Centre for the Implementation of the Equity Provisions of the Convention on Biological Diversity (TRC for CBD). Agrobiodiversity has long served as the feed stock for plant breeding and biotech-

nology enterprises, and the need for equity in sharing the benefits arising from this use is no longer in question. In fact, equitable sharing of benefits is mandated by Articles 8 (j) and 15 (7) of the legally binding Convention on Biological Diversity. However, the need now is for the development of a *do how* component. It is for this purpose that the TRC for CBD was set up as described later in this annual report.

This TRC for CBD, probably the first of its kind in the world, was formally dedicated by Ms. Elizabeth Dowdeswell, Executive Director of the United Nations Environment Programme, on 10 July 1996, to tribal and rural families.

In January 1996, a Technical Consultation on an Implementation Framework for Farmers' Rights was organised with support from FAO and SIDA to develop guidelines for legislation on Plant Breeders' and Farmers' Rights. This consultation helped to articulate with clarity and precision the provisions which should find a place in Plant Variety Protection Acts to ensure equity in sharing benefits.

A film entitled "Seeds of Hope" highlighted the irony of the poverty of the primary conservers of agrobiodiversity, in contrast to the prosperity of those who utilise their genetic material.

Among other developments in the Biodiversity Programme were:

- The planting of large numbers of micropropagated seedlings of the rare and endangered plants *Piper barberi*, *Rauwolfia micrantha*, *Ceropegia jainii*, *Crotalaria longipes* and *Hydrocotyl conferta* in the Gudalur Gene Pool Reserve forest in the Nilgiri Hills.
- Planting of micropropagated seedlings of the mangrove species, *Avicennia marina* and *Excoecaria agallocha* in the Pichavaram forest.
- Preparation of a Training Module on Biodiversity Indexing in Agriculture.
- Mapping the distribution of terrestrial and inland aquatic vertebrates, with special attention to fishes, amphibians and reptiles, on the Great Nicobar Island.
- Identification of macromycetes as bioindicators for monitoring forest disturbances, forestry practices, soil conditions and pollution, and lichens for monitoring air pollution and the health of forest ecosystems.
- Identifying genetic relationships among mangrove species using molecular markers and preparation of genomic clones for seven mangrove species for the purpose of locating genes for tolerance to salinity.
- Organisation of a Trainers' Training Programme for representatives of

non-governmental organisations on the conservation of biodiversity, as well as its indexing and sustainable management.

- Training of university students in biomonitoring and multi-media database development.
- Organisation of a high level training course for senior scientists on "Yeast Genetic Manipulation and Molecular Markers."

The Biotechnology Programme is, on the one hand, helping to save species threat-

however, continue to be maintained with the help of the Tamil Nadu State Forest Department.

Programme Area 300: Ecotechnology and Sustainable Agriculture

The Biovillage, Integrated Intensive Farming System (IIFS) and the Integrated Pest Management (IPM) programmes, which are the major components of Programme Area 300, made good progress during the year. Ecotechnologies, involving the blending of traditional and frontier technologies

so as to combine both economic viability and environmental sustainability, provided the foundation for all these projects. In recognition of our role in spreading the concept of ecotechnology, UNESCO designated MSSRF in February

The **Technical Resource Centre for the Implementation of the Equity Provisions of the Convention on Biodiversity** was formally dedicated by Ms. Elizabeth Dowdeswell, Executive Director of the United Nations Environment Programme, on 10 July 1996, to tribal and rural families.

ened with extinction, and on the other, undertaking anticipatory research to help coastal farmers cope with a potential sea level rise in the future. A project for the establishment of a Genetic Resource Centre for adaptation to sea level rise, initiated in 1990 with financial support from the Department of Biotechnology, Government of India, came to an end in 1995. A comprehensive report was prepared and printed summarising the work done under this project. The Centre will,

1996 as the Coordinating Centre for the Asian Ecotechnology Network, jointly sponsored by UNESCO and Equipe Cousteau. UNESCO also announced the creation of a Chair in Ecotechnology at MSSRF.

Another development in this area is the organisation of training programmes to enable farm youth to prepare, in their own homes, biopesticides for use in Integrated Pest Management (IPM) of

cotton. The biopesticides involved are two nuclear polyhedrosis viruses (NPV) of American bollworm (*Helicoverpa armigera*) and leaf caterpillar (*Spodoptera litura*). For the control of the American bollworm and spotted bollworm (*Earias* spp.), an egg parasitoid (*Trichogramma chilonis*) is produced. This parasitoid is also used against the sugarcane internode borer (*Chilo sacchariphagus indicus*). In addition, plant products such as neem, *Notchi* (*Vitex negundo*), *Ipomea cornia* and *Pongamia glabra* are produced for use against several pests of cotton, sugarcane, rice and betelvine in the village.

About thirty farmers and farm women are being given hands-on training three days a week for about six months in methods of production, storage, transport and field use of these biopesticides along with other components of IPM. They assess the utility of each biopesticide for their own farm situation. The ultimate aim of this programme is to foster the growth of a "Youth for Integrated Pest Management" movement in the cotton growing areas of the country.

Home preparation of biological tools for sustainable agriculture such as biopesticides, vermicompost, and biofertilisers will help to substitute market-purchased chemical pesticides and mineral fertilisers with farm-grown inputs. Such knowledge and labour intensive techniques will contribute towards the alleviation of the two major

problems in rural areas, namely poverty and lack of opportunities for skilled employment.

The Biovillage Programme was extended to an additional 16 villages in the Union Territory of Pondicherry. The programme helps to address concurrently the physical, economic, environmental and social components of sustainable food and nutrition security. The following are among the significant developments during the year:

- Formation of enterprise-based groups, thereby conferring on individual small producers the advantages of scale in marketing.
- Establishment of a Mushroom Training Centre at Kizhur.
- Formation of a Village Development Council in Kizhur with support from the Indian Bank.
- Preparation of detailed plans for the establishment of a Biocentre at Pilliyarkuppam, for providing demand-driven services on a single window basis.
- Promotion of eco-farming practices such as Integrated Nutrient Supply and Integrated Pest Management.
- Organisation of field trials with hybrid rice strains obtained from various sources.

A multi-media database on the ecological farmers of Tamil Nadu was prepared, as an aid to the promotion of sustainable agricultural production systems. Work on the organisation of seed villages was initiated in the Dharmapuri district of Tamil Nadu for achieving the goal of technological empowerment of rural women, leading to a reduction in the number of hours of work and an addition to the economic value of each hour of their work.

Collaboration with the International Agriculture Training Programme of the United Kingdom in training a cadre of young ecohorticulturists came to an end this year. An encouraging feature is the continued activities of the young rural "change agents" trained under this programme in spreading the art and science of ecological horticulture in their respective villages.

With generous financial support from the Sir Dorabji Tata Trust, and with the approval of Mr. Ratan Tata, Chairperson of Tata Sons, an Ecotechnology Centre dedicated to the memory of the late JRD Tata was established to bring together in an interactive manner all MSSRF programmes relating to the development and dissemination of ecotechnologies. The J.R.D. Tata Ecotechnology Centre was formally dedicated to rural and tribal families on

Monday, 29 July 1996, on the occasion of the 92nd birthday of Bharat Ratna JRD Tata. This Centre will initially concentrate on both factor-and systems-oriented field research in the following areas:

- Eco-horticulture.
- Eco-aquaculture (in collaboration with the Central Institute of Freshwater Aquaculture of ICAR).
- Integrated Pest Management.
- Integrated Nutrient Supply.
- Wasteland and water shed development.
- Integrated Intensive Farming Systems.
- Agri-processing and post-harvest technology (in collaboration with the Central Food Technological Research Institute).

The training programmes of the Regional Technical Resource Centre funded by the Council for Advancement of People's Action and Rural Technology (CAPART) will be implemented by the JRD Tata Ecotechnology Centre. Steps were also taken during the year to prioritise the programmes of the Dr. B.V. Rao Chair in Sustainable Development, established with generous

With generous financial support from the Sir Dorabji Tata Trust, an **Ecotechnology Centre** dedicated to the memory of the late JRD Tata was established to bring together in an interactive manner all MSSRF programmes relating to the development and dissemination of ecotechnologies.

support from the Venkateshwara Group, in memory of the late Dr. B.V. Rao, doyen of India's modern poultry industry. It was decided to relate this chair to the gender component of sustainable development. The chair titled *Dr. B.V. Rao Chair on Gender and Development* will

be filled soon and will foster further the goal of the Foundation to impart a pro-poor, pro-woman and pro-nature orientation to a job-led economic growth strategy in rural India.

Programme Area 400: Reaching the Unreached

The focus of Programme Area 400 has been on gender issues, with work relating to the multiple roles of women and their ramifications, especially in respect to child care. The primary methodology adopted in this area is networking with other organisations which have similar objectives. The following are some of the significant results during the past year:

- *Two research studies* with important policy implications on how women handle their multiple roles in the economic, domestic and child care areas, and their impact on the well-being of both women and children.

In recognition of our role in spreading the concept of ecotechnology, UNESCO designated MSSRF in February 1996 as the Coordinating Centre for the **Asian Ecotechnology Network**, jointly sponsored by UNESCO and Equipe Cousteau.

- *Communication* through street theatre, in the form of a cultural *Jatha* (tour) in rural areas of an interactive play on the theme of female infanticide/foeticide; and through a sustained campaign on television on the theme of *Burden on the Pre-School Child*, which

has elicited an overwhelming response.

- Documentation of innovations, resource materials and research results, in both video and print.

A detailed design for initiating a National Hunger-Free Area Programme (HFAP) was developed under a project supported by Hunger Project (India). Studies carried out in a few villages in the Dharmapuri district of Tamil Nadu and in the Union Territory of Pondicherry reveal that ending chronic hunger in these areas can be achieved with minimum additional financial outlay, provided a horizontal dimension can be added to the numerous vertically structured anti-poverty programmes. This will also depend upon organising broad-based, local-level coalitions for Sustainable Food and Nutrition Security to develop, implement and monitor the Hunger-Free Area Programme. These coalitions must include representatives

from elected Panchayats/Nagarpalikas, voluntary organisations, the corporate sector, government departments, women's organisations, research and academic community and mass media.

From the work carried out under the HFAP, Biovillage and other village-based projects, it has become clear that a broader conception of food and nutrition security will help to introduce the necessary packages of technologies, services and public policies. Food and nutrition security must ensure that:

- Every individual has the physical, economic, social and environmental access to balanced diet including the necessary macro- and micro-nutrients, safe drinking water, sanitation, environmental hygiene, primary health care and education, so as to lead a healthy and productive life.
- Food originates from efficient and environmentally benign production technologies that conserve and enhance the natural resource base of agriculture, forestry and fisheries.

From the work carried out in the **HFAP, Biovillage** and other village-based projects, it has become clear that a broader concept of food and nutrition security will help to introduce the necessary packages of technologies, services and public policies.

In the budget of Tamil Nadu for 1996-97, presented to the state legislature on 17 July 1996 by the Hon. Chief Minister Dr. Mu. Karunanidhi, provision has been made for initiating a Hunger-Free Area Programme in the state. Tamil Nadu is the first state in India to initiate such an integrated programme for the elimination of poverty-induced endemic hunger.

In order to empower the women and men elected to grassroots democratic institutions such as Panchayats, a *Socio-Demographic Charter* was developed as a planning, implementation and monitoring tool. The training module prepared for this purpose has both generic and location-specific components. The training module has been pre-tested in the states of Rajasthan, West Bengal and the Union Territory of Pondicherry, and will be made available to Panchayati Raj training institutions in October 1996. When widely adopted as a tool for planning village development, the Socio-Demographic Charter will not only help focus priority attention on basic human needs, but will also enable rural families to relate the growth of the human population to the supporting capacity of the concerned ecosystem.

Programme Area 500: Education, Communication, Training and Capacity Building

As in earlier years, several training programmes, ranging from farmer to farmer learning to advanced post-gradu-

ate courses were organised. Both the Anna and Madras Universities recognised MSSRF for post-graduate work leading to Ph.D. One staff member received the Ph.D. degree from Osmania University during the year.

The architectural plan was finalised for the construction of a Farmers' Home Cum Training Centre on land kindly made available by the Government of Tamil Nadu on long term lease. This will facilitate the expansion of the training and capacity building programmes of MSSRF. Staff members and friends joined in laying foundation stones on 14 April 1996. This building, designed by Architect A. Venkat will incorporate features relating to rain water harvesting, energy use efficiency and solar energy utilisation.

The Friday Seminar Series has become institutionalised, and several national and international seminars, symposia and dialogues were organised. Notable among them were seminars relating to the work of mathematician Ramanujam and biologist J.B.S. Haldane. An International Workshop on the Impact of Climate Change on Food and Livelihood Security was held in December 1995 in collaboration with the Climate Institute of Washington, USA. As mentioned earlier, an international Technical Consultation on an Implementation Framework for Farmers' Rights was organised in January 1996. In February 1996, an international dialogue on

Ecotechnology and Shaping the Future was organised in collaboration with UNESCO and Equipe Cousteau. The participants in this dialogue included: Prof. Federico Mayor, Director General of UNESCO; Dr. Mohammed El Ashry, Chairman, Global Environment Facility; and Dr. (Ms.) Wakako Hironaka, Former Minister for Environment, Japan.

In July 1996, the Foundation hosted the Science Academies Summit on Uncommon Opportunities for a Food Secure World, on behalf of the National Academy of Agricultural Sciences of India, the Italian National Science Academy and the Third World Academy of Sciences. The Summit participants included: Dr. Ismail Serageldin, Chairman, Consultative Group on International Agricultural Research (CGIAR); Ms. Elizabeth Dowdeswell, UN Under-Secretary General and Executive Director, UNEP; Dr. Adnan Badran, Deputy Director General of UNESCO; and Prof. G.T. Scarascia Mugnozza, President, Italian National Science Academy. The Madras Declaration developed at this meeting indicates the pathway to sustainable food and nutrition security. The Declaration will be sent to the world leaders who will be attending the World Food Summit convened by FAO in Rome in November 1996.

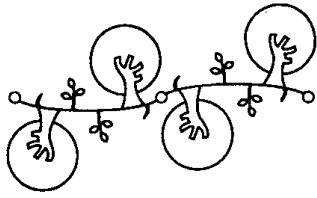
Providing young scientists and scholars with opportunities for professional growth has been an important goal of the Foundation. During the past year, many

MSSRF scientists participated in national and international symposia, and their contributions received high appreciation. Diversity among professional staff in terms of gender and field of specialisation and an encouraging environment helped to utilise the varied talents of staff at every level in an optimal manner. The advice and assistance extended by several senior scientists, who are serving as Distinguished Fellows of the Foundation, have proven to be of great help to our younger researchers.

Thanks to the streamlining of the administrative procedures and the computerisation of accounts, administrative and financial services rendered to scientists and donors were vastly improved. We are indebted to national, bilateral and international donors, whose names are listed in this annual report, for their generous financial support and encouragement. But for this support, the work described in this report would not have been possible.

This year's Annual Report represents a change in format for MSSRF. It concisely presents the highlights of the Foundation's activities in all programme areas during the past year. While this new Annual Report format will help us reach a wider audience, separate sectional reports have also been printed to provide in-depth information on specific research and training activities. These detailed sectional reports are available for Programme Areas 100, 200, 300 and 400.

The programme-specific information for this report was contributed by the concerned project scientists, with compilation coordinated by Dr. V. Balaji. The design of the cover was done by *Frontline*, for which we are indebted to Mr. N. Ram. Mr. Michael Harley and Ms. Shanaz Padamsee edited and designed the report. Our sincere gratitude goes to all of them.



Programme Area 100

Coastal Systems Research



***W**as established as MSSRF's first programme to link the livelihood security of coastal communities and the ecological security of coastal areas in a mutually reinforcing manner.*

Highlights of the Year

Introduction

The coastal environment is an essential component of the global life support system as it includes a variety of highly productive habitats. These include the mangrove ecosystems, sea grass beds and coral reefs. However, the coastal zone is also a place of high human activity and it is estimated that the human population in the coastal zone (less than 50 km from the ocean) will comprise 3/4 of the world's total by the year 2100. This rapid population growth will put a severe strain on coastal resources. In order to protect this fragile ecosystem, an integrated participatory approach based on sound scientific principles is urgently required. This is what the Coastal Systems Research Programme (CRSP) at MSSRF endeavours to do.

One of the ecosystems given priority attention in the CRSP is mangrove wetlands. These areas protect people and property against cyclones and sea erosion and provide livelihood opportunities by maintaining fish productivity. They are also unique in that they harbour salt

tolerant flora whose genes may be of immense use in future crop improvement programmes. Protection of mangroves is particularly essential in India where nearly 50-60% of this ecosystem has been degraded in a period of 40 years. Poor appreciation of the ecological and economic value of mangroves has been the primary cause of this degradation. The integrated conservation and management project of CSRP addresses these issues through education and demonstrates alternate techniques of development through extension.

The highlights of Programme Area 100 during this year are presented here.

Subprogramme Area 101: Integrating Conservation with Development in Mangrove Ecosystems

CSRP has initiated several projects to develop and demonstrate techniques for the restoration of mangrove ecosystems. These activities are focused on the mangroves of Pichavaram and Muthupet in Tamil Nadu and Bhitarkanika in Orissa.

Pichavaram Mangroves

Restoration

One demonstration site within the Pichavaram system has been degraded due to improper tidal flushing, one portion lacking drainage, and an elevated area isolated from tidal waters. To restore the areas, a series of distributory canals was laid. These canals provide water to the elevated region and drain the stagnant water from the remainder. As a result, the biophysical characteristics of the site have improved sufficiently to establish *Rhizophora* spp. and *Avicennia marina* plantations. The growth of these plantations has been normal and comparable to a healthy environment.

Awareness programme

The long-term conservation of the mangrove wetland is dependent on the participation of the local community. To promote awareness among school children in the area, the following activities were initiated in six schools, targeting an age group of 11-15 years:

- Field visits.
- Slide and video shows.
- Essay and drawing competitions.
- Street plays.
- Establishment of nature clubs with the help of WWF-India.

To emphasise the importance of mangroves among the adults of the region, three approaches are followed:

- Distribution of posters depicting the ecological and economic functions of mangrove wetlands.

- Distribution of educational materials in Tamil.
- Focusing public interest in mangrove conservation through traditional communication media.

Agroforestry

Cattle grazing is one of the main threats to the Pichavaram mangroves. In order to minimise this stress, and based on meetings with local people, an agroforestry programme to provide alternative sources of fodder was initiated in the Pichavaram area. Fodder grasses were intercropped with coconut groves and casuarina plantations. This programme generated interest among the local people and they have visited the site to learn this technique. Once this demonstration has proved to be successful, the programme will be extended to other areas close to the Pichavaram mangroves.

Bhitarkanika Mangroves

The work carried in the mangroves of Orissa aims at understanding the localised specific uses, indigenous knowledge systems and the level of dependency the local population has on this ecosystem for their economic activity.

Fish resources

The ability of estuarine mangrove areas to support onshore and offshore fisheries is well recognised. In the forest an estimated 80% of the population engages in artisanal fisheries. The fish harvest-

ers capture the benefits offered by the forest, while exerting very little influence on its productivity. Our survey has further shown that the fish landing centres at Dhamra and Talchua support employment opportunities of villagers within a 15 km radius.

Agriculture

Agricultural practices in the sanctuary areas are not directly dependent on forest resources. Agriculture is being practised on land reclaimed from mangroves and utilising fresh water during the monsoon. Embankments of mangrove mud have been constructed to protect the paddy fields from salt water intrusion. Rice is the only crop grown in the sanctuary land and the local varieties differ in time of maturation and flood tolerance.

Honey gathering

Near every dense forest mangrove block there are a group of honey gatherers called the Dalais. They practice agriculture in addition to honey gathering, which is only a male activity. The mangroves flower from March to June and

honey is collected during that period. One kg of honey fetches Rs. 25 from the Forest Department and Rs. 40 in the open market.

Basket and mat weaving

A community of scheduled castes are engaged in this activity. The forest resources used in their occupation are listed in Table 1.

Restoration of degraded mangrove blocks

The area set aside for a plantation is located in the northern part of the Mahanadi Delta known as the Kauntilo forest block (about 700 acres). The first phase of the plantation is intended as a demonstration site for the villagers, forest officers, researchers and interested public. Thus the site is near a village market and adjoining the saline embankments of prawn farms. Eight and a half ha. of area has been covered so far. The major constraints to establishment of the mangrove plantation is grazing by cattle, prawn and crab collection, as well as firewood collection by the people of the surrounding villages. At the juvenile

Table 1. Local uses of wild plant species, Bhitarkanika, Orissa.

Local Name	Latin Name	Use	Plant Part
Bahumuruga	<i>Flagellaria indica</i>	Rope, mats	Stem
Hental	<i>Phoenix paludosa</i>	Mats	Leaves
Naalia ghass	<i>Myriostachya wightiana</i>	Baskets, mats	Grass blades, stolons
Bonia	<i>Hibiscus tilaceous</i>	Rope	Bark
Keuti ghaas	<i>Cyperus corymbosis</i>	Baskets, mats	Grass blades

stages of plantation these activities trampled the plants and resulted in a loss in the establishment rate.

Coastal Wetlands: Mangrove Conservation and Management

On the basis of the experience gained in implementing various international and national projects on mangrove wetland conservation, a new project has been launched from June 1996. This project is supported by the India-Canada Facility. The goal of the project is to enhance national capability and national action in the conservation and sustainable management of coastal mangrove wetlands. The purpose of this project is to build enough capacity in local communities, voluntary organisations, grassroots level democratic organisations and government agencies to conserve, restore and sustain mangrove wetlands in an integrated manner. This will be achieved through participatory research, training and extension. The project is being implemented in seven sites across four states: Tamil Nadu, Andhra Pradesh, Orissa and West Bengal.

Subprogram Area 103: Establishment of a Model Integrated Coastal Ecosystem

The aim of this programme is to establish a Model Pilot Coastal Ecosystem which could serve as a base for technology transfer and a demonstration site for the sustainable management of natural resources. During this year, three

experiments were continued, and yielded conclusive results.

Agroforestry

A study was undertaken to compare income generated on plots used exclusively for high density casuarina plantations and plots intercropping lower density casuarina (*Casuarina litorea*) with groundnut and black gram. The study demonstrated that the plots with the intercropped casuarina yielded greater total income, if the yield from the intercrop was also taken into consideration (Table 2). Furthermore, the farmer obtained a yearly income from the agricultural crops instead of having to wait for five years or more till the casuarina was harvested. Three farmers have tried this approach on their own this year.

Studies on silvi-horticulture and ground water irrigation were discontinued during the year. However, several farmers have continued the work on their own initiative. Although the programme of goat rearing under stall fed conditions was also discontinued, monitoring of the breeding took place. Projects on the agriculture reclamation of problem soil and the establishment of kitchen gardens continued during the year.

In the study on restoration of saline coastal areas, degraded soils were treated with either pyrites, composted coir pith and gypsum or casuarina needles and gypsum. The result of the field experiment showed that the application of gypsum and composted coir pith re-

corded the highest yield of paddy, followed by pyrite. All treatments produced better yields than the control plot. The treatment with gypsum and composted coir pith performed better because of higher moisture retention which helped better the growth and yield of paddy, even under the severe drought conditions that prevailed during the year. The analy-

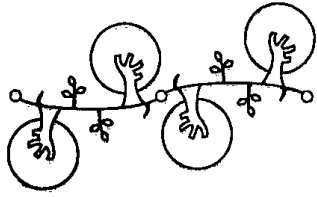
sis of post harvest soil revealed a reduction in pH for all treatments.

Training programmes

Both participant and non-participant farmers took part in these programmes. Cashew grafting was demonstrated on January 1996, in which 30 male and 15 female farmers participated.

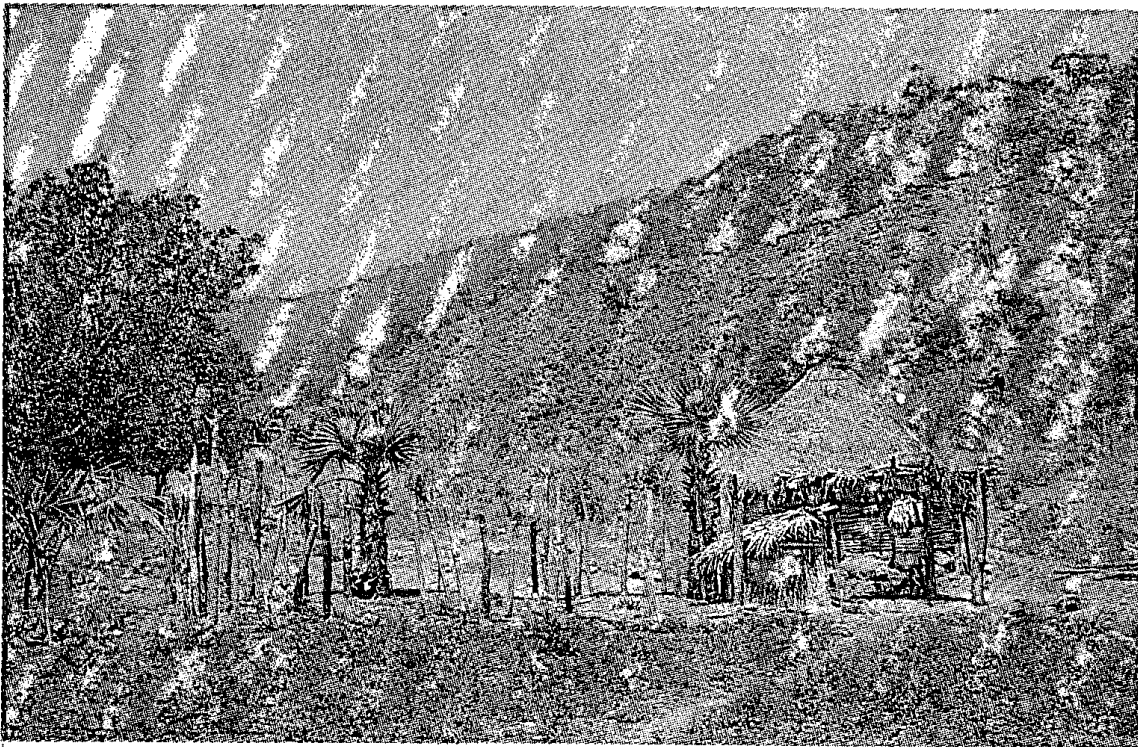
Table 2. Income from casuarina with intercropping.

Details	Site I		Site II	
	Experimental plot	Control Plot	Experimental plot	Control plot
Number of trees per hectare	2500	8264	2500	8250
Mortality/ha	50	1775	75	1700
Actual number of trees available/ha	2450	6489	2425	6550
Weight of a single good pole after 3 yrs	6.5 kg	5.2 kg	8.5 kg	2.5 kg
Total weight of poles per hectare in kg	15925	33742.8	20612.5	16375
Cost of casuarina poles/mt in rupees	950.00	950.00	950.00	950.00
Value of casuarina poles in rupees	15128.75	32055.66	19581.87	15556.25
Income from inter-crop in the 3rd year in rupees	7713 (ground nut)		1392.50 (black gram)	
Total intercrop income	23139		4177.5	
Total income	38267	32055.66	23759.37	15556.25
Difference	6212.09		8203.12	



Programme Area 200

Biodiversity and Biotechnology



***P**romotes the monitoring, conservation and sustainable management of biological resources in partnership with rural and tribal peoples, and with special emphasis on the equitable sharing of benefits.*

Highlights of the Year

Introduction

During recent years, biological diversity has gained recognition as the skeletal support of both human welfare and ecological security. Wild plants and traditional cultivars, among other biological resources, represent the raw genetic material for crop improvement, drug development and biotechnology. The cancer fighting drug taxol is derived from the yew tree. Genetic resistance against the brown rice hopper was discovered in a wild plant and transferred to cultivated rice. In the future, the identification of genes for salt tolerance in mangroves and other plants may lead to the development of salt tolerant crops varieties. Each species or gene lost ultimately reduces our options for adaptation to a rapidly changing environment, and thus conservation becomes a social, economic and environmental imperative.

There is also an emerging recognition of biological diversity as a form of wealth concentrated in the South, and a primary resource base upon which to build

development efforts. The sustainable utilisation of this biodiversity offers a key to unlock the human potential of a vast portion of the world's population burdened with chronic poverty.

In fact, the sustainable utilisation of biodiversity depends on these same people, those rural and tribal families who have long been its stewards. The traditional knowledge which has evolved over generations of association with biological resources is as much a resource as is biodiversity itself. There have already been numerous situations in which the practices of rural and tribal peoples have guided biotechnologists to new drugs, industrial chemicals and agriculturally beneficial genes. Furthermore, the widescale conservation of biodiversity can only take place by utilising local humanpower. As a result, tribal and rural people working at the grassroots level are fundamental to the protection and development of biological resources.

Within this context, MSSRF's Biodiversity Programme focuses on the

mobilisation of communities for action to prevent irreversible damage to the basic life support systems of the hydro-sphere, the atmosphere and the biosphere. In its wide range of research and training activities, priority is placed on involving rural and tribal women and men in the conservation of genetic diversity. The programme components are tuned to break out of old approaches, such as simply excluding people from their traditional lands in the name of conservation. Instead, MSSRF staff are working to blend indigenous and local knowledge, ethics and awareness into the complex conservation matrix involving the interactions of protected areas, agriculture, forestry, economics, intellectual property rights, trade and tenure, among other factors. This requires a combined strategy of biological inventory, *in situ* and *ex situ* conservation, laboratory and field propagation, as well as intensive cooperation with local and tribal peoples.

An important component of this partnership with tribal peoples is embodied in MSSRF's Technical Resource Centre for the Implementation of the Equity Provisions of the Convention on Biological Diversity. As a part of the SIDA-supported N.I. Vavilov Centre, the Technical Centre integrates many of MSSRF's biodiversity related activities in an effort to protect and preserve the innovations and practices of local communities and tribals, and to ensure recognition and reward for their contributions to the conservation and development of genetic

resources. The major components of the Technical Centre include:

- Chronicling the contributions of tribal and rural families in conservation and enhancement.
- Organisation of an Agrobiodiversity Conservation Corps of young tribal and rural women and men for protecting the intellectual property contributions of their communities.
- Development of multi-media databases to document the intellectual contributions of tribal and rural families.
- Maintenance of a Community Gene Bank and Herbarium.
- Revitalisation of genetic conservation traditions.
- Establishment of a Legal Advisory Unit.

Much of this programme area's activities focus on agricultural biodiversity. The landraces and traditional cultivars developed and maintained by farmers, as well as the wild relatives of crop plants, represent a rich storehouse of genetic resources. However, as traditional crops are increasingly displaced by high yielding varieties and homogenised farming systems, the base of agrobiodiversity has come under threat. This genetic erosion translates into reduced adaptive flexibility at the farm level and lost raw materials for crop breeding programmes.

The highlights of activities undertaken within Programme Area 200 during the reporting period are presented here.

Subprogramme Area 201: Protecting the Endangered Protected Areas

The Great Nicobar Island was declared a Biosphere Reserve in 1989 under the Indian component of the UNESCO-sponsored Man and the Biosphere Programme. However, many aspects of the island's biological resources have yet to be catalogued by scientists.

During the reporting period, MSSRF continued an on-going study of the island to map the distribution of terrestrial and inland aquatic vertebrates, with special attention to fishes, amphibians and reptiles. This represents the first attempt of its kind, and it is expected that MSSRF's study will lead to a management plan for the reserve.

Eighty-one species of vertebrates have been recorded on the island during the past year. Among the birds, the large hawkcuckoo (*Cuculus sparverioides*), Andaman drongo (*Dicrurus andamanesis*), and brown flycatcher (*Muscicapa latirostris*) have been reported for the first time on the island. The discovery of the archer fish (*Toxotes* sp.) also represents a first report for the reserve.

Subprogramme Area 202: Tribal Area Biodiversity Conservation Programme

As a first step toward protecting and preserving indigenous knowledge on the conservation and use of agrobiodiversity, ethnobotanical information on 233 plant species was recorded for a number of tribal groups in South India. These data have been incorporated into a multimedia database within MSSRF's Informatics Centre to assist in protecting the intellectual property rights of the tribals. Our studies found that the Irulas, Kadars, Malaimalasar, Malasar, Malayalis, Muthuvans, Paliyars and Pulayars tribals use a remarkably

wide variety of wild plant species, a sampling of which are included in Table 3. Mr. Palani, a Kadar of Udumanparai

in Valparai, and many others indicated that in the present scenario of vanishing traditional knowledge, MSSRF's documentation will help bridge the widening gap between the elder and younger generation of the tribal community.

Based on this work, the Kolli hills of Tamil Nadu were identified for intensive work in supporting, encouraging and revitalising *in situ* conservation practices

Vertebrate Species Reported for the First Time on the Great Nicobar Island	
Large hawkcuckoo	(<i>Cuculus sparverioides</i>)
Andaman drongo	(<i>Dicrurus andamanesis</i>)
Brown flycatcher	(<i>Muscicapa latirostris</i>)
Archer fish	(<i>Toxotes</i> sp.)

Table 3. Wild plant species used by the tribes, South India.

Local Name	Latin Name	Use	Tribe Name
Korangu peetha	<i>Allophylus cobbe</i>	Fruits edible	Malasar
Thanneer vittan	<i>Asparagus racemosus</i>	Roots with "Gasagasa" orally administered for piles	Malayalis
Velleri	<i>Dodonaea viscosa</i>	Leaves with "Jeerakam" orally administered for jaundice	Malayalis
Ney kotta	<i>Harpulia arborea</i>	Bark juice used as leech repellent	Kadars & Malasar
Nannari	<i>Hemidesmus indicus</i>	Roots with <i>Curculigo orchioides</i> tubers used as an aphrodisiac for males	Malayalis
Gurrapu dekka	<i>Mucuna monosperma</i>	Seed paste applied for migraine and mumps	Konda Reddy

of wild and traditionally cultivated plants among the Malayali people. Although the region is known for its rich diversity of agricultural and wild plants, traditional crops are being rapidly replaced by the widespread cultivation of tapioca and turmeric. Detailed documentation of indigenous knowledge, farming methods, crop varieties and informal innovations were completed during the year. This has laid the foundation for supporting conservation practices among the Malayalis, many of whom have expressed strong interest in the partnership with MSSRF.

A fifth Trainers Training Programme was conducted at the Rural Unit for Health and Social Affairs (RUHSA) in Vellore, Tamil Nadu on 16-19 October

1995 for selected NGO representatives in various aspects of biodiversity conservation. Participants have been subsequently organising grassroots training programmes at the village level.

Subprogramme Area 203: Community Gene Bank

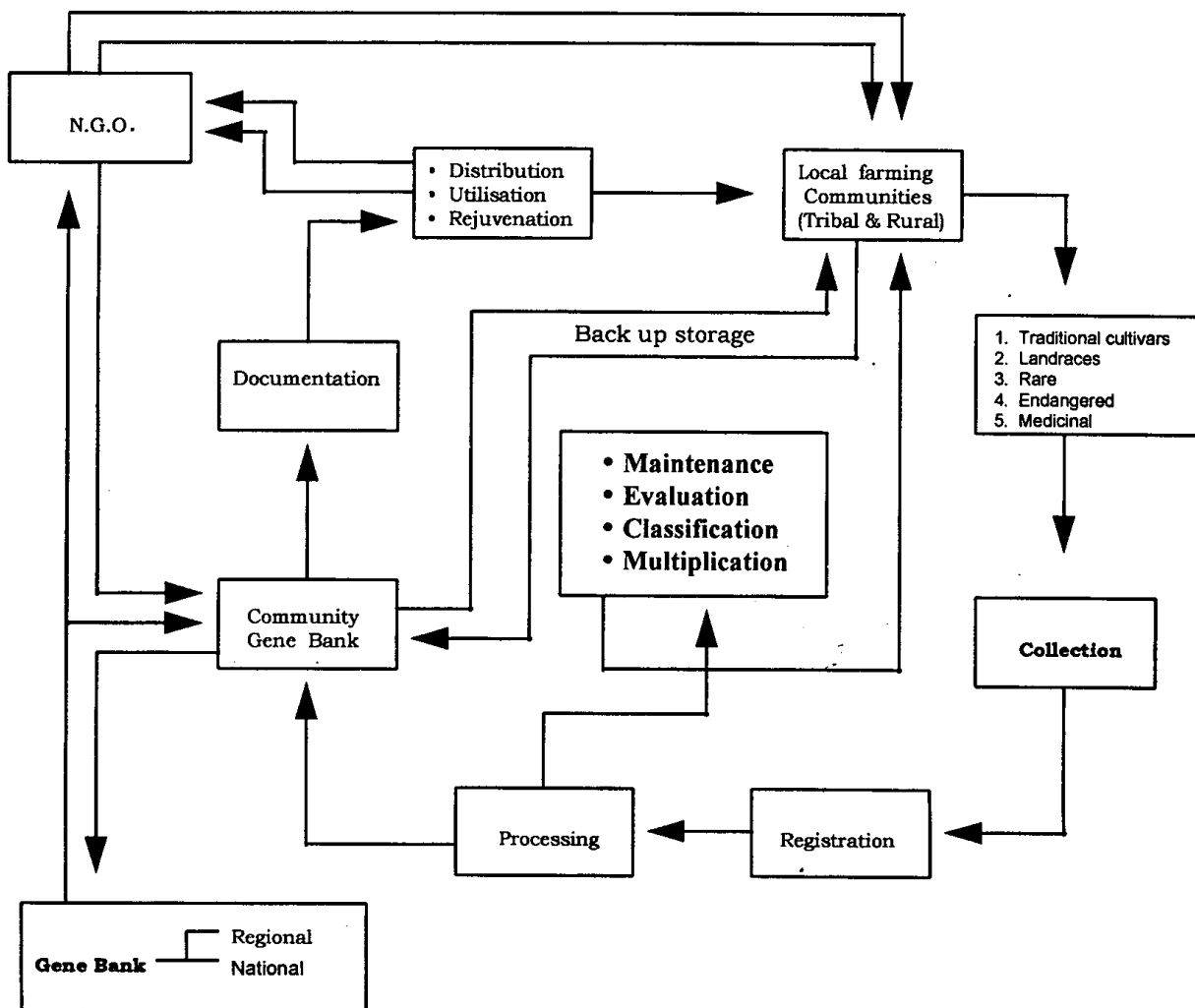
As a result of the on-going work with the Malayalis, the tribals have chosen to take advantage of MSSRF's Community Gene Bank to preserve their traditional cultivars. The Malayalis have lost several landraces in the past due to lack of proper storage and handling methodologies. The seeds deposited by the Malayalis will be held as back up stor-

age for the tribals, made available to others only with the prior consent from the donor families.

Collection activities increased overall during the second year, with 590 accessions including cereals, millets, pulses, vegetables, spices, economically important grams and endangered medicinal plant species. Approximately 50 acces-

sions of each paddy, millet and pulses were multiplied through field trials, and duplicate sets of seed materials were deposited at the National Bureau of Plant Genetic Resources in New Delhi for long term preservation. Accessions in the Community Gene Bank are catalogued and linked to the intellectual property rights databases developed in MSSRF's Informatics Centre.

Figure 1. Community Gene Bank activities.



Subprogramme Area 204: Saving Endangered Plant Species

The flora of the Western Ghats is extensively threatened, and the region is considered as one of the 18 ecological "hot spots" of the world. During previous years, MSSRF staff surveying the southern Western Ghats collected approximately 125 threatened species. Information on these species is crucial for determining priority actions for conservation, and MSSRF's research has already led to conservation action to save a number of endangered species in the past. For example, *Piper barberi* and *Syzygium travancoricum* have been multiplied by tissue culture in large numbers and re-introduced in the Gudalur Gene Pool Reserve Area in Tamil Nadu.

During this year, 15 species were assessed under International Union for the Conservation of Nature (1994) guidelines. This included two Red Data Book species, *Vateria macrocarpa* and *Belosynapsis vivipara*. Conservation of all threatened species should integrate habitat protection and species-specific efforts with regional development plans.

Subprogramme Area 205: Conserving Economically Useful and Medicinal Endangered Species

During the current year, MSSRF continued its work in the micropropagation and reintroduction into the field of endangered plant species. Ten species were chosen for detailed investigation, of which eight were successfully propagated and transferred to the field: *Ceropegia jainii*, *Freria indica*, *Hydrocotyl conferta*, *Kampheria galanga*, *Piper barberi*, *P. longum*, *Rauwolfia tetraphylla* and *Uraria picta*. Reintroduction of the plants takes place after a two phase process of hardening, whereby the micropropagated plants are gradually acclimatised to field conditions. Reintroduced plants are currently being monitored for survival rate and establishment time, as well as for genetic variability using Random Amplified Polymorphic DNA (RAPD) markers.

Efforts were also undertaken to propagate mangroves through micropropagation and other laboratory techniques. Encouraging results were obtained for vegetative propagation

Selection of Threatened Plants Identified in the Study of the W. Ghats

Critically Endangered

Aglaia barberi
Derris thothathrii
Vateria macrocarpa

Endangered

Anectochilus elatus
Belosynapsis vivipara
Crotalaria candicans
C. obtecta
Euphorbia santapau

Vulnerable

Crotalaria grahamiana
Hydnocarpus pendulus
Impatiens parasitica
Phrynium rheedii

through cuttings of *Avicennia marina*, *A. officinalis*, *Xylocarpus granatum*, *Excoecaria agallocha* and *Rhizophora* species. These and other propagated materials will form a part of MSSRF's Mangrove Genetic Resource Centre.

Subprogramme Area 206: Monitoring Ecosystem Health Using Bioindicators

MSSRF has undertaken a study monitoring the diversity of the bacterial community in the mangrove system at Pichavaram. Genetic diversity studies are underway for approximately 90 species using RAPD, which will serve as an assessment of ecosystem functioning. In addition, a spectrum of soil microorganisms were treated with heavy metals, and it was observed that nitrifying bacteria could be used as an indicator of low level heavy metal toxicity.

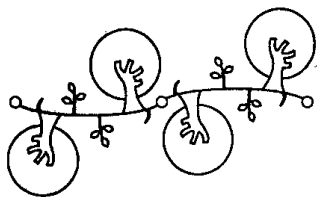
In the Siruvani hills in the Western Ghats, soil biological criteria, macromycetes and lichen diversity are being used to assess the health of the ecosystem. Soil microbial diversity was found to be lowest in a managed forest comprised of teak and rosewood plantations. The ideal candidate for monitoring forest disturbance, forestry practices, soil condition and pollution has been identified as macromycetes (macro fungus: capped mushrooms, etc.), while lichens are good candidates for monitoring air pollution, forestry practices and disturbance. Local communities may be

trained to use these relatively conspicuous organisms as "early warning systems" for ecological disturbance.

Subprogramme Area 207: Genetic Characterisation and Diversity Studies in Mangroves

Few conventional genetic studies have been successfully completed on mangrove species due to a number of factors, including their small and uniformly shaped chromosomes. Therefore, MSSRF's molecular biology group focuses on tapping the potential of molecular marker technologies, including RAPD and Restriction Fragment Length Polymorphism (RFLP), for research in the otherwise neglected mangrove species.

During the past year, twenty mangrove species were analysed using both RAPD and RFLP methods. Genetic variability was species-specific and strongly influenced by climatic conditions and ecological zone of origin. Genomic relationships among the twenty species of the Pichavaram forest were also established using molecular markers, demonstrating five distinct clusters of relation. This is the first time the genetic relationships between several mangrove species have been established using molecular markers. In addition, genomic clones were prepared for seven different mangrove genera. These are being screened to identify genes for salinity tolerance and other traits of interest.



Programme Area 300

Ecotechnology and Sustainable Agriculture



***A**ims to generate and extend to the farm and rural household environmentally sound, socially equitable and economically viable technologies, which combine the best of frontier technology with traditional knowledge.*

Highlights of the Year

Introduction

There is emerging recognition that sustainable rural development depends upon a shift away from the environmentally destructive and socially disruptive approaches of the past which have left millions of people unreached by the benefits of progress. Instead, an alternative paradigm must be developed which will foster job-led economic growth rooted in the principles of ecology, equity, energy efficiency and employment generation. To meet the challenges facing them, developing nations must transform the poor and marginalised into agents of poverty alleviation and community development.

Agricultural research and development will clearly play a foundational role in this approach to rural prosperity. However, the broader strategy for livelihood security must also include the generation of ecojobs. These will provide economic opportunity to the resource poor through natural resource conserving and enhancing enterprises such as biopesticide production, eco-forestry and wasteland restoration, among many others. Both on and off the farm, the physical tools for these ecojobs will be provided by

ecotechnologies - the products of blending frontier technologies such as information, space and biotechnologies with the ecological prudence and practices of local communities. By combining the ecological and economic strengths of multiple approaches, and by targeting the marginalised, ecotechnologies offer interventions for sustainable development. A high potential area is the production of "biological software," that is, the wide range of biological inputs that can substitute for chemical ones in agriculture.

The JRD Tata Ecotechnology Centre was established within MSSRF to research, develop and diffuse environmentally sound technologies in partnership with farmers and rural families. The goal is to realise sustainable development at the individual and household levels, as well as at the village level. The Ecotechnology Centre includes the Biovillage Programme, the ICAR-MSSRF Integrated Pest Management (IPM) Programme and the other programmes reported in this section.

The highlights of activities undertaken within Programme Area 300 during the reporting period are presented here.

Subprogramme Area 301: Biovillages

The Biovillage Programme focuses on generating multiple livelihood opportunities within the participating villages. The programme promotes complementary, small-scale enterprises among the resource poor to maximise their productivity and to ensure reliable income and credit. With the support of UNDP, the programme has focused on 19 villages spread over 3700 ha. in Pondicherry Union Territory since January 1995. The spill over activities under IFAD and the Hunger Project for testing the feasibility of some aspects of the Biovillage paradigm were terminated by March 1996. This year, Biovillage activities were focused under four general categories:

On farm research and demonstration

Activities within this area included the production and testing of hybrid rice seeds for yield superiority. The yields obtained from these varieties were shown to be 12% higher than that of the local variety. In addition, a plot was set up during January-May 1996 to demonstrate yields of five additional hybrid rice varieties to local farmers. Research results from the previous years' trials on paddy utilising biofertilizers showed that profits could be increased to Rs. 650-2165 per hectare. This was partially due to improvement in yields (4-6%), as well as from the savings gained by utilising a reduced amount of chemical fertiliser (20%). Trials are also underway for developing Integrated Crop Management

Systems that incorporate numerous "eco-friendly" practices, including bio-fertilizers, biopesticides, judicious water management and IPM.

Enterprises for enhancing livelihood security

Mushroom cultivation was expanded by two groups in Kizhur village, and a demonstration centre was built there to train participants. The group sericulture project initiated in Pillayarkuppam village has encouraged the participants to develop a savings scheme. From the sale of the cocoons early this year, the group has accumulated savings of Rs. 1900. Production in the dairy group was also expanded. The participants already engaged in mushroom and jasmine cultivation were provided access to an additional source of income by the introduction of goat rearing.

Access to common property resources

In Khizur village the aquaculture project drew to a close in June 1995. The fish harvested brought in a combined net income of Rs. 18,100 for the participating women. A second group of nine landless women were selected to continue the project for the following year.

Support services

This included designing production schedules for vegetable growers to meet the demands of the marketing agency, introduction of processing for the mushrooms and building a database of commodity prices to render marketing advice. A collaborative effort was also

established with the Save the Grain Campaign of the Government of India, and through this 25 storage bins were constructed in two villages. Links have been established between programme participants and Indian Bank.

Subprogramme Area 302: Biological Software and Sustainable Agriculture

In India, between 15-40% of crop losses are caused by pests, diseases and weeds during cultivation, with another 10% loss in storage. Although Integrated Pest Management (IPM) technology has been developed for the major crops in India, it must be fine-tuned to suit local needs through farmer-participatory approaches.

Research on Biopesticides and IPM

Research in cotton belt of Tamil Nadu was conducted during 1995-96. Hot spot areas where use of chemical pesticides was unusually high were identified. Studies in these regions were aimed at lowering incidence of pests and diseases, conserving biodiversity, reducing use of chemical pesticides and fertilisers and developing the capacity of farmers. Based on these studies, it was determined that habitat manipulation could effectively check the build up of pests. Intercropping increased the natural enemies of pests and decreased the pest load. These

studies revealed that area-wide IPM is a profitable proposition.

Studies on groundnut IPM were carried out under rainfed conditions in Sanadhavelur village of Chengai MGR district, Tamil Nadu, during 1995-96. Development and adoption of IPM tactics for this crop centered around the cost factor. Intercropping with cowpea was effective in managing populations of red hairy caterpillar (*Amsacta albistriga*) due to the preference of the adult moth for the cowpea. Several biopesticides were evaluated for efficacy against leafminer (*Aproaerema modicella*) and leafhopper (*Empoasca kerri*)

Under the FAO-UNDP sponsored FARM Project (Farmer-centred Agricultural Resources Management) on technology upgradation and transfer of IPM methods in various rice systems, effective methods of pest and disease management were demonstrated at a number of sites. Studies revealed that bund cropping enhanced the number of natural enemies of pests in the fields. In wetland rice systems this affect was especially pronounced. A study was carried out on biomonitoring of diseases in rice

A study on **biomonitoring of diseases in rice** in lowland irrigated systems revealed that a sedge plant (*Saccharum spontaneum*) served as a bioindicator for blast (*Pyricularia oryzae*) and brownspot (*Dreschlera oryzae*) diseases of rice. These diseases occurred in the sedge 7-10 days before infecting the rice.

in lowland irrigated systems. A sedge plant (*Saccharum spontaneum*) served as a bioindicator for blast (*Pyricularia oryzae*) and brownspot (*Dreschlera oryzae*) diseases of rice. These diseases occurred in the sedge 7-10 days before infecting the rice.

Subprogramme Area 303: Integrated Intensive Farming Systems

This project was developed to chronicle successful farms from the five agro-ecological zones in Tamil Nadu. Information on these farms will be stored in a database. Extension personnel and farmers will be trained in the use and dissemination of this technology. The activities for the year 1995-96 were broadly divided into two categories:

Development of a Multimedia Database on Integrated Intensive Farming Systems (IIFS)

Data collected from IIFS farmers working in five agro-ecological zones of Tamil Nadu have been stored in a multimedia database designed at MSSRF's Informatics Centre. In the first year, twenty-seven farms were documented. Brief profiles of all the farms visited have been included in the database. From those twenty-seven, six farms were chosen as representative and detailed information was recorded. For the second year (1996-1997), plans have been made to prepare an illustrated training manual on IIFS techniques and to complete twelve case studies of IIFS farmers.

IIFS - Demonstration Site

On October 2, 1995, the 125th birth anniversary of Mahatma Gandhi, MSSRF in collaboration with Association of Sarva Seva Farms (ASSEFA) launched an IIFS programme in Puliyani village, 120 km from Madras.

The work is at the primary stage in Puliyani. It began with the establishment of a "medicinal plants" nursery and a "green" health garden. Soil samples from 20 fields and water from 30 wells in the village have been tested, and the results have been noted in "Soil Health Cards" distributed to farmers. To eradicate malaria mosquitoes, gambusia fish have been released into wells. Techniques of vermicomposting were demonstrated to the villagers. A youth association, trained in IIFS techniques, was formed in the village to disseminate information to farmers. A model farm was set up in an area of 0.5 ha. Different techniques of IIFS are demonstrated in this plot.

Subprogramme Area 304: Pilot Biopesticide Feed Stock Model of Wasteland Development

Increasing amounts of chemical fertilisers and pesticides have been used on agricultural lands, creating environmental problems. The application of biopesticides and biofertilisers offers a benign alternative. "Pilot Biopesticides Feed Stock Model" was developed for Pudupatty revenue village in Tamil Nadu. The project, funded by the Depart-

ment of Wastelands Development, Government of India, was started in April 1995. A seminar for farmers covered the cultivation and use of neem, production of neem based biopesticides, application of these pesticides to crops and soil conservation methods.

Sixteen decentralised neem nurseries were established in the field by the farmers based on the training they received. Inputs including neem seeds, farmyard manure, polythene bags and azospirillum were provided free of cost. Seedlings raised from local neem seeds and Andhra neem seeds, tissue-cultured neem seedlings and melia seeds, both local and Andhra, were planted in the village.

For the first time, a mobile soil testing unit was brought to the village. Soil samples from 130 farms were tested, as well as 20 well water samples. Recommendations were made to the farmers. A base-line survey was carried out to determine the availability of wastelands, the problems faced by farmers in developing these lands, the farmers' choice of trees and intercrops, as well as their awareness of neem based biofertilisers and biopesticides.

Subprogramme Area 305: Eco-Aquaculture

Low Input Sustainable Aquaculture (LISA)

The integrated agriculture, aquaculture and animal husbandry system called Low

Input Sustainable Aquaculture (LISA) is designed to reach resource poor, small scale farmers. This programme attempts to increase their employment opportunities, nutrition and income. This ecologically sound farming system includes the processing and utilisation of organic wastes through aquaculture (Figure 2).

Based on these principles, a project on LISA has been proposed with the following objectives:

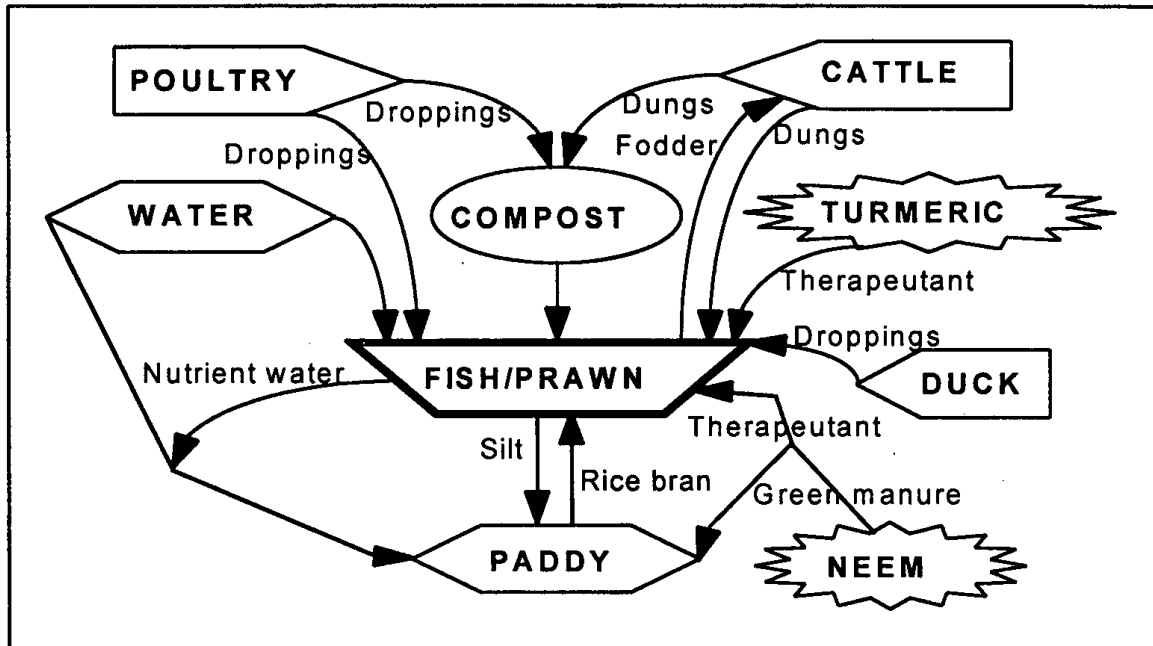
- To develop an organic inter-linkage between agriculture, aquaculture and livestock at the farm level.
- To disseminate the available techniques of utilisation of organic wastes as substitutes for chemical fertilisers in aquaculture
- To identify the non-conventional organic sources and formulate the processing methods.

The preliminary work has been initiated, and programme funding has been sanctioned from the JRD Tata Ecotechnology Centre for a period of three years.

Semi-Intensive Prawn Aquaculture Farm Project

This project was sponsored by Department of Biotechnology, Government of India, to establish a demonstration and training centre for creating a cadre of fisheries entrepreneurs who could inte-

Figure 2. Integrated farming: bio-resource model.



grate the principles of ecology and social equity. However, although all initial measures have been undertaken to set up the farm, the Supreme Court's stay order on coastal aquaculture has prevented the project from moving any further. In the interim period an epidemiological study was conducted on the white spot viral disease which decimated prawn hatcheries along the coast from Karaikal to Pondicherry. Although no control measures have been identified as yet, recommendations have been made to farmers regarding indicators of outbreak and planning for an early harvest.

Subprogramme Area 306: Seed Village

The production of hybrid seeds and planting material of fruit trees like mango provides an opportunity for adding eco-

nomie value to the labour of rural women who tend to be engaged mostly in unskilled work. The tasks of training rural families in seed production technology and ensuring quality control and remunerative marketing become easy, if such work is undertaken on a compact area basis. Thus was born the concept of "Seed Village," which is currently being practised in several parts of the country by seed companies and Agricultural Universities.

As a part of the project for promoting symbiotic partnerships between the seed industry and resource-poor rural families, the seed village project was initiated during 1995 in two villages, Kodyalam and Kuppatty of the Thally block of Dharmapuri district, Tamil Nadu. The crops chosen were brinjal (*Solanum melongena*), bhendi (*Abalmoschers*

esculentus) and sunflower (*Helianthis esculentus*). The parent seeds were provided by the Indo-American Hybrid Seeds Corporation, Bangalore. Eight farmers were trained in seed production and they raised seeds in about 2 hectares. The seeds will be purchased by the same seed corporation. It is hoped that based on the experience of the initial 8 farmers, many more families in these villages will take to seed production.

Programme Area 307: Ecohorticulture

Long term ecological sustainability over short term productivity is the focus of this project. The project provided training in ecological and horticultural technologies to 92 field supervisors from Kattangalathur and Kancheepuram. Information on this training is included in Subprogramme Area 501 of this report.

Satellite model eco-farms

After the completion of induction training the field supervisors extended their knowledge to client farmers through a series of workshops. To capitalise on the awareness created and to sustain the interest of the farmers, each field supervisor laid a model demonstration plot in his own field. The same plot was also used as a training ground for the farmers in agricultural and horticultural methods.

Marketing

In the marketing study completed last year, suggestions were made to link

farmers with corporations and to provide transportation for the collection of produce from client farmers. Both suggestions have been followed through. Kasthuri Estates and Maxworth Green Harvest have agreed to procure vegetables from these farmers at a fixed rate.

Skills competency test

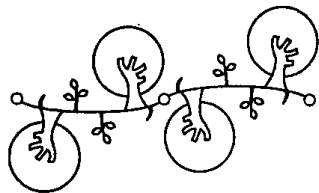
A workplace competency test has been developed by the project. This will not only evaluate skills learned by the field supervisors but also acts as a refresher course. A range of techniques in vegetable and fruit crop production were covered by the project.

Self help groups

The field supervisors in both blocks have organised self-help groups among client farmers and landless women in their villages. The main purpose of organising such a group is to encourage them to save a portion of their income. Training has been organised for field supervisors by bank officials, on organising and operating such groups.

Project evaluation

The project ended in March 1996. Mr. Basil Hoare, an external consultant, had evaluated the project during the months of February and March 1996. An attitudinal survey has been taken up with the project evaluation. The survey revealed the positive impact of the project in the locale. Even though the project ended, it will continue to support the field supervisors and the farmers by imparting need based training.



Programme Area 400

Reaching the Unreached



***T**akes the benefits of scientific research to the economically and socially disadvantaged sections of society, those which have been by-passed by technological innovation, with special emphasis on women and children.*

Highlights of the Year

Introduction

The overall objective of MSSRF's Reaching the Unreached Programme has been to involve and integrate the marginalised, especially women, more directly and holistically in the development process. This is accomplished in part by empowering them through scientific and technological innovation, but also by studying the constraints which limit their participation, and promoting the support services which can remove some of those constraints. The activities included in this programme area range from research studies utilising a blend of methodologies, to activist interventions, to training programmes aimed at involving people in the decision-making affecting their daily lives.

Food and livelihood security are a major emphasis of the programme area. The Tamil Nadu Council for Sustainable Livelihoods has been engaged in detailed studies of a small area in an effort to work out a methodology for achieving a "hunger-free" district. The study of household nutritional security attempts to isolate the

factors involved, and to relate them to a conceptual "continuum of female dependency."

The project *Children on the Agenda* focuses on child care, both as a support service, and as an entry point for women's development. The project undertakes interventions aimed at raising awareness, as well as policy change through advocacy. The key strategies are networking with a diverse group of agencies allied in a common cause, and using communication media to create wider public awareness. Training for early childhood care is given importance as a support service, while research and documentation are clearly geared to advocacy.

Empowerment of local communities, and especially women, is the goal of the programme to develop training modules for preparing Socio-Demographic Charters for villages and towns. These charters function as a tool to help people better understand their circumstances, and make decisions about their own futures.

The completion of one other initiative related to this programme area is recorded in this section: the Small Farmers' Agribusiness Consortium, begun in '93.

The highlights of activities within each subprogramme area during the reporting period are presented here:

Subprogramme Area 401: Tamil Nadu Council for Sustainable Livelihood Security/Livelihoods

The work on the design document of the Hunger-Free Area Programme (HFAP) has been completed, including a macro-level study of the Dharmapuri district of Tamil Nadu and three micro-level studies based on a common framework:

- The first of these, set in Dharmapuri district, directly involved grassroots workers and focused on the need to converge existing programmes and government staff in addressing hunger related problems.
- The second study, set in Madurai district and undertaken with the Indian Council for Child Welfare, revealed that female infanticide is more closely related to the financial inability to perform rituals related to the girl child and woman than it is to "poverty."
- The third study was set in Pudukottai district and demonstrated that access to food is complicated by many other factors, including the health system.

To translate the HFAP into grassroots action, an operational framework has been suggested for pilot projects leading to a National Sustainable Food and Livelihood Security Act. The framework proposes a grassroots level corps of hunger fighters and a broad-based grassroots coalition of all the players from the public and private sectors. Preliminary analysis has included documentation of existing welfare and anti-poverty programmes with the intent to understand the process of receiving benefits.

Subprogramme Area 402: Project ACCESS and Children on the Agenda

Project ACCESS is currently the convenor of the Tamil Nadu Forum for Creche and Child Care Services (TN-FORCES), a network of 63 NGOs, trade unions, women's associations and others. This year, TN-FORCES took up Gender Sensitisation an additional theme for 1996. Work continued on the previous years' themes of Burden on the Pre-school Child and Maternity and Child Care Services.

In the area of advocacy, which is done mainly through the network, the core group prepared a charter of demands for women and young children in the form of an appeal to all political parties to address these issues in their election manifestos. The media group completed a study on the portrayal of women in Tamil cinema. The child health group was able to win two concrete benefits,

both announced in the budget speech for 1995-96:

- Six months maternity leave to women workers in the organised sector.
- Extension of Noon Meals to pregnant women and lactating mothers for six months.

On the theme of Burden of the Pre-school Child, the Southern Regional group developed six street-plays now being multiplied through workshops, as well as audio and video materials.

In the area of communication, a series of stories generated through the writer's workshop were published in a variety of weeklies and monthlies. The short story competition in *Rani*, a popular women's magazine with a wide rural circulation, drew 600 stories. There has been an unprecedented public response to the short messages developed by the project and telecast on Doordarshan.

In the area of research, studies on child care strategies of women working in the unorganised sector and the utility of the soft toy kit in balwadis have been published.

In addition, a study on job satisfaction and work conditions of child care providers is in the final stages and a draft report of the multi-centric study on women's multiple roles and the management of breast feeding is now in the process of critiquing.

In the final area of training and instructional materials, the manual *Playing to Learn* has met with an excellent response, and has already been reprinted. Negotiations are on for its translation into Hindi and regional languages.

Subprogramme Area 403: Multiple Approaches in ECCE in India

This project came to a close at the end of 1995, with eight case studies of innovative programmes in Early Childhood Care and Education (ECCE) published under the title of the SURAKSHA series. The studies form the basis for an intensive campaign of advocacy and dissemination through distribution at conferences and seminars, as well as promotion through advertising in journals and direct mailing of fliers. Positive feedback and continuing demand demonstrate the utility of such documentation.

The culmination of the project was a workshop on Innovative Approaches in ECCE in India held in December 1995 at Delhi, jointly organised by MSSRF and the National Institute for Public Co-operation and Child Development. The meeting brought together policy makers, scholars and practitioners to discuss ways and means of applying the insights gained from the studies in the mainstream of ECCE across the country.

Subprogramme Area 404: Household Nutritional Security

Households are conventionally classified as either male-headed or female-headed. However, female dependency, or the economic contribution of women to their families, may be better understood as a continuum bounded by each of those extremes. In many households that are not "female-headed," the woman's economic contribution plays a vital role, especially in food security.

During the past year, a study was completed on the relationship of food security to this continuum, set in five areas representative of the agro-ecological zones of Tamil Nadu and in two urban slums. Although 86% of the households studied depended to varying extents on the economic contribution of women, only

14% could be said to be "female-headed," that is, with no male presence. While the 14% of households which were female-headed showed the least food security, the progression between other levels was not linear. Conclusions were drawn regarding the inadequacy of programme interventions for women who shoulder major responsibility for their families, as well as on the need to restructure interventions, and especially child care, to better support women in fulfilling their actual economic role.

Subprogramme Area 405: Agribusiness for Small Farmers

The UNDP/Planning Commission-sponsored project on "Planning for Full Employment: Strategies for the Small Farmers Agribusiness Consortium

Table 4. Selected enterprises identified for SFAC Pilot Projects.

State	Selected Enterprises Identified
Kerala	Aquaculture, coconut, floriculture
Tamil Nadu	Horticulture, sericulture, wasteland enterprises
Pondicherry	Horticulture, poultry, oilseeds
Rajasthan	Arid horticulture, seed village, nontraditional oilseeds
Gujarat	Horticulture, aquaculture
West Bengal	Marketing of flowers, vegetable, wasteland enterprises
Karnataka	Oleoresins, particleboard and cotton pressing, gining
Andhra Pradesh	Sericulture, wasteland enterprises, animal husbandry
Uttar Pradesh	Medicinal plants, cold water fisheries, nut fruits
Assam	Rural infrastructure enterprises, ecotourism, papaya
Orissa	Aquaculture, aromatic plantations, horticulture
Madhya Pradesh	HYV vegetables, potato cultivation, vegetable processing

(SFAC)" aims to take the benefits of scale associated with agribusiness to small farmers. The consortium will engage research institutions, government departments, private industry, the financial sector, NGOs and the media. MSSRF's mandate was to develop 12 major projects in different parts of the country, based on an appropriate mix of enterprises, with active participation by state governments, financial institutions and farm families. Table 4 provides selected information on the pilot projects proposals. The project design phase was completed in November 1995.

MSSRF has prepared, at the request of the Secretary of Agriculture, Government of India, a proposal for establishing a National Resource Centre for Agribusiness Entrepreneurship Development, with the objective of catalysing the implementation of the district project proposals. At the request of SFAC, Ministry of Agriculture, MSSRF held a national level workshop on the implementation aspects of the SFAC programme in March 1996.

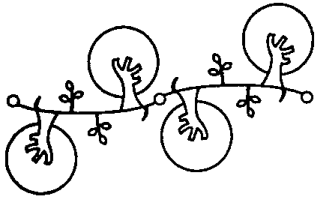
Subprogramme Area 406: Training Modules for Enabling Elected Members of Village Panchayats to Prepare Socio-Demographic Charters

As a result of the 73rd and 74th Constitutional Amendments, a need has arisen to train first time decision makers as they are elected to Panchayats and other lo-

cal government bodies. With the financial support of the John D. and Catherine T. MacArthur Foundation, MSSRF has undertaken the preparation of such training modules. These are intended to enable elected members of local bodies to prepare Socio-Demographic Charters with the twin goals of priority setting in meeting the unmet minimum needs of the local population, and the sustainable utilisation of natural resources.

At a national consultation held at MSSRF in June 1995, scholars, government officials and representatives of local bodies finalised a methodology for the project. The subsequent study was conducted in the states of Karnataka, Rajasthan, Tamil Nadu and West Bengal and the Union Territory of Pondicherry. A comprehensive checklist was next developed to gather information on minimum needs and awareness regarding Panchayati Raj through in-depth focus groups and interviews, particularly with women. Modules in the areas of health, education, environment, hygiene, housing, nutrition and gender issues have been prepared, and pre-tested in a few field situations.

In March 1996, a national conference on "Devolution of Finances to Local Bodies," was organised by MSSRF, the Tamil Nadu State Finance Commission and the Madras School of Economics. Participants emphasized the need to give local bodies the necessary financial autonomy and power to mobilise funds from various sectors.



Programme Area 500

Education, Communication, Training and Capacity Building



***F** ocuses on the organisation of workshops, training seminars and interdisciplinary dialogues as well as on the development of communications systems ranging from high technology to mobilisation of folk media and participatory theatre forms.*

Highlights of the Year

Introduction

Each of MSSRF's major programme areas incorporates elements of communication and education as basic strategies for achieving their specific aims. Therefore, the activities of Programme Area 500 enervate every aspect of the Foundation's work.

The broad spectrum of issues and settings for MSSRF's communications activities necessitates the utilisation of a wide range of media forms, which offers unique opportunities for blending the best of traditional approaches with the latest in information technology. Publications disseminate the results of our activities; training programmes, workshops and "farmer to farmer" networking build capacity for sustainable development regionally as well as at the grassroots; a series of annual conferences fosters dialogue on problems that require multidisciplinary solutions; folk and traditional theatre offers opportunities for people to confront and reflect on development issues through familiar cultural tools; the Asian Ecotechnology Network was established to catalyse the development and dissemination of

ecotechnologies regionally; a homepage on the World Wide Web puts MSSRF on the Internet at <http://www.mssrf.org>.

The *Honda Informatics Centre* was established to provide researchers in agriculture and the environmental sciences access to a large collection of CD-ROMs and other information systems. The development of multimedia databases is an area of special focus, creatively utilising information technology to document, preserve and disseminate the traditional knowledge of tribal and rural peoples. Efforts in this area include:

- The Mangrove Ecosystems Information Service, a unique global-level database.
- The Farmers' Rights Information Service, established as a component of MSSRF's Technical Resource Centre on the Implementation of the Equity Provisions of the Convention on Biological Diversity.
- A database on the ecological farmers of South India, based on data from MSSRF's study on Integrated Intensive Farming Systems.

The highlights of activities undertaken within Programme Area 500 during the reporting period are presented here.

Subprogramme Area 501: Training Programmes in Ecohorticulture

About 1000 farm families have benefited from this programme, while many more have been impacted indirectly. Participating farmers organised themselves into small groups to undertake agribusiness activities. Training in agribusiness opportunities was given to these groups with the help of financial institutions. An "Impact Evaluation Study" was carried out by the International Agricultural Training Programme (IATP) from 20 February to 21 March 1996. The study showed that the concept of recruitment and training of extension workers from within the villages has proved to be successful, and the adoption of increased use of organic farm practices was an important achievement.

Subprogramme Area 502: Conferences, Workshops and Training Programmes

Impact of Climate Change on Food and Livelihood Security: An Agenda for Action

The Global Climate Convention signed at Rio de Janeiro in 1992 and the subsequent Conferences of Contracting Parties

underline the urgency of steps for avoiding potential adverse changes in temperature, precipitation, sea level and the incidence of ultraviolet-B radiation. This workshop was designed to address the issues relating to climate impact with particular reference to potential sea level rise, coastal planning, energy policy and food and livelihood security. Co-sponsored by MSSRF and the Climate Institute, Washington DC, USA, and held in Madras on 4-6 December 1995, the meeting was convened to develop precise action plans in these areas and others related to climate change for South and Southeast Asia (selected recommendations listed on page 46).

Agrobiodiversity and Farmers' Rights: Technical Consultation on an Implementation Framework for Farmers' Rights

The Convention on Biological Diversity offers new opportunities to recognise and reward the contributions of tribal and rural peoples in the conservation and enhancement of agrobiodiversity, which is the basis of the concept of Farmers' Rights. The urgency to do so is increased by the Trade Related Intellectual Property provisions of the World Trade Agreement, which mandate the protection of plant varieties as the intellectual property of breeders. Within this context, a Technical Consultation was held at MSSRF from 15-18 January 1996 to develop an implementation framework for Farmers' Rights at both the national and global levels. The meeting was

Selected Recommendations of Participants at the Climate Change Conference

Coastal

Support for a South Asian Anticipatory Network on Climate Change and Sea Level Rise to delineate areas vulnerable to inundation, tropical cyclones, storm surges and subsidence; identify sites such as mangroves, coastal forests, sand dunes and areas subject to saltwater intrusion; and advise on disaster prevention strategies.

Develop a pilot project selecting a delta and examining mangroves, storm surge effects, ground water, agricultural and timber uses, aquaculture, fisheries, sociological aspects, etc.

Improve early warning systems for, and responses to, extreme events.

Set up, in each coastal state, a Coastal Zone Management Authority with sufficient powers and resources - government and planning agencies to take climatic impacts into account when new developments in coastal areas are being considered. It was agreed that climate change and sea level rise were only additions to the huge pressures coastal areas already face.

Conduct research to develop genetic material capable of performing under conditions of sea level rise, for instance mangroves, sea grasses, salt resistant crop varieties, etc.

Energy

Endorse more active efforts to develop renewable technologies and expand their use including non-grid connected power generation to serve remote populations in a decentralised fashion.

Promote technology transfer from developed countries and indigenous R&D in fields which have both energy and environmental implications such as CFC free refrigeration, energy from wastes, biomass production and utilisation, photovoltaics especially relevant to tropical countries, clean coal technologies and solar desalination for clean drinking water.

Conduct demonstration projects for proof of concept and subsequent commercialisation in specific areas, such as the city of Madras - MSSRF is a solar power example itself.

Invest in maintenance and efficient distribution of energy.

Food Security

Identify/develop environmentally friendly agro-techniques and increase research on crop varieties adapted to suit warmer/drier growing conditions.

Assess both the most favourable and the most seriously affected agro-ecozones, and identify suitable cropping systems and component technologies - increase the use of remote sensing data and geographical information technology.

Involve rural communities in formulating, implementing and evaluating local level initiatives to improve sustainability of food production - address the constraints faced by women in the farming work force.

Prepare educational material, including video tapes, in local languages on climate change and its impact on agriculture, soil and human health for villages and towns.

Encourage ecologically sustainable aquaculture and introduce appropriate provisions for this purpose in the Coastal Zone Regulation Act.

organised with support from FAO and SIDA. The results of the conference were published and distributed at the Fourth International Technical Conference on Plant Genetic Resources, convened by FAO in Leipzig, Germany, 17-23 June 1996, where the realisation and funding of Farmers' Rights was a major issue.

Asian Regional Workshop on Ecotechnology and Shaping the Future

This conference was convened at MSSRF from 4-8 February 1996 to lay the foundations of the Asian Ecotechnology Network, a regional component of the Ecotechnie Programme of UNESCO and Equipe Cousteau. Over seventy participants from around Asia, including scientists, experts in rural development and political leaders, worked together to formulate a plan of action for the Network's mission of catalysing the development and dissemination of ecotechnologies regionally. A Network Advisory Committee has been formed to provide overall policy guidance. The conference also marked the inauguration of an UNESCO-Cousteau Ecotechnie Chair at MSSRF. Prof. Federico Mayor, Director General, UNESCO, announced that the first holder of this chair will be Prof. M.S. Swaminathan.

***Kulavai*: An Affirmation**

This national workshop on women and theatre was organised by MSSRF's Voicing Silence theatre group at Madras

between 6-9 February 1996. It was envisaged as a forum for consolidating women's presence in the medium of theatre, in terms of quality, achievement and strength. The workshop brought together both theatre workers with established reputations and activists using theatre as a tool for gender related cultural work. The event was funded by several agencies, and has been documented in an one-hour video film.

Science Academies Summit: Uncommon Opportunities for a Food Secure World

With the emerging potential of biotechnology, information systems and ecological farming, science now offers unprecedented opportunities to reach the goal of "food for all." The scientific and policy framework for this achievement must be provided through an evergreen revolution based on the principles of ecology, social equity and employment generation. This conference was held at MSSRF from 8-11 July 1996 to develop a joint statement from participating Academies to the world leaders who will gather in Rome for the World Food Summit in November 1996. This Madras Declaration presents a scientific and public policy agenda to achieve universal food and nutrition security through action at the national and international levels. The Summit was co-sponsored by the National Academy of Agricultural Sciences of India, the Italian National Science Academy and the Third World Academy of Sciences.

Training Programme on Yeast Genetic Manipulation and Molecular Markers

A two week long training programme was conducted by MSSRF's molecular biology group from 27 November to 11 December 1995, with the financial support from the Department of Biotechnology, Government of India. Sixteen active researchers from various institutions were selected as participants. The programme covered DNA isolation methods, DNA purification and estimation methods, RAPD and RFLP techniques, statistical analysis of data, pulsed field gel electrophoresis, protein purification methods, yeast culture and transformation, as well as other techniques.

Subprogramme Area 503: Communication for Development

Traditional Communication

This year MSSRF once again supported performances of *Pancha Bootham*, a play based on the theme of sustainable development, this time performed by the young apprentice artists of Kattai Koothu Munnetra Valarcchi Sangam. To simultaneously train young people and promote the art form, the Sangam conducts training sessions every winter for boys between the ages of eight and twenty-five. Of the six training courses held during 95-96, one learned this play.

Voicing Silence

In its third year, the Voicing Silence theatre group carried out a wide range of activities on women's development, from performances to a national workshop. The play, *Pacha Mannu* (The New Born), was developed on the theme of female infanticide and foeticide. *Pacha Mannu* is an experience, not just a play, in that it helps both the participants and spectators explore the complex cycle of events that shape the life and identity of a woman. Designed for street theatre, the play has been performed more than forty times in a series of cultural tours (*Jathas*) in both urban and rural Tamil Nadu. Performances are continuing, and deep responses have been evoked from both audiences and participants.

With the help of Arivoli Iyakkam, a workshop for women quarry workers of Pudukkottai district of Tamil Nadu was organised on 6-8 October 1995. Eighteen women of varying age, marital status and community participated in the workshop. It was designed to help women analyse their personal and public life in the context of the changed economic scenario following the success of the women-led cooperatives of quarry workers during the last five years. The workshop raised issues of caste identities which normally tend to be glossed over by development projects. Based on their life stories, a play was developed, entitled *Pugai Pokkigal* (Chimneys), and plans have been made to develop it further for local performances in the coming year.

Publications

Books / Monographs / Manuals

Hoon, Vineeta. 1996. *Living on the Move: The Bhotiyas of the Kumaon Himalaya*, Sage India, New Delhi.

Karikalan, S.J.P. 1995. *Moving up to school: community preschools for the rural poor - PWDS*, Martandam. Suraksha Monograph series No. 6. Mina Swaminathan (Ed.). Madras, MSSRF. pp 38.

MSSRF. 1995. *Protecting Endangered National Parks*. Rajiv Gandhi Institute for Contemporary Studies Project No.7. pp 206.

MSSRF. 1996. *Asian Biotechnology and Biodiversity. A training module for Asia-Pacific Farmer Centred Agriculture Resource Management (FARM)*.

Pandit, Harshida. 1995. *Children of the union: creches for women tobacco workers' children - SEWA, Ahmedabad*. Suraksha Monograph series No.5. Mina Swaminathan (Ed.). Madras, MSSRF. pp 46.

Samuel, Raja S. (Ed.) 1996. *Design for Partnership*. Proceedings of the consultation on government and non-governmental organisations partnership in child care, Proceedings No. 12. MSSRF, Madras. 4-5 November.

Singh Asha and Mina Swaminathan. 1995. *Playing to learn: a training manual for ECE*. MSSRF, Madras.

Sharma, Jyoti. 1995. *Working hand in Hand: NGO Government partnership in child care - Bal Niketan Sangh*. Suraksha Monograph series No.8. Mina Swaminathan (Ed.). Madras, MSSRF. pp 46.

Sriram, Rajalakshmi. 1995. *Another kind of child care: alternatives for rural women - Mahila Samakhya*, Gujarat. Suraksha Monograph series No.7. Mina Swaminathan (Ed.). Madras, MSSRF. pp 64.

Swaminathan, M.S. (Ed.) 1996. *Agro-biodiversity and Farmers' Rights*. M.S. Swaminathan Research Foundation, Proceedings No. 14. pp 223.

Swaminathan, M.S. 1996. *Sustainable Agriculture: Towards an Evergreen Revolution*. Konark Publishers Pvt. Ltd., Delhi. pp 232.

Swaminathan, M.S. 1996. *Sustainable Agriculture: Towards Food Security*. Konark Publishers Pvt. Ltd., Delhi. pp 272.

Swaminathan, M.S. and Sanjay V. Deshmukh. (Eds.). *Genetic engineering and adaptation to climate change: establishment of a genetic resources centre for identifying and conserving candidate genes for use in the development of transgenic plants*. Final Report. M.S.Swaminathan Research Foundation, Madras. pp 523.

Swaminathan, Mina. 1995. *Play activities for young children*. TINIP, Communication and Training Centre, Taramani, Madras, MSSRF, (Tamil).

Swaminathan, Mina. 1996. *Play activities for young children*. DTERT, Madras, (Tamil).

Swaminathan, Mina. 1996. *Learning from Innovations*. Proceedings No. 13. Consultation on Innovative Approaches in ECCE in India, MSSRF, Madras.

Swaminathan, Mina. (Ed.) 1996. *First three years: a manual for ECCE* DTERT, Madras. (Tamil).

Reports / Theses

Arul Raj, M.R. and S. Raja Samuel. 1995. *Balancing multiple roles*, Research Series No. 1, MSSRF, Madras. pp 42.

Hoon, Vineeta, Latha Nagarajan, and D. Dhanapal 1995. *Small Farmers Agri-business Consortium (SFAC). Consolidated report on SFAC*, MSSRF, Madras.

Selvam, V. 1996. *Integrating Conservation with Development in Mangrove Ecosystems in Tamil Nadu*. CIDA Project Final Report, MSSRF, Madras.

Venkataramani, G., Sudha Umapathy, L. Pandiarajan, M. Nageswaran. 1995. *Development of multi-media database on integrated intensive farming systems based on ecological techniques from different agro-ecological zones of Tamilnadu*. Project annual report, MSSRF, Madras.

Articles in Journals / Books (1995-1996)

Balakrishna, P. 1995. Screening of salt tolerant varieties of rice (*Oryza sativa*) through scanning electron microscopy and ion analysis. *The Indian Journal of Agricultural Sciences*. 65:896899.

Balakrishna, P. 1995. Agriculture and biotechnology for sustainable development. *VIII Kerala Science Congress Compendium*. pp 60-69.

Balakrishna, P. 1996. Role of traditional cultivars and *in-situ* conservation in sustainable agriculture: A case study in rice (*Oryza sativa*). *FAO/IPGRI Plant Genetic Resources Newsletter* (in press).

Balakrishna, P. 1996. Salt secretion in rice, *Oryza sativa*. *Rice Biotechnology Quarterly*. (in press).

Balakrishna, P. 1996. Advances in rice biotechnology. *Lessons from the past into the future*. Kachroo, B K (Ed.), Oxford & IBH, New Delhi. (in press).

Balakrishna, P. 1996. Molecular based conservation: an appraisal. *Current Science*. (in press). vol. 70(9). 774.

Daniels, R.J.R. 1995. Environment and adaptive biology of plants. *Current Science*. 69:72

Daniels, R.J.R. 1995. Leks. *Current Science*. 69: 703-704.

- Daniels, R.J.R. and M. Jayanthi 1996. Biology and conservation of endangered plants: The need to study breeding systems. *Tropical Ecology*. 37(1).
- Daniels, R.J.R., N.V. Joshi, and M. Gadgil. 1995. Human extraction and its influence on the humid tropical forests of the Uttara Kannada district, South India. *Journal of Applied Ecology*. 32:866-874.
- Daniels, R.J.R. and J. Vencatesan. 1995. Traditional ecological knowledge and sustainable use of natural resources. *Current Science*. 69(7):569-570.
- Daniels, R.J.R. 1996. The vanishing aborigines of the Andaman and Nicobar Islands. *Current Science*. 70(9):775-776.
- Daniels, R.J.R. 1995. Amphibians of West Bengal Plains. *Cobra* 20:20-21.
- Daniels, R.J.R. 1995. Habitat selection in Western Ghats - Amphibians - *Anura*: Implications for species conservation. *Cobra* 20:7-15.
- Daniels, R.J.R. and M.S. Ravichandran. 1995. The Ceylonese tree frog *Polypedates cruciger Blyth*: a new record for India. *Asiatic Herpetological Research*. 6:36-37.
- Daniels, R.J.R. 1995. Notes on the status of Monitor Lizards and Crocodiles in India. *Cobra* 21:6-11.
- Finch Rob P. and P. Balakrishna. 1996. Molecular analysis of biodiversity in *Porteresia coarctata*. *International Rice Research Newsletter*. (in press).
- Finch Rob P., P. Balakrishna and N. McRoberts. 1996. Analysis of genetic diversity in natural populations of *Porteresia coarctata* (Roxb.) T. Using PCR based fingerprinting techniques. (in press).
- Hoon, Vineeta. 1995. IPR and Mountain Communities. M.S. Swaminathan (Ed.) *Farmers Rights and Plant Genetic Resources: Recognition and Reward*, Macmillan India Ltd. pp 131-134.
- Hoon, Vineeta. 1995. Strategies to a job led growth: Small farmers producer groups. M.S. Swaminathan, N.S. Randhawa, T.N. Ananathkrishnan and P. Narain (Eds.) *II Agricultural Congress - 1995 proceedings*. National Academy of Agricultural Sciences, IARI, New Delhi. pp 114-122.
- Jayanthi, M. and R.J.R. Daniels. 1996. *Crotalaria longipes* in the Nilgiris and Kolli hills, S. India. *Plant Talk* 5:27-28.
- Jayaraj, S. 1995. Use of polymers in the development of agriculture. *Future Trends in Chemical Engineering Applications*. (Eds.) Y.B.G. Varma and M.S. Ananth. Indian Institute of Technology, Madras.
- Krishnamurthy, K.V. and G.N. Hariharan. 1995. Lichens. *History and progress of botany in India, modern period*. Johri, B.M. (Ed.), Oxford & IBH, New Delhi, pp 375-385.
- Kumar Anil N. and M. Sivadasan. 1996. *Sida ravii*, a new species of *Malvaceae* from India. *Willdenowia* 25:651-654.
- Kumar, Anil N. 1996. Resource Centre for Farmers' Rights. *Agrobiodiversity and Farmers' Rights*. Proceedings of a Technical Consultation on an Implementation Framework for Farmers' Rights. M.S. Swaminathan Research Foundation, Madras. pp 176-177.
- Mangai, A. 1995. Conceptualising modern theatre art. *Tamizh Nataka Malar*. pp 163-166. (Tamil).

- Mangai, A. 1995. Theatrical events centering women - notes for discussion. *Nataka Veli*. 30:8-13. (in Tamil).
- Mathan, N., M. Parani, Ajay Parida, Sudha Nair. RAPD analysis of root nodulating organisms isolated from *Arachis hypogea*. Letters in *Applied Microbiology* (in press).
- Parani, M. and A. Parida, 1996. Genetic Diversity in *Tylophora Indica*. *Journal of Biotechnology and Biochemistry*. (in press).
- Ramanan, B.V., P. Balakrishna, and T.S. Suryanarayanan. 1996. Screening of traditional rice varieties (*Oryza sativa*) and wild rice (*Porteresia coarctata*) for endophytes. *Rice Biotechnology Quarterly*. (in press).
- Ravishankar, T. 1995. Strengthening role of tribal communities in biodiversity conservation. *Proceedings of WWF National Conservation Congress*. New Delhi, India. pp 65-67.
- Ravishankar, T. 1996. Resource Centre for Farmers' Rights. *Agrobiodiversity and Farmers' Rights*. Proceedings of a Technical Consultation on an Implementation Framework for Farmers' Rights. M.S. Swaminathan Research Foundation, Madras. pp 174-176.
- Ravishankar, T. 1996. Role of tribal people in the conservation of plant genetic resources. *Ethnobiology and Human Welfare. Proceedings of IV International Congress on Ethnobiology*. New Delhi, India. pp 310-314.
- Ravishankar, T. and V. Selvam. 1995. Contributions of tribal communities in the conservation of traditional cultivars. *Using diversity; enhancing and maintaining genetic resources on farm*. Louise Sperling & Michael Loevinsohn (Ed.), IDRC, New Delhi. pp 78-86.
- Swaminathan, M.S., Anuja Gulati, R. Prabhakar Rao and R. Ravichandran. 1995. Population programmes in the context of democratic decentralization: allocation of responsibilities and resources to Panchayats and Nagarpalikas. Srinivasan, K. (Ed.) 1996. *Population Policy and Reproductive Health*. Hindustan Publishing Corporation. pp 181-186.
- Swaminathan, M.S. 1995. Farmers' rights: fair shares for all in progress towards saving India's genetic diversity. *Plant Talk*. pp 16-17.
- Swaminathan, M.S. 1995. Agricultural productivity: key to food security in Asia-Pacific. *APO Productivity Journal*, summer 1995. pp 112-142.
- Swaminathan, M.S. 1995. A plant variety protection system for India. *Newer forms of intellectual property protection: proceedings of the workshop*. Swaminathan, K.V. (Ed.). Waterfalls Institute of Technology Transfer. New Delhi. pp 64-74.
- Swaminathan, M.S. 1995. Agriculture, food security and employment: changing times, uncommon opportunities. *Nature & Resources*. 31(1): 2-15.
- Swaminathan, M.S. 1995. Blossoms in the dust. *People & the Planet*. 4(4): 26-27.
- Swaminathan, M.S. 1995. Intensive farming: rationale of integrated systems. *Survey of Indian Agriculture*. The Hindu, Madras. pp 7-13.
- Swaminathan, M.S. 1996. Ensuring food for all. *Science & technology for achieving food, economic & health security*. Rao, U.R. (Ed.). Prism Books, Bangalore. pp 123-168.

Swaminathan, M.S. 1996. The increasing role of science and technology in national development in the 21st century: new challenges for developing countries. *Biotechnology for development: a compendium of essays*. Das, M.R., and Mundayoor, Satish. (comp.) The State Committee on Science, Technology and Environment, Kerala. pp 1-29.

Vencatesan, Jayshree. 1996. Women's multiple roles and coping strategies: myths and realities. *Indian Journal of Gender Studies*. 3(1): 39-56.

*Swaminathan, M.S. 1994. A plant variety protection system for India. *GATT accord: India's strategic response*. Ramchandriah, V. (Ed.). Commonwealth Publishers, New Delhi. pp 175-188.

*Swaminathan, M.S. 1994. Draft Plant Varieties Recognition and Protection Act: rationale and structure. *GATT accord: India's strategic response*. Ramchandriah, V., (Ed.). Commonwealth Publishers, New Delhi. pp 189-243.

Presentations in Conferences / Symposia

Anand, Ajith. 1996. Marker aided studies for screening genetic stability in micropropagated plants of *Piper* species. Abstract presented at the *National Seminar on Spices Biotechnology*, BIOSAAP, Calicut. 24-25 April.

Balakrishna, P. 1995. Plant tissue culture and commercialisation in sustainable development. Abstract presented at *II International Plant Tissue Culture Conference*, Dhaka, Bangladesh. 15-17 December.

Balakrishna, P. 1996. New approaches to insect control. Paper presented at the *National Academy of Agricultural Sciences (NAAS)*, Seminar, Pune. 15-17 April.

Balakrishna, P. and P. Rob Finch. 1995. Studies on the evaluation of *Porteresia coarctata* as a donor of salt tolerance into *Oryza sativa*. Paper presented at the *III International Rice Genetics Congress*. Manila, Philippines. 16-20 October.

Daniels, R.J.R. 1996. Economic valuation of biodiversity: an ecological perspective. Paper presented at the *Indo-British workshop on Biodiversity Conservation and Evaluation*. TBGRI, Trivandrum. 15-17 February.

Gulati Anuja., R. Prabhakar Rao and R. Ravichandran. 1995. Socio-Demographic Charters: an area specific planning tool. Paper presented at the *National Symposium on Rejuvenating Grassroot Democracy and Federalism*. Madras. 6-7 October.

Gulati Anuja. and R. Prabhakar Rao. 1995. Gender code: operating guidelines for Panchayat members. Paper presented at *International workshop on impact of climate change on food and livelihood security: an agenda for action*. Madras. 4-6 December.

Gulati Anuja. and R. Prabhakar Rao. 1996. Planning for local self government. Paper presented at the *Asian regional workshop on eco-technology and shaping the future*. Madras. 4-8 February.

Gulati Anuja., R. Prabhakar Rao and R. Ravichandran. 1996. Training and education for womens' empowerment: a case study approach. Paper presented at *National seminar on decentralisation and development following the 73rd amendment*. New Delhi. 22-23 March.

* Not included in 1994-95 Annual Report due to late publication.

- Gulati Anuja., R. Prabhakar Rao, R. Ravichandran and K.G. Raj Mohan. 1996. Devolution of finances to local bodies. Paper presented at the *National conference organised by the State Finance Commission, Tamil Nadu*. Madras School of Economics and MSSRF, Madras. 14-15 March.
- Hoon, Vineeta., N. Latha and D. Dhanapal. 1995. A full employment strategy for the developing countries. Paper presented at the *International seminar on social democracy in the newly emerging global order*. Jawaharlal Nehru University, New Delhi. 6-8 November.
- Hoon, Vineeta. 1996. Development of Gender and Environment balanced eco-technology for sustainable mountain development. Paper presented at a *Workshop on Role of Bamboo, Rattan and Medicinal Plants in Mountain Development*, organised by IDRC, INBAR, ICIMOD and IBPGR, Pokhara, Nepal. 13-17 May.
- Hoon, Vineeta. 1995. Small farmers, tribals and seed business. Paper presented at the *Workshop on integrated seed systems for low input agriculture*, Palawija Project, Malang Indonesia. 24-27 October.
- Hoon, Vineeta. 1995. Forest Management and Indigenous People: Potential for Participation. Paper presented at the conference on *Indigenous knowledge on forests*. Maxmueller Bhavan, New Delhi, organised by ETH, Zurich and GTZ. 28-30 March.
- Jayanthi, M. 1996. Somatic embryogenesis and genetic variation studies in regenerants of *Tylophora indica* (Burm. F) Merrill. Paper presented at the proceedings of the *National symposium on current trends in Plant Biochemistry and Biotechnology*. Hisar. 23-25 February.
- Jayanthi, M., Ajith Anand, C. Srinivasa Rao, V.M. Patil and P. Balakrishna. 1996. In vitro propagation of some medicinal plants and wild relatives native to Western Ghats. Abstract for the *National Symposium on Plant Tissue Culture*. G B Pant University, Pantnagar. 10-12 April.
- Jayaraj, S., N. Sathiah, S. Malarvannan, M.P. Parthiban and M. Ansar Ali. 1995. Integrated pest management in rice, cotton and groundnut. Paper presented at the *Workshop on Ecological Agriculture: Role of Integrated Pest Management* held at MSSRF, Madras. 14-15 April.
- Jayaraj, S. 1995. Scenario studies for future agriculture and crop protection in India. Paper presented at the *XIII International Plant Protection Congress* held at The Hague, The Netherlands. 2-7 July.
- Jayaraj, S. 1995. Integrated pest management for sustainable development. Paper presented at the Dr. T.V. Ramakrishna Ayyar Birth Centenary Lecture, *National Symposium on Biotechnological Inputs in Insect-Plant Interactions*, Entomology Research Institute, Loyola College, Madras. 14-16 December.
- Jayaraj, S. 1996. Biological control and integrated pest management. Paper presented at the *VII Dr. C. P. Alexander Memorial Lecture 1996*, University of Delhi, Delhi. 18 January.
- Kumar Anil N. and G. Venkataramani. 1996. Paper presented on Floristic Richness of Sacred Groves of Kerala at *National conference on conservation of sacred groves of India* organised by WWF-India, Hyderabad. 20-21 April.

- Kumar, Anil N. 1996. Paper presented on Status and Distribution of Medicinal Plants in Southern Western Ghats, India. *ARI Golden Jubilee Seminar on Perspectives of Medico-Botany*, Agharkar Research Institute, Pune. 5-7 June.
- Mohan, M.S.S., G.N. Hariharan, R.J.R. Daniels. 1995. Biomonitoring mangrove ecosystems: a case study using lichen biodiversity and their distribution pattern in Pichavaram, South India. Paper presented at the *V Annual Meeting of Indian Association for Angiosperm Taxonomy and National Symposium on New Directions in Plant Biodiversity Research* held at Bharathiadasan University. Tiruchirapalli. 27-29 September.
- Nair, Sudha. 1995. Biodiversity and environmental pollution. Paper presented at the *National Symposium on chemopollutants and sustainable ecosystems*. Hyderabad. 23-25 November.
- Nair, Sudha. 1995. Bioinformatics and release of novel organisms into the environment. Paper presented at the training programme on *Information resource on the release of organisms into the environment* at Bioinformatics Information Centre, University of Pune, Pune. 21-26 August.
- Parida, A., M. Lakshmi, M. Parani and C.S. Anuratha. 1996. Biotechnology and Biodiversity: Use of molecular markers in the conservation and sustainable utilization of mangrove species. in: proceedings of the *X International symposium on Biotechnology*, Sydney, Australia. 25-30 August.
- Sekar, K., N. Brindha and N. Latha. 1995. Problems and alternatives in marketing of vegetables: our experience. Paper presented at the *International Convention for Vegetable Dealers*. New Delhi. 21-24 November.
- Selvam, V. and K.K. Ravichandran. 1996. Community participation in the restoration of degraded mangroves: a case study of Pichavaram mangroves, Tamil Nadu, India. Paper presented at the ECOTONE V Seminar on *Community participation in Conservation, Sustainable Use and Rehabilitation of Mangroves in South Asia*, Ho Chi Minh City, Vietnam. 8-12 January.
- Selvam, V. and K.K. Ravichandran. 1996. Restoration Ecology of the Mangrove Wetlands. Paper presented at the *National Seminar on Ecologically Sensitive Ecosystem*, Annamalai University, Porto-Novo. 22-23 March.
- Selvam, V. and K.K. Ravichandran. 1996. Conservation and management of mangrove wetlands: role of the local communities. Paper presented at *Consultation meeting on Conservation and Regeneration of mangrove in South Asia*, Madras. 15-17 April.
- Swaminathan, Mina. and Rama Narayan. 1995. Impediments to breast feeding: an analytical review. Paper presented at the *Workshop on empowerment of women for breastfeeding*, NIPCCD. 4 August.
- Swaminathan, Mina. 1995. Multiple approaches in ECCE in India: insights from SURAKSHA studies. Paper presented at the *Consultation on innovative programmes of early childhood care and education*, NIPCCD. 12-13 December.
- Swaminathan, Mina. 1995. Theatre-Communication-Development. Paper presented at the *S. Asian Workshop on Popular Culture and Development*, UN Volunteers, Delhi. 2-4 May.
- Swaminathan, Mina. 1996. Maternity and child care services for women workers in the unorganised sector. Paper presented at the *Consultation on social security*, SEWA, Ahmedabad. 12-13 February.

Swaminathan, Mina. 1996. Innovations in ECCE in India. Paper presented at the *Second International Early Years Education Conference*, University of Warwick, U.K. 25-29 March.

Swaminathan, M.S. 1996. Building a national ecological security system. Paper presented at the *Salim Ali Centenary Seminar* at Bombay Natural History Society, Bombay. 12 February.

Swaminathan, M.S. and R. Prabhakar Rao. 1995. Preparation of Socio Demographic Charters by Panchayats and Nagarpalikas. Paper presented at *National Consultation on Population Programmes in India*, Madras. 10 June.

Umapathy, Sudha. 1995. Women and integrated intensive farming systems. Paper presented at the *International conference on the impact of climate change on food and livelihood security, Agenda for Action*, MSSRF, Madras. 4-6 December.

Vencatesan, Jayshree. 1995. Multiple roles of women and coping strategies for child care. Paper presented at the *VII Biennial conference of the Indian Association of Women's Studies*, Jaipur. 27-31 December.

Participation in Training Programmes / Workshops

Bhandari, Ruchi. 1996. *Development and environment issues*. Training programme at Anna Institute of Management, Madras. 6-10 May.

Ganesan, M. 1996. *Savings and Credit*. State level training at Society for Rural Development, Dharmapuri. 4-7 March.

Gnanappazham, L. 1995. *Application of remote sensing and geographic information system in forestry*. Workshop held by Forest Survey of India, Ministry of Environment and Forest, Dehradun. 20-21 October.

Gnanappazham, L. 1995. *IRS 1-C satellite. User interaction workshop*, National Remote Sensing Agency, Hyderabad. 14 March.

Gnanappazham, L. 1995. *THEMAPS and DIGITIZ mapping and GIS software*. Training in System Research Institute, Pune. 17-23 July.

Hoon, Vineeta. 1996. *Leading Women in Agriculture and Rural Development*, course organised by CINADCO, Shefaim, Israel.

Mohanram, C.L. 1995. *Hybrid vegetable seeds production*. Training at Indo-American Hybrid Seeds, Bangalore. 24-25 May.

Parida, A., C.S. Anuratha, M. Lakshmi, M. Parani, and J. Kurien. 1995. Application of molecular marker in assessing genetic diversity in Indian mangroves. *Induced Mutations and Molecular Techniques for Crop Improvement.*, IAEA/FAO, Vienna, pp 595-600.

Prabhakar, Rao R. 1996. *Managing human in forestry management*. Workshop held at Indian Institute of Forest Management, Bhopal. 29 January - 2 February.

Selvam, V. 1996. *Assessment of Technological Needs for Sustainability*. Expert meeting, Scheveningen, The Netherlands. 5-7 February.

Sivakumar, N. 1995. *Advance irrigation and soil conservation*. Course conducted by Consulate General of Israel. Organised by Water Technology Centre, Coimbatore. 4-15 December.

Sivakumar, N. 1995. *Wasteland development*. Trainers training programme for conservation of biodiversity held at Ruhsa, Vellore, India. 18 October.

Sivakumar, N. 1996. *Agroforestry and Wasteland development*. Workshop on biodiversity and environmental health held at Ruhsa, Vellore, India. 28 May.

Subashini, H.D. 1996. Participated in the Training Programme on *Integrated Environmental Management* conducted by Tamil Nadu Pollution Control Board. 13-16 March.

Subashini, H.D. 1996. Participated in the Trainers Training course for the *part time trainers of the Environmental Training Institute* at Tamil Nadu Pollution Control Board, Madras. 13-24 May.

Umamathy, Sudha. 1996. *Development and environment issues*. Training programme at Anna Institute of Management, Madras. 6-10 May.

Awards / Honours

Nagarajan, Latha. 1995. *United Nations World Youth Leadership Training Summit*. Participated as an Indian representative. New York. 28 August - 1 September.

Swaminathan, M.S. 1995. *Global Environmental Leadership Award*. The Climate Institute, Washington, D.C., USA, for encouraging village level responses to environmental issues.

Swaminathan, M.S. 1996. *Hony. Fellow of the Crop Science Society of America and the American Society of Agronomy*.

Umamathy, Sudha. 1996. *Sustainability - concept and process in agricultural development*. Paper writing competition held at the Sustainable Development Management Workshop organized by Asian Society for Entrepreneurship Education & Development (ASEED), IARI, New Delhi. Received the first prize.

Videos

Learning through play = Vilayattu moolum kalvi. English/Tamil. 22 min. (with Dept. of Social Welfare Government of Tamil Nadu) 1993.

Five elements = Pancha Bhootham. English/Tamil. 58 min. 1993.

Women work and child care = Ivargalin kuzhandaigalum kuzhandaigale. English/Tamil. 23 min. 1994.

Anguish = Thavippu. English/Tamil. 18 min. 1994.

A dangerous burden = Intha bharam thevaya. English/Tamil. 28 min. 1995.

Learning can be fun = A.. AA.. Arivathil anandam. English/Tamil. 22 min. 1995.

Adventure in Partnership. English/Tamil. 15 min. 1995.

Seeds of Hope. English. 26 min. 1995.

Hardship or fun = Sumaiya suvaiya. Tamil. 30 min. 1996.

About the Foundation

M.S. Swaminathan Research Foundation (MSSRF)

Registered in 1988 as a non-profit Trust, recognised by the Government of India, Department of Scientific and Industrial Research, New Delhi, and by the Director General of Income Tax (Exemptions), for the purpose of exemption of contributions from Income Tax under Section 80G and Section 35 (i) (ii) of Income Tax Act, 1961, read with Rule 6 of Income Tax Rules, 1962. The Ministry of Home Affairs, Government of India, has recognised the Foundation for receiving funds from sources abroad under the provisions of the Foreign Contribution (Regulation) Act, 1976.

Board of Trustees

Prof. M.S. Swaminathan, Madras,
Chairman.

Ms. Mina Swaminathan, Madras.

Prof. V. L. Chopra, New Delhi.

Dr. K. Kanungo, Bhubaneshwar.

Dr. V.K. Ramachandran, Bombay.

Dr. Soumya Swaminathan,
Madras.

Centre for Research on Sustainable Agricultural and Rural Development (CRSARD)

Governing Body

<i>President</i>	Prof. M.S. Swaminathan 11 Rathna Nagar Teynampet Madras 600 018.	<i>Member</i>	Mr. S.S. Rajasekhar "River View" Kotturpuram Madras 600 085.
<i>Secretary</i>	Dr. A. Sankaram 10 Krishnaswamy Avenue Mylapore Madras 600 004.	<i>Member</i>	Prof. Kunthala Jayaraman Dean of Technology A C College of Technology Anna University Madras 600 025.
<i>Treasurer</i>	Dr. Chitra Viji SRUTI Poes Garden Madras 600 086.	<i>Member</i>	Dr. K. Alagarwamy Director Central Institute for Brackish Water Aquaculture Marshalls Road, Egmore Madras 600 008.
<i>Member</i>	Mr. A.M. Mahmood Husain IFS (Retd.) 43, Chamiers Road Madras 600 028.	<i>Member</i>	Prof. T.N. Ananthakrishnan Director Entomology Research Institute Loyola College Madras.
<i>Member</i>	Dr. S. Sankaran Vice-Chancellor Tamil Nadu Agricultural University Coimbatore 641 003.	<i>Member</i>	Mr. G. Venkataramani THE HINDU Kasthuri Buildings Madras 600 002.
<i>Member</i>	Dr. S. Shanmugasundaram Vice-Chancellor Tamil Nadu Veterinary & Animal Sciences University Madras 600 007.		

Auditors

M/s Brahmayya & Company, Madras.

Research Council of CRSARD

Prof. M.S. Swaminathan, *Chairman*.

Dr. M. Anandkrishnan, Vice-Chairman, Tamil Nadu State Council for Higher Education, Madras.

Dr. S. Shanmugasundaram, Vice-Chancellor, Tamil Nadu Veterinary & Animal Sciences University, Madras.

Dr. S. Sankaran, Vice-Chancellor, Tamil Nadu Agricultural University, Coimbatore.

Dr. K. Alagarwamy, Director, Central Institute for Brackish Water Aquaculture, Madras.

Dr. T.N. Ananthakrishnan, Director, Entomology Research Institute, Loyola College, Madras.

Mr. A.M. Mahmood Husain, IFS (Retd.), Forestry Expert, Madras.

Dr. S. Jayaraj, ICAR National Professor, M.S. Swaminathan Research Foundation, Madras.

Dr. Parvathi Menon, Social Scientist, Bangalore.

Dr. A. Sankaram, Agricultural Consultant, Madras.

Project Advisory Committees

Advisory Committee for the Project "Application of Biotechnology in the Conservation of Endangered Plant Species for Genetic Enhancement"

Prof. M.S. Swaminathan, *Chairman*.

Dr. T.N. Khoshoo, Jawaharlal Nehru Fellow, Tata Energy Research Institute, New Delhi.

Mr. S. John Joseph, MSSRF, Madras.

Dr. Joseph Thomas, Vice-President, SPIC & Director, Centre for Biotechnology, SPIC Science Foundation, Guindy, Madras.

Prof. Kunthala Jayaraman, Dean of Technology, AC College of Technology, Anna University, Madras.

Director, Botanical Survey of India, Calcutta.

Nominee (Technical), Department of Biotechnology, Government of India, New Delhi.

Nominee (Finance), Department of Biotechnology, Government of India, New Delhi.

Policy Advisory Committee for the Technical Resource Centre for the Implementation of the Equity Provisions of the Convention on Biological Diversity

Prof. M.S. Swaminathan, *Chairman*.

Ms. Amarjit K. Ahuja IAS, Joint Secretary, Ministry of Environment & Forests, New Delhi.

Dr. C.S. Rangachari IAS, Principal Secretary, Government of Andhra Pradesh, Hyderabad.

Mrs. Latika Padalkar IAS, Secretary, Social Welfare, Government of Tamil Nadu, Madras.

Dr. K.P.S. Chandel, Director, National Bureau of Plant Genetic Resources, New Delhi.

Mr. V.R. Chitrapu IFS, Principal Chief Conservator of Forests, Government of Tamil Nadu, Madras.

Mr. John Mathai, Secretary, Forests & Wildlife Department, Government of Kerala.

Mr. N. Surendran IFS, Principal Chief Conservator of Forests, Department of Forest, Government of Kerala.

Mr. C.P. Oberoi IFS, Principal Chief Conservator of Forests, Department of Forest, Government of Andaman & Nicobar Islands, Haddo, Port Blair.

Dr. Chhatrapati Singh, Director, Centre for Environmental Law, World Wide Fund for Nature - India, New Delhi.

Mr. C.S. Srinivasan, Deputy Secretary (Seeds), Department of Agriculture, New Delhi (representing Secretary, Agriculture, Government of India).

Mr. K.S. Dehal IFS, Chief Conservator of Forests (Research), Madras.

Mr. C.K. Sreedharan IFS, Chief Conservator of Forests/Planning, Madras.

Ms. Rasheeda Bhagat, Chief of Bureau, Indian Express, Madras.

Mr. G. Venkataramani, The Hindu, Madras.

Dr. Parvathi Menon, Frontline, Bangalore.

Ms. Uma Prabhu, The Times of India, Bombay.

Mr. B. Vijayaraghavan, IAS (Retd.), Chairman, Madras Snake Park Trust, Madras.

Mr. U.S. Natarajan, IAS (Retd.), Madras.

Mr. Deepak Mullick, Alternate President, Association of Seed Industry, Bombay.

Mr. Sriram Panchu, SHIREEN, Madras.

Mr. Sanjay Shukla, Executive Director,
Society for Social Forestry R&D,
Madras.

Dr. N. Anil Kumar, MSSRF, Madras.

Dr. V. Balaji, MSSRF, Madras.

Dr. K. Balasubramanian, MSSRF,
Madras.

Dr. S. John Joseph, MSSRF, Madras.

Dr. R.J. Ranjit Daniels, MSSRF,
Madras.

Dr. T. Ravishankar, MSSRF, Madras.

Dr. S.D. Sharma, MSSRF, Madras.

Dr. L. Vedavalli, MSSRF, Madras.

Dr. Vineeta Hoon, MSSRF, Madras.

Multiple Approaches in Early Childhood Care and Education

Dr. Neera Desai, formerly Director,
Centre for Women's Studies of SNTD
Women's University, Bombay.

Ms. S.S. Jayalakshmi, Secretary, Vidya
Vikasini Society, Coimbatore.

Ms. Divyalatha, Programme Officer,
Aga Khan Foundation, New Delhi.

Dr. H.H. Mankad, Professor, Narsee
Monjee Institute of Management
Studies, Bombay.

Dr. Anjali Mehta, Professor,
B.K.Institute of Management Studies,
Ahmedabad.

Dr. Rajalakshmi Muralidharan,
formerly Head, Dept. of Preschool and
Elementary Education, NCERT, New
Delhi.

Dr. T.S. Saraswathi, Professor,
Department of H.D.F.S.,
M.S.University of Baroda, Baroda

Ms. Mina Swaminathan, Hony. Project
Director, ACCESS, MSSRF, Madras.

Children on the Agenda

Ms. Andal Damodaran, Hon. General
Secretary, Indian Council for Child
Welfare, Madras.

Dr. Rajammal P. Devadas, Chancellor,
Avinashilingam Institute for Home
Science and Higher Education for
Women (Deemed University),
Coimbatore.

Dr. Radha Paul, Director, World
Vision, Madras.

Director, Social Welfare, Government
of Tamil Nadu, Madras (*ex-officio*).

Dr. L.S. Saraswathi, Freelance
Consultant, Madras.

Ms. E.V. Shantha, Freelance
Consultant, Madras.

Ms. Mina Swaminathan, Hony. Project Director, ACCESS, MSSRF, Madras.

Community Network for the Conservation of Biological Diversity

Prof. M.S. Swaminathan, *Chairman*.

Prof. G.T. Scarascia-Mugnozza, President, Italian National Science Academy, Rome.

Prof. C. Monti, University of Naples, Naples, Italy.

Dr. V. Ramanatha Rao, International Plant Genetic Resources Institute, Asia-Pacific Office, Singapore.

Dr. K.P.S. Chandel, Director, National Bureau of Plant Genetic Resources, New Delhi.

Mr. S. John Joseph, MSSRF, Madras.

Tamil Nadu Council for Sustainable Livelihood Security

Prof. M.S. Swaminathan, Chairman, MSSRF, Madras.

Ms. Lalita Banavali, Managing Director, Hunger Project, India.

Dr. Abraham Joseph, Community Health and Development, Christian Medical College, Vellore.

Dr. M. Anandakrishnan, Vice-Chairman, Tamil Nadu State Council for Higher Education, Madras.

Dr. Asha Krishnakumar, *Frontline*, Madras.

Dr. V.B. Athreya, Professor and Head, Department of Economics, Bharathidasan University, Tiruchirapalli.

Ms. Geetha Ramaseshan, Lawyer, Madras.

Fr. Joseph Xavier, S.J., Department of Social Work, Loyola College, Madras.

Mr. K. Loganathan, Director, ASSEFA, Madras.

Dr. S. Rajagopalan, Distinguished Fellow, MSSRF, Madras.

Dr. C.S. Ramachandran, Governor, Rotary International 3230, Madras.

Rtn. R. Ramakrishnan, Rotary International 3230, Madras.

Ms. Shanti Duraiswamy, Director, Asian Youth Centre, Madras.

Ms. Vasantha Surya, Freelance writer, Madras.

Mr. William D'Souza, Project Coordinator, MYRADA Dharmapuri Plan Project, Dharmapuri.

Secretary, Finance, Government of Tamil Nadu, Madras.

Secretary, Planning and Development Department, Government of Tamil Nadu, Madras.

Member Secretary, State Planning Commission, Madras.

Secretary, Rural Development Department, Government of Tamil Nadu, Madras.

Secretary, Social Welfare Department, Government of Tamil Nadu, Madras.

Secretary, Information and Tourism, Government of Tamil Nadu, Madras.

Secretary, Health and Family Welfare Department, Government of Tamil Nadu, Madras.

Secretary, Education Department, Government of Tamil Nadu, Madras.

Secretary, Housing and Urban Development Department, Government of Tamil Nadu, Madras.

Additional Secretary, Health and Family Welfare Department, Government of Tamil Nadu, Madras.

ICAR - National Professor Project on Integrated Pest Management

Prof. M.S. Swaminathan, Chairman, MSSRF, Madras.

Prof. T.N. Ananthakrishnan, Director, Entomology Research Institute, Loyola College, Madras. ❸

Thiru. P.A. Ramiah IAS, Director of Agriculture, Government of Tamil Nadu, Madras.

Dr. P. B. Mathur, Assistant Director-General (ASE), (UNDP), ICAR, New Delhi.

Dr. K. Venugopal, Project Coordinator & Head, Central Institute of Cotton Research, Regional Station, Coimbatore.

Dr. M. Gopalan, Director, Centre for Plant Protection Studies, Tamil Nadu Agricultural University, Coimbatore.

Dr. Joseph Thomas, Vice-President, SPIC & Director, Centre for Biotechnology, SPIC Science Foundation, Guindy, Madras.

Dr. A. Narayanan, Executive Director, SIMA Cotton R&D Centre, Coimbatore.

Mr. K. Nanjayan, General Manager (Soya Production), Sakthi Soyas Ltd., Coimbatore.

Dr. T. Chellathurai, General Manager, Tuticorin Alkali Chemicals and Fertilizers Ltd., Madras.

One nominee from DBT, Government of India, New Delhi.

Prof. S. Jayaraj, ICAR National Professor, MSSRF, Madras.

Biovillage Project Advisory Committee

Development Commissioner-cum-Secretary (Planning), Government of Pondicherry, *Chairman*.

Mr. V. Kalyanasundaram, District Representative, NABARD, Pondicherry.

Mr. M. Arunachalam, Director of Fisheries, Government of Pondicherry, Pondicherry.

Dr. K. Raghunathan, Director of Animal Husbandry, Government of Pondicherry, Pondicherry.

Mr. K. Meenakshisundaram, Regional Manager, Indian Bank, Pondicherry.

Mr. N. Loganathan, Under Secretary (Agriculture), Government of Pondicherry, Pondicherry.

Dr. K.N.N.S. Nair, Adviser, Biovillage Programme, MSSRF, Madras.

Collector-cum-Secretary (Revenue), Government of Pondicherry, Pondicherry.

Mr. S. Natarajan, Additional Director (Agriculture), Department of Agriculture, Government of Pondicherry, Pondicherry.

Director of Agriculture, Government of Pondicherry, Pondicherry.

Dr. R.P. Singh, Director (Economics), National Institute of Rural Development, Hyderabad.

Mr. B. Radhakrishnan, United Nations Development Programme, New Delhi.

Dr. Anil Mainra, Deputy Secretary, Ministry of Environment and Forests, National Afforestation and Ecological Development Board, New Delhi.

Mr. P. Mathews Samuel, Director of Industries, Government of Pondicherry, Pondicherry.

Mr. K. Mahadevan, Managing Director, PAPSCO, Pondicherry.

Mr. D. Subramanian, Deputy General Manager, PASIC, Pondicherry.

Mr. A. Murugaiyan, Deputy Director, DRDA, Government of Pondicherry, Pondicherry.

Mr. Paul Adrien, Joint Director (Chem.).

Mr. R. Natarajan, D.D.A. (Inputs), Villianur.

Mr. K. Natarajan, J.D.A.(T&V) I., Department of Agriculture, Thattanchavady.

Mr. H.M. Sathyamurthy, LDM, IB, Pondicherry.

Dr. R.S.S. Hopper, National Project Coordinator, MSSRF, *Member-Secretary*.

Advisory Committee for the Asian Ecotechnology Network

Dr. Wakako Hironaka, Former Minister for Environment, Japan, *Chair*.

Prof. Song Jian, State Councillor and Chairman, Environment and Science and Technology Commissions, China, *Co-Chair*.

Prof. Jiro Kondo, Director-General, RITE, Japan, *Co-Chair*.

Prof. M.S. Swaminathan, UNESCO-Cousteau Ecotechnie Chair, *Co-Chair*.

Dr. Mohammed Yunus, Chair, Grameen Bank, Bangladesh.

Dr. Nona Javier, Executive Trustee, Ramon Magsaysay Foundation, The Philippines.

Dr. Setijati Sastrapradja, Director, Biodiversity Foundation of Indonesia, Bogor.

Dr. Vo Tong Xuan, University of Cantho, Vietnam.

Dr. Syed Babar Ali, President, WWF International, Lahore, Pakistan.

Dr. Heitor G. De Souza, Rector, United Nations University, Tokyo.

Prof. Darwish M.K. Al Gobaisi, *Editor-in-Chief*, EOLSS, Abu Dhabi, UAE.

Prof. Pierre Lasserre, Ecotechnie Focal Point for UNESCO, Paris.

Mme. Nathalie de Pompignan, Ecotechnie Network Development, Equipe Cousteau, Paris.

Dr. Jeffrey McNeely, Chief Scientist, IUCN, Gland, Switzerland.

Dr. A.Z.M. Obaidullah Khan, FAO Regional Representative, Bangkok.

Dr. Seijin Shimoyama, Asian Productivity Organisation, Tokyo.

Representative of the Asian Development Bank.

Representative of the UNDP.

Representative of the UNEP.

Representative of the Global Environment Facility.

Director, Regional Centre of the International Ocean Institute, Suva, Fiji.

Representative, UN-ESCAP, Bangkok.

Representative, Consultative Group on International Agricultural Research.

Dr. V. Balaji, Asian Ecotechnology Network Coordinator, MSSRF, Madras, *Member-Secretary*.

The Foundation Staff

Prof. M.S. Swaminathan
Chairman
UNESCO-Cousteau Ecotechnie Chair

Administration and Support Services

Mr. R.S. Kuppusamy
Manager (Personnel & Admn.)

Mr. C.K. Ramachandran
Manager (Budget & Accounts)

Mr. N. Parasuraman
Assistant Manager (Estate)

Ms. V. Sridevi
Secretary

Ms. R. Malathy
Secretary

Ms. Usha Kumar*
Secretary

Programme Area 100: Coastal Systems Research

Integrating Conservation and Development

Dr. R. Natarajan*
Emeritus Scientist (CSIR)

Dr. Hemal S. Kanvinde
Senior Scientific Officer

Dr. Sanjay V Deshmukh*
Senior Scientific Officer & Coordinator

Dr. L.N. Acharjyo
Project Coordinator

Ms. G. Uma*
Scientist

Mr. Prafulla Kumar Mishra
Research Associate

Mr. G. Rajashekar*
Research Associate

Mr. P. Sampathkumar*
Research Associate

** Left during the year.*

Ms. Sheela Suryanarayana*
Research Associate

Ms. M.R. Neelavathi*
Photolab Technician

Mr. S. Neethi Manickam*
Farm Manager

Mr. Nirakar Behera
Field Assistant

Mr. Jamini Kant Biswal
Field Assistant

Mr. B.B. Sahoo*
Field Assistant

Mr. T.E. Krishnan
Driver

Coastal Wetlands: Mangrove Conservation and Management

Dr. V. Selvam
Project Coordinator

Dr. L.R.A. Narayan
Distinguished Fellow

Mr. K. Johnson
Project Officer

Dr. R. Krishnamoorthy
Senior Scientific Officer

Ms. L. Gnanapazham
Research Associate

Mr. K.K. Ravichandran
Research Associate

Mr. K.G. Mani
Research Assistant

Mr. S. Subbiyan
Technical Assistant

Programme Area 200: Biodiversity and Biotechnology

N.I. Vavilov Centre

Mr. S. John Joseph
Project Director

Dr. Vineeta Hoon
Consultant

Dr. S.D. Sharma
Distinguished Fellow

Dr. N. Anil Kumar
Scientist

Dr. T. Ravishankar
Scientist

Dr. L. Vedavalli
Scientist

Dr. G.N. Hariharan
Scientist

Mr. A. A. Nambi*
Scientist

Ms. M. Geetharani
Gene Bank Manager

Ms. Pratima Gurung
Research Associate

Ms. R. Rengalakshmi
Research Associate

* *Left during the year.*

Dr. Smita Tripathy
Research Associate

Ms. Rita Abraham*
Research Fellow

Mr. P.V. David
Technical Assistant

Mr. V. Govindarajan[§]
Technical Assistant

Mr. G. Sureshkumar
Technical Assistant

Mr. G.R. Panda*
Research Assistant

Mr. R. Ondiveeran
Farm Assistant

Mr. Banamali Mahala
Field Assistant

Mr. Christ Daniel Toppo*
Field Assistant

Mr. R. Sabu Kuttan
Field Assistant

Mr. S. Shamir Kumar Paul
Electrical Supervisor

Ms. G. Anuradha
Administrative Assistant

Ms. D. Rukmani
Administrative Assistant

Mr. E. Thiruvengadam
Administrative Assistant

Ms. R. Vidya
Administrative Assistant

Ms. R. Vijaya
Administrative Assistant

Ms. T. Vijayasulochana
Administrative Assistant

Mr. K. Sunder Vadivelu
Administrative Assistant

Mr. S. Gopalakrishnan
Driver

Mr. K. Pandi
Driver

Biotechnology and Biodiversity

Dr. R.J. Ranjit Daniels
Principal Scientific Officer

Dr. Ajay Kumar Parida
Senior Scientific Officer

Dr. C. S. Anuratha
Senior Scientific Officer

Dr. P. Balakrishna
Senior Scientific Officer

Dr. Sudha Nair
Senior Scientific Officer

Dr. Nivedita Ram
Senior Scientific Officer

Dr. M.S.S. Mohan
Senior Scientific Officer

[§] Expired on 14th July 1996.

* Left during the year.

Dr. H.D. Subhashini
Senior Scientific Officer

Ms. M. Jayanthi
Senior Research Fellow

Mr. N. Mathan
Senior Research Fellow

Mr. Vishwanath M Patil*
Senior Research Fellow

Mr. S. Elango
Senior Research Fellow

Mr. Ajit Anand
Senior Research Fellow

Mr. M. Parani
Senior Research Fellow

Mr. C. Srinivasa Rao
Senior Research Fellow

Ms. Jyothi Kurian*
Senior Research Fellow

Ms. M. Lakshmi
Senior Research Fellow

Ms. R. Latha
Junior Research Fellow

Mr. P. Eganathan
Research Assistant

Mr. K.M. Kadirvelu
Technical Assistant

Mr. M.M. Saravanan
Laboratory Assistant

Mr. S. Muralidharan
Laboratory Assistant

Mr. S. Purushothaman
Office Assistant

**Programme Area 300:
Ecotechnology and
Sustainable Agriculture**

JRD Tata Ecotechnology Centre

Dr. K. Balasubramanian
Project Director

Dr. A. Sankaram
Distinguished Fellow

Dr. A. Venkataraman
Distinguished Fellow

Mr. G. Venkataramani
Visiting Fellow

Dr. Chitra Vijji
Adviser

Mr. K. Sekar*
Assistant Professor#

Mr. V. Vijayakumar
Consultant

Ms. N. Brindha
Project Associate

Dr. D. Dhanapal
Project Associate

Mr. A. Gopalakrishnan
Project Associate

On deputation from Annamalai University.

* Left during the year.

Ms. Jayshree Vencatesan
Project Associate

Mr. K. Karthikeyan*
Project Associate

Ms. Latha Nagarajan
Project Associate

Mr. R.J. Lazaras*
Project Associate

Mr. C. L. Mohan Ram
Project Associate

Mr. M. Nageswaran
Project Associate

Mr. L. Pandiarajan
Project Associate

Ms. Ruchi Bhandari
Project Associate

Ms. A. Shaleesha
Project Associate

Mr. N. Sivakumar
Project Associate

Ms. Sudha Umapathy
Project Associate

Mr. M. Ganesan
Senior Research Fellow

Ms. A.P. Jeyabharathy
Junior Research Fellow

Mr. C. Thilagar
Junior Research Fellow

Mr. R. Venkataramanan
Accountant

Mr. S. Arivukarasu
Systems Assistant

Mr. A. Vedamoorthy
Technical Assistant

Ms. N. Parvathi*
Administrative Assistant

Mr. S. Mohan
Office Assistant

Mr. S. Mohan*
Driver

Biovillage

Dr. R. S. Shanthakumar Hopper
National Project Coordinator

Dr. K.N.N.S. Nair
Distinguished Fellow and Adviser

Dr. A.R. Thiagarajan
Consultant

Ms. S. Bhanumathy
Project Associate

Ms. R. Jayasree*
Project Associate

Ms. K. T. Kalaiselvi
Project Associate

Ms. R. Kavitha*
Project Associate

** Left during the year.*

Mr. T. Oudaya Baskar
Project Associate

Ms. Vasanthi Marien*
Project Associate

Ms. S. Pushpalatha Sivasubramanian
Project Associate

Ms. P. Madhana Kumari
Project Associate

Mr. K. Raghupathy*
Project Associate

Ms. Vasanthi Vasan
Office Manager

Mr. K.G. Rajamohan
Project Associate

Mr. J. Arjunan
Field Assistant

Mr. R. Rajasekara Pandey
Project Associate

Mr. A. Govindarasu
Field Assistant

Mr. L. Sathiyarayanan
Project Associate

Mr. R. Jeeva
Field Assistant

Ms. V. Savithri*
Project Associate

Mr. T. Kumaran
Field Assistant

Mr. V. Selvam
Project Associate

Ms. G. Meenakshi
Field Assistant

Ms. S.V. Santhy
Project Associate

Mr. D. Gopalakrishnan*
Office Assistant

Mr. S. Soundararadjane
Project Associate

Mr. Felix
Office Assistant

Ms. R. Sowmya
Project Associate

Mr. S. Saravanane
Driver

Mr. D.K. Sridhar Babu
Project Associate

Integrated Pest Management

Mr. D. Tiroutchelvame
Project Associate

Prof. S. Jayaraj
ICAR National Professor

Mr. M. Thirumalai
Project Associate

Mr. N. Sathiah
Assistant Professor[#]

[#] On deputation from Tamil Nadu Agricultural University.

* Left during the year.

Ms. G. Anandhi Radhika*
Senior Research Fellow

Mr. V. Baskaran
Senior Research Fellow

Ms. Camillus S. Leema Rose
Senior Research Fellow

Mr. M. Gunalan*
Senior Research Fellow

Ms. R. Mahalakshmi
Senior Research Fellow

Mr. S. Malarvannan*
Senior Research Fellow

Mr. M.P. Parthiban*
Senior Research Fellow

Ms. S. Radhika*
Senior Research Fellow

Ms. K. Revathi*
Senior Research Fellow

Mr. M. Selvaraj*
Senior Research Fellow

Mr. S. Varadarajan*
Senior Research Fellow

Mr. S. Balaji
Junior Research Fellow

Mr. R. Kalyana Sundaram
Junior Research Fellow

Mr. Vai. Karthikeyapandian*
Junior Research Fellow

Mr. S. Mohamed Rafi
Junior Research Fellow

Ms. B.B. Saliha
Junior Research Fellow

Mr. N. Srinivasan*
Junior Research Fellow

Mr. V. Sudalai Kumar*
Junior Research Fellow

Ms. S. Sumathi*
Stenographer

Mr. S. Vijayakumar*
Assistant-cum-Clerk

Mr. G. Ganesh*
Driver

Mr. K. Ramesh
Driver

**Programme Area 400:
Reaching the Unreached**

**Tamil Nadu Council for
Sustainable Livelihoods**

Dr. S. Rajagopalan
Distinguished Fellow

Ms. S. Sharada
Project Associate

Ms. K. Sheela
Secretary

** Left during the year.*

Project ACCESS

Ms. Mina Swaminathan
Hon. Project Director

Mr. A. Sarvesan*
Project Coordinator

Dr. V. Padma
Assistant Professor#

Ms. Krishna Iyer*
Project Coordinator

Mr. S. Raja Samuel
Project Coordinator

Ms. Rama Narayanan
Consultant

Ms. A.S. Padmavati
Consultant

Ms. R. Santhiya Maheswari
Project Associate

Ms. D. Radhika
Project Associate

Ms. I. Glory
Project Associate

Mr. S. Murali
Project Associate

Ms. V. Vijaya*
Project Associate

Ms. E. Rajeshwari
Secretary

Ms. K. Annammal
Secretary

Ms. K. Meena Kumari*
Secretary

Mr. S. Karthikeyan
Accountant

Ms. R. Jayashree
Accounts Assistant

Mr. T. Balasaravanan*
Administrative Assistant

Programme Area 500: Education, Communication, Training and Capacity Building

Informatics Centre & Electronic Library

Dr. V. Balaji
Project Director and Coordinator,
Asian Ecotechnology Network

Mr. S. Arunachalam
Distinguished Fellow

Mr. E. Lakshmana Narasimhan*
Systems Manager

Mr. Michael Harley
Consultant/Adviser - Communication

Ms. Shanaz Padamsee
Communication Manager

On deputation from Manonmaniam Sundaranar University.

* *Left during the year.*

Mr. S. Senthilkumaran
Research Fellow

Mr. K. Suresh
Trainee Programmer

Mr. C.V. Parthasarathy
Trainee Programmer

Mr. G.S. Sridhar
Research Assistant

Ms. K. Uma Rani
Research Assistant

Library

Ms. A. L. Usha*
Librarian

Ms. Sylvia Snehalata
Librarian

Socio-Demographic Charter

Ms. Anuja Gulati
Project Leader

Dr. R. Prabhakar Rao
Consultant

Mr. Himansu Ghosh
Project Associate

Ms. Manashi Ray*
Project Associate

Mr. R. Ravichandran*
Project Associate

Ms. Sahide Abibanu Begum
Office Assistant

Visiting Professor

Dr. Joseph H. Hulse
Canada

Visiting Scholars

Ms. Asha Verghese
Mexico

Ms. Arishana Bissessur
South Africa

Mr. Bacchialoni Matthieu
France

Ms. Bergot Sophie
France

Ms. Katyayani Balasubramanian*
India

Ms. J. Niranjani
India

Ms. Sharmila Bagchi*
Canada

Mr. V. Shivakumar*
India

Mr. Thomas Kraft*
USA

** Left during the year.*

List of Donors

From 1st July 95 To 30th June 96

Core Contributions - National Institutional

Aspee Agro Equipments Pvt. Ltd.
Mumbai

Shivalik Hatcheries Pvt. Ltd.
Pune

Economist Communication Ltd.
Madras

Shri Mahila Sewa Sahakari Bank Ltd.
Ahmedabad

Falcon Travels & Tours
Madras

Sundaram Finance Ltd.
Madras

Foundation for Technology
Assessment and Adaptation, Madras

Venco Research & Breeding Farm Ltd.
Pune

Indian Overseas Bank
Madras

Venkateshwara Hatcheries Ltd.
Pune

Kasturi & Sons Ltd.
Madras

Venkateshwara Research & Breeding
Farm Ltd., Pune

Maharashtra Hybrid Seeds Co. Ltd.
Mumbai

Western Hatcheries Ltd.
Pune

Sharada Viswanathan Foundation
Madras

Core Contributions - Individual

All staff members of MSSRF		Mrs. Mina Swaminathan	Madras
Dr. R.D. Asana	Valsad	Mr. M. Murali Rao	New Delhi
Dr. V. Balaji	Madras	Dr. S. Nagarajan	Karnal
Ms. Geeta Srinivasan	Madras	Mr. M.S. Ramdas	Alappuzha
Mr. P.V.R. Krishna Rao	Madras	Dr. Sanjay V. Deshmukh	Mumbai
Mr. M.S. Krishnamurthy	Madras	Dr. A. Sankaram	Madras
Dr. Manmohan Attavar	Bangalore	Dr. P.V. Shenoi	Bangalore
Mrs. Mathuram Bhoothalingam	Madras	Prof. M.S. Swaminathan	Madras

Core Contributions - International

Canadian Hunger Foundation
Ottawa, Canada

Mr. Takeshi Hara
Tokyo, Japan

Mr. Christopher Dowswell
Mexico

Sources of Project Support

Programme Area 100: Coastal Systems Research

National

Sir Dorabji Tata Trust, Bombay.

Council of Scientific & Industrial Research, New Delhi.

Department of Biotechnology, Government of India.

India-Canada Environment Facility.

International

International Development Research Centre, Canada.

Canadian International Development Authority.

Norwegian Agency for Development Co-operation.

Programme Area 200: Biodiversity and Biotechnology

National

Department of Biotechnology, Government of India.

Ministry of Environment & Forests, Government of India.

International

Swedish International Development Agency.

International Plant Genetic Resources Institute, Rome and the Govt. of Italy.

The Darwin Initiative, UK.

UN Development Programme.

Ramon Magsaysay Foundation (Programme for Asian Projects), The Philippines.

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Germany.

Swiss Agency for Development and Co-operation (SDC), Switzerland.

Ministry of Foreign Affairs, The Hague, The Netherlands.

John D. & Catherine T. MacArthur Foundation, Chicago, USA.

Programme Area 300: Ecotechnology and Sustainable Agriculture

National

Indian Council of Agricultural Research, New Delhi.

The Hunger Project (India), Bombay.

Department of Wastelands Development, Ministry of Rural Development, Government of India.

Council for Advancement of People's Action and Rural Technology, New Delhi.

Sir Dorabji Tata Trust, Bombay.

International

International Fund for Agricultural Development, Rome.

The Hunger Project, Japan.

The Hunger Project, Sweden.

UN Development Programme.

Programme Area 400: Reaching the Unreached

National

The Hunger Project (India), Bombay.

Council for Advancement of People's Action and Rural Technology (CAPART), New Delhi.

Venkateshwara Hatcheries Ltd., Pune.

International

Aga Khan Foundation (India).

Bernard van Leer Foundation, The Netherlands.

UN Development Programme.

John D. & Catherine T. MacArthur Foundation, Chicago, USA.

UNICEF.

Programme Area 500: Education, Communication, Training and Capacity Building

National

Council for Advancement of People's Action and Rural Technology (CAPART), New Delhi.

Department of Ocean Development, Government of India.

Council of Scientific and Industrial Research.

Sir Dorabji Tata Trust, Bombay.

Directorate of Agriculture, Tamil Nadu.

Department of Biotechnology, Government of India.

Kasturi & Sons Ltd., Madras.

Department of Women and Child Development, Ministry of Human Resource Development, Government of India.

Ministry of Environment & Forests, Government of India.

International

International Agricultural Training Programme, UK.

International Development Research Centre, Canada.

International Atomic Energy Agency, Vienna.

John D. & Catherine T. MacArthur Foundation, Chicago, USA.

UN Development Programme
FAO-FARM.

UN Food and Agriculture Organisation.

Swedish International Development Agency.

Honda Foundation, Japan.

UN Educational Scientific and Cultural Organization.

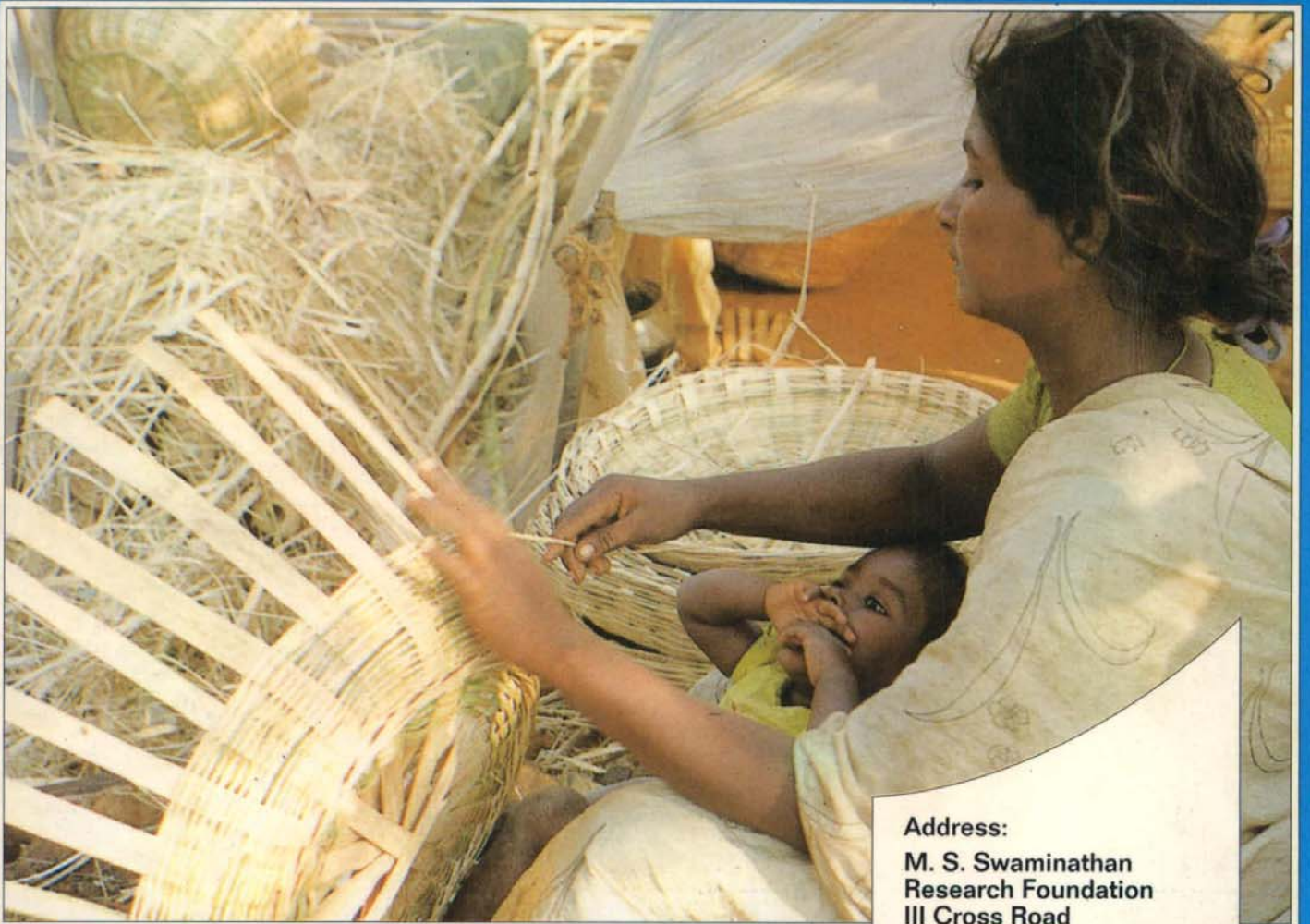
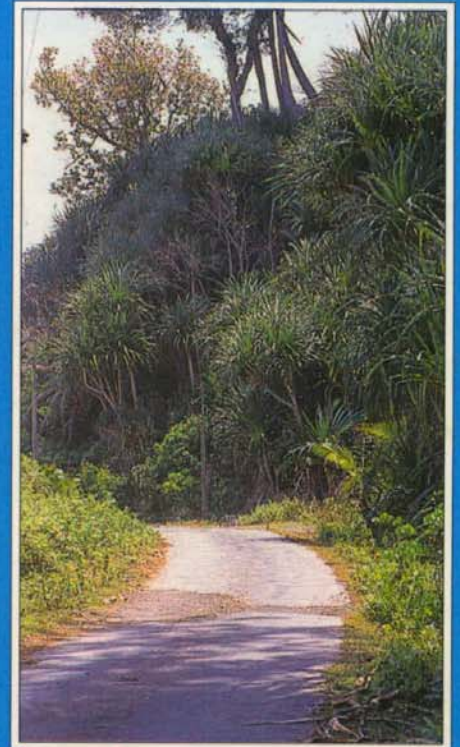
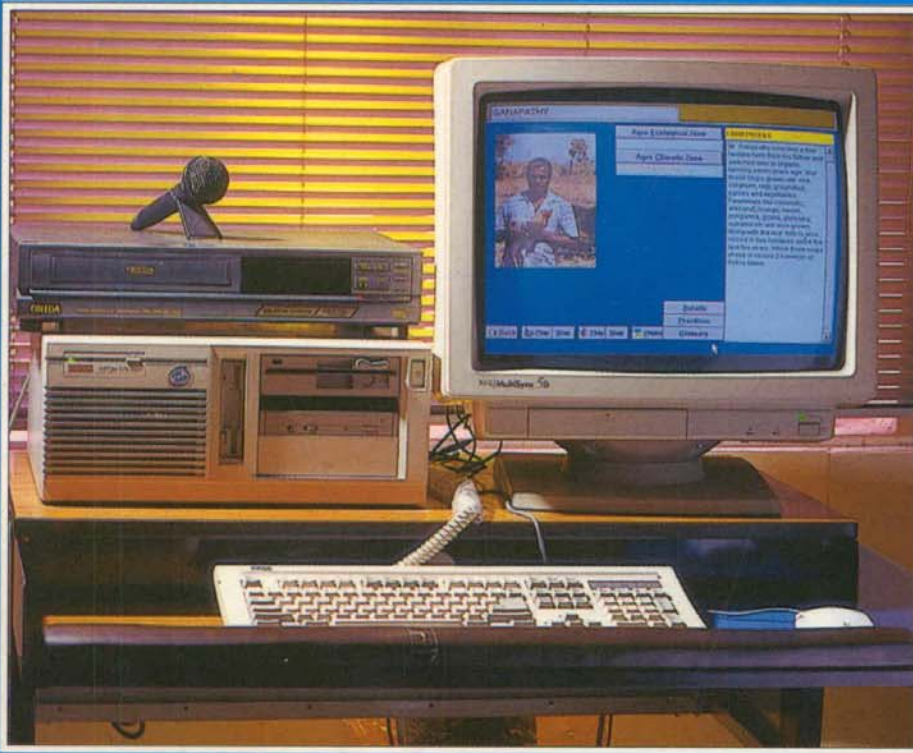
Encyclopedia of Life Support Systems, Abu Dhabi, UAE.

Humanistisch Instituut voor Ontwikkelingssamenwerking Stichting, The Netherlands.

Foundation for Genetic Research, USA.

International Fund for Agricultural Development, Rome.

Royal Danish Embassy.



Address:
M. S. Swaminathan
Research Foundation
III Cross Road
Institutional Area
Taramani
Madras-600 113. India.