



M S SWAMINATHAN RESEARCH FOUNDATION

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# BIODIVERSITY PROGRAMME

Hindsight and Forethought







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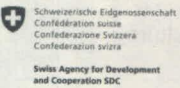
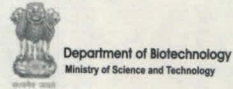
# Abbreviations

ACC	- Agro-biodiversity Conservation Corps
BCUE	- Biodiversity Conservation, Utilization and Enhancement
BdP	- Biodiversity Programme
BIOV	- Biovillage
BMC	- Biodiversity Management Committee
CAbC	- Community Agro-biodiversity Centre
CBCC	- Community Biodiversity Conservation Corps
CBD	- Convention on Biological Diversity
CBM	- Community Biodiversity Management
CBP	- Community Biodiversity Programme
CFBs	- Community Food Banks
CGB	- Community Gene Bank
CH	- Community Herbarium
CMPR-AVSS	- Centre for Medicinal Plants Research, Arya Vaidya Sala
CRKSC	- Centre for Research in Indigenous Knowledge Science and Culture
DES	- Department of Economics and Statistics
DSIR	- Department of Scientific and Industrial Research
ECAS	- Every Child A Scientist
FRIS	- Farmers Right Information System
FS	- Food Security
IPR	- Intellectual Property Rights
IPM	- Integrated Pest Management
IUCN	- International Union for Conservation of Nature and Natural Resources
KFRI	- Kerala Forest Research Institute
LR	- Land-race
LEISA	- Low External Input Sustainable Agriculture
MDG	- Millennium Development Goals
MEA	- Millennium Ecosystem Assessment
MSSRF	- M S Swaminathan Research Foundation
NAFED	- National Agricultural Cooperative Marketing Federation of India Limited
NWFP	- Non-Wood Forest Produce
NGO	- Non Governmental Organization
NRM	- Natural Resource Management
ODISK	- On-Farm Diversity Information System Kerala
PBR	- People's Biodiversity Registers
PGR	- Plant Genetic Resources
PGUS	- Panchabati Grama Unnayan Samiti
PPB	- Participatory Plant Breeding
PPV&FR Act	- Plant Variety Protection and Farmers' Rights Act
RAPID	- Rare Angiosperm Plant Information Database
RET	- Rare, Endemic and Threatened
RFLP	- Restricted Fragment Length Polymorphism
SDC	- Swiss Agency for Development and Co-operation
SHG	- Self Help Group
SMCGRC	- G. T. Scarascia Mugnozza Community Genetic Resource Centre
UNDP	- United Nations Development Programme
UPOV	- International Union for the Protection of New Varieties of Plants
VKC	- Village Knowledge Centre

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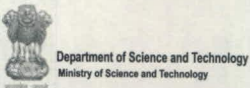
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SIR DORAJI TATA TRUST AND THE ALLIED TRUSTS



The International Tropical Timber Organization



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We would like to place our profound sense of gratitude to Prof. (Dr) M. S. Swaminathan, Chairman, MSSRF, who gave us the pedestal to climb on and Ms Mina Swaminathan for her constant backing through out the journey.

We proudly keep in mind our earlier Trustees, Executive Directors and would like to thank them for all the generous holds.

We mark our deep sense of gratitude to all our earlier programme staff members. The names of Dr John Joseph, Dr Sanjay V. Deshmukh, Dr P. Balakrishna, Dr R. J. Ranjit Daniels and Dr Hemale S. Kanvinde need particular mention, as they were there to build and distill the programme.

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We take this opportunity to gratefully acknowledge the consistent guidance provided by Dr S. Bala Ravi, Advisor, Biodiversity, MSSRF.

We would like to place immense gratitude to our present Trustees, Executive Director, Directors of other programme areas, administrative and accounts team for their support to take up fresh and innovative challenges.

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Without the patience and generosity of the communities that we associate in all the spheres of action, the programme would not have been turned out a splendid success. We are indebted to the Rural and Tribal families, who are the custodians of the genetic wealth which we talk about in the coming leaves and who still cares it for the budding generations.

There are other, countless people to whom we are grateful for their wisdom and encouragement.

Authors

# Foreword

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## Foreword

Since long, *in situ* conservation of biodiversity through National Parks, Biosphere Reserves, Heritage Sites, and other forms of protected areas, as well as *ex situ* preservation through Botanical and Zoological gardens and cryogenic gene banks have received considerable attention. Such forms of conservation as well as monitoring through Red Data Books have mostly been undertaken by professionals and publicly funded organizations. The significant contributions to biodiversity conservation and enhancement by tribal and rural women and men have however remained largely unrecognized and unsung. Community conservation methods range from *insitu* on-farm conservation to *exsitu* preservation through sacred groves and home gardens. Community conservation is largely responsible for the existence of numerous land races in crop plants, as for example, for the over 125,000 strains of rice occurring in the world. Fortunately, both the Convention on Biological Diversity adopted at the Earth Summit held in Rio-de Janeiro in 1992 and the FAO Treaty on Genetic Resources for Food Security recognize the role of farmers and rural communities in the field of biodiversity conservation and their enrichment through natural and human selection. The Biodiversity Act and the Plant Variety Protection and Farmers' Rights Act enacted by the Parliament of India accord recognition and reward to the primary conservers. The Plant Variety Protection and Farmers' Rights Authority has also instituted Genome Saviour Awards for rewarding the contributions of the local community to the conservation of agro-biodiversity.

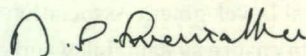
With the onset of the era of climate change, community conservation has assumed greater significance. The crops on which global food security is anchored fall under two broad categories climate sensitive and climate resilient crops. Because of the large number of the land races available, rice is more climate-resilient. *Dioscorea* and many tuber crops conserved by the tribal families of Wayanad are also climate resilient. We should now intensify our conservation efforts with respect to climate resilient crops.

This Publication summarises the work done during the last 20 years in saving endemic species and habitats and in encouraging the involvement of rural and



tribal communities in both conservation and improvement through participatory breeding and knowledge management. Several Rare, Endemic, and Threatened species have been saved for posterity and biodiversity "hot spots" have been converted into biodiversity "happy spots". The first Prime Minister of India, Jawaharlal Nehru often remarked "We are a poor people inhabiting a rich country". He compared the prosperity of nature with the poverty of people and stressed that the rich bioresources should be converted into jobs and income for local communities through the application of Science and Technology. This approach is the basic philosophy of MSSRF and has led to creating an economic stake in conservation. Biohappiness now prevails in the areas in Tamil Nadu, Kerala, and Orissa where MSSRF is promoting community biodiversity movement. Biohappiness results from the conservation and sustainable and equitable use of biodiversity.

Dr. N. Anil Kumar, Director of Biodiversity Programme and his team of dedicated scientists and scholars deserve our gratitude for their labour of love for both conservers and conservation.



Prof. M. S. Swaminathan

## Preface

Biodiversity has been one of the oldest and core programme areas of the M.S.Swaminathan Research Foundation that has made significant contributions at the local, national and international levels. The Keystone Dialogue organized in Chennai in 1990 was one of the first international series that shaped the Convention on Biological Diversity (CBD). A series of consultations and workshops organized by MSSRF played an important role in shaping both the Protection of Plant Varieties and Farmers' Rights Act 2001 and the Biological Diversity Act 2002 enacted by the Government of India. At the field level the 4 C Approach that pays concurrent attention to Conservation, Cultivation, Consumption and Commerce of neglected and underutilized species (NUS) and varieties of rice, millets, medicinal plants, tubers and native greens and conservation of rare, endemic and threatened species (RET) of trees and plants are important contributions. Training and Capacity Building of members of Panchayat Raj Institutions (PRIs), Self Help Groups (SHGs) and non-government organizations (NGOs) about various field level interventions and institutionalization of the efforts through establishment of Community Level Institutions notably the Panchabati Grama Unnanya Samithi (PGUS) in Jeypore, Koraput District, the Kolli Hills Agrobiodiversity Conservers' Federation (KHABCoFED) and Wayanad Agricultural Development Association (WARDA) have been the hallmark of MSSRF to ensure sustainability and continuity of interventions. The national and international accolades including the Equator Initiative Award 2002 to the work in Jeypore, the Genome Saviour Award 2006 to Jeypore and Genome Saviour Award 2008 to Wayanad by the Protection of Plant Varieties and Farmers Rights Authority (PPVFRA) stand as a testimony to work of the biodiversity group. This publication is a humble effort to document for posterity, the work carried out by group and I extend my whole hearted appreciation for the same.



  
Dr. Ajay Kumar Parida / Executive Director / 5 February 2010

## Introduction

The M S Swaminathan Research Foundation (MSSRF), working for sustainable agricultural and rural development, completes 20 years of its existence in 2010. Incidentally, 2010 is also the International Year of Biodiversity, and an appropriate occasion to review the progress made in the Biodiversity programme in relation to the 2010 Biodiversity Target: "Significant reduction in the current rate of biodiversity loss as a contribution to poverty reduction". Over the last two decades, MSSRF's Biodiversity Programme (BdP) has undertaken a range of integrated interventions in partnership with local communities.

Since 1990s, the biodiversity components in focus of MSSRF's are in-situ, on farm community conservation of biodiversity, that comprise innumerable number of crops, animals and socio-economically and ecologically important wild plant and microbial diversity found in situ and on farm. The BdP implemented several projects, with support from national and international donors, aimed at mainstreaming some of the provisions of the Convention on Biological Diversity (CBD) at national, local and international levels. The activities have been implemented through need-based research and issue-based professional networks involving key stakeholders. This helped the biodiversity team to function as a 'Resource Group' in the area of Community Biodiversity Management (CBM) both in the local and regional level. The activities in the area of CBM have contributed significantly to the MSSRF's mandate of sustainable agricultural and rural development. The suggestions of our peers and external reviewers and community partners also played significant roles in shaping the programme and appraisal of the current work. This report highlights the key results achieved by BdP over the last two decades. Ten selected pilot interventions of the programme that have completed more than five years of implementation are described and analysed in the light of emerging scenarios in biodiversity management. The report captures MSSRF's experience and learning in securing on-farm conservation of several vanishing crops and varieties and, in building sustainable livelihoods of local communities.

From this report, the reader will find pertinent ideas, methods and approaches for designing and establishing Community Agro-biodiversity Centres - a model

for in situ and on farm biodiversity management as a decentralized strategy in livelihood improvement, reduction of poverty and empowerment of local communities. The proposals and strategies for way forward have been identified based on the lessons from the past and positioned in the emerging context of global climate change and food security. Some of the reported activities are only pilots in progress, indicating that new lessons and knowledge lie ahead of us.

The purpose of this report is to reach out to the key stakeholders in the area of biodiversity and stimulate necessary policy actions towards upscaling some of the successful achievements of the BdP. The report also has the potential to influence other organizations, working in India and elsewhere, in the implementation of the CBD provisions related to sustainable and equitable management of biodiversity, particularly on-farm and in-situ management of agro biodiversity with reasonable time and available resources.

We hope that this report will serve the intended purpose of reaching out to targeted audience in the area of community biodiversity management. We take this opportunity to thank all our donors and partners for the support extended to us and involvement in carrying forward nearly two decades. We look forward to receiving your comments and suggestions for improving the outreach of MSSRF Biodiversity programme.

**Dr N. Anil Kumar** / Director, Biodiversity / 13, February 2010

## Session 1

# 20 *years* (1990-2010) OF THE BIODIVERSITY PROGRAMME *an overview*

- 1 The Biodiversity Programme of MSSRF was launched in 1990 to concurrently address conservation of biodiversity and create sustainable livelihoods for the poor living in the biodiversity 'hotspots' of the peninsular India. In the first Annual Report of MSSRF (1991-1992), Prof. M. S. Swaminathan stated, "We can neither sustain a national food security system nor face the challenge of climate change, if we fail to conserve and utilize in a sustainable manner our genetic wealth in flora, fauna and micro-organisms". This statement reflects the rationale of the MSSRF's biodiversity programme and has flourished over the years through distinct phases of growth in the form of clearly defined initiatives in mainstreaming biodiversity for achieving on-farm conservation, food security, sustainable livelihoods and development in eco-agriculture.

2 From the inception of the Biodiversity programme, it was decided that the activities of the programme will address the high priority actions advocated by the CBD framework and involve members of local communities as major partners. The focal areas of actions were (i) reducing the rate of loss of biodiversity, particularly on-farm genetic diversity, (ii) promoting sustainable use of bio-resources, (iii) addressing major threats to biodiversity, (iv) protecting traditional knowledge, and (v) ensuring benefit sharing. With the integrated implementation of these five areas, the BdP has successfully demonstrated that conservation and livelihood improvement efforts can complement each other. The focus in biodiversity was agro- biodiversity. In situ and on farm conservation of PGRs of food and health security relevance notably traditional cultivars and wild relatives of crops. Saving endangered plant species was another equally important area of action since the early days.
- 3 In the initial five years of BdP (1990-1995), there were multiple priorities in the agenda: coastal area biodiversity, sustainable agriculture and biotechnological application in genetic variability studies. These priorities were grouped under Five sub-programme areas, viz., (i) N. I. Vavilov Research and Training Centre for the Sustainable Management of

Biological Diversity for the purpose of promoting community conservation methods; (ii) Genetic Resource Centre for Adaptation to Sea level Rise to address the anticipated impacts of the global climate change through conservation and sustainable utilization of coastal area biodiversity, specifically Mangrove Ecosystem; (iii) Saving Endangered Plant Species focusing on one of the Global Hotspots of Biodiversity - the Western Ghats; (iv) Establishing a Genetic Garden for Sustainable Agriculture for large scale production and distribution of plant and microbial species of fertilizer, pest control and agro-forestry value, and (v) Use of RFLP Analysis in the study of Genetic Variability in Mangrove Species in order to search for useful genes for plant breeding purposes. In the initial five years, the activities and deliveries of the five sub programme areas were restricted only to Tamil Nadu.

- 4 As the years progressed, many more concerns and areas of action, such as 'saving endangered national parks and Gene sanctuaries', 'monitoring ecosystem's health using bio-indicators', 'ecological restoration, and bio-prospecting for novel genes, novel compounds and novel micro-organisms' figured in the list of priorities of the Programme Area. Barring the bio-prospecting component, these activities did not move forward.
- 5 In 1993, a Community Gene Bank (CGB) was established in MSSRF as a medium-term storage facility with controlled temperature and humidity for housing the collection and storage of traditional PGRs, and a Community

Herbarium (CH) containing voucher samples of such varieties. This functioned as a common facility for ex-situ conservation of PGRs provided by farmers. By 1997, the sub-programme areas, Sustainable Management of Biological Diversity, Saving Endangered Plant Species and Sustainable Agriculture along with CGB and CH grew rapidly and evolved into a major stream of community-biodiversity programme and spread out to other states like Kerala and Odisha.

- 6 In 1997, the Community Biodiversity Programme (CBP) in Kerala was established as an exclusive institution called Community Agro-biodiversity Centre (CAbC). The Centre operates from a 13-acre land donated by Ms. Mina & Prof. M. S. Swaminathan in Kalpetta, Wayanad district of Western Ghats. From 1997 onwards, the CAbC emerged as a model for genetic resource management, community empowerment and mainstreaming biodiversity conservation in tribal/rural agricultural development. In 2007, a similar centre, the Biju Patnaik Medicinal Plants Garden and Research Centre (BPMPGRC) was established in Orissa to coordinate the activities that had commenced in 1993. With the establishment of this centre, the community biodiversity programme expanded with the participation of local tribal communities (see Box 1 & II). The works of the Biodiversity Programme in the Kolli Hills of Tamil Nadu since 1994 were also brought under the umbrella of community biodiversity programme (Box III). Parallel to these changes, the sub-programme Adaptation to Sea level Rise became a

major part of the Programme Area - Coastal Ecosystems, and the RFLP Analysis evolved into another new Programme Area called Biotechnology in the year 2005.

- 7 The visibility and transparency of MSSRF's Biodiversity Programme is apparent since it started its Network initiative that included over 50 NGOs from Tamil Nadu, Kerala and Andhra Pradesh and involved experts and scientists from different institutions in order to create Awareness on Biodiversity among the locals. This enabled a high percentage of reach for MSSRF in these states in spreading the message of conservation and sustainable development, and provided credibility to MSSRF as an NGO's NGO. The programme has continuously maintained a professional network with key stakeholders in various realms of sustainable agricultural and rural development, particularly in Kerala and Tamil Nadu. Over the last two decades BdP showed high commitment in addressing relevant issues highlighted by the CBD articles 8 (j) and 15, and have shaped its interest in community level actions and action research in the areas of biodiversity conservation, poverty reduction, and natural resource management (NRM).
- 8 The key initiative of the Biodiversity Programme is community biodiversity management (CBM). This focus on empowerment of local communities for on-farm and in-situ conservation of crop diversity and the socio-economically important wild plant species for livelihood improvement. Community-centred conservation and livelihood improvement through capacity building of local men and women proved that it is an appropriate approach towards conservation, sustainable and equitable use of biodiversity.
- 9 Equally significant efforts were taken in enlarging the food security basket of local communities in Kerala, Tamil Nadu and Odisha. This was done by including Neglected and Underutilized Species (NUS) of crops like millets, tubers, grain legumes and leafy vegetables in the diet. The seed and food security issues led to the development of the concept Field-Gene-Seed-Grain Bank and Water Bank and the Participatory Management of farmers' varieties. The approaches through partnership building attracted the attention of different quarters and helped establish useful linkages with national and state governments as well as national and international non-governmental organizations.
- 10 Several donor agencies supported the BdP of MSSRF, the Swiss Agency for Development and Cooperation (SDC) being one of the biggest. In 1997, the "Conservation and Sustainable Use and Equitable Sharing of Benefits arising out of Biodiversity Project" was launched with the support of SDC. This was aimed at small farmers to improve their production through environmentally-sound natural resource management practices. The project was implemented in Jeypore, Odisha, Wayanad in Kerala and Kolli Hills in Tamil Nadu. The International Fund for Agricultural Development (IFAD) stepped in Kolli hills in 2003 to promote millets notably finger millet

and its value addition through training and capacity building. Intercropping of millets within the widespread fields of tapioca was attempted in this project. In 2005, the International Food Policy Research Institute (IFPRI) provided an opportunity to expand the team's understanding on millets in various terrains apart from the Kolli Hills.

11 The decade long intervention with the support of SDC helped the programme in community capacity building in the Koraput region of Odisha, Kolli Hills in Tamil Nadu and Wayanad in Kerala and, successfully demonstrated local level implementation of the relevant articles of CBD and Millennium Development Goals (MDGs) 1 & 7. The NRM interventions on Eco-agriculture demonstrated high potential for knowledge sharing and to effectively address the issues related to modern agriculture in order to open up possibilities of promoting sustainable agricultural practices in rice in Koraput, millets in Kolli hills and Yams and tubers in Wayanad.

12 Over the last few years, several initiatives were brought together and integrated into the programme to address critical issues in in-situ and on-farm management of genetic resources. Participatory Plant Breeding (PPB) was initiated in Odisha with support from SDC in 1998, Millet project in Kolli hills by IFAD and Bioersity International and, Global Environmental Facility (GEF) supported small grant project on yams in Wayanad has proved that it is an effective approach for enhancing the potential of cultivated crops, and also a pathway to secure sustainable

livelihoods. Twenty-six local rice varieties were improved through the PPB programme and large-scale cultivation of people-preferred PPB varieties like Kalajeera were promoted. The project's contributions for community conservation and poverty reduction helped the tribal communities of the Jeypore tract to win the Equator Initiative Award of 2002. Following this, a community level institution called the Panchabati Grama Unnayan Samiti (PGUS), was established in the same year. In February 2007, PGUS was selected for the Genome Saviour Award for the Protection of Plant Variety and Farmers Rights Authority (PPV&FRA) of the Government of India.

13 The CBP through projects on Neglected and Underutilized Species (NUS) in Kolli hills received wide recognition while assisting local communities in their efforts to identify, catalogue, manage and market diverse kinds of millets and value-added products of hitherto neglected grains. This intervention helped in increasing the area of cultivation of three minor millets - finger millet, little millet, and Italian millet. Village level seed banks, farmer-to-farmer seed exchange systems, dissemination of information using various forms of communication like handbills, street plays, seed melas and market linkages were done to revitalize interest among local communities with regard to these millets. Small scale machineries for processing such millets were introduced in the villages to reduce the drudgery of women involved in processing them. Yield enhancements of landraces of millets



using modified method of cultivation, support for relay cropping and linking millets to organic product chain in neighbouring districts were also done to evince interest among the local communities.

- 14 Equally impressive was the work on yams and taros in the Wayanad district. Several unknown varieties of the so-called "underground" crops of yams and taros were brought to the attention of the outside world. In 2008, the contributions of Kurichya and Kuruma tribal communities of Wayanad were recognized with the Genome Saviour Award for their efforts in on-farm conservation and enhancement of 20 farmers' varieties of rice by the Protection of Plant Varieties and Farmers' Rights Authority (PPVFRA), Government of India.
- 15 The ground work of BdP has always been in-situ and on farm conservation of endangered species and varieties belonging to both wild and cultivated biodiversity. The experiences gathered in participatory in-situ on-farm and ex-situ on-farm conservation of the BdP offered an advantageous edge in dealing with issues related to the equity provisions of the CBD and Farmers' Rights. The initiative of Saving Endangered Plant Species dealt with the issue of conservation of threatened plant species by protecting hundreds of Rare, Endangered and Threatened (RET) trees, rare species of medicinal plants, woody climbers, orchids, and butterfly host plants in ex-situ and near wild conditions. A project supported by Sir Dorabji Tata Trust in

2006 yielded mass production of seedlings belonging to 80 targeted RET species of the Western Ghat region. The project facilitated the launch of a tree planting campaign named "50,000 RET Trees by 2012". These efforts gave way for the selection of CABc as the best Green Institution Award for the year 2009 by the Kerala State Biodiversity Board for.

- 16 As MSSRF commemorates its 20th Anniversary, the organization is pleased with its contribution to shaping two important Indian legislation the Protection of Plant Varieties and Farmers' Rights (PPVFR) Act 2001 and Biological Diversity Act 2002. MSSRF Scientists and policy experts played a major role in drafting these legislation, which spell-out the major mechanism for the country to achieve many of the 2010 Biodiversity targets like benefit-sharing and protection of IPRs of local communities. The potential impact of this legal frame work in community management of biodiversity need not be overstated. Another remarkable contribution of the programme is empowering large numbers of researchers and students working in the area of biodiversity and enabling them to form alliances with community leaders, farmers, environmental experts, foresters and policy makers for long-term actions in the area of community biodiversity management in Wayanad, Koraput, and Kolli hills. The integrated conservation efforts in biodiversity in participation with local communities paved the way for MSSRF to receive the Stockholm Challenge Award in 1996.

11 In spite of MSSRF's best efforts in creating sustainable livelihoods without compromising the on-farm conservation of biodiversity, it has been an elusive dream. An external review by Dr. Uma Lele & Ms. Kavitha Gandhi in 2008 commented on the performance of programme and highlighted some weaknesses that required to be addressed on a priority basis.

18 The major thrust area of BdP in the coming years will be overcoming these weaknesses by setting practical examples in creating an economic stake in conservation and legal and genetic literacy empowerment of key local stakeholders. We are aware that the markets for products and services derived from biodiversity are growing, which offer ample opportunities for generating alternative sources of income and for establishing production process based on sustainable use of biodiversity. However, we also understand that the ways and means to help individuals and communities to target marketing of such products and services need to

be clearly demonstrated in suitable scales to make visible impacts.

19 The findings of the external evaluators and our learning were discussed by the Board of Trustees and the Council of Directors of MSSRF who clearly defined the key objectives, strategies and plan of actions to be taken up for the next five to ten years from now, with a vision for next 20 years. The reach out of the programme, the number of staff and support agencies grew over the years. The programme that started with one employee in 1990 currently employs 51 staff members and work in partnership with several farm families and different governmental and non-governmental members to achieve the targeted programme goals and objectives. We want to say that the team is dedicated to achieve the vision and mission of the biodiversity programme with elevated and clearly defined goals, a result-oriented approach, acquiring competent skills, setting of internationally accepted standards of performance excellence and ensuring a principled leadership.


**BOX**

## Community Agro-biodiversity Centre Kalpetta, Wayanad, Kerala

In 1997, MSSRF established its first Community Agro-biodiversity Centre in Wayanad district of Kerala to work on 'community biodiversity management' by promoting a coalition of the concerned, notably, government departments and voluntary organizations for the conservation of the genetic wealth of Wayanad and surrounding region. The partnership helped in achieving a unique breakthrough in the local efforts in conservation and sustainable utilization of plants of direct economic value like medicinal plants, ethnic food plants, and other traditional crop varieties. The objectives of the Centre are: (1) generate public awareness, participation and action for preventing further genetic erosion and strengthen the on farm and in-situ conservation traditions of rural and tribal families of Wayanad and adjoining regions; (2) create an economic stake in genetic

resources conservation through the domestication of endangered plants of value in human and animal health and nutrition and their commercialization through remunerative buy-back arrangements; (3) save endangered plant species by multiplication using propagation techniques including tissue culture, mist propagation (4) provide opportunities for students of universities and colleges to undergo training in biosystematics and tribal taxonomy and undertake post-graduate dissertations in different aspects of agro-biodiversity conservation and use.

The 'community' approach to conservation of biodiversity and the strategic placement in a "biodiversity hot spot" provided a unique position for CABc. The Centre's interventions in strengthening community efforts in addressing conservation issues have been appreciated by

people from different walks of life. Studies conducted by the Centre on wild food plants, endangered plants, medicinal plants and cultivated traditional plant genetic resources generated high quality information and resource base about local PGRs. The ex-situ plant collections (in an orchidarium housing over 100 species; an arboretum with 60 rare tree species and a medicinal plant garden with over 400 species) established in CABc attract students and other visitors providing them a rare opportunity to view and understand diversity. In the year 2007-2009, over 50,000 seedlings of rare and endemic tree species were raised and distributed to rejuvenate degraded habitats. The Centre's work on education, training and dissemination with a pro-nature, pro-poor and pro-women approach has contributed in setting both local and regional level actions for agricultural development.



## BOX 2 Tribal Biodiversity Centre Jeypore, Koraput District, Odisha

The Koraput region of Odisha is known globally for its rich biodiversity and is regarded as the secondary centre of origin of rice. The Jeypore Botanical Survey (JBS) carried out in 1955-60 recorded 1745 landraces of rice, of which only 324 landraces are now traceable. In addition, over 1200 medicinal plant species are also available in this region. Realizing its importance and to address issues related to biodiversity, MSSRF established the Biju Patnaik Centre to save, study and use biodiversity found in the tribal area by strengthening the conservation traditions of local communities. The Centre has been active promoting on farm conservation, cultivation, consumption and commercialisation of traditional crop varieties. An ex-situ genetic conservation centre of medicinal plants used in the health care of major tribes of the region viz. Bhatra, Bhumia, Bonda, Gadaba, Gond, Paroja, Kandha, Koya and Saura has been established. This would also serve as a repository of various genetic stocks useful to the future generations of tribal families.

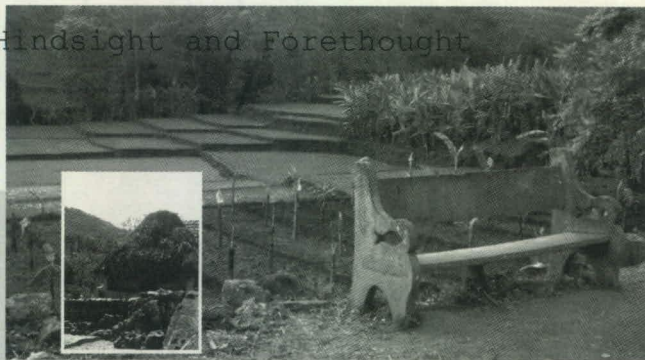
Other activities of the centre include, conservation of underutilized millets, promotion of sustainable livelihoods through micro level interventions, establishment of community

managed gene, seed, grain and water banks, promotion of genetic literacy, documentation of local conservation traditions and prospecting and preserving endangered plant species of Eastern Ghats. The community grain-seed-gene bank continuum has proven to be an effective pathway towards achieving food and nutritional security.

Establishment of SHGs involved in water resources management, wasteland reclamation and marketing of speciality rice like Kalajeera, and products of minor millets stand out as an example of successful initiative of tribal families. Efforts are made to reduce the drudgery of farm women through appropriate technological interventions like provision of small mills for processing paddy.

The centre's work in this region fostered a sense of ownership among tribals participating actively in various aspects of the work of the centre, namely conservation, enhancement through participatory breeding, cultivation of vanishing crops and chronicling dying wisdom. The initiatives taken up by the centre enabled the local tribal communities of Jeypore region of Odisha to receive the prestigious Equator Initiative Award, 2002 and Plant Genome Saviour Award, 2007 for their selfless efforts in

conservation of local genetic resources and traditions. The communities with whom the foundation is working could also secure national level awards like Krishi Bisharad Sanman- 2003, Felicitation by Honourable Chief Minister of Odisha- 2004 and the Folk fare Award - 2008. The Food and Agriculture Organization (FAO) of the United Nations declared Jeypore region as a Globally Important Agricultural Heritage System (GIAHS) and the centre as its nodal point. A participatory Knowledge Management System is also being developed to foster genetic, trade and legal literacy. The centre helps tribal women and men to protect their intellectual property rights under the provisions of the Protection of Plant Varieties and Farmers' Rights Act 2001 and Biodiversity Act 2002. Skill and capacity building of rural people are achieved through the Village Knowledge Centres' (VKC) help to empower the villagers to plan and implement their own activities. Future thrusts on establishment of a Community College as well as training centre with residential facility and added emphasis on value addition and marketing of traditional varieties are expected to enable utilisation of the available bio resources to the maximum extent for the betterment of the local community.



## BOX 3 Community Agro-biodiversity Programme Kolli Hills, Tamil Nadu

The Kolli Hills in Namakkal District of Tamil Nadu is known for cultivation of a range of landraces and multiple sources of natural resources like livestock, trees, and collection of Non-Timber Forest Produce (NTFP). The M. S. Swaminathan Research Foundation (MSSRF) commenced its work in the Kolli Hills in 1994. Appraisal and documentation project to understand people, their culture, value systems, and traditional knowledge, farming systems, forest conservation practices and livelihoods were first carried out under a project supported by the Swedish International Development Agency (SIDA) and another project by the GTZ. Potential areas for development interventions and action were identified, of which millets were chosen as a strategic crop. A project was developed on those lines and supported by the Hindustan Lever Research Fund (HLRF).

Participatory characterization of millets and input based enhancement trials were conducted in association with knowledgeable farmers. Creating an economic stake in conservation was identified as an important pathway. A book *Kolli Malai Padalgal* (Folk Songs of Kolli Hills), which contained oral

sources on agriculture, social dimensions of the Malaiyali community, was published as part of the efforts. Studies were conducted on community conservation like protection of sacred groves, cultivation and consumption of millets. The Government of Netherlands supported a project on Agro-biodiversity Conservation Corps (ACC), while some fund from IDRC were utilized for exploring the possibility of providing livelihoods based on natural resources notably millets, pineapples and forest resources.

A public-private partnership model with regard to export of organic pineapples through the process of certification was put in place and had a local economic benefit. The Swiss Agency for Development and Cooperation (SDC) supported a project that helped in the capacity building of communities in biodiversity and natural resources management. Village level seed banks, farmer-to-farmer seed exchange systems, dissemination of information using various forms of communication like handbills, street plays, seed melas, market linkages were conducted to revive the interest in millets among the local communities. Drudgery

involved in processing of millets was identified as one of the key causes for its decline from household food system. Therefore, the project promoted establishment of small scale machinery for processing millets. These efforts were backed with yield enhancement of some landraces of millets using modified method of cultivation, support for relay cropping and linking millets to organic product chain in neighbouring districts.

The International Fund for Agricultural Development (IFAD) stepped in to promote millets, notably finger millet and its value addition through training and capacity building. Intercropping of millets within the widespread fields of tapioca was attempted. The International Food Policy Research Institute (IFPRI) provided an opportunity to expand the team's understanding on millets in various terrains apart from the Kolli Hills. The work over a decade and half led to the establishment of the Kolli Hills Agro-biodiversity Conserver's Federation (KHABCOFED), a community based institution with a membership of 500 tribal families belonging to 40 Self Help Groups and 4 farmers clubs.

## Session 2

### BIODIVERSITY PROGRAMME

# 20 *Evolving priorities for next years*

20 Looking back, we see that the goal of the Biodiversity programme remain relevant. Additional importance is gained with the rapidly changing environment. Several changes, positive and negative are visible in our operational environment. Hence some of the priorities for action require to be reworked. In view of the emerging challenge of climate and global environmental change, emphasis has to be shifted more towards addressing the new dimensions of on-farm conservation of biodiversity, food security, poverty reduction and sustainable livelihoods.

21 While our vision envisages that farming communities in the intervention sites follow agricultural practices that are not inimical to the earth, we also recognize that effective use of technologies like Biotechnology, Information Technology and Eco-technologies are required to design sustainable agricultural practices and to address new challenges emerging due to the impacts of changes in the weather and climate.

#### PROMOTING ADAPTATION TO CLIMATE CHANGE

22 Climate change is likely to be the single most limiting factor with regard to food and agricultural production in the future. We recognize the immense importance of Climate change for agro-biodiversity and agro-ecosystems maintained and used by communities. Severe loss in food crops, livestock, and of harvested species of trees, fish and wildlife, particularly in the semi-arid and sub humid, coastal and inland water regions of India. These regions are areas where agriculture is the primary livelihood and where a majority of poor depend heavily on agro-biodiversity. The programme may have to include more such locations and target tangible actions in the future.

23 The Millennium Ecosystem Assessment (MEA) predicts that climate change will lead to intensification of pests and disease attack, increased soil moisture evaporation and lower yields of crops, livestock and fisheries and, reduce

diversity of species. Therefore, every ecosystem, species and variety matters to arm ourselves to counteract the deleterious effect of climate change. On-farm erosion of genetic diversity of crops, breeds and strains are reported as exceptionally high in many parts of India and predicted to continue at much faster pace in the future. As an adaptation option, in situ on-farm conservation of traditional crops and breeds that cope with wide agro-climatic and agro-ecological conditions is seen as a reliable tool. Conservation of diversity on-farm and in situ in forests and protected areas is likely to back up food and agricultural security options of the future.

24 One of the 2010 Biodiversity Targets at global level is to achieve significant reduction in the current rate of loss of biodiversity. The loss of biodiversity is alarming across known species groups. The tropical biomes, that have a larger share of endemic biodiversity and face severe developmental pressures, are believed to have a larger number of threatened species and much of the threat is from human activities, largely in the form of conversion or degradation of habitats of biodiversity for alternate land uses. Three of the 34 global biodiversity hotspots are in India and they are severely threatened, calling for corrective steps to stem the erosion of genetic resources. Knowledge and information is limited about the distributional pattern and conservation status of the threatened tree species of India facing climate change, with predictions indicating around 10 per cent of all tree species of India would be lost in near future.

## ADDRESSING FOOD AND AGRICULTURAL SECURITY

- 25 We realize that one of our important interventions for helping local communities in vulnerable areas is to place 'safety nets' that ensure household food security. Developing nutrition gardens and new seed materials to cope with the changing needs in the light of climate change will be an important priority in our agenda. Several locally available food plants play a critical and important role during chronic food shortages in many of poor households. Several of these species and varieties are able to withstand severe drought and remain as reserve food beneath the soil for a period of four to five years. Assistance need to be extended to local communities in their efforts to identify, catalogue and manage diverse food plants and crop varieties and also to establish gene pool centers for some of the promising ones.
- 26 Biodiversity is the key that sustains agricultural production and productivity. It would be very difficult for a nation like India to achieve the global target of conservation of up to 70% genetic diversity of crops and other major socio-economically valuable plant species in-situ, unless management efforts are taken to incorporate community-conserved biodiversity and agricultural landscapes. Over the next few years, MSSRF would be paying attention to study traditionally managed agro-ecosystems that support food production and food security for their structure and processes. So the goal of finding practical ways for effective

selection, enhancement and the use of traditionally maintained agricultural landscapes and diversity will be of more relevance to our work in the coming years.

27 Change in land use from traditional to modern methods, has increased food and agricultural production but contributes to green-house gases and to global warming. Traditional land use is now considered as a sustainable pathway for reducing

green house gas emissions from agricultural landscapes. In addition, such practices also increase the habitat value by restoring wild vegetation for carbon sequestration. Reduction of chemical fertilizers through use of alternate methods like INM & IPM result in minimizing pollution and thereby contributes to health of communities dependent on it. Promoting ecologically sound agricultural practices, therefore, gains importance.



## WAY FORWARD

# 5 *The programme plan for* *years* (2010-2015)

- 28 The Evaluation Report by Dr. Uma Lele on the performance of BdP called for evolving strategies for creating economic benefits and livelihood opportunities for local biodiversity knowledge holders. Pursuant to this report, the Working Group on BdP discussed the findings in three levels - at the Council of Directors (COD), on February 2, 2009, followed by Biodiversity Programme coordination group (Chennai team) on March 20, 2009 and at the regional level - meeting at Jeypore Centre and Wayanad Centre on 29- 30 March, 2009.
- 29 The discussions helped us to identify strategies and set priorities needed to achieve greater efficiency and gains in the performance of BdP in the future. Further, we also realized that the programme required the establishment of an effective monitoring system by identifying measurable indicators and standards of excellence to assess its performance. It was decided to develop a Plan for the Way Forward by taking into consideration of the major suggestions made in the report: (i) Need for innovative and viable economic models to demonstrate that biodiversity conservation is essential for ensuring sustainable livelihoods; (ii) Diverse pathways to explore and demonstrate economic viability in conservation efforts; (iii) Field based demonstration of Cases for Access and Benefit Sharing practices arising out of biodiversity conservation hinging on the Protection of Plant Varieties and Farmers' Rights Act 2001 and the Biodiversity Act 2002; (iv) Evidences for biodiversity synergy with the other programme areas of MSSRF such as biotechnology, Food Security and Eco technology, ICT ; and (v) the Need of an Independent monitoring and evaluation system.
- 30 A consensus was reached by the BdP on three thrust areas: (i) Community Biodiversity Conservation and Enhancement, (ii) Sustainable Livelihoods, Food and Nutritional Security; and (iii) Education, Training and Capacity Building (as cross-cutting theme) designated as sub-programme. The priority genetic resources include neglected and under-utilized crops and species of food and nutritional value and rare, endemic and threatened plant species of medicinal and conservation value.

31 The discussions also found that a highly useful strategy for achieving many of the objectives of the programme is a 'C4' continuum. The 4Cs are of (1) Conservation, which includes enhancement and sustainable use of biodiversity and comprises in situ, on-farm and ex situ conservation involving seed bank, cryogenic community gene bank, in vitro cultures in the case of vegetatively propagated species; (2) Cultivation that promotes low external input, sustainable agriculture based on principles of organic farming; (3) Consumption that covers food security and nutrition, revitalization of traditional food habits including the use of underutilized crops and tubers, survey of prevailing macro and micro nutritional deficiencies; and (4) Commerce that creates an economic stake in conservation for concurrently addressing the cause of conservation and livelihood security through self-help groups. Since the 4 Cs are closely linked, progress in one 'C' is possible only with progress in other three C's.

32 We propose to work with the C4 strategic approach embracing the three sub-programme areas. Using the C 4 framework, the BdP would develop location specific strategies and targets in Kerala (Wayanad district); Odisha (Koraput district) and in Tamil Nadu (Kolli Hills) taking into account the current, changing socio-economic conditions and emerging needs of local communities. The MSSRF community genebank will function as a common facility for collection, storage and exchange of seed materials identified from across the three States. Integrated interaction with tribal communities in these locations in the 'C4' areas will be a major goal to promote meaningful and symbiotic linkages between scientists and tribal families. Focused efforts will be undertaken to establish synergy with the other programme areas of MSSRF such as eco-technology, bio-technology, information technology, and Food Security.

## SUB PROGRAMME AREA 1

**COMMUNITY BIODIVERSITY  
CONSERVATION AND ENHANCEMENT**

*Focus: Strengthening integrated conservation, selection, enhancement, and practical use of genetic resources of Neglected and Underutilised (NUS) Crops & RET Plants*

33 We recognize that in the three targeted States, the variability in crop genetic diversity was developed and safeguarded by farmers, livestock breeders, forest workers, fishermen and indigenous people is extremely important in providing food security and genetic enhancement efforts in modern agriculture. In most of the crops and breeds, the on-farm erosion of genetic diversity continues at a much faster pace. Hence, the challenge is to conserve as much genetic diversity at the lowest possible public cost. It would be very difficult to achieve the global target of conservation of up to 70% genetic diversity of crops and other major socio-economically valuable plant species such as medicinal plants and wild food plants in-situ unless combined efforts are taken in the management of community-conserved agricultural landscapes and biodiversity.

34 However, several issues exist in finding practical ways for effective selection, enhancement and use of such diversity, especially with on-farm biodiversity. The efforts of BdP will be directed towards setting goals for conservation and enhancement of genetic diversity of underutilised crops, livestock, and of harvested species of trees and other valuable species, along with the maintenance of associated local knowledge. The programme will evolve and implement

practical methods to arrest the genetic erosion and strengthen integrated conservation with the effective involvement of local communities.

35 The underutilised genetic resources such as millets, yams and taros, minor legumes and fruits will be studied with reference to: (i) Community conservation practices and adaptation to climate change; and (ii) the Role of Community institutions' in protection of traditional knowledge and community rights. The following three areas will be the main pillars of action in this programme.

**Initiative 1:  
FARMERS' VARIETIES**

*(Promoting awareness on benefits of farmers' varieties and wild food species)*

36 We found that many of the varieties and species that have been phased out of the farmers' field due to neglect from state research and development system. For instance, we discovered about 20 traditional varieties of yam and 6-8 of taro on-farm, largely restricted to home gardens of the Malabar region in Kerala, whereas in cultivation both yams and taros together, there are only 5 or 7 varieties. We understand that this is because of neglect towards such varieties, as more preference is given to one or two tuber crops like cassava and potato. If this continues, all those tuber crops, except cassava and

potato, would have disappeared from farmers' fields. Majority of farmers, particularly women, we spoke to, said that no fair price offered by the market or no preference shown by children of the family to such crops grown in family farms, because of market influence on the food habit of the younger generation. Our research shows that amongst the local youth there is a tendency to simplify their diets and eliminate diversity that has traditionally been a strong component. We also realize that little is known either about the nutritional value or possible undesirable side-effects of food originating from wild and non-domesticated plants.

37 Biodiversity of local environment and food security interactions are often viewed at four levels- farm crop level, home garden level, forest level and semi-wild level. MSSRF studies show that the forest/semi-wild dwelling tribal men and women in Wayanad District of Kerala, have acquired knowledge about 200 wild edible species, most of them accessed and utilized from the semi-wild environment. Apart from such diversity, there are many NWFPs managed and used by local communities. Traditionally, people accessed wild bushes to trap small animals/or dig root tubers, and agricultural fields to gather greens, catch fish and crab, which constituted a major source of animal protein. Local people are by and large not aware of the nutritional value of prolonged consumption of native diet that were traditionally included and were good for their health. Therefore, it becomes imperative to carry out both extension and applied research

on the nutritional values of these plants and their potential impacts on human health.

**Initiative 2:  
GENDER &  
AGROBIODIVERSITY**

*(Recognising Gender in Sustainable agro-biodiversity management)*

38 Biodiversity management and food production in most of our intervention sites takes place based on distinct gender roles, particularly in relation to seed-saving, selection and traditional plant use for food and medicinal purposes. Recent land use changes towards cash crops-based farming in states like Kerala and Tamil Nadu destabilized the long existing patterns of the link between women and agro-biodiversity. Studies indicate that there has been an alarming shift from rice and subsistence crops to cash crops across Kerala and particularly in the Wayanad district. For example, in the year 1985-86, the area under rice cultivation in Wayanad was 30,767 ha, and it was reduced to 11,832 ha in 2006-07, a decline of 61.5 per cent. Such drastic changes are negative for women since this has significantly displaced women labour. There are several instances where women's role was a decisive factor in conservation of agro-biodiversity. Women follow more eco-friendly agricultural practices like conservation agriculture that help maintain the resilience of ecosystem services of agricultural landscapes without reducing crop productivity, and increase the habitat value by restoring wild vegetation for carbon sequestration. Our studies indicate that incorporation of gendered knowledge and practices are important for achieving the goal of

sustainable management of biodiversity.

- 39 A lesson learned in this context is that establishing appropriate training and policy initiatives in Gender-related biodiversity will greatly benefit long-term management of biodiversity and food production. Policy-level research and training women in the area of gender science will help achieve goals like sustainable food production and traditional health care management. Initiative 3: 'RET' PLANTS (Saving the Rare, Endemic and Threatened Plant Species)

- 40 Literature shows that approximately 600 tree species in India are threatened with extinction, a sizable percentage being located in south India. The 2006 IUCN Red List of threatened species includes 350 vascular plant species from India, many of them endangered species, of which 203 are found in the Western Ghats. The tree species mentioned in this Red list as well as in the Indian Red Data Book are said to occur only in one or few collections provides an insufficient picture of their distribution, variation, population structure, and precise threat status. Holistic information is required about endangered tree species in terms of their economic, ecologic, livelihood, medicinal or cultural importance.

- 41 Concerted action to research and promote tree conservation, thereby protecting them from extinction and dealing with climate change. To fulfil this objective, research fellowships in three major impact areas of conservation, - Forest Ecology including Tree breeding, Plant

Taxonomy and Ethnobiology-will be instituted and it would be useful to address the issue conservation biology. The sustained efforts of MSSRF Scientists from CABIC, has convinced the Kerala Forest Department to approve the reintroduction of 16 endangered tree species in the Wayanad Wildlife Sanctuary. The most valuable contribution was in the restoration of a critically endangered leguminous tree, *Cynometra travancorica*. A lesson we learned is that conservation of maximum possible number of endangered tree species under in-situ or ex-situ conditions will help to address the issues of conservation and climate change.

## SUB PROGRAMME AREA 2

**SUSTAINABLE LIVELIHOOD AND FOOD & NUTRITIONAL SECURITY COMMUNITY BIODIVERSITY**

*Focus: To create an economic stake in conservation for concurrently serving the cause of conservation and livelihood security and revitalize past food consumption habits including the use of underutilized crops.*

42 Markets for products and services derived from biodiversity are growing in our intervention sites, and offers ample opportunities for generating alternative sources of income for the people. However, the ways and means to help individuals and communities target marketing of such products and services have not been clearly demonstrated in suitable scales. In the future, the thrust will be on demonstrating ecologically sustainable income-generating ventures, preferably by adopting the strategy of partnership with other institutions that have proven their skills in livelihood development.

43 International trade has conventionally proved to be destructive to biodiversity and peoples' livelihoods by encouraging over exploitation of natural resources. The argument against commercialization of biodiversity is that trade is likely to have adverse consequences on biodiversity leading to specialization by exploiting comparative advantage. Although over a period of 10,000 years of settled agriculture, men and women have discovered about 50,000 varieties of edible plants, only a few crops like wheat, rice, maize (corn) get widely cultivated, because of the relative advantages in international trade for such crops and varieties. This has resulted in a large number of neglected and underutilized species that is vanishing from the food

baskets of human societies.

44 Lack of adequate knowledge about the value is one of the reasons for the erosion of biodiversity. When it comes directly to the domestic trade of agricultural commodities in the three targeted States, production complexities, nature of production systems and state-support make them perform differently, chiefly because of the socio-cultural and political differences in resource management. The priority directions in BdP, therefore, will be: (i) to facilitate income generation process through biodiversity products and ecosystem services that do not undermine sustainability; (ii) to facilitate initiatives like small farmer agri-business consortiums for socio-economically important genetic resources like medicinal plants, fruits and vegetables; and (iii) to undertake research in valuation of community biodiversity and the ecosystem services of traditionally managed fields.

**Initiative 4:  
SUSTAINABLE LIVELIHOODS**  
*(Optimising conservation and livelihood benefits)*

45 Markets for products and services derived from biodiversity are growing, which offer opportunities for generating alternative sources of income and for production based on

sustainable use of biodiversity. While there is high potential for creating a (niche) market for biodiversity products, it is an "untapped" area of opportunity. Markets have the potential to stimulate conservation and cultivation of little known crops/orphan species. This would be possible only by meaningful research and widespread education of consumers. There is a widespread agreement among the MSSRF team that much can be done towards livelihoods by way of facilitating responsible community-based marketing of biodiversity products. We are also fully aware of the market potential of initiatives like Bio prospecting and the possibility of sharing benefits with the partnering local communities. We believe that the Western Ghats has huge potential for bioprospecting because of its credibility as one of the world's most diverse hotspots.

- 46 We are convinced that there is an urgent need for identifying ways and means to help individuals and communities to target-marketing of biodiversity products in suitable scales. A lesson we have drawn at this instant is that, only by creating an economic stake in conservation can one effectively deal with the issue of poverty reduction.

**Initiative 5:  
ECO-AGRICULTURE**

*(Promoting Eco- agricultural or conservation agricultural practices)*

- 47 Awareness is growing across India on the risks in regular consumption of fruits and vegetables raised through intensive chemical farming that is

likely to result in accumulation insecticides, herbicides and nitrate fertilizers in human bodies, and induced people to begin consuming organically grown foods, that not only helps in maintaining good health, but also improve soil-health and microbial biodiversity in soils.

- 46 In the traditional food consumption pattern, the intake of micro-nutrients is often ensured because of the use of a wide range of plants and animals obtained from the local environment. Significant potential exist for hill area agriculture to go for eco-agriculture since such regions are conducive to maintaining the ecosystem services provided by agricultural landscapes without reducing productivity. These practices increase habitat value by restoring wild vegetation, while at the same time contributing for carbon sequestration. Traditional land use practices have been proved to be ecologically sustainable and are now being considered as an effective way in reducing greenhouse gas emissions from agricultural landscapes. Some modifications like reduced use of chemical fertilisers and fossil fuels, efficient use of organic matter are required to reduce emission of greenhouse gases and thereby mitigate the effects of climate change. Reduction of chemical fertilizers through alternate methods like IPM results in minimizing pollution and plays a positive role in contributing to health of those who consume those foods. Sustainable farming practices like organic farming, LEISA, permaculture, biodynamic etc., that use traditional varieties of seeds, farming processes that work with nature and help in mitigating climate

change will be given priority in the programme.

49 In many of the project sites, farmers have had to follow a sustainable method of cultivation, by force and by choice since they depend on their own seeds for raising a new crop and do not have the economic power to purchase expensive fertilisers or pesticides. They rely on traditional knowledge for control of pests and improve the soil health. Special market recognition for such produce does not exist. Ecoagriculture strategies are likely to be beneficial to small and marginal farms and the challenge is to take this to large-scale farms in high productive regions. This would be one of the core objectives of the programme.

50 The priority will be on :(i) Promotion of sustainable agricultural practices in larger scale and linking with markets for effectively influencing with the economic viability of eco-agriculture, particularly conservation farming like organic cultivation; (ii) Establishing a link between sustainable agriculture methods and reduction of greenhouse gases; (iii) Addressing the research gaps in the study of ecosystem services of traditionally maintained agricultural landscapes;(iv) Creating awareness for a healthy nutrition system; (v) Promotion of practical methods to revitalize traditional food habits of our ancestors, including the use of neglected and under-utilized species; and (vi) Promotion of horticultural and agricultural remedies for nutritional maladies such as Vitamin- A, iron, iodine and zinc deficiencies, and enhance diversity in

traditional food basket for improving food and nutritional security of the growing population in developing countries. The most important strategy identified is launching a nutrition literacy movement in cities. Case study evidences from different regions of India are required on the benefits of consumption pattern of traditional communities that contribute to conservation of biodiversity. The activities of this programme will be integrated with that of the Food Security programme of MSSRF.

#### **Initiative 6: WATER BANKS**

*(Promoting Water Banks and Water shed protection Areas)*

51 Many of the States in India are "water poor" and stressed with rapid depletion of ground water. Reports show several north Indian States engaged in production of wheat and rice have lost over 109 km<sup>3</sup> of ground water during 2002-2008. The water used to produce agricultural or industrial products is called virtual water. On an average, 3700 litres of water is used in India to produce 1 kg of husked rice, 1654 litres of water for 1 kg wheat, 10,000 litres of water to produce 1 kg of boneless beef, nearly 200 litres of water for 1 glass of milk (200 ml) and 135 litres of water for 1 egg (40 g). How long can the water-poor regions in India export a large volume of virtual water to meet the food security of other States? Community-level institution such as watershed protection committees can play an effective role in managing the local food production by capturing the benefits of abundance of rain water.



52 Several of the states located in the west coast of India are bestowed with high volume of water in the form of precipitation. Rice is the most suited crop for the region in addition to products like milk, meat and egg. For example, the State of Kerala has an average annual precipitation of 3000 mm, but its land is poor and labour expensive, particularly with regard to cultivation of food crops. Food crops in Kerala are confined to just 11.57% of the gross cropped area, which is also under the threat of conversion to remunerative food crops like banana, pineapple or even tapioca. In the light of climate change and other ecological implications, the food security and food access policy of Kerala need to be reviewed. One of the best options to come out of this vicious circle is to revive homestead

farming through home gardens having a rich biodiversity, protection of water and sustainable land use. Studies indicate that the CO<sub>2</sub> sink capacity of agricultural soil is based on farm management practices, and agricultural landscapes can make a modest contribution in global C mitigation, while improving agricultural productivity and sustainability. The practice of maintaining diversity-rich farms also increases the habitat value by restoring more vegetation for carbon sequestration.

53 There is an urgent need for promoting water banks and watershed protected areas to promote them as effective adaptive approaches to address the issue of sustainable food production in the light of climate change.

### SUB PROGRAMME AREA 3

## EDUCATION, COMMUNICATION AND TRAINING PROGRAMME

54 Realizing the need to educate the people about the biodiversity legislations, we visualize training and capacity building on a long-term basis. The prime objectives are to : (i) Educate, train and build the knowledge and capacity on Indian legislations, Biodiversity Act 2002 and Forest Rights Acts; (ii) Build the capacity of the district tribal leaders to integrate the principles and right provisions in these legislations into their leadership actions amongst their community; (iii) Assist in ensuring the rights of the Scheduled Tribes and other forest dwellers residing within the forest; and (iv) Empowering local community access reward and recognition for their contribution in conservation of biodiversity. The legislations mentioned here give considerable authority in the hands of Panchayath Raj Institutions (PRIs) in aiding their implementation. However, a majority of elected representatives, government officials and community leaders are deprived of the critical knowledge required for evolving biodiversity integrated developmental plans. The challenge, therefore, is to empower local bodies integrate the provisions in the legislations to the local developmental plans.

55 Establishing a resource centre related to Forest Rights and Farmers' Rights to decision-making on access to genetic resources and benefit-sharing and seed management is likely to help in the legal and genetic literacy of local communities. This can be

achieved through integrating three components- (i) a Training Unit, (ii) Organization of a Community Rights Protection Forum and (iii) Digital Documentation unit for chronicling conservation contributions of local communities. Trained PRI members of the programme will lead all these units. The expected major impact will be the emergence of empowered groups of elected PRI members from the ST/SC sections, who lead sustainable development of their respective villages.

#### **Initiative 7: LEGAL AND GENETIC LITERACY**

*(Capacity building of local community in Legal and Genetic Literacy)*

56 The legislation that deal with sustainable management of India's biodiversity namely, Forest Rights Act 2006, Biodiversity Act 2002 and PPVFR Act 2001 recognizes the rights of tribal and local communities that are critical to the conservation, sustainable use and active enhancement of biological diversity. The Forest Rights Act 2006 seeks to grant "forest rights" the rights to access biodiversity, and community rights to Intellectual Property (IP) and Traditional Knowledge (TK) related to forest biodiversity and cultural diversity. The PPVFR Act has specific provisions that recognize Farmers' Rights to save, use, sow, re-sow exchange, share or sell their farm produce including the seed of a

protected variety. The Biodiversity Act identifies the right of local communities and individuals seeking equitable share in benefits arising out of the use of biological resources.

57 These Acts place considerable authority in the hands of Panchayat Raj Institutions and local bodies, especially gram sabhas in helping the implementation of the "rights" provisions outlined in them. For instance, in the Scheduled Tribes Act, the Gram Sabha has to function for recognizing forest rights, regulate access to forest resources, and punish those violating the provisions of the Act. The Biodiversity Act warrants every local body to constitute a Biodiversity Management Committee (BMC) within its area for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of farmers' varieties and breeds and chronicling of knowledge relating to biological diversity.

58 One of the envisaged utilization of the Gene Fund provisions in the PPVFR Act is for capacity building on ex-situ conservation at the level of the local body, particularly in regions identified as agro-biodiversity hot spots and for supporting in-situ conservation. However, a majority of elected members and officials of PRIs are deprived of the critical knowledge required for evolving biodiversity integrated developmental plans. The challenge, therefore, is to empower functionaries of local bodies to integrate these into local development plans. Capacity building of PRIs dealing with conservation or

sustainable development is very weak, and exclusively carried out by state sponsored institutions. There is a need for the involvement of credible organizations for a nation-wide genetic and legal-literacy campaign in areas rich in agro-biodiversity.

**Initiative 8:  
TAXONOMY INITIATIVE**

*(Training in Systematic Biology for sustainable Biodiversity management)*

59 There is a dire need of an integrated research agenda combining Linnaean and Folk/ ethno-taxonomy, ecology and molecular biology to deliver effective results in conservation of biodiversity. An important lesson is that the recent developments in disciplines such as molecular biology, phyto-chemistry and genetics call for training conventional taxonomists in modern methods to enable them to research the phylogeny and molecular taxonomy of endangered taxa. Local youth could also be trained as a cadre of 'para taxonomists' for carrying out inventory, collection and identification of specimens to help in local level biodiversity mapping as per the mandate of the National Biodiversity Authority (NBA).

60 The tribal areas afford a wonderful opportunity to re-conceptualize our unity with the biosphere and for reconnecting communities with their landscapes. We propose to offer training programmes for educated tribal youth and university scholars in the areas of taxonomy, genetic resources conservation, evaluation and utilization. Meaningful methods and procedures should be established to undertake training and capacity

building in plant taxonomy, a dying discipline of Botany.

**Initiative 9:  
EVERY CHILD A SCIENTIST**  
*(Educating Children on Biodiversity)*

61 The ECAS (Every Child A Scientist) programme aims to educate children and youth of tribal and non-tribal communities on the importance/value of biodiversity and natural resources, associated traditional and indigenous knowledge systems of the region. There is a rapid erosion of Traditional Knowledge (TK) pertaining to the environment and biodiversity, which is evident amongst the younger generation. If this trend continues, we may lose forever the knowledge, traditions and customs related to our culture in the near future. Achieving this goal is possible only with the effective involvement of students and children, elders and teachers. The work focused on inculcating among children, values of their culture and knowledge in protecting environment and bio-resources associated with agriculture and healthcare systems **using knowledgeable individuals belonging to their own communities.**

62 Our experience in ECAS at DNA clubs in Odisha and Wayanad shows that at the first instance, children were not appreciative but got significantly involved when the curriculum was linked to application of modern tools like computers, photography and field exposures with the active participation of parents, teachers and scientists. The programme is likely to develop into a tribal child-friendly environmental education system based on the concept of integrated natural resource management that integrates conventional field study and modern Information and Communication Technologies (ICT). The programme is planning to design and prepare educational materials suited to tribal and rural children and their teachers about biodiversity, ecosystems, traditional knowledge, minor forest produce, crop and breed diversity, and climate change. The initiative, we hope will evolve to provide efficient knowledge service about Biodiversity & Environment to students, teachers and the general public.

## BIODIVERSITY PROGRAMME PLAN (2010 - 2015) summary

Sub Programme Area	Initiatives	MajorFocus
SPA 1 Community Biodiversity Conservation and Enhancement	<b>1. FARMERS' VARIETIES</b>	1. Neglected and Underutilised Crops 2. Wild Food Plants 3. Non-wood Forest Produce (NWFPs)
	<b>2. GENDER &amp; AGRO-BIODIVERSITY</b>	4. Rice diversity 5. Millet Diversity 6. Medicinal Plant diversity
	<b>3. RET PLANTS</b>	7. Tree Diversity
SPA 2 Sustainable Livelihoods & Food Security	<b>4. SUSTAINABLE LIVELIHOODS</b>	8. Small Farmers' Agri-business 9. Food & Nutritional Security
	<b>5. ECO-AGRICULTURE</b>	10. Organic Farming 11. Low External Input Sustainable Agriculture (LEISA)
	<b>6. WATER BANKS</b>	12. Watershed Management
SPA 3 Education Communication & Training	<b>7. GENETIC AND LEGAL LITERACY</b>	13. Rights of Forest Dwellers Act 2006 14. Protection of Plant Varieties and Farmers Rights Act (PPVFR) 2001 15. Biodiversity Act 2002
	<b>8. TAXONOMY INITIATIVE</b>	16. Plant Taxonomy 17. Conservation Biology
	<b>9. EVERY CHILD A SCIENTIST</b>	18. Biodiversity 19. Climate Change
CONSERVATION	CULTIVATION	CONSUMPTION      COMMERCE

BIODIVERSITY PROGRAMME PLAN (2010-2015)  
SUMMARY

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## Initiative **1** SAVING ENDANGERED SPECIES

As early as in 1990-91 through its Sub-Programme Area of "Saving Endangered Species", MSSRF commenced its work on saving endangered species. In the initial years studies were carried out in collaboration with the Botanical Survey of India (BSI), State Forest Departments, National Bureau of Plant Genetic Resources (NBPGR) and other such institutes on such species. It obtained propagating materials, developed priorities in conservation at specific locations and species, undertook research on the process of multiplication such species, and distributed such seedlings through the State Forest

Department to promote restoration programmes, disseminate information on methods of saving endangered species and provide facilities for research scholars to undertake focused research in this critical area.

Initial explorations in species-rich areas of Western and Eastern Ghats led to the collection of endemic species that were in the Red Data listings, and were conserved in the greenhouse. The first Annual Report of MSSRF (1990-1991) listed 123 endangered species from Tamil Nadu alone and the list rose to 171 by 1991. Similarly, in Kerala, extensive field



surveys revealed that species that need to be included in the Red Data Book had been overlooked, while some species that actually could be found in other localities were described as rare. A noteworthy contribution was the 'rediscovery' of three species listed earlier as extinct - *Sageraea grandiflora* (Annonaceae), *Madhuca bourdilloni* (Sapotaceae) and *Nothopegia aureo-fulva* (Anacardiaceae). The year 1997-98 saw the work focussing upon Wayanad, wherein 31 endangered species were reported, initially for collection of fruits of *Syzigium travancoricum* and this was also the first report of this species in Wayanad. Plants like *Piper barberi* and *Syzigium travancoricum*, multiplied through tissue culture were reintroduced in the Gudalur Gene Pool Reserve Area of Tamil Nadu.

At CABIC, the efforts were started in 1997 with the floristic study of Wayanad district. When this study ended in 2009, it came up with the scientific evidence for the richest flowering plant diversity of any district in Kerala, listing a total of 2,034 species belonging to 903 genera and 171 families. The study has contributed remarkably to Angiosperm Systematics with four new taxonomic discoveries from the location. During 2003-04, the Centre also engaged in the conservation of 10 select Rare Endangered and

Threatened plant species, specifically targeting the livelihood security of the tribal and rural communities.

In 2006, an innovative approach towards research and conservation of endangered plant species took off in commemoration of the 80th birthday of Prof. M. S. Swaminathan, by instituting 8 research scholarships to meritorious students to pursue their doctoral programme in the area of conserving 80 RET plants. Over and above the scholarly work conducted by the researchers, the programme also aims at bringing the support of the community to play a more pro-active role in conserving endangered species, by encouraging them to grow species of conservation importance in their own farm-lands, temples and institutional premises.

The Biju Patnaik Medicinal Plants Garden and Research Centre (BPMPGRC) at Jeypore initiated a study of the geographic distribution and population status of native plant genetic resources in the Eastern Ghats Eco-region. It is part of an on-going study in seven districts of Odisha to examine the status of plants, areas and species which require to be conserved. Conservation of endangered species requires integration of habitat protection, species-specific efforts and regional development plans.

## **BOX 4** Saving 80 RET Plants of Western Ghats A Success Story

The 80 RET Conservation Programme launched at CAAbC was a big leap in MSSRF's Biodiversity Programme. It was a collaborative programme of the Centre with four leading institutes- Kerala Forest Research Institute (KFRI), Peechi; Centre for Medicinal Plants Research, Arya Vaidya Sala (CMPR-AVSS), Kottakkal; Sree Narayana Mangalam College, Maliankara; and Centre for Research in Indigenous Knowledge Science and Culture (CRIKSC), Kozhikode. It was unique in terms of using the strategy of integrating conservation and research through a fellowship programme. Eight Research Fellowships were created to facilitate doctoral programmes in Systematic Botany as a means to revive this dying discipline as well as to promote young plant taxonomists having concern for conservation.

The programme produced 50,533 healthy seedlings of 80 RET species. Special

conservation zones were established in the Reserved Forest Areas, with the involvement of the Kerala Forests and Wildlife Department. The seedlings were re-introduced in Wayanad and Kozhikode districts spread over an area 125 ha land split into five plots with the aim of restoring the population of the species. Regular assessment of the survival rate of the plantlets is undertaken. The Vallikudil (Vine Hut) initiative for schools is a novel approach that stemmed from this programme to promote the conservation of rare, woody climbing plants of Western Ghats. The RET Conservation Garden at CAAbC having 700 seedlings in 10 acres and the 20 tree groves with a total of 6,000 RET seedlings in cardamom and coffee plantations of Wayanad are other major ex-situ conservation initiatives undertaken by the programme.

The forum for RET, formed as part of the programme, was an attempt to establish a network

of R & D organizations, academic and government institutions, and interested individuals, working for the cause of conservation of RET species in the Western Ghats. The forum serves as a common platform for member researchers to work for the common goal of RET conservation. The group is keen to undertake active conservation efforts by means of conducting awareness programmes and implementing ex-situ conservation measures. For RET is now being shaped into a leading conservation group in Kerala having 280 registered members and involving ten partner organizations. The best green institution award For RET by the Kerala Biodiversity Board for 2009 stand as a testimony to the achievement of this initiative. The Centre is moving ahead with the second phase of the programme focussing on the conservation of 100 RET tree species of the Western Ghats.

Hindsight and Forethought



## Initiative **2** SCARASCIA MUGNOZZA **COMMUNITY GENE BANK**

In 1994, M S Swaminathan Research Foundation received a generous grant from the Government of Italy through the efforts of noted geneticist and breeder Prof. Scarascia Mugnozza to support MSSRF's activities in integrated gene management, which facilitated the establishment of a Community Gene Bank named G. T. Scarascia Mugnozza Community Genetic Resource Centre (SMCGRC). The major aim of this Centre is to support and recognize the community conservation systems. This gene bank is a medium-term storage facility maintained at 40°C and 25% RH in a walk-in cold room. A duplicate sample of 4°C each accession is also stored in the long-term storage at the National Gene Bank, New Delhi as an additional safeguard. The SMCGRC also consists of

a herbarium of farmers' varieties. The ex-situ conservation under SMCGRC is distinct on few counts from the widely practiced ex-situ conservation. Accessions in the ex-situ gene bank are deposited by farming communities, which had evolved and conserved these accessions, with trusteeship entrusted to the M S Swaminathan Research Foundation. The accessions belong to major food crops noted for their agronomic potential under different biotic and abiotic stresses. They are accessible, subject to Indian laws by any party with Prior Informed Consent (PIC) of the holder community. M S Swaminathan Research Foundation facilitates such access through Mutually Agreed Terms (MAT) and Material Transfer Agreement (MTA). Information about accessions have been

digitalized into a database called Farmers Right Information System (FRIS), containing traditional knowledge associated with each accession, their passport data and nationally and internationally accepted scientific descriptors. This database is devised to establish the intellectual property rights of farmers on their variety, as per the UPOV norms.

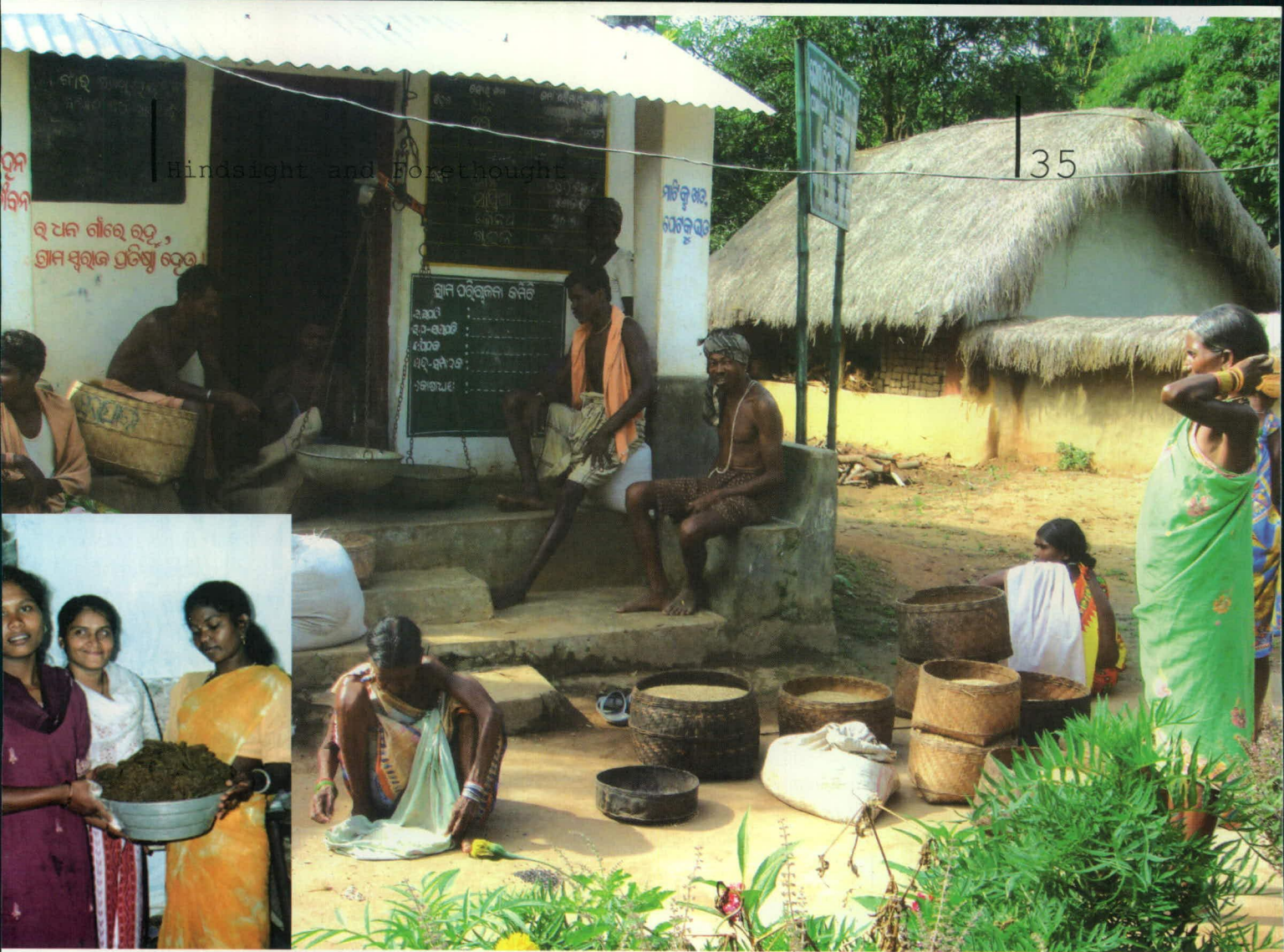
### COMMUNITY CONSERVATION SYSTEMS:

M S Swaminathan Research Foundation has been undertaking and advocating in-situ on-farm conservation, particularly in parts of India noted for high intensity agro-biodiversity and rapid genetic erosion. The conservation approach practiced and advocated by MSSRF includes in-situ on-farm and ex-situ gene bank conservation. It has been actively engaged in conservation of genetic diversity of rice in Jeypore tract of Orissa, a major center of rice genetic diversity, nutritious millets in Kolli Hills of Tamil Nadu, and the medicinal plants including Njavara rice varieties of medicinal value in Wayanad region of Western Ghats in Kerala. The tribal communities associated with the conservation are the Amanatya, Bhatra, Bhumia, Didayi, Kolar, Koya, Kutia, Kuvi, Langia Soura, Paroja, Pentia, Rana, Sabarkandha, Soura and Sundhi in Jeypore, the Malayali in Kolli Hills, and Kurichiya, Kuruma, Mullukurumba, Paniya,

and Kattunayakka tribes in Wayanad. The Agro-biodiversity Conservation Corps (ACC) formed by the efforts of this initiative, have mobilized tribal youth, school children, rural women and men in conservation, and trained them in managing Village Gene-seed-grain Bank and documenting local agro-biodiversity.

### IN-SITU ON-FARM CONSERVATION:

An important feature of in-situ on-farm conservation is the involvement of traditional conservers, integration of conservation with a community gene-seed-grain bank continuum and the establishment of economic stake in conservation using participatory plant selection, value addition and market linkages. Unlike the conservation undertaken by public institutions at public costs, the conservation practiced by tribal and rural communities is at private cost. The in-situ on farm conservation involves high opportunity cost due to the low economic potential of many traditional varieties in comparison with modern high yielding varieties. In-situ conservation is made sustainable when communities are able to link conservation with economic or cultural stakes as well as their way of living. The knowledge system established and the genetic enrichment achieved under in-situ conservation are of profound significance to future agriculture.



# Initiative **3** BIODIVERSITY CONSERVATION POVERTY REDUCTION AND NATURAL RESOURCE MANAGEMENT

A PAN-MSSRF INITIATIVE

The chief objective of this initiative is to concurrently conserve and utilize the rich agro-biodiversity held by tribal communities in three agro-biodiversity hotspots: the Jeypore tract in Orissa, known to be a secondary centre of origin of rice; Wayanad in the Western Ghats of Kerala, a Global Biodiversity Hotspot; and Kolli Hills in Tamil Nadu, a site known for a wide range of millets by integrating various models and approaches

developed and tested by MSSRF in an PAN-MSSRF mode. The project comprises four thematic areas: Biodiversity Conservation, Utilization and Enhancement (BCUE), Food Security (FS), Biovillage (BIOV) and Village Knowledge Centre (VKC).

MSSRF, as a technical knowledge and resource centre, has been concurrently innovating people-centric institutions at

other experimental sites. The earlier work related NRM in the project sites, notably by the BCUE component provided an ideal substrate and unique opportunity to translate theory into practice, elevated by the people. The bio-village model has helped promote synergy between conservation and enlarged options of natural resources like soil, water and biodiversity and to generate non-farm livelihoods. The food security component is based on community food banks (CFBs) managed by committees consisting of community members who have worked as an effective team for ameliorating poverty in villages. The Village Knowledge Centres (VKCs) are providing valuable and dynamic information and education materials concerning health, farm productivity, producer-oriented marketing and forewarning of weather- and climate-driven likely disasters and their management. As valid and innovative structures of integrated management of bio-resources of farming communities,

the four paradigms have come to be recognized and commended. Theoretically, they have collective strength to reinforce and empower an integrated Natural Resources Management (NRM) at higher levels.

The earlier work on landraces in Jeypore tract has shown that those poor tribals having specific preference for food consumption, which is difficult to change. Traditional food crops have high nutritional quality and hence, upscaling them would bring about a concomitant improvement in the nutritional status as well. The methods such as Food Security, Biovillage and Village Knowledge Centres (VKCs), provide additive support to enrich the economic stability of the tribal poor and hope to eventually accelerate the reach towards the Millennium Development Goal 1 (MDG1). The process is expected to bring about improvement in the cultural, social and nutritional status. After intense in-house discussions, MSSRF chose Jeypore as the site for testing the cumulative output of this initiative.

## BOX 5 Cultivation and marketing of Kalajeera

### AN AROMATIC RICE: a success story

**K**alajeera is an aromatic, black, small and oval grain variety land-race (LR) of rice cultivated in lowlands in Odisha. It is traditionally used for consumption, particularly during festivals, marriages and birthday ceremonies. It is also used to make puddings, Biryani and Pulau. It is a popular variety preferred for its aroma, taste and other culinary properties. The tribal custom prefers to offer black items such as black hen, black mustard seeds and black paddy for propitiation of deities. The tribal community, in a participatory stock-taking of currently valued/used land-races, zeroed in on about 26 land races raised in low land, medium land and upland. These land-races were grown in participatory plant improvement experiments using traditional (T) and modified (M) practices of cultivation. At the end of the experiment, people in coordination with MSSRF scientists, preferentially selected 6 land-races to cultivate on a large scale, Two each for upland, medium land and low land areas. Kalajeera is one such land-race selected in this way for low land cultivation. Its performance in farmers' small experimental plots of 120 sq. m under traditional and modified conditions clearly demonstrated the high grain and straw yields. People thus became seriously interested in its large-scale cultivation, using our modified methods.

As a result of these interventions of MSSRF, Kalajeera is now able to compete, under varying weather stresses, with other modern varieties and its importance has increased both within the community and in the local market. Improved yields realized consistently in farmers' large plots naturally created an increased demand for Kalajeera seed. MSSRF has organized training programmes for participatory farmers, on purification and production of good quality seed. It has also enabled the establishment of gene-seed-grain Banks, to cope with a demand-driven self-reliant seed supply and seed security system. In Tolla, a tribal village, farmers voluntarily provided lands for seed production of Kalajeera to extend the programme among more farmers. With proper technical guidance and using appropriate technology provided by MSSRF, the farmers were able to produce a stock of 29 quintals of pure seed from mother plants in 2003. In 2004, it was extended to 49 farmers cultivating in 29 acres. Simultaneously, it has spread to 83 and 127 farmers cultivating in 66 and 100 acres of land in 2005 and 2006 respectively. Initially, the Kalajeera rice marketing was conducted locally by door to door approach, primarily targeting retailers, and hotels. About 16 quintals of rice were sold at Rs.20 to Rs.25 per kg. Marketing problems got compounded during 2006, when the production of Kalajeera in Kharif 2005 went up to 45 tonnes and farmers, after reserving seeds and grains for their own use,

offered 29.3 tonnes for sale. Neither was it possible to convert them into hand-pounded rice, nor was it feasible to sell to local merchants who offered very low price, in view of the rise in production. Realizing these problems, MSSRF requested the help of the Government to arrange for marketing Kalajeera paddy through Government-controlled channels. Government, in turn, directed National Agricultural Co-operative Marketing Federation of India Ltd., (NAFED) to procure Kalajeera at a favourable price. Convinced of their quality, NAFED offered a price of Rs10/ per kg of paddy. This is the highest price ever got by poor tribal farmers for a rice land-race.

This success story of Kalajeera has attracted the attention of several villages under Jeypore, Boipariguda and Kundura Blocks, and it has resulted in the formation of Kalinga Kalajeera Rice Growers Cooperative Society. The increased production of Kalajeera has also revived the market demand for this grain with favourable prices. MSSRF, handicapped by limited personnel and resources, found it arduous to monitor production even in about 100 acres across 27 hamlets. Therefore, there is an urgent need for mainstreaming Kalajeera with the Agriculture Department, and formation of Farmers Association, which can take up responsibilities of monitoring the cultivation, promotion and marketing of Kalajeera.



## Initiative **4** AGRO-BIODIVERSITY CONSERVATION CORPS

A few years of working with traditional communities across the country, MSSRF felt that members of the local population, be they the tribal youth or women, can themselves play a significant role in conserving the local biodiversity. Towards this an Agro-biodiversity Conservation Corps (ACC) was organised in 1995-96. The Agro-biodiversity Conservation Corps together with the scientists formed the Agro-biodiversity Conservation Team to

provide an ethno-agricultural driven farm extension service which played a major role in revitalising traditional farming practices.

The programme funded by the Netherlands Ministry of Foreign Affairs supported the strengthening of the knowledge base and role of local communities in selected areas of Tamil Nadu (Kolli Hills, Erimalai), Kerala (Wayanad), Orissa (Jagatjori, outside



Bitherkanikka Wildlife Sanctuary) and Lakshadweep (Kavaratti, including the coral reef area).

Volunteers were selected based on a series of test to assess their perceptions, skills, aptitude and willingness to join in the efforts. Volunteers were initially trained through a series of workshops based on folk media methods like riddles, drawings, songs, drama etc., to document, identify and conserve biodiversity in their landscapes. These trained volunteers take-up issues related to conservation in their own areas and neighbourhoods. Every year such volunteers were selected and trained, continued with the enthusiasm of the older volunteers and received with great zest by the fresh entrants.

In some areas like the Kolli Hills, the ACC has been made the partner for undertaking initiatives in agro industries,

while in some places like Jeypore; they had taken-up local issues like conservation. Over the years, the ACC has become more streamlined by planning activities under Research, Training & Capacity Building, Institutional Building and Conservation & Dissemination.

The ACC has, in all the areas helped build-up the movement by networking with students, NGOs, Panchayat members, local communities. Over the last two decades, it has contributed significantly in various ways for conservation. In Orissa, the highlight was the mangrove structures conserved through the efforts of the ACC, which withstood the onslaught of the super cyclone of 1999. At Wayanad; the volunteers have become skilled enough to make documentaries related to biodiversity.



## Initiative **5** BIODIVERSITY EDUCATION FOR CHILDREN (EVERY CHILD A SCIENTIST)

Creating awareness on biodiversity among school children is the first step towards safeguarding our environment. Working with communities, children are never far from the focus of our work, as we realise that they can be the catalyst that would bring about a positive change regarding their local environment. Providing a platform for children, especially those belonging to tribal communities, and other socially and economically backward communities to be in-charge of their environment backed with education was identified as an

important area of intervention. CABc initiated a long-term focus in 2002, with the support of the Department of Biotechnology, focussing on such children in the innovatively designed 'Every Child a Scientist' programme.

The programme aims to impart knowledge regarding the genetic wealth and traditional wisdom. A significant impact of the programme has been in *persuading school drop-outs re-enter school and complete their education*. CABc takes pride with the fact that since

2002, several students have gone back to school and completed their formal school education because of the ECAS programme. ECAS provides space for students to explore nature and learn about it through non-formal classes. Dialogue, debate, watching documentaries, quizzes, talks by specialists, use of ICT, field visits and direct observation are some of the methods adopted by the programme.

ECAS aims to promote knowledge on biodiversity heritage among youth, especially tribal and rural, explore and document bio-resources and their value to communities, identify ways to conserve it, create a scientific temperament among children. The youngsters selected for the programme have inventoried natural diversity and chronicled traditional knowledge. Details of wild food plants, butterflies and their host plants have been collected. Simple databases and books on biological diversity have been published.

Till date over 60 schools has been brought under this programme. One of the methodologies adopted for this programme is to train school teachers to be an effective communicator for biodiversity issues. Children have been trained to document, identify the local flora and fauna, propagation techniques of medicinal plants, understanding the cultural and ethno-botanical linkages of bio-resources.

The capacities of youth belonging to the Biodiversity Conservation Corps has been built to such an extent that they are not only taking a keen interest in the local biodiversity issues, but are also keenly helping out our programme during their vacation by handling classes, accompanying students on field trips, providing volunteer support to long summer camps for students. Some of the students who joined as youngsters in this programme have now emerged as promising youth leaders who are likely to make a mark in the ethos of biodiversity conservation.



## Initiative **6** GREEN HEALTH CAMPAIGN

MSSRF initiated the Green Health Campaign in Wayanad and in Koraput, where, 10 selected species of medicinal importance were raised in large numbers in nurseries, and distributed to members of the communities after adequate training on how to use them for various treatments. The significant impact of this project was the economic empowerment of the trained SHGs who manufactured three herbal products and marketed them.

The Green Health Campaign focussed on the following areas-

- Medicinal plant conservation & sustainable use.
- Training for preparation of health care products.
- Market facilitation for income generation.
- Medicinal plant knowledge documentation.

The programme had an impact in both the locations, since women trained continue to produce some of the herbal

formulations that are either used by their families or sold within a small circle. Another impact was the reduction on household expenses over medicare. A major successful product under this campaign in Wayanad was the preparation of 'Navadhanya' mixture as a health supplement. It was estimated that the SHGs were earning anything between Rs.5000/- to Rs.1, 50,000/- depending on the drive of the groups.

A Herbal Garden consisting a total of 347 medicinal plants used in the traditional system of nine tribes belonging to the Koraput region of Odisha, conserved at the Koraput Centre, 109 tree species, 91 shrubs, 39 climbers, 102 herbs and 6 others like orchids, grasses and ferns. These efforts coupled with skill and capacity-building of tribal youth on conservation, cultivation, consumption and commercialisation of medicinal plants are expected to lead to the establishment of a community managed herbal bio-valley.

The Centre also has distributed genuine planting materials of fourteen different species of commonly used medicinal plants to tribal households. These plants will be useful to them to cure the common ailments like cold, cough,

diarrhoea, dysentery, fever, cut wounds, headaches, vomiting etc. Out of the 14 plant species, packages of at least 5 plants were given to each farm family for planting in their backyard garden. They have also initiated activities to establish herbal gardens in tribal schools to create awareness among school children on the conservation of medicinal plants used in the traditional healthcare practices of their area. Students' herbal gardens were established inside the school campus in a protected area with each plant bearing labels depicting the local name, botanical name and its uses.

Three associations were established for traditional health care practitioners belonging to Bhumia, Paroja and Bonda tribes in Koraput region. A single platform is an appropriate and effective forum for addressing conservation and sustainable use of medicinal plants.

To address the issue of over-exploitation of medicinal plants from the wild, this programme at CABc, Wayanad, envisaged the cultivation of selected medicinal plant species as an intercrop by the SHGs, which will be purchased by an herbal formulation unit to produce herb-based medicines and cosmetics, where the members of the SHG also have stake. The nurseries of medicinal plants were also raised by the SHGs and the members of the SHGs were trained in the cultivation and utilisation of certain species for treatment, ensuring a holistic approach to medicinal plant conservation.

The outcome of this programme has been visits to the Centre by a steady stream of people from distant places to learn about medicinal plants and their uses. In addition, local traditional healers have approached the Centre to improve their knowledge of medicinal plants.

## **BOX 6 Herbal Preventive for Malaria** a success story

The Jeypore centre facilitated popularization of a local herbal remedy for Malaria. This is a decoction comprising of four plants or their parts, viz. leaves of *Nyctanthes arbo-tristis*, whole plant of *Andrographis paniculata*, leaves of *Azadirachta indica*, and branch & leaf of *Tinospora cordifolia*. Ten ml of this decoction is to be administered with 5 ml of honey for 6 months to prevent malaria. This program was continuously demonstrated in villages for 3 months. Apart from malarial prevention, this decoction helped them in curing other diseases like skin diseases, joint pains etc.



# Initiative **7** PEOPLE'S BIODIVERSITY REGISTERS

With the signing of the Convention on Biological Diversity in 1992 and the passing of the Biological Diversity Act by the Indian Government, wherein a strong emphasis is laid on the conservation of biodiversity, sustainable and equitable utilisation of bio-resources, it has become very important that this traditional knowledge is safeguarded. With rapid erosion of traditional knowledge, the reality of complete disappearance of the wisdom built over centuries is imminent. Moreover, with communities empowered over ethical issues of 'ownership' of this knowledge, it is well accepted that to claim ownership of knowledge, documentation is necessary as it will help in proving the prior art.

The Biological Diversity Act, 2002 has made it mandatory that all local bodies should constitute a Biodiversity Management Committee (BMC) whose mandate, among others, is to prepare People's Biodiversity Registers (PBR) in consultation with the local people; the Register should contain comprehensive information on the availability and folk-knowledge of local biological resources. The National Biodiversity Authority (NBA) and the State Biodiversity Board (SBB) would provide guidance and technical support for the preparation of the Registers. MSSRF through its various centres has taken the lead in facilitating the Gram Panchayats to complete their

PBRs. The major two objectives of the PBRs were-

- Knowledge and information about cultural and ecological history of the region.
- Knowledge and information about conservation and sustainable use of biodiversity

The procedure followed (with minor modifications suitable for each site) a three phase level-

### **Phase I**

Formation of a general committee called Biodiversity Management Committee (BMC) constituted by Panchayat Presidents, Village Administrative Officers, School Headmasters, Forest Range Officers, Temple Priests, Ward Members and local NGOs with the Panchayat President designated as Chairperson.

Formation of a 25-member Community Conservation Corps (CBCC) with members drawn from the elderly, labourers, farmers, fishing community, hunters, traditional healers etc., who interact with the community on a continuous basis.

### **Phase II**

Here the members of the CBCC are given necessary trainings on the basis of the Voluntary Code of Conduct for Fostering Bio partnerships developed by MSSRF.

### **Phase III**

Here the actual documentation takes place with interactive discussions with user groups. The documentation could be through classes, from field, interaction with knowledge-holders, analysing old

myths and traditions, and study of manuscripts.

Generally the phase will follow these actual steps:

1. Sensitisation for study, survey and management through Grama Sabhas.
2. Formation of Biodiversity Conservation Corps.
3. Training in identification and collection of data on biological resources and traditional knowledge.
4. Collection of data.
5. Analysis and validation of data.
6. Identification of local heritage sites.
7. Preparation of PBR.
8. Procedures to reward knowledge-holders and farmers.
9. Maintenance of PBR.
10. Computerisation of the information on resources.
11. Development of action plans based on the information available on PBRs.
12. Implementation of short-term action plan.

Kolli Hills, Wayanad and Jeypore sites initiated the preparation of PBRs in 1997. Sixty men and 50 women in Kolli Hills, 20 men and 40 women in Wayanad and 40 men and 30 women in Jeypore were trained for this purpose. The community was trained to collate the information present within their hamlets. Posters, handouts and training manuals on PBR preparation were some of the materials generated as part of this exercise. PBRs for two Panchayats in Wayanad and seven hamlets of Kolli Hills were completed. The initial exercise was done to build-up the capacity of the community which will in the long run associate with the preparation of PBRs in the whole of the district.

## **BOX 7** People's Biodiversity Registers a success story from Wayanad, Kerala

In 1997, CABIC initiated a specific programme to prepare People's Biodiversity Registers in four Grama Panchayats viz. Kottathara, Meppadi, Pozhuthana and Thariyodu of Wayanad district. The PBR exercise was a pioneering effort in the district, in which the local community actively took part in the documentation process. The Registers brought out to light the recent trends in landscape management and the extent of alteration that has happened to various agricultural landscapes of the panchayat. The documentation revealed that a

number of crops including millets like Chama, Varagu and Thina, and several crop varieties in particular, 68 traditional rice varieties, have disappeared from the region. Moreover, the documentation of the past tradition of tuber-cultivation, as a coping mechanism at times of food scarcity, has emphasized its importance in the changing scenario of agriculture and the predicted global food crisis.

The PBR prepared by the Centre received appreciation from various experts in terms of its uniqueness in content as well as the methodology adopted. The methodology as well as the format

developed and adopted by MSSRF has been recommended by Dr Kannaiyan, former Chairman of National Biodiversity Authority (NBA), for all local bodies in the country for further PBR activities. This appreciation from NBA is a reflection of the nation-wide recognition for our efforts and the success of this endeavour. The Centre also took the initiative for translating the Biodiversity Act into Malayalam and produced an illustrated user-friendly manual of the Act (Manual of Biodiversity Act) which is available in the website of NBA.





## Initiative **8** CONSERVATION OF SPECIALITY RICE VARIETIES

The CABc has been involved in the conservation of local cultivars of rice and the traditional practices as well, since 1997. A survey was initiated in Wayanad, Kannur and Kasaragod districts, which reported nearly hundred traditional varieties. Many of them were collected and deposited in the Community Gene Bank at MSSRF, Chennai. Later, a collaborative mode of work with farmer's participation, where scientists work to strengthen farmers' informal research and development system was adopted to conserve those varieties and to protect rice ecosystem. Among the speciality rice category, primarily, Navara, the gifted medicinal rice of Kerala had been given most importance in research and

extension activities. The emphasis was on farmers' partaking in the research and extension processes in revitalizing conservation traditions. In the approach, farmers were not only just providers of land or labour to do experiments, but also were partners in the research process continuously collaborating in the efforts.

A Farmer-centred approach in seed purification of speciality rice varieties had also been attempted. A preliminary effort has been made to understand the different strains of Navara variety at biochemical level, has resulted in prioritizing the varieties based on their amino acid composition. A Forum for Protecting Paddy fields (Vaylanadu

Samrakshana Samithy) was formed drawing together farmers, scientists and NGOs for reviving rice cultivation and protecting traditional varieties. The potential of System of Rice Intensification (SRI) and Modified Rice Cultivation Practice (MRCP an improved version of SRI) were also experimented and promoted. It was found that, by adopting SRI technique, crop yields increased by 2 to 4 folds compared to conventional transplanting method. CAbC was the first to introduce the technique in Wayanad. To overcome constraints like inadequate scientific knowledge about native land-races, low productivity, undesirable agronomic characters of varieties and lack of marketing options etc., various research programmes and collaborative efforts have been made by the Centre and some of them continue to be in operation.

The Centre also initiated seed multiplication focusing on economically important traditional rice varieties like Navara, Gandhakasala, Jeerakasala, Mullanchanna, and Chennellu. A large quantity of the varieties has been distributed through farmers' network. Commencing from 2005, CAbC executes a special project which was conceived around the medicinal property, validation and market expansion of Navara and other specialty rice varieties of the Wayanad region. In consultation with farmers, political leaders, officials, members of Panchayath Raj Institutions, NGO representatives, agricultural professionals and scientists several policy documents on the possibilities of cultivation and conservation of rice germplasm of the district have been prepared amidst an unprecedented rate of conversion of rice field for no-grain cultivation. The efforts of the Centre in understanding the rice field as an

ecosystem has contributed well to the account of biodiversity of both flora and fauna. Through years, it was able to generate awareness and alertness to the farming community on themes like conservation of local land-races and rice fields, Farmers' Rights etc. On top, the efforts enabled to enlarge the outreach of the Centre in the area of biodiversity to a larger spectrum of society.

**BOX**

## **Kurichya and Kuruma Communities are conferred with the Second Plant Genome Saviour Community Recognition Award for the year 2008**

a success story from Wayanad, Kerala

The Protection of Plant Varieties and Farmers' Rights Authority of India, under the provisions of the Gene Fund of the Protection of Plant Varieties and Farmers' Rights Act 2001, recognized Kurichya and Kuruma tribal communities of Wayanad for their collective efforts in the conservation of novel Rice germplasm. These communities have been conserving 20 novel Rice genotypes having a variety of specialities including tolerance to drought and flood, aroma etc. The application for the award was submitted by Wayanad District Tribal Development Action Council (WTDAC) under the aegis of Community Agro-biodiversity Centre of M. S. Swaminathan Research Foundation. These communities of farmers have been identified through a process of public announcement and examination by an expert committee. The application forwarded in this regard was based on a few case studies undertaken by MSSRF in the years 2002-2006. The representatives of WTDAC received the 2nd Plant Genome Saviour Community Recognition Award from Shri Sharad Pawar, Honourable Minister for Agriculture, Government of India at a function held at New Delhi on February 12, 2009.



## Initiative **9** GENETIC & LEGAL LITERACY CAMPAIGN

The BdP has been in the forefront of drafting significant legislations that have a deep impact on the country's biological resources and traditional knowledge. India has been in the forefront of bringing in legislations that can go a long way in conservation and sustainable utilisation of biodiversity. It is likely to economically support conservers and preservers of biodiversity and knowledge farmers, tribals, traditional healers, women etc. In reality, despite good intentions, the awareness of such legal support is lacking both among the educated and non-literates. It is in this context that, it

was felt that MSSRF should be intensely involved in disseminating knowledge and implications of such laws to farmers, tribals, community and Panchayat leaders, who are likely to be affected by such laws and legislations.

As part of Education, Capacity Building and Training, at each of our centres, trainings and workshops are held to educate the people about the 'Biodiversity Act, 2002', the 'Protection of Plant Varieties and Farmer's Rights Act, 2001' and the 'Scheduled Tribes and Traditional Forest Dwellers (Recognition

of Forest Rights) Act, 2006'. MSSRF has also taken specific pro-active steps to familiarise the general public about the Acts and their implications in a simple terms.

MSSRF has also facilitated the completion of People's Biodiversity Registers in various Panchayats of Wayanad, Kerala and Kolli Hills, Tamil Nadu, and Jeypore, Orissa. These are written records of the wealth of the local traditional knowledge which would have otherwise disappeared from the communities for lack of encouragement. Since 1996, BdP has operated an information service - 'Farmer's Rights Information Service' (FRIS)- to assist the implementation of the equity provision of the Convention of the Biological Diversity (CBD) related to farmer's traditional wisdom which can secure benefits from National & Global Community Gene Funds. FRIS provides the details of the contribution of tribals and farmers in the conservation of agro-biodiversity along with policy issues, gender dimensions, and ethnography.

In 2007, the Department of Scientific and Industrial Research (DSIR) supported a project for building the capacities of community and Panchayat leaders to better understand the Biodiversity Act

and the Protection of Plant Varieties and Farmers Rights Act. Four districts of Tamil Nadu were chosen to undergo training. For easier understanding, the Biodiversity Act was explained through illustrative lectures, film and field visits. Similarly, the Community Agro-biodiversity Centre, MSSRF at Wayanad, Kerala has translated some of the Acts and prepared training manuals in Malayalam for wider and effective dissemination.

MSSRF constantly facilitates local communities in their endeavours of conserving their traditional knowledge and seeds. In 2009, farmers from tribal communities - Kurichiyas & Kurumas of Wayanad received the 2nd Genome Saviour Award from the Government of India.

The Biodiversity Programme Area has the ethical and moral responsibility of not only conserving biological wealth, but also ensure that communities are made aware of laws governing the biological resources and the role that their knowledge has played in conserving invaluable biodiversity. Towards this, MSSRF is also setting up Intellectual Property Rights Cells (IPR Cells) to disseminate IPR related Acts and support individuals/groups for safeguarding their knowledge and innovations.



# Initiative **10** FOOD SECURITY FOR THE MARGINALIZED TRIBAL GROUPS

CAbC started a programme to enhance the livelihoods of tribal groups through sustainable use of wild and traditional edible species. The intervention begun with a participatory research study to access the traditional knowledge on wild edible resources, the gender dimensions of its management and present livelihood options. The study sought to focus attention on practices related to wild food

management - approaches and pattern of wild food resources conservation and utilization. The in-depth research revealed that the tribal groups have an extensive knowledge regarding wild food and use a wide array of plants and animal with some variations among the different user groups. Some of the user groups had found uses for alien species indicating that traditional knowledge is constantly

evolving. Women play a greater role in conserving wild food that adds to the food basket of the family. The study highlighted that 372 wild edibles are accessed by tribal communities.

A synthesis of the role of wild foods in the lives of the socio-cultural groups at times of emergencies and food famines and the diversity of wild foods used for the sustenance revealed that the Paniya community is heavily dependent on the wild environment for their food needs. The Kattunaikka are next in the knowledge ladder followed by the Paniya. Interesting information was that the non-tribal communities like resource-poor Muslim women also access the semi-wild environment for food, particularly for the greens. The decline in traditional knowledge related to wild food from one generation to the next is a stark reality indicated by the study. The changes in gender relations and its impact on food species management, the perception of both males and females of different age groups about the structure, function and dynamics of the agricultural landscapes vis-à-vis availability of food species also came under the purview of the study. The implications of land use changes, agrochemicals, restrictions of forest access, influence of development and impact of invasion of alien species on the availability of wild food were highlighted in the study.

The study also showed that many tribal and rural families continue to conserve a wide range of plants for meeting their food needs. Women are more skilful in managing the surrounding landscape and are the chief knowledge-holders and conservationists. Moreover, they are taking effective steps towards the sustainable management of landscapes and species that provide edible greens. Unfortunately, changing trends in gender

relations inhibit these efforts. The decline of traditional knowledge, especially among youth, affects the sustainable use of several wild edibles. As a follow up, extensive awareness classes were conducted as part of the programme. Realizing the importance of enhancing the nutritional supply, a 'food plants' package for home gardens was prepared with the help of Central Tuber Crops Research Institute (CTCRI), after conducting a socio-economic survey and livelihood analysis. The package consists of both wild and traditional edible species like tubers, greens, vegetables, fruit trees and fruit yielding climbers. It consisted of four species of fruit trees, three species of fruit-yielding climbers, seven species of traditional yam varieties, sweet potato, taro, elephant-foot yam, Asparagus and seeds of nine traditional vegetable species. As a result of the efforts, a germplasm plot with thirteen wild and fourteen traditional varieties of Dioscorea, four traditional varieties and three wild varieties of Colocasia, one species of Amorphophallus, three varieties of sweet potato, two varieties of Canna, two varieties of arrow root, twelve species/ varieties of legumes have been conserved ex-situ at the Centre. Communities like the Kattunaikka have traditionally depended on honey for their livelihood. The decline in the availability of honey has serious implications on food and nutritional security of such communities. Hence, a programme on apiculture with the help of Khadi Board was initiated in selected tribal colonies to enhance their livelihood options. It is encouraging that the people are able to earn an additional source of income through harvesting and marketing honey.

An integrated tribal development programme in a tribal hamlet at Manantvady based on the felt needs of

the people has been initiated with the financial support of Tribal and Forest Departments. A nutritional survey was conducted in selected tribal colonies to assess the existing nutritional status of people in selected hamlets to identify

basic health and nutrition issues. The major outcome of this programme is the formation of a Tribal Cluster Development Society with democratic checks and means to ensure transparency in fund utilization at an intervention spot.

## **BOX 9** The Journey from Dependency to Self Sustainability

The major impact and the appreciation for the programme were evident when the Department of Tribal Welfare and District Panchayat requested our help to design and implement tuber crop exclusive programmes for tribal groups in various parts of the Wayanad District. The second year of implementation of the home garden programme was quite impressive at Ponkuzhy Kattunaikka colony. The implementing team, which had to pursue members of the colony in the first year, were surprised to see people

preparing their home garden plots well in advance for cultivation and assembling seed materials on their own. People were very happy to prepare dishes out of tubers during November to February, definitely a rare scene in huts of hunter gatherers. The SSA teacher said that, earlier children used to ask for 'Kanji' by 10 AM i. But now, especially during the tuber harvesting months, they are not bothered about the time for 'Kanji', as most of them consume tubers in the morning. The women of the colony said that, they could avoid the scene where they used to be sent away from

the farm premises of Chettys (a traditional agriculturists community in the district) while they dug up in the soil in search of tubers for consumption. They found it an exciting journey from dependency to self-sustainability. Two of the colony members who had rich harvests, sold their tubers in local market. As a result of the regular interaction with the community and understanding their felt need, we could negotiate with the Integrated Child Development Scheme (ICDS) authorities and an anganvady was also opened at the place.



**MILLET MELA**

(The Traditional Food Festival Recipes From Kolli Hills)



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