Saving Lives and Livelihoods

Key Lessons from a Successful Partnership with IDRC and CIDA

M. S. Swaminathan Research Foundation

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FOREWORD

International Development Research Centre (IDRC), is a unique international organization devoted to the cause of promoting development based on sound science. Thanks to the vision of its first President, Dr. David Hopper and Vice President, Dr. Joseph H Hulse, IDRC has from its inception paid particular focus to the human dimension of development. Thus, it has sponsored many projects in India relating to areas such as the conservation and utilization of under- utilized crops, like millets and tubers. IDRC has also been supporting programmes in the field of aquaculture in order to increase the role of culture and capture fisheries in nutrition security. The idea of establishing a World Agroforestry Centre (ICRAF) was also the outcome of an IDRC sponsored paper by John Bene.

From the early years of the establishment of MSSRF, IDRC has been extending valuable support to the projects undertaken by the scientists and scholars of MSSRF. The very first project to be supported was the development of a methodology for integrated coastal zone management through a Coastal Research programme (CSR) based on the model of the Farming Systems programme (FSR) spearheaded by IDRC. On the occasion of the 25th anniversary of MSSRF, our scientists undertook an exercise for both looking back and looking forward. It was clear from this exercise that IDRC's support to MSSRF from 1990 onwards has been critical for initiatives like the Village Knowledge Centre, Biovillages, Conservation of Mangroves and Coastal Biodiversity, Management of Tsunami affected areas and enlargement of the Food Basket through a wide range of millets and other orphan crops.

MSSRF has also been fortunate to have had the visit of several past Chairs of IDRC, the most recent being the visit of Dr. David Malone in 2008. We are happy to welcome the present Chair of IDRC, Dr. Jean Lebel. To be effective from the point of view of human wellbeing and happiness, development programmes like those designed to overcome hunger and poverty must be rooted in science. MSSRF's vision is to bring the benefits of modern science and technology to rural and tribal families based on a pro-nature, pro-poor and pro-women orientation to technology development and dissemination.

I hope this publication will help to draw attention to the very significant initiatives of IDRC in India in collaboration with MSSRF. It will be evident from the perusal of the publication that mobilising the power of partnership will help to accelerate progress in achieving the human goals of development, viz, a world without hunger and extreme deprivation and poverty.

I am grateful to Dr. Ajay Parida, Executive Director and other colleagues in MSSRF for putting together this publication which brings out the transformational role of this partnership in the lives of the socially and economically under-privileged sections of our society. This publication is dedicated to the late Dr. Joseph Hulse, whose guidance and support have been critical to our programmes and progress.

M S Swaminathan

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Joseph Hulse, Former Vice-President, IDRC

With great grief, MSSRF condoles the passing away of Dr. Joseph Hulse on October 22, 2013, at age 90.

A former Vice President of IDRC, Dr. Hulse during his long and illustrious career in academia and international development, served as President of the Canadian Institute of Food Science and Technology, Chair of the Canadian Freedom from Hunger Committee, and Assistant Director of Nutrition at the UN Food and Agriculture Organization, among other posts. He was also Visiting Professor at the University of Manchester and Honorary Fellow of the London Metropolitan University. For 15 years, he chaired the International Commission on the Application of Science to Agriculture, Food and Forestry, a commission that composed of eight of the world's most eminent biological scientists as well as scientists from 25 national academies of science.

Dr. Hulse was a distinguished visiting professor at the M.S. Swaminathan Research Foundation in Chennai for nearly 15 years and immensely contributed to the development and growth of MSSRF's programmes on food and nutrition security.

A long standing friend of India, Dr. Hulse played an important role in the development of the Central Food Technological Research Institute in Mysore. His work in India, a country he loved, earned him the Padma Shri award in 2008 for distinguished service to the cause of nutrition security. In 2006, he was elected Fellow of the India's National Academy of Sciences.

Dr. Hulse wrote extensively on sustainable development. His latest book, Sustainable Development at Risk, was published by IDRC and Foundation Books in 2007.

MSSRF dedicates this publication in loving memory of Dr. Hulse and his commitment to the eradication of hunger and malnutrition in developing countries.

IDRC and MSSRF Partnership

The partnership between MSSRF and IDRC was developed way back in 1991. Over the last 20 years there have been some memorable landmarks in this journey that led the partnership to cherish and grow. The partnership has resulted in many fruitful lessons and experiences, outputs and development outcomes.

MSSRF through its own experience-interaction and discussion with IDRC/ CIDA has seen and experienced the advantage of its partnership with IDRC/ CIDA over the years. The partnership has been collectively responsible for a) joint value creation—developing new insights through the interaction of different perspectives and approaches, b) linkage with policy processes, in order to foster change in policies and practices to support sustainable development, and c) capacity development for all members in research and communications, in particular strengthening the understanding of regional and sectoral considerations in sustainable development.

Success of this partnership is a determinant of a) the attainment of immediate objectives, b) the quality of the collaboration experience itself and c) the realization of the "multiplier effect" of projects and program interventions resulting in additional benefits. In IDRC and MSSRF partnership: a) both considered the learning events as an opportunity, b) displayed high level of energy and enthusiasm, c) shared information internally and externally, d) had a clear, shared purpose and direction and e) encouraged flexibility and creativity. These brought partnership closer and raised the level of trust which was key to an effective partnership.

Following pages gives a glimpse of the results achieved and the lessons learned in this effective journey and we look forward to many more milestones to be achieved in the coming days.

Genesis and growth of Integrated Coastal Zone Management Programme

Majority of the coastal communities depend on fisheries, agriculture, tourism and related activities for livelihood. In addition, coastal zone supports large industrial complexes and other commercial activities. The coastal zone is also prone to natural disasters such as cyclones, storm surges, floods, tsunami, etc. which many times cause severe damage to life and property. Further, the prospects for sea level rise as a result of global warming and the consequent melting of glaciers, Arctic and Antarctic ices and other ice caps, are real. The competing demands on the coastal zone for various land uses, multiple economic activities and conservation and sustainable management of natural resources and preparedness to manage natural disasters, requires a coordinated management strategy. However, no organization was giving integrated and adequate attention to the management of land and sea surface on the one hand, and to capture and culture fisheries and forestry and agro-forestry on the other. IDRC supported in 1991 a research project on "Establishment of a model Integrated Coastal Ecosystem" which played a crucial in developing Integrated Coastal Zone Management Plan for India. IDRC which has long supported Farming System Research (FSR) welcomed MSSRF's concept of CSR.

Development of Coastal Systems Research Methodology

In order to facilitate the establishment of "Sustainable Integrated Coastal Ecosystem" a Coastal Systems Research approach was developed with support from IDRC. Some of the principles of the Farming System Research (FSR) programme spearheaded by IDRC were integrated in CSR, which is designed to address the issues confronting coastal communities in a holistic manner. CSR approach consists following steps:

1. Survey and analysis of current pattern of economic development and natural resources management and the development of a Natural Resource Management Balance Sheet for coastal areas.

2. Analysis of the linkages between the livelihood security of local communities and the ecological security of the coastal zone.

3. The plan may be finalized with the participation of local community and other stakeholders.

4. Articulate clearly the technological intervention points in the areas of capture and culture fisheries, coastal forestry and agro-forestry and coastal crop and animal husbandry. Help to mobilize the needed credit, insurance, marketing and public policy support required for the successful refinement and dissemination of ecologically sound methods of natural resources utilization.

5. Organize the necessary demonstration, on-farm research, fish seed and feed production and all other steps needed for the Sustainable Coastal Ecosystem management (SCEM) package for widespread adoption and impact. The SCEM package should spell out for each area- the precise technologies, services and public policies needed for the package to find favour among the concerned people and thereby trigger a self-replicating pattern of coastal eco-development.

6. Develop and introduce suitable monitoring tools and promote organizational structures for group endeavour in areas like prevention of sea erosion and conservation of coastal vegetation as well as in processing and marketing.

Establishment of Model Integrated Coastal Ecosystem at Vettaikaran Iruppu

The coastal area of the then Thanjavur District (currently divided into Nagapattinam, Thiruvarur and Nagapattinam Districts) of Tamil Nadu was selected in 1990 as the site for testing the Coastal Systems Research Approach developed by MSSRF to establish a Model Integrated Costal Ecosystem. A spearhead team of social and biological scientists was constituted in March 1990 which prepared a Survey and Natural Resources Management Balance Sheet of the selected area during the year 1990-91. The team selected a village, namely, Vettaikaran Iruppu in Nagapattinam area for this establishment of Model Integrated Coastal Ecosystem and recommended the following survey before undertaking any interventions.

1. An overall assessment of each village by studying village records and through discussions with the Panchayat officials.

2. A complete listing of all families in project villages to get a proper fix on the total human resources and the individual family situations.

3. Comprehensive survey of: a) Natural Resource Endowments, b) Human Resource Endowments, including special attention to women, c) Infrastructure Endowments, d) Education, health care, input supply, marketing, training, adaptive research, communication (rural roads) and electrification, e) Technological Status, f) Livelihood Status, g) Primary Sector: Crop husbandry, animal husbandry, forestry and fisheries, h) Secondary sector: Agro-processing, small industries and facilities for the preparation of value-added products and, i) Tertiary sector: Traders, artisans, financial institutes, Government staff, etc...

Findings of the survey

1. Poor resource base: Vettaikaran Iruppu has a poor resource base. Seventy percent of the area of the village is covered by sandy soil, which has poor nutrient content and water holding capacity. Water quality is good and the soil is mostly saline in nature.

2. Climate and rainfall: While the total rainfall was 2429 mm in 1977, it was as low as 870 mm in 1980. During 1992, when the project was implemented, the village received only 58% of the normal rainfall in November and 51% in December.

3. Land use pattern: Out of the total area of 1168 ha about 812 ha are cultivated both under rainfed and dryland conditions. It is also seen that there is gradual decline in fallow and corresponding increase in cultivated area, both under dryland and rainfed conditions.

4. Human resources: Due to the extremely poor natural resources base of the village, the available labour resources continued to be underutilised. Except during paddy cultivation and its harvest and the intermittent groundnut cultivation and its harvest, the economic activity in the village is observed to be generally dull. The educated unemployed represent another pool of untapped resource in the village.

5. Land ownership and farm size distribution: One fourth of the total population are under landless labour category and half are marginal farmers. Only one percent of the farmers are classified as large and medium farmers.

6. Given the poor soil fertility and rainfed nature of the cultivation, even most of the farms larger than two ha of land could not support the dependent households at the full employment level. Therefore there is need to enhance the productivity of existing land resources and identify opportunities for non-farm jobs. Nutritional security of the village households is generally not satisfactory due to imbalanced and inadequate diet. Special emphasis is therefore needed on the introduction and promotion of nutrition enriching, as well as income increasing, horticultural and pulse crops.

Existing practices and technological interventions identified

On the basis of the survey and further findings through other participatory tools, existing practices in livelihood and natural resource management in Vettaikaran Iruppu were identified and technological options that would integrate livelihood with ecological security were also identified through participatory analysis with the community. The vocation, existing practices and technological interventions identified and implemented to improve the situation in Vettaikaran Iruppu village are given below.

Vocation	Existing Practices	Technological options
Crop and animal husbandry	Paddy is cultivated as dry crop during the monsoon. Ground nut occupies 10 to 15% of the cultivated area. Bullocks for ploughing and haulage are reared in many houses. Milch animals are reared in 25% of the families. Goat rearing is a common practice. Poultry farming is not common	Alley and organic farming technique to integrate livestock and crop farming. Introduction of poultry on a large scale. Introduction of high yielding Cashew varieties from Vengurla (Maharashtra) and hybrid pigeon pea varieties from ICRISAT.
Coastal forestry and agroforestry	Casuarina plantation for fuel wood; tamarind, cashew, mango, coconut are cultivated with low yield. Processing and marketing facilities are not adequate. Least priority is given for vegetable and medicinal plants. Indiscriminate use of pesticides.	Improved method in seed, nursery and plantation techniques in palm, casuarina, cashew nut, coconut, mangrove, vegetable and medicinal plants. Integrated Pest Management and improved marketing
Capture fisheries	Artisanal fisheries from natural resources including sea. Indigenous fishing crafts and gears are used. Bulk trawling deprives the share of the non-mechanized fishermen. Exploitation of brood stock prawn and fish	Introduction of sustainable fish harvesting practices; hygienic and improved practices in harvesting, landing and drying; storage and processing facilities and product oriented marketing strategies

Vocation	Existing Practices	Technological options
Culture fisheries	A few private farmers holding 0.5 to 1 ha practice prawn farming. Non-availability of seed and feed are the main constraints in the existing practices.	Integrated brackish water aquaculture; seed production through localized hatcheries and nutritionally balanced feed preparation. Organization of training programmes
Biomass utilization	Coir production is practiced. Cashew apple, cashew shell, tamarind shell and other plant products are not used for preparation of value added products	New opportunities in bio-processing leading to better utilization of parts of plant/animal/fish biomass

The technological interventions identified are demonstrated with the participation of community and lessons learnt from these demonstrations were used by the community to improve their practices in agriculture, fishery and biomass based enterprises. Even after the project came to an end, the local community formed a Society for Sustainable Coastal Zone Management to the replicate technical interventions in large scale.

Integrated Coastal Zone Management

One of the important lessons learnt from this experiment was that there is a need to harness the power of partnership among various stakeholders to achieve sustainable management of coastal resources. This partnership was very much essential to prepare and implement practically possible Integrated Coastal Zone Management Plans. The IDRC project thus paved the way for the development and promotion of a National Integrated Coastal Zone Management Strategy. The programme has led to the regeneration of degraded mangrove forests and for strengthening the coping capacity of coastal communities in the events of cyclone, tsunami and sea level rise.

Joint Mangrove Wetland Management

Most of the major mangrove wetlands of India were declared as Reserve Forests (absolute property of the state) during late 19th century or early 20th century and since then they have been managed by various government agencies. Currently these mangrove wetlands are under the control of the State Forest Departments. However, sustainable management of mangrove wetlands is still new to science and art because of the following reasons:

1. Till late 1970s, mangroves were considered as wastelands and mangrove management meant only exploitation of mangrove forestry resources and conversion of mangrove wetlands to other land uses. This management approach resulted in severe degradation of mangrove wetlands.

2. During early 1980s, protective and productive functions of mangrove wetlands was brought to light by researchers, which caused a dramatic change in mangrove management policy from total exploitation to total protection. Role of local user communities in the management of the mangrove wetland was totally neglected during this period.

3. During late 1980s and early 1990s, attention on mangrove management was focused on restoration. But many of the restoration activities were based on general opinion local communities were mainly responsible for mangrove degradation. In some areas, both these ecological changes and local people's exploitation worked synergistically to degrade mangrove wetlands.

4. Another major reason for failure in sustainable management of mangrove wetlands was marginalisation of the local communities in developing and implementing mangrove wetland management plans.

Joint Mangrove Management Programme

Under these circumstances, MSSRF and State Forest Departments of Tamil Nadu, Andhra Pradesh and Orissa jointly developed and implemented Joint Mangrove Management project on pilot scale from 1993 to 2003 with the support of Canadian International Development Agency and India Canada Environment Facility.

Participatory research: Since it was repeatedly mentioned in the Forest Working Plans that attempts to restore degraded mangroves yielded

limited results and there was conflicting reasons for degradation between the Forest Department and local community, a participatory research was conducted in Phase I of the JMM programme. It showed that clear felling system of management practiced by the government from 1930 to late 1960s was mainly responsible for degradation of mangroves. Under this management system mangrove trees were felled on a rotation basis every 20 or 30 years for revenue generation. Studies by MSSRF indicated that large scale clear felling exposed mangrove wetland to sun light, which caused evaporation of soil water. As a result, soil in the clear-felled area shrank, changing the flat topography into a trough. Tidal water entered the trough-shaped portions and became stagnant. Evaporation of stagnant water increased soil salinity to a level lethal to mangroves. As a result, no regeneration of mangrove plants was seen in the clear-felled area. This was the main cause of degradation rather than use of mangrove resources by the community.

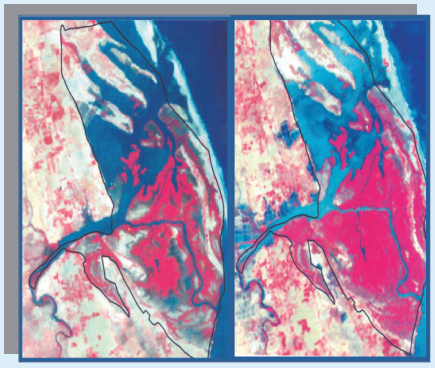
Restoration technique: On the basis of the above finding a simple technique was developed and demonstrated to restore degraded mangrove areas with the participation of the State Forest Department and local community. This technique included a canal system, consisting of main and feeder canals, which was designed and dug in the demonstration area. Through this canal system tidal water flew freely in

and out of the degraded area (instead of stagnating), thus decreasing soil salinity and increasing soil moisture, which in turn supported mangrove growth. This improvement in biophysical condition helped in natural regeneration of mangroves also.

Joint Mangrove Management: At the end of the successful demonstration three key questions were asked: i) How these artificial canal system can be maintained? ii) How to upscale restoration activities? and iii) How to sustain restored mangroves? Answers to these questions led development of Joint Mangrove Management Programme and implemented in Pichavaram and Muthpet mangroves in Tamil Nadu, Krishna and Godavari mangroves in Andhra Pradesh, Bhitar Kanika and Devi mangroves in Odhisa and Sunderbans in West Bengal. As first step mangrove user communities were identified, mobilized and organised into village level institution namely, Village Development and Mangrove Council (VDMC). The decision making body or the general body of the VDMC facilitated JMM process and partnership among stakeholders. Participatory Rural Appraisal and socio-economic survey was used to identify concerns of the community and the Forest Department relating to mangrove conservation and management and socio-economic and infrastructural development. On the basis of these, micro plans were prepared and implemented to address the concerns identified through PRA and survey. Funds were mobilized from the project, Forest Department, financial institutions and government institutions.

Outputs

- An innovative, simple and cost effective method was developed and demonstrated to restore degraded mangroves
- A science based, people centred and process oriented approach to restore, rehabilitate and sustain mangrove wetland was developed and pilot tested
- Established 33 village level institutions (VLIS) for Joint Mangrove Management with about 5240 mangrove user families as members in the states of Tamil Nadu and Andhra Pradesh and Odisha and West Bengal
- Restored 1447 ha of degraded mangrove wetlands through these village level institutions; About 6.8 million mangrove saplings planted in the restored area, of which nearly 75-80% survived; due to natural regeneration, these areas are colonized by different species
- About 12000 ha of flourishing mangrove forests brought under JMM
- 194 Self Help Groups –both women and men –were organized and linked to various government schemes for enhancement of livelihood security



Outcomes

- Community and Forest Department gained confidence to restore mangroves in a scientific manner through participatory approach
- State Forest Departments used the model to mobilize resources and started replicating the model and NGOs who were trained in JMM started replicating the model
- Mangrove restoration activities generated 90 man days of work per ha and thus 135000 may days of work generated by the project; it is still creating employment since mangrove restoration activities is still continued by the Forest Department
- PRA indicates that fishery resources, particularly crab resources of mangrove increased substantially after mangrove restoration

Impact

- Action to restore and conserve mangrove wetlands at the national and state level increased manifold, which was indicated by increased allocation of resources from the Central Government to State Governments for mangrove restoration and management programmes
- The Ministry of Environment prepared and is implementing a National Mangrove Action Plan which included JMM as the best available model for mangrove management

The recent Forest Survey of India report indicates that mangrove forest cover of India has increased by 617 sq.km form 4046 sq.km in 1987 to 4663 sq.km in 2011. The community based Joint Mangrove Management programme played catalytic role both in terms of developing, demonstrating suitable models and also in bringing changes in programmes and policies.

Lessons learnt

The important lessons learnt from this Joint Mangrove Management Project are: i) an institutional mechanism is necessary in mangrove user hamlets to provide concurrent attention to conservation of mangrove wetlands and poverty reduction among mangrove user communities, ii) poverty reduction, social development and livelihood enhancement should be taken up as strategies to mobilize and organize community for mangrove conservation and iii) community should be empowered technically, socially and economically to take active participation in joint mangrove management programmes.

Rural Knowledge Revolution – The Village Knowledge Centre Movement

In the global context, inequality of access to Information and Communication Technologies (ICTs) is greater within developing countries, especially between urban and rural areas, where the digital divide continues to widen. India is on the threshold of a truly revolutionary era of discovery and information explosion. Empowering villages through knowledge and resource rich centers, providing the right array of opportunities, and creating appropriate actions points for people to exchange information and participate in meaningful development-one that is defined and shaped by their own communities, is the beginning of a journey of transformation. The Village Knowledge Centre movement is located in this context of moving towards an inclusive information society.

Conceptualisation of the Village Knowledge Centre

In an experiment in leapfrogging electronic knowledge delivery to the poor, International Development Research Centre (IDRC) and M.S. Swaminathan Research Foundation (MSSRF), in January 1992, conducted an Interdisciplinary Dialogue on Information Technology: Reaching the Unreached. The dialogue revealed that the future of food security in the developing world, especially South Asia, would be dependent less on resource intensive agriculture and more on knowledge intensity.

As a result of this dialogue in 1992, Village Resource Centres (VRC) and Village Knowledge Centres (VKCs) were conceptualised along a hub-and-spokes model. The hub is the VRC located at the district or block level, and the spokes are the VKCs managed by the rural community.

The VRC-VKCs disseminate locale-specific, demand driven information, and knowledge, and builds the skills of rural communities

in Tamil Nadu, Pudhucherry, Odisha, Kerala and Maharashtra to translate knowledge into action, using a gamut of best-fit Information and Communication Technologies (ICTs). In sum, VRCs and VKCs are thus action platforms which empower rural communities through access to and use of transformational ICTs.

Vision and Mission

The vision is to "promote sustainable rural livelihoods through digital empowerment based on a pro-poor and pro-women orientation to technology choice and dissemination, and human resource development". The mission is to "bring together experts and grassroots level communities in two-way communication with the objective of making knowledge accessible to every home and hut".

Implementation of VKCs

In 1998, MSSRF started 3 VKCs in Pondicherry with support from IDRC and Canadian International Development Agency (CIDA). The support continued until 2009 under the different phases of project titled, "Impact of ICTs on Poverty Alleviation in Rural Pondicherry, India". In 2013, there are 17 VRCs and 77 VKCs in operation, across Tamil Nadu, Andhra Pradesh, Maharashtra, Odisha, Kerala, and Puducherry.

A participatory needs assessment identifies priority areas such as food safety, security, livelihoods, etc. A strong sense of community ownership characterizes these centres as they contribute for the venue, electricity and telephone bills and knowledge workers. The centres are managed through a three-tier knowledge network. MSSRF, Chennai, at the first tier, connects several data generators and data providers focusing on content and capacity building. At the second-tier are VRCs located at the block/commune/mandal level or at the centre point of a cluster of villages. VKCs are located at the third-tier at the village level among a cluster of villages or panchayat level.

Awards and Recognitions

The VRC-VKC programme has won the Motorola Dispatch Solution Gold Award (1999) and Stockholm Challenge Award (2001). Scientific American selected this programme (2004) for special mention when it chose Prof. M.S. Swaminathan as one among the 50 scientific leaders of the world who are making a difference. This project was also covered by New York Times, Science, Nature, New Scientist, Scientific American and SciDev.Net. It has been commented upon by Presidents, Prime Ministers, and heads of global organizations. In the words of Ms. Maureen O'Neil, former President of IDRC, these knowledge centres offer "real possibilities for changing poor peoples' lives through knowledge intensive, community oriented work with communication technology."

Use of Information Communication Technologies

With the support of IDRC and a few technocrat organizations, several rural dissemination technologies are tested and implemented. VRCs are connected through Indian Space Research Organization's (ISRO) uplink and downlink satellite facilities. Users located at one node of this network can fully interact with others located at another node (VKC) through video and audio links. Each node (VKC) can further be

expanded using different technologies such as notice boards, pamphlets, public address system (wired / wireless / GSM), community newspaper (vernacular), cable TV, audio / video conferencing through wireless, telephone, face-to-face meetings, mobile phone, SMS server, internet radio server, fixed wireless loop telephone, closed user group, pen drives and CDs through bus drivers, K YAN-PC, Electronic Display Board, intranet website and so forth.

Information and Communication Technology enabling Last Mile Connectivity

In order to bring sustainable development through knowledge empowerment in the project coverage area, the VRC and VKC programme has focused its interventions on agriculture, fisheries, health, and education. The focus is to build the knowledge and skills of the communities, through end to end solutions for primary livelihoods, enabling them take timely decisions and minimize risk and maximize economic benefit: The gender mainstreamed interventions are aimed at bringing about positive changes in the lives of women to enhance their self esteem and status in society.

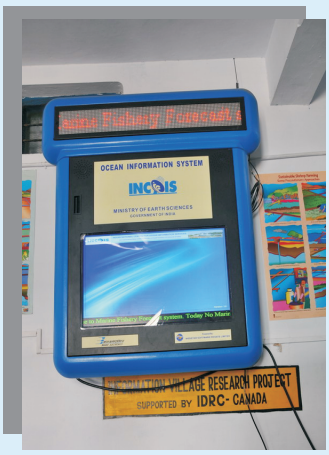
Fisher Friend Mobile Application – An Innovative Technology in CDMA & Android

The fishermen folk are one of the most vulnerable groups in India, who often face a number of problems related to their livelihoods due to unpredictable weather conditions, inability to find exact location of fish shoal, habitat destruction etc. FFMA acts as a decision making support system catering to the information needs of fisher folks as a "one stop shop" service. Hundred mobiles were distributed to fishers and they receive information on sea wave height, weather, and potential fishing zone, rural yellow pages for fisher folk, government announcements, etc. in the vernacular language.

In the growing context of technology development and changing needs among fishermen, the FFMA has been upgraded using Android OS in the regional vernacular (Tamil and Telugu) to provide a single solution to meet the multiple information needs of fisher folk, embedding a few more significant features in 2013. It offers GPS with PFZ, and Tuna Forecasting, alert system while fishermen cross international boundary line, marking options of dangerous zones like dead coral reefs, sunken boats, rocky substance, disaster alerts for cyclone, high wave and tsunami, calling facility of significant contact persons like Indian Coast Guard, 24/7 Helpline of MSSRF, officials of Fisheries Department and market details.

Scientific Information to Fishermen

With the help of Indian National Centre for Ocean Information Services (INCOIS), Department of Earth Sciences, Government of India, the VRCs and VKC programme has taken up GSM Based Electronic Display Boards (EDB) and deployment of Wave Rider Buoy in the coastal areas. EDBs located at the VKC disseminate information on wave height, weather, wind speed, wind direction, availability of fish (Potential Fishing Zone), and Tsunami early warning information to the



fishing communities. Wave Rider Buoy integrated with INSAT deployed in the sea during 2012 provides real time information, through mobile telephony, on wave, swell patterns, and surface temperature of sea conditions, for the following three days at three hourly intervals to fishermen.

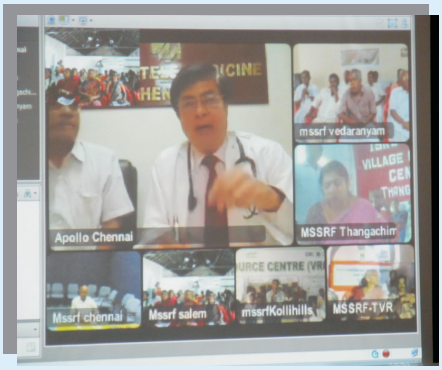
Capacity Building

The fishemen folk receive training programmes with hands-on components focusing on quality fish management, handling Global Positioning System, Sea Safety Measures, and Fish value added products as a step towards risk reduction and livelihood enhancement.

Information and Knowledge Services using Mobile Telephony

Need based audio / text information and knowledge services are provided to the farmers, fishermen, SHG members, and other community members using mobile phones, for timely decision making. An exclusive helpline for fisheries (24/7 hrs) and agriculture have been established to cater to their demands towards improving livelihoods.

Phone-in programme, a theme / season based programme, enables the rural community to interact with subject matter specialists to get clarifications for their doubts, and seek guidance and advice to improve their lives and livelihoods.



Knowledge on Wheels

Soil health is the most crucial factor in farming. The Mobile Soil and Water Testing Laboratory (MSTL) travels to farmers field to test pH, electrical conductivity, soil macro-nutrients, such as nitrogen, potash, and phosphorous, and hardness of water both in terms of cations and anions for determining the quality of irrigation water. The soil health cards bearing the test results and experts' recommendations are disseminated.

Animal health is ensured through appropriate interventions related to care and management of livestock, in which quality milk production, fodder management, artificial insemination, disease management, are provided through video / audio conferencing, phone-in-programmes, and short messages. VRCs and VKCs provide tele-ophthalmology and telemedicine services to the rural communities through Sankara Nethralaya Medical Research Foundation and Mahatma Gandhi Medical College respectively. The mobile eye-care and telemedicine unit has all the necessary equipments to diagnose eye problems and general health problems. Tele-education on health to rural communities in partnership with Apollo Hospital is done through video conferencing.

Study Tours

Nationals from Ghana, Uganda, Ecuador, Guatemala, Peru, Thailand, Nigeria, Philippines, Bangladesh, Papua New Guinea, Malaysia, Camreoon, Cambodia, Kenya, Indonesia, Sri Lanka, Chile, Colombia, Bolivia, Panama and India have participated in mutually enriching exchange and study tours supported by IDRC / telecentre.org and other partners.

Grameen Gyan Abhiyan

In 2004, in partnership with several national and international organizations, MSSRF initiated extending the Village Knowledge Centres (VKCs) by creating a multi-stake holder partnership called Mission 2007/Grameen Gyan Abhiyan (Rural Knowledge Movement).

GGA has grown into a national movement energized by the coalition of government, non-government, academic and business sectors committed to the cause of taking ICT to all the 600,000 villages of India. Based on Mission 2007/GGA, many national initiatives such as Indian Space Research Organization's VRC programme, Department of Information Technology's Community Service Centres (CSCs) programme, etc. were expanded. Further, the National Policy for Farmers – 2007 Agricultural Policy has recommended establishing Gyan Choupals in villages under the section of Extension, Training and Knowledge Connectivity.

GGA has also triggered similar initiatives in other countries such as PAN Africa Network, ICTA in Sri Lanka, Telecentre Network in Bangladesh, PhilCeCNet in Philippines, and Mission Swaabhimaan in Nepal, Rwanda Telecentre Network in Rwanda.

Jamsetji Tata Training School (JTTS) for promoting Lifelong Learning

The Jamsetji Tata Training School was officially launched on 17th February 2007 to provide multiple platforms including on-site and

offsite training programmes and capacity building initiatives for mutual exchange between peers, experts and fellows, experts and telecentre operators. JTTS aims to create a platform for knowledge exchange meeting the needs of the following constituencies of intervention: traditional knowledge holders, Fellows, civil society organisations, telecentre operators, and managers, and potential stakeholders who are willing to initiate and implement VRC/VKC or other models of telecentres.

NVA Fellows

Though the human resources of rural India are rooted with enormous potentials and experiences and rich in traditional knowledge and wisdom, they remain invisible in the forefront of development. The Jamsetji Tata National Virtual Academy (NVA) Fellows is an award recognition bestowed upon grassroots leaders and academicians. 1568 NVA Fellows (M:968; F:600) have been inducted from 24 States and one Union Territory. NVA has also selected 31 (M: 26 / F: 5) International Fellows from 11 countries (Afghanistan, Kenya, Nepal, Nigeria, Philippines, Sri Lanka, Chille, Bolivia, Columbia, Panama and Peru).

Beyond Tsunami: Converting a Calamity into an Opportunity

After Indonesia, India and Sri Lanka were worst affected by the tsunami tragedy and suffered the worst number of casualties. Studies conducted after the tsunami disaster also pointed to the benefit of natural bioshields such as mangroves, sand dunes and shelterbelts, as coastal villages protected by these bioshields generally were better off than villages exposed directly to the tsunami. While the December 2004 tsunami may be a rare occurrence, the coastal communities in India and Sri Lanka were regularly under threat from other natural hazards such as tropical storms, cyclones, and flooding. As a result, while short-term rehabilitation needs were addressed immediately following the devastating tsunami, an equally important task would be to build a stronger resilience among the coastal communities in India and Sri Lanka, so that they could better prepare for future natural calamities.

On March 31, 2006, the Canadian International Development Agency (CIDA) and the International Development Research Centre (IDRC) supported an action research project that would help to strengthen the resilience of tsunami-affected communities in India and Sri Lanka. The M.S. Swaminathan Research Foundation (MSSRF), Chennai, India - Sarvodaya Shramadana Movement - based in Colombo, Sri Lanka and Practical Action – also based in Colombo implemented the project under the management leadership of IDRC.

Goal, purposes and objectives

The goal of this project was to reduce the vulnerability of rural poor in coastal areas of India to natural disasters through bioshield development, livelihood enhancement and knowledge empowerment.

Project site: In India, the project was implemented 10 villages in Pudukkottai, Ramanathapuram and Tuticorin Districts in Tamil Nadu and 8 villages in Krishna District in Andhra Pradesh. In Tamil Nadu

about1990 families with a population 6558 and in Andhra Pradesh nearly 2520 families with a population 7997 were covered under the project.

Project partner: In Tamil Nadu the project was implemented in partnership with two grassroots NGOs namely, People's Action for Development (PAD in Tuticorin District) and Society for Participatory Research and Integrated Training (SPRIT in Pudukkottai). In Andhra Pradesh, a grassroots NGO namely, Praja Pragathi Seva Sangam (PPSS) is partnering in the implementation of the project in the Krishna district site.

Approach: A "Process-oriented, people-centred and science-based" approach was followed to plan and implement project activities. It is process-oriented approach because it consists of a series of steps which accommodate changes in perception, socio-economic circumstances and problems, and the priorities of stakeholders. It is a science-based approach because all mangrove management activities are based on a sound understanding of the ecological processes that operate within and upon mangrove wetlands.

Community mobilization and organization: Mobilization of the community in all the project villages achieved through conducting orientation workshops, exposure visits to successful models of

community based mangrove management, VRCs and VKCs and of various livelihood activities. These exposure visits helped the community to understand the importance of establishing a village level institution for planning, implementation and monitoring. Community leaders, women, men and youth were also given exposure to participatory tools and techniques and gender issues. One of the important learning was that exposure visits organized separately for women to successful sites rather than jointly with men can play a crucial role in empowering women to participate actively in decision making process at community level.

Bioshield: Mangrove bioshield has been established in about 280 ha and non-mangrove bioshield in 27 ha, with participation of community and strategic partners such as local government. Both in Tamil Nadu and Andhra Pradesh biophysical condition of mangrove bioshield site was improved through an artificially developed network of canals and plantation was raised along the banks of these canals. Apart from this tested method, a new technique to raise mangrove bioshield was tested in the project. In Tamil Nadu, near Muthuragunathapuram village extensive inter tidal area of about 60 ha, which is flushed regularly by tidal water, is present and in this area mangrove saplings raised in nursery were directly planted without any artificial canal system. Now this plantation has established successfully, and government agencies and NGOs are adapting this technique to raise bioshield.

Livelihood: In all the tsunami affected villages, livelihood interventions and families participating in these interventions were identified through Participatory Rural Appraisal. The activities that were taken up to strengthen livelihood can be grouped into: a) direct interventions to enhance income from current livelihood activities, b) demonstrations of viable alternative income generating opportunities and c) organizing training programmes to enhance vocational skills. Women headed families were given priority in all the livelihood strengthening activities. About 1500 poor families have been covered under various livelihood programmes. Reclaiming agriculture from abandoned shrimp farms, integrated mangrove fishery farming systems and sustainable aquaculture are some of the important initiatives taken up in enhancing livelihood secuirty of the tsunami affected families of the project villages.

Reclaiming abandoned shrimp farms for agriculture: In India shrimp farming reached peak in production in late 1990s. After that it suffered setbacks in terms of production, value and area due to monoculture, disease, poor environmental management, excessive use of artificial feed and increased input costs. Many of the farmers left shrimp farming and abandoned their farms and migrated to nearby urban areas either temporarily or permanently in search of employment and livelihood. Tsunami aggravated the issue of salinity and therefore the land resource which happened to be one of the major livelihood assets, continued to remain unproductive. With the support of this project, experiments were conducted in one of the project villages namely Sorlagondi in Krishna District of Andhra Pradesh to reclaim many of the abandoned shrimp farms for agriculture (Box):

Process of reclaiming abandoned shrimp farms for agriculture

Around 80 acres of abandoned shrimp farms were identified for reclamation by the community. A process, which had three steps were followed to reclaim the lands: (i) land levelling, (ii) ploughing and (iii) leaching. There were 32 abandoned shrimp farms in the identified 80 acres of land which was levelled by filling soil. This was estimated in consultation with a civil engineer. Land levelling was done using machineries. Following the land levelling process ploughing was done for two times. Since salinity was severe leaching process was adopted as a third step and it was done at three stages, initially 80 acres of land was flooded with fresh water lifted from the irrigation canal and left for 15 days and then drained into the drainage canal located on the other side. The same day after draining the water, one ton gypsum was applied to each acre and flooded with fresh water and left for 15 days and flushed into the drainage canal. Gypsum application promoted water infiltration and thereby removed sodium along with calcium and improved the soil quality. Immediately after draining, the land was again flooded for the third time with fresh water and drained after 15 days. The total expenditure for this intervention in 80 acres was Rs.400,000/- and now paddy is being cultivated in these reclaimed lands and average yield was 2250 kg per acre.

Sustainable Shrimp farming: In areas where shrimp farms could not be reclaimed for agriculture, eco-aquaculture practices were introduced to sustain shrimp farming. This was demonstrated in about 365 acres of abandoned shrimp farms with the support of National Centre for Sustainable Aquaculture (NaCSA), Government of India. In eco-aquaculture farms, shrimp farming system was shifted from semi-intensive type to improved extensive type. In order to avoid introduction of diseased shrimp seeds, NaCSA trained the farmers identifying and buying disease free certified shrimp seeds. Instead of commercial feeds all of the farmers were trained to use only rice bran as feed. Optimum feeding was demonstrated, which enabled the reduction in cost as well as maintenance of water and soil quality. Local farmers were also trained to monitor water quality, disease incidences and the feeding behaviours of shrimps and take remedial action. To reduce input cost in pumping seawater in and out of the pond regularly, water sharing mechanism was also developed. In addition NaCSA helped in branding the product as organic shrimps and market directly, which fetched double the price to the farmers. As a result of these practices, farmers have now started earning a profit of about Rs.15000/- per acre in a period of 3 to 4 months.

Integrated mangrove fishery farming system: In one of the tsunami affected villages, a new approach namely Integrated Mangrove Fishery Farming System (IMFFS) was introduced in which cultivation of mangroves, halophytes (salt-loving plants) and culture of fish, crab and prawn are integrated. This system provides some tangible solutions to make coastal aquaculture sustainable and also strengthen resilience of coastal communities. This also provides opportunity to integrate livelihood and mangrove bioshield. In the Integrated Mangrove Fishery Farming System, shrimp ponds are designed in such a way to provide 30 to 35% of physical space for growing saline-tolerant vegetations including mangroves and halophytes and 70 to 65% water spread area

for fish culture. Physical space for mangrove plantation is created by constructing bunds inside the pond in a zigzag manner or as small mounds. As a result, tidal water will fill the pond by gravitation during high tide and drain out during low tide. The pond can be made deeper to allow 3 feet of water remain in the pond as standing water. In Sorlagondi village in Andhra Pradesh, IMFFS was established in about 10 acres in government land and ownership of these farms is given to 10 tribal families, who make their livelihood by catching crabs in mangrove water by hand and sell them to middlemen. The Village Development Council supports them financially to take up this agro-aquaculture farming.

VRCs and VKCs: As a part of the project, 4 VRCs and 10 VKCs established in the tsunami affected project villages. In these villages need assessment was conducted using various participatory tools. All the contents are in the local vernacular language. Strategic partners, who share their expertise, resources, services or commodities based on the demand and also proactively to meet the needs of the local community, have also been identified and linkages with them have been established. In the project villages, public and private sector organizations, NGOs, research and academic institutions are partnering with the VRC and VKC activities for effective delivery of need based services. Demand driven content collected through various sectors are disseminated using different communication technologies.

Strengthening Organizational and Research Capacities of M.S. Swaminathan Research Foundation (MSSRF)

On January 2009, Dr. David Malone, IDRC President, and eight governors of IDRC visited M S Swaminathan Research Foundation, Chennai. On that occasion the IDRC announced support to MSSRF under the title "Strengthening Organizational and Research Capacities of M.S. Swaminathan Research Foundation (MSSRF)". It has two components: 1) Institutional support and 2) Support to a research project on Information Communication and Education Programme Area to lead MSSRF's knowledge management and networking activities.

Institutional Grant: The institutional support was provided as core support to strengthen Programme Area Coastal Systems Research (CSR) of MSSRF. This grant is deposited in fixed deposits and 50% of the interest earned used to support core staff of CSR programme and the remaining 50% utilized for research activities outlined in the strategic plan of the CSR. Activities will be carried out only in a time bound phases. In phase I activities relating to the following objectives will be to

- study the existing adaptive capacity among mangrove and non-mangrove dependent communities to cope with climate change and sea level rise, and identify interventions to strengthen adaptive capacity;

- create awareness about halophytes among stakeholders including local community, researchers, government and non-governmental communities, and develop strategies to use and conserve halophytes;
- build a baseline database for planning, implementing and monitoring a pan-MSSRF project for promoting self-sustenance in a cluster of coastal villages; and
- permit retention of the critical research skills necessary for the new strategic plan

Research Grant: This grant was utilized for a PAN MSSRF project for a period of 3 years covering the aspects of Knowledge Management, Networking, Monitoring and Evaluation, and Geo-informatics. These activities are implemented by the Information Education and Communication Programme with support from all other Programme Areas and management teams. Specifically, this part of the grant deals with

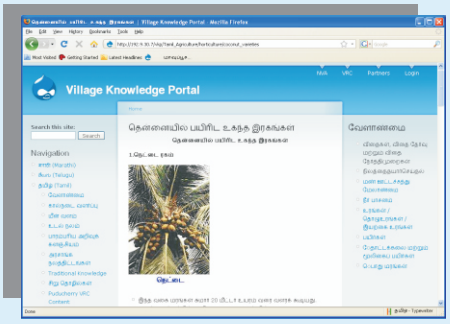
- developing and testing strategies towards a Knowledge Management System (KMS) for cross programme area learning and strengthening research capacity;
- strengthen GGA Secretariat's networking capacities for engaging stakeholders, including researchers, policy makers and development practitioners
- to develop and test strategies towards a utilization-focused evaluation system to enhance the internal learning, provide feedback on overall performance vis a vis MSSRF's mission;
- better integrate geo-informatics and remote sensing tools in MSSRF's PAs; and
- develop programmatic and strategic plans for the Jamsetji Tata National Virtual Academy (NVA)

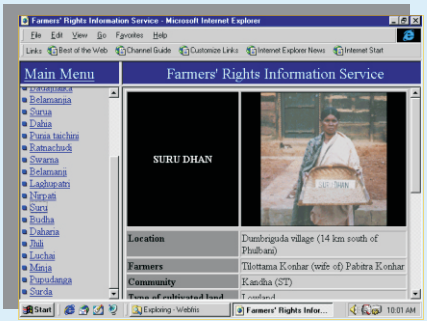
The outcome in the medium term is expected to be greater integration of MSSRF programmes, and providing the necessary and supportive organizational changes in capacities and systems for knowledge management, networking through ICTs, geo-spatial planning, and evaluative thinking.

The Knowledge Management System (KMS) stores the wealth of knowledge and learning over a period of time by implementing various thematic and multi-disciplinary projects in MSSRF. It utilised Word Press open source web-site software with many plug-ins to develop a knowledge and document repository of all the Programme Areas of the Foundation. With in-house capacity and consultations of experts, the KMS has been developed and launched in public domain.

The Programme Area (PA) wise reports, publications and projects and general contents for the public like Conventions, Conferences, Video and Photo publications information on events, documents produced out of the Research projects / findings and project data has been reposited in the KMS. The four web-sites under the KMS have been viewed around the world by virtual visitors. Knowledge Management System: KMS has four interlinked Web-sites enabling public view are

- MSSRF Organisational website www.mssrf.org
- Jamsetji Tata National Virtual Academy (NVA) www.mssrf-nva.org
- Multi Media Resource Centre www.mssrf.in
- GGA Partners www.mssrf.gga.org





The Monitoring and Evaluation System across the six Programme Areas has been achieved by introducing Utilization Focused Evaluation (U-FE) System to 12 staff from four Programme Areas. The 8 sessions conducted during the period of one year had inputs from the expert and practical exercises where the participants learnt, by working out project based evaluation steps. The efforts put in through this to understand the importance of M & E culminated in continuous effort for devising M & E system moving beyond outputs to outcome and impact levels. Baseline of all the Project Intervention at the Institution level was done and the staff oriented on the importance of Monitoring and different methods of evaluation including systematization. Systematic efforts have been made by the four Programme Areas inviting external resource persons to devise M & E system for their respective on-going projects. The remaining two Programme Areas follow their own M & E system to track changes.

Grameen Gyan Abhiyan (GGA) network partnership has been strengthened. A separate web-site for GGA has been developed to include the profiles of the 400 and plus members. One strategic meeting with key partners was held in which Professor Dr. M.S. Swaminathan reiterated the importance of ICT for Development and the role played by both public and private organisations in reaching need-based and locally demanded information, knowledge, and skills to improve rural lives and livelihoods. The participating partners confirmed their commitment in carrying forward the Mission to impact rural development. The strengths of the partners in the technology, contents, and reach in rural areas have been appreciated.

The application of GIS in the monitoring of the project implementation and its immediate and long-term impacts has been shared with the selected staff of all the six PAs in a training programme. The exposure to the GIS maps and its relevance and usage has been covered in the training programme. For monitoring purposes, all the PAs selected one project area to digitize the map with area-specific data.

One village from each PA with required application was identified and thematic layers are generated by analyzing the spatial data and integrating with non-spatial data is in progress. It is expected that the final maps will facilitate effective planning and monitoring project interventions.

In sum, there has been significant learning in building and strengthening partnerships, leveraging Government and Academic Institutions for the support to the project, and content analysis for public and private sharing. Staff capacity has been enhanced in the use and application of communication, geographical mapping technologies, evaluation systems, and strengthening partnership.

Alleviating Poverty and Malnutrition in Agrobiodiversity Hotspots (APM)

India is rich in genetic variability of several economically important plants. Several agro-biodiversity hotspots are predominantly inhabited by tribal families and are characterised by culinary and curative (medicinal plants) diversity, in which women play a key role. Although these tribals have a conservation ethos which conserve rich genetic variability, a public good, at personal cost, economic and public policy compulsions often lead to a shift in their attention from endemic agro-biodiversity to modern high yielding varieties.

The malnutrition situation in India is a cause for concern. Recent surveys indicate that 22 per cent of the Indian population is undernourished and 40 per cent of children below the age of 3 years are underweight and anemic, while 33 per cent of women aged between 15-49 years have a below-normal Body Mass Index (BMl). The Nutrition Advisory Council has identified 200 high malnutrition burden districts, many of which fall under agro-biodiversity hotspots. A considerable segment of the local population, particularly women and children, suffer from the following three major kinds of endemic hunger:

- Calorie deprivation arising from poverty induced under-nutrition;
- Protein hunger caused by inadequate consumption of pulses or milk, fish and meat and
- Hidden hunger caused by the deficiency of micronutrients in the diet.

The challenge is the development and adoption of agricultural strategies that can help alleviate poverty and malnutrition in agro-biodiversity hotspots. These hotspots need to be converted into happy spots using agro-biodiversity for creating more food, jobs and income in an ecologically sustainable manner.

Research Problem

The Alleviating Poverty and Malnutrition (APM) Project is a development research project that investigates the extent to which integrated agriculture can contribute towards alleviating poverty and malnutrition among small farm families in three different locations namely, Kolli Hills in Tamil Nadu, Wayanad in Kerala and Jeypore in Odisha known for their agro-biodiversity wealth. The major research hypothesis is that integrated agriculture that harnesses local agro-biodiversity offers cost-effective, rapid and sustainable solutions to the challenges of poverty and malnutrition without environmental harm. The project is being implemented in three agro-biodiversity hotspots in India – Kundra block in Koraput district of Odisha, Meenangadi panchayat in Wayanad district of Kerala and Kolli Hills in Namakkal district of Tamil Nadu.

Specific research questions, which guide the research process are:

1. What are the main constraints and opportunities affecting production, income and food and nutrition security in agro-biodiversity hotspots?
2. To what extent integrated farming systems in biodiversity hot spots and bio-resource-based participatory and location specific on-farm and off-farm activities contribute to enhanced farm productivity and income and improved environmental sustainability?

3. What are the measurable effects of targeted malady-remedy-based interventions deploying crop diversity with or without mineral supplementation on rural malnutrition at individual, household and community levels?
4. Will the greater participation of women in planning, implementing and monitoring ensure greater equity and sustainability of interventions?
5. Can local community and grassroots institutions be empowered and enabled to play a role in developing and managing the value chain of local produce?
6. Can skill, technology and information empowerment of communities bring a change in management of resources, products and value chain and what synergistic role the ICT could play in this respect?
7. Will the learning of this exercise have regional/ global relevance?

Goals and Objectives

The overall goal of the project is enhancing food, nutritional security and income of rural poor in agro-biodiversity hotspots and this is to be achieved through following objectives and interventions:

- Increase farm productivity by promoting integrated and sustainable use of local crop and livestock diversity with attention to under-utilized crops and breeds, vegetables and fruit trees.
- Enhancing food and nutrition security at individual, household and community levels, understanding gender dimensions of poverty and socio-economic empowerment of women.
- Enhancing on- and off-farm livelihood diversification options.
- Need based capacity building of focal farm families involving panchayats, governmental, non-governmental and service providing institutions and policy makers.
- Developing tools and processes including ICT for information/knowledge management and policy advocacy.

Partnership with University of Alberta

The APM Project has been jointly designed by natural and social scientists from the M.S.Swaminathan Research Foundation and the University of Alberta, Edmonton, Canada with the purpose of resolving the enigmatic contradiction between prosperity of nature and poverty of people in India. These institutions have joined forces to conduct research that can inform and guide future development practices in the disadvantaged regions of Tamil Nadu, Kerala and Odisha states. The project is exploring the potential sustainable, integrated agricultural systems to increase the food and nutritional security for women, men and children in rural India, in ways that maintain and promote biodiversity.

Some salient leads from the project

Home gardens: Home gardens established in the backyards can meet the food and nutrition requirements for domestic consumption with a wide range of local vegetables. The project looks at the food and nutrition requirements and creates awareness on gardens through trainings and demonstration plots. At the microlevel home gardens increased women's control over foods consumed at the household level, increased consumption of vegetables, increased self efficacy related to home garden management and enhanced ability to share food in the

community. At the macro level, it decreased reliance on markets to obtain food and promoted attitudes and beliefs of positive health outcomes associated with home grown vegetables.

Community Fish Ponds: To enable communities increase their access to fish as a nutrition and protein supplement, fishes were raised in community ponds. Fingerlings of Catla, Rohu, Mrigal and other carps were released into the ponds. The experiment was successful in supplementing consumption, and income. Fish as a source of nutrition from local ponds is a new resource established as part of the project.

Bio-char: Agricultural residues can potentially be converted into char through the process of pyrolysis. This char then can be converted to biochar by incorporating any form of compost with it. Application of this biochar in cultivated lands provides multiple environmental, economic and social benefits. It acts as a source of carbon sink, reduces emission of nitrogen dioxide from soils and enhances soil health. It increases water retention capacities of soils, enhances soil fertility and aids crop productivity. Further, use of energy efficient and modified cookstoves produces char, reduces the use of firewood, related drudgery of collecting firewood, reduces smoke and indoor pollution.Produced char can also be used profitably.Thus biochar can have an overall beneficial impact.

Small farm machinery: Several activities in the project promote small-scale mechanization across the project sites. These activities include pulverisers, power tillers, row markers, and treadle pumps for water lifting. Selection of these activities was made through focus group discussion with farmers groups and the local project site committee. The benefits of small farm machinery have been multi-fold. Provision of power tillers has reduced the time required and cost of cultivation for small holders. Pulverizers and de-hullers have reduced drudgery of women who had to spend time and efforts in food processing for their households. Treadle pumps have saved time and reduced drudgery of women involved in water lifting.

Wild foods: Despite the expansion of markets, a section of tribal households continue to collect and use wild foods from forests, fallows and fields. These 'commons' contribute to nutrition and well being of households. This project attempt to document and understand the manner in which wild foods contribute to the household consumption.

Conservation and Promotion of Nutritive and Underutilized Small Millets Diversity

Small millets are widely grown by marginalised communities especially in the dry land plains and hilly ecosystems of South Asia and Africa. Finger millet (Eleusine coracana L.), little millet (Panicum sumatrense Roth ex Roemer & Schultes), Italian or Foxtail millet (Setaria italica L.), Barnyard millet (Echinochloa colona L.), Proso millet (Panicum miliaceum L.) and Kodo millet (Paspalum scrobiculatum L.) are often defined as climate-smart nutritious millets and grown over approximately 2 million ha across India. They are hardy and resilient crops in diverse agro-climatic adverse conditions. Most of them have short growth cycle and do fit well in intercropping and multiple cropping systems. The production of millets is possible even under adverse agro-climatic conditions, which is an important attribute in the light of current changes in climate due to global warming. In addition to these key production related attributes, minor millets are known to possess superior quality in terms of glycemic index and micronutrients thus contributing positive health benefits. The cultivation of minor millets has been declining steadily over the last few decades due to their lower competitiveness compared to cash crops. The reasons for lower competitiveness include lack of - high yielding varieties, good quality seeds, improved agronomic practices, proper processing technologies and poor value chain.

Small millets in Kolli Hills and Status

Kolli Hills located in the Eastern part of Namakkal district in Tamil Nadu State of Southern India. During the early days of settlement by this community in this region, millets used to be their main food crop. These predominantly included finger millet (Eleusine coracana), little millet (Panicum sumatrense) and Italian (or foxtail) millet (Setaria italica). The lack of communication for the hill dwelling community with the plains increased their dependence on these grains for their food security for very long time. The narrow valleys between the hills allowed a very limited cultivation of rice. However, the large upland area offered extensive cultivation of millets and these grains constituted the principal food grain of the community for several years in the past. The community possesses considerable traditional knowledge on the cultivation, conservation and utilization of these grains. They had developed different cropping systems around the millets by choosing crops such as maize, pigeon pea and mustard. These new crops had occupied the land that was once used to cultivate millets. The third reason for lesser preference to the cultivation and consumption of millets is the drudgery associated with its traditional processing in the context of supply of grains which are easier to process and consume. To counter these developments and to promote the cultivation and conservation of millets, MSSRF initiated interventions that were aimed at increasing the productivity of millets, removing the drudgery of processing and building value chain on the millets.

Integrated approach towards creating an economic value for millets cultivation

During the last decade, the M.S. Swaminathan Research Foundation (MSSRF) in partnership with several Agriculture Research Institutes, Universities, NGOs, GOs and International Agencies has been conducting an extensive participatory research work on millets, aimed at reviving, conserving and enhancing their sustainable use. Multidisciplinary teams worked at different geographical locations using participatory approaches and addressing bottlenecks in most critical areas for their enhancement, using the 'Four Cs framework' that pays concurrent attention to focusing Conservation, Cultivation, Consumption and Commercialization.

Establishing Community Institutions for promotion of millets

MSSRF organized local farm women and men, who are more enthusiastic in cultivation and consumption of millets, into Self Help Groups (SHGs) and Farmers Clubs (FCs). SHGs were encouraged to build collective savings from their income, carry out financial lending service within the group and are often linked with local banking service. They are trained and supported to collectively undertake farming related activities such as promotion of millet cultivation. Either specific SHGs or members of different SHGs are facilitated to undertake specific activities of their interest, such as improved production practices, variety selection and quality seed production, management of millet processing units, grain procurement and transportation to processing centers, building its value chain. The various SHGs have been confederated under the Kolli Hills Agro Biodiversity Conserver's Federation (KHABCoFED).

Strengthening the local millet seed supply system

The farmers of different zones in the Kolli Hills appeared to cultivate different local varieties of millets. MSSRF efforts in collecting the seeds of these local varieties from different locations were able to identify 21 distinct land races of finger millet, little millet and Italian millet. As the

seeds of some of these varieties are in extreme shortage and as most of the varieties had got mixed with others under the traditional method of mixed farming, SHGs were trained by MSSRF in the production of quality seed and their safe storage in Village Seed banks. These banks revived the traditional seed storage systems like thombai, a large structure made of mud and wood, and kuthir (a small structure made of mud and sand), and promoted seed exchange practices. SHGs in 15 villages, located in seven nadus (conglomeration of several geographically linked villages) have their own safe seed storage bins and institutional system for regular seed production, distribution and exchange. This is an important village managed institutional structure supporting the conservation of local land races.

Increasing yield through improving millet cultivation practices

The availability of quality seed substantially contributed to the promotion of millets cultivation. However, compared to the alternative crops (e.g. tapioca, pine apple, etc) the yield as well as income from millet to do not match. Productivity enhancement was hence an essential need to sustain millets under competitive farming situation. Together with SHGs, MSSRF undertook different agronomic measures such as row planting, reduced seed rates, application of farm yard manure, and also intercropping millet with tapioca to increase yield and net income. These initiatives were all to increase the yield by 39% in finger millet,

37% in little millet and 30% in foxtail millet and the economic return per unit area. This made convincing impact on farmers for increased cultivation of millets using improved practices.

Participatory Selection of better varieties

Another approach used to promote millet production was broadening the genetic diversity used in the cultivation. Few hundreds of accessions of three millets from the germplasm bank of ICRISAT, Hyderabad and improved cultivars developed under the national programme from the All India Coordinated Small Millet Improvement Project, Bengaluru were accessed by MSSRF and repeatedly cultivated for farmer participatory selection of varieties. These Participatory Variety Selection (PVS) experiments, under repeated selection using farmers' knowledge and skill led to the final identification of three varieties, which yielded better than the rest. These included improved varieties as well as the local land races. The PVS experiments resulted in identification of few varieties which have 20-30 % higher yield than those varieties under cultivation.

Introducing drudgery-free grain processing technology

All millets except finger millet have a very hard seed coat requiring high abrasive force to remove the rice from the seed coat. This decortication process has been done by a very tedious physical process using mortar and pestle. No machinery suited to these millets was available to reduce this drudgery. Therefore, introduction of small mechanical milling facility in the area by MSSRF signaled a major change in the outlook of women and substantially contributed to revival of interest in finger millet cultivation and consumption. MSSRF acknowledges the support from SDC, IFAD, and McGill University, Canada for the supply of these mills in Kolli Hills. A collaborative project with UASD and McGill University, Canada, supported by CIFSRF- IDRC, has yielded a development of new prototype machinery for processing little millet with processing recovery efficiency of 90-95%. Further research is on

progress to extend this technology to customize to other small millets. Another important spin off from the mechanization of millet processing was the local interest, particularly from women, in building value chain of millets.

Development and promotion of new marketable millet products

Value chain building required specialized training on value added product development, maintaining consistent product quality, packaging, labeling and marketing. Selected members of SHGs were trained on value addition at the Rural Home Science Colleges in Avinashilingam University, Coimbatore and also the Agricultural Universities at Bengaluru and Dharwad.This training planned and supported by MSSRF, empowered village women in the production of all value added items like malt,rava, and readymade mixes of millets. Some of these value added products having good commercial potential were identified through market studies and put in the production line through the collective work of SHGs. Different SHGs are encouraged to specialize in the production of different value added products. During the early stages of production of these value added products and marketing, assistance of MSSRF was extended for further training on product quality, packaging, labeling, marketing and account keeping. Currently, three villages are engaged in millet value addition activities.

Establishing a market for value added millets products

While farmers have experience in marketing primary produce, they lacked capacity in marketing value added products. Therefore, MSSRF was required to continuously assist SHGs in marketing products in urban areas. Slowly members of SHGs with marketing skills were identified to undertake product marketing through local retail outlets. They were also enabled to establish a retail outlet for all products in Kolli Hills under the banner of Kolli Hills Agrobiodiversity Conservers Federation (KHABCoFED). Over the last few years, millet products branded "Kolli Hills Natural Products' are available in department stores in Chennai and few other towns in Tamil Nadu. The most popular and largely sold millet products are readymade mixes, milled germ of little millet and Italian millet, finger millet malt. Since 2001, millet producers of KHABCoFED have sold 9 metric tonnes of whole grain, 23.3 metric tonnes of little millet rava and flour, 7.4 metric tonnes of value added products of total value of 15.2 lakhs.

Promoting the products

Product differentiation and branding are important tools for obtaining a competitive market position. Products are neatly packed and accompanied by preparation instructions and recipes (MSSRF 2004). Products are sold under a specific brand name, advertising the products as locally grown and organic. To increase awareness on the nutritional quality of millets and its derived products MSSRF and SHGs are promoting millet products through exhibitions at local events and annual temple festivals. In addition, MSSRF is advocating the use of millets in the Integrated Child Development Programme (ICDS) and distribution of millets in the Public Distribution System (PDS), in areas where millets are largely grown and available at favorable prices.

Increased economic benefits lead to increased cultivation and use

A decade of participatory research and development efforts has enabled farm families to access and manage local genetic materials through community seeds banks and social networks. Millet production and yield have been increased through the selection of adapted varieties, use of quality seed, and improved agronomic practices. The interventions through quality seed production and improved agronomic techniques imparted to communities have helped to realize increase in yield and income. Millet processing pulverisers have reduced the drudgery in processing finger millet. Millet processing technologies, the development of new millet uses, and linking products to markets through awareness and promotion campaigns have increased the use of millets. The value chain interventions have generated employment and income for millet producers and other actors in the value chain. Community institutions built around these actions in the form of Self Help Groups and Farmers Organisation were able to promote their millet value added products as they have improved access to suitable markets for millets. Enhanced local utilization and value addition opportunities have increased consumption of millets.

Success through collective efforts

The value chain development strategy is bottom-up; all actions in the chain are based on collective decision making by the SHGs and their

local enterprises. This was essential since small millets have to compete with high market value crops like cassava for individual farmers' interest on their production, and with subsidized crops like rice for consumer interest on their purchase. Collective decision making, action and ownership through the SHGs along the chain, pooling resources, realizing economies of scale, and sharing information appears to be key in the current success of developing a millet value chain. However, this is not sufficient for sustained success.

Challenges in creating a sustainable demand

To create an expanding demand for millets value added products, a robust marketing channel for this basically supply driven value chain will be needed. Difficulties to tackle are the competition of subsidized commodities like rice, the lost knowledge on millets culinary preparation, and the change in consumer taste. These will be easier to overcome with consumers within the production area compared to outside the areas of production; therefore initial focus has been on the creation of a robust regional market. The entry point in the marketing strategy has been the understanding of past uses, and the development and promotion of new uses for millets; followed by raising awareness of and exposing consumers to millets and their derived products, including novel foods, at regional events. At present rice, flour and five value added products of little, Italian and finger millet malt and Murukku (fried item), are being sold through twenty-five organic outlets in thirteen districts. Scope of increased supply of these diversified products to more consumers is foreseen.

Millets, Policy Environment and Further tasks

The outcome of the integrated 4C approach has contributed significantly in advancing research and development and creating an enabling policy environment for nutritious millets in India. Millets are gaining a new role as health foods among rural and urban high income user groups, although mostly through niche markets. In spite of these successes,

further work is still required for the refinement of equipment to allow de-hulling, polishing and milling of some of those species having smallest grain size (such as little millet, proso millet, kodo millet). Enhanced networking among NGOs, CBOs, private and public sectors has become imperative to scale up successful methods and approaches beyond project sites. Further innovative practices developed in the project on cultivation, processing, marketing of the underutilized and neglected nutri-millets will have potential for larger replication in similar agro ecologies.

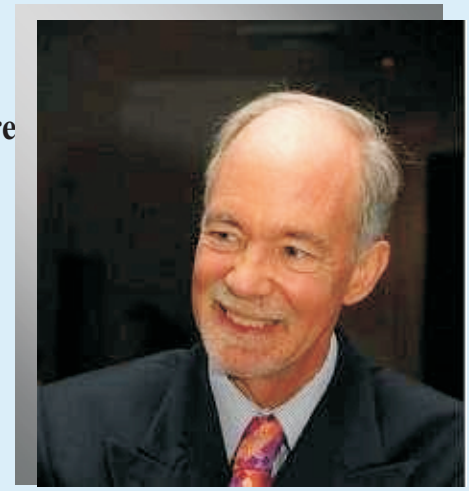
In the area of public policy, the following three significant outputs are worthy of mention:

1. The National Food Security Act, 2013 of India, which is probably the world's largest social protection measure against hunger, provides for the distribution of millets and other underutilized crops in the Public Distribution System (PDS) at a very low cost of Re. 1 per kg. Earlier, only wheat and rice were included in the PDS but under the Food Security Act, the food basket has been enlarged to include nutri-cereals (commonly referred to as coarse cereals).
2. The Budget of the Government of India for 2013-14 has included a provision of Rs. 200 crores for initiating a Nutri-farm movement in the districts with a high malnutrition burden. The Nutri-farm will include the cultivation of ragi, high iron bajra and crops belonging to Pennisetum, Paspalum, Setaria, Eleusine and other genera.
3. Based on the results obtained under IDRC – CIDA supported projects, Prof. M.S. Swaminathan has proposed that one of the years of this decade may be designated as “International Year of Underutilized (Orphan) Crops”. 2013 is being commemorated as the International Year of Quinoa. Quinoa was one of the main foods of the Andean people before the Incas.

Millennium Lecture

India: Challenges in agriculture and road map for the future *

Dr. David M. Malone
President, International
Development Research Centre



Agriculture policy, driven by bursts of fear and enthusiasm, often shows politicians in a very poor light the world over: serving up short-term fixes for public worries over food security and pandering shamelessly to farm (and fishing community) voters.

But does this lead to good policy to achieve lasting growth in output? Sadly, often not. No country has a monopoly on expensive, counterproductive and trade-distorting agricultural policy. The current World Trade Organisation (WTO) Doha Round has foundered repeatedly on the reluctance of the United States and the European Union to cut back on subsidies that have done so much to damage the agricultural interests of others. The U.S. stampede into biofuels only two years ago significantly undermined international stocks. Even my own country, Canada, one of the world's most efficient grain and livestock producers, maintains a system to prop up the prices of dairy and poultry products, leaving hapless consumers to face some of the most expensive milk, eggs and butter in the world.

* Lecture delivered at MSSRF, Chennai on 23rd January 2008

India was once at the apex of international achievement in agricultural innovation. Drawing on a wide variety of international grain types, pioneers of high yielding hybrid seeds, notably M.S. Swaminathan, were able to achieve in the 1960s and 1970s a real "green revolution" in India, boosting agricultural productivity impressively and making the country fully self-sufficient in its main food requirements for the first time in modern history. Scientific innovation was supported by energetic policy at the Union and State levels to achieve one of the world's most striking agricultural successes of the 20th century. But then, as so often with success, a purposeful policy dissolved into politicking and piecemeal implementation.

Unsupported by rigorous policy, excess use of fertilizers, unsustainable use of water resources encouraged by free or subsidised electricity for farm pumps led to soil degradation and depletion of sub-surface aquifers. This occurred at a time when an expanding population, the first hints of the consequences of climate change and a sudden spike in agricultural commodity prices in 2007-2008 linked to lower international grain stocks and a sharp rise in commodity prices, notably oil, provided an unwelcome reminder to Indians that all was not well with the agricultural policy. What ensued was impulse buying on international markets at the same time as export of some items was prohibited (hurting mainly other developing countries, the industrialised world having cornered all the food it needed). One salutary measure offered by Delhi was the lowering of tariffs on some necessary international food imports but by November 2008, the government was again raising tariffs on some products (soya) in order to protect domestic producers.

What do all these measures, taken together, amount to? Certainly not a coherent set of policies to raise productivity over several decades. Rather, as elsewhere in the world when governments face similar pressures, they smack off political expediency and improvisation.

Is India facing a lasting crisis in agriculture and a serious threat to its food security? In a word, yes. There is no reason for short-term panic. India remains in good years capable of meeting its main needs and simultaneously of earning sizeable sums from agricultural exports. Rather, it is the combination of Indian demographics with the growing success of the country's overall economy and environmental stress that create a challenge: increasingly prosperous Indians will be eating more (and probably wasting more also, as do middle classes everywhere).

Global rice production has stagnated for the past 10 years, while the price has increased four-fold. President George Bush raised the ire of Indian commentators last year when he commented that the international food crisis was due to an expanding demand from India and China. Perhaps his mistake was not in differentiating between them: food consumption in China more than doubled after 1990. India's consumption rose much more modestly, by roughly 30 per cent. But does anybody seriously believe that a significantly more prosperous India will avoid greater food consumption, including of meat (so expensive in grain to produce)?

It may be instructive to take a short detour and consider the diverging path of early economic reforms in India and China. India's key economic reforms of the early 1990s centred on liberalisation favouring the manufacturing and services sectors. These were tremendously successful but little was done for agriculture. China, on the other hand,starting its key reforms earlier, focused first on agriculture, perhaps sensing that a dramatic drop in rural poverty might make other reforms more saleable politically to those skeptical of change.

A fine article in Economic and Political Weekly by Shenggen Fan and Ashok Gulati in June 2008 traced the outlines of China's revolutionary attempt, in the late 1970s, to raise agricultural production by encouraging multiple experiments at the local level, “learning by

doing." Only after it was clear what worked (and what did not), a process Deng Xiaoping described as "crossing the river while feeling the rocks," did Beijing launch a full-bore nationwide reform process that succeeded dramatically in raising production and decisively reducing rural poverty. These are steps India still has not taken.

That said, in the current global slowdown, rural India may be better equipped to absorb the shock than its highly privatized Chinese counterpart because of the wide range of Indian anti-poverty programmes constituting a fragile but hopeful safety net.

Is improvement of productivity and nutrition a matter only of agricultural policy? Obviously not.

As is well known but never ceases to surprise, India suffers from higher levels of child malnutrition than Sub-Saharan Africa. This is not because basic Indian foodstuffs are less nutritious than Africa's. Canada's global micro-nutrient initiative, co-funded by U.N. agencies and the World Bank, while making a significant contribution to fighting against malnourishment, stunting and wasting in India (all at heartbreaking levels, all with life-long effects) is not as successful as it should be. Why? Because of poor rural health, education and physical infrastructure (the latter inhibiting the free flow of foodstuffs that would naturally alleviate nutrition problems).

Thus, "food security" relates to much more than agricultural incentives and disincentives. Wider national policies and programmes are at least as important. And yet, in spite (or perhaps because) of India's vibrant democracy, admirably free and crusading press and dynamic civil society in constant contention with each other, little has been achieved in recent years.

An early debate on climate change is beginning to take hold in India. Whether or not the Copenhagen Conference later this year produces a

successor to the Kyoto protocol, India will need to take a number of steps now in the interests of its own food security.

Canada and India share an unwelcome phenomenon: melting ice — lots of it, in Canada's north and in the Himalayas. For India's northern breadbasket, this portends shifts in water supply that could destroy the foundation of the country's food self-sufficiency. Prudential steps need to be taken urgently to mitigate and adapt to the effects of these coming changes in water supply.

The success of the U.S. and Canadian rural development model depended, within decades of the first European farming settlement, on creating non-farm rural jobs so that sub-division of farms and unemployment could be avoided. These jobs mostly related to servicing a growing agricultural sector and processing food, in order to get as much of it as possible to distant markets intact (a major challenge for India today with respect to fresh produce). Rather than misguided attempts to force rural migrants from urban settings they have reached in search of livelihoods, coherent government policies need to encourage good non-farm jobs in rural areas.

As an enthusiastic and respectful friend of this great country, I hope that the next Parliament and government will tackle the full range of policies necessary to boost agricultural production and nutritional progress. India is not short of agricultural land. Per capita, it has as much as Italy and Germany, both highly efficient agricultural producers. It is not short of water: the monsoons, while sometimes disappointing, can be counted upon to reward sensible water management policies and programmes.

Above all, India abounds in admirable human capital: optimistic, hard working, endlessly entrepreneurial. If any country can succeed in boosting world agricultural production, it should be India. But this will require a range of sound policies, determined implementation and a rebalancing of national attention to include more systematically and meaningfully rural interests and perspectives.

Highlights of the Speech delivered by

Dr. Jean Lebel,
President, IDRC
3 December 2013

It is really a pleasure for me to be here today. Let me thank Prof. M.S. Swaminathan for the warm welcome, and for mobilising the team and colleagues of other institutes, organisations and stakeholder over here today. I also thank the presenters and my colleagues from IDRC, New Delhi. I have been working with IDRC for 17 years now in various roles and functions, as a Programme Officer, Programme Leader, Director of the Agriculture and Environment Programme, Vice President and now as the President. I know a little about IDRC, and also about the work of our recipient. Having been in the field and a researcher, I am always delighted to go back to the roots of the science often, at least from the agriculture and environment side. I am pleased to meet recipients, officials, and also listening carefully to these conversations in the context of our next Strategic Development Plan for the period 2015 – 2020. While planning for this visit, I wanted to meet our colleagues at the M.S. Swaminathan Research Foundation because of the long history of collaboration between our organisations. IDRC works within the Foreign Affairs of the Canadian Government, collaborating with a number of Universities, and the Department of Foreign Affair Trade and Development. We are demonstrating by stopping over here, the type of relationship that takes time to build.

Long term presence is value. Before the present meeting, we had a set of presentations about the early days of our Information, Communication and Technology (ICT) work. A quantum leap in development has been made by integrating smarts phones in a way well before some of us in the north. I am aware of this since, I have a little house situated 1000 km away from Ottawa at the Gas Bay Shore. The cell phone got there only in the year 2011. I used to tell my friends over there in a small village of 200 that, it was easier for me to reach people in Africa and India than to reach them in Gas Bay. Innovation hit the ground and brought about transformative change, of which you have been part of. It is all the more important for me to stop here, because of the quality of work has been your trademark, because you are looking at key issues, and have been at the forefront of innovation, spearheading research, results and practices for which you were picked by our Department of Foreign Affairs and Trade and Development. When I think of the ICTs, the very early work was then picked up by ISEF, CIDA and it led to a major impact - not in one village but in thousands of villages, some of those are still being used today. This morning you were telling me that there are 100,000 people who are receiving feeds from the work coming out of MSSRF on a daily basis in order to make a better environment and agricultural practices, which is quite remarkable.

We are at a point of time where in Canada there has been a lot of conversation about innovation. Our Governor General has always keen in bringing the triangle of Education, Innovation and Trade. IDRC comes into this picture of Education and Innovation, being conditioned to boost changes within the country and in between the countries of India and Canada. Food Security is definitely at the centre of Canadian interests not only from the development perspective but also from Foreign Affair and Trade perspective. The two projects being discussed today fall in that perspective. When we set up the Canadian International Food Security Research Fund (CIFSRF) with our colleagues from CIDA (now DFATD),

we thought that this was a fertile ground to bring together the best of India with the best of Canada in the Agricultural Sector, in order to make a big impact and a big change. You have demonstrated this with the result that have already achieved and the ones that will be generated in the future. Hence, this collaboration between Canada and India through the M.S. Swaminathan Research Foundation is truly a one where the research comes at scale. This research can have an impact not only at the level of a village, but at the level of a region or higher. It is not only about technology, but also about understanding the social context and with the notion of bringing greater equity among everyone. That everyone will benefit from the innovation and changes. This is what we are looking at IDRC for the future.

If you were to ask me today what are the three things that IDRC would like to concentrate on in the future, I would well say little bit of the same, but also a little bit more known to us and also known to actors and recipients across the world. I think there is a lot of space for continuing building leadership - building actual leadership in the field of research for development for the future. The students participating in your project and the personnel are to secure leadership once the project is completed, going to higher ground and the institution should also capitalise on this leadership in the future. The second thing that IDRC will do is to catalyse collaboration. The two projects presented here have demonstrated some results which indicated how important they are. I have also seen the collaborative spirit. That is not only about science, but also about the policy, the involvement of multiple actors including that of the private sector. Catalysing collaboration will be the

mainstay of the IDRC in future. The third element I would like to speak about is impact. Every one speaks about the impacts, every one want to have an attribution to the impacts. But when I talk about impacts, I talk more about knowing where we are in the continuum. Where impact is some time at the local level, it is quite important and will lead to something at a greater scale. But knowing where we are at the impact scale, the impact pathway is important. And through the work we have been doing here, we have made a drastic change. IDRC was working extensively around community based natural resource management some years ago. We came to the conclusion that we had contributed 20 years of support and decided to move out. It was excellent work and is still taking place, but we have been able to build quite an area of expertise that can carry this on without our support. There are a number of organisations around the world that work on community based natural resource management, in a very innovative manner and probably in a better way than IDRC has ever done. So when we made that change, we asked ourselves where we could go to make a significant change in the life and livelihood of people. We decided to look at innovations that are present in agriculture, that have not reached hundreds of thousands of farmers but has a good potential. That is where your work is squarely falling. Leadership, collaboration, impacts all of this to lead to a better world, better life and livelihood.

I want to thank you Prof. M.S. Swaminathan for the book that you have been able to put together on the occasion of our visit. Not only will I carry it back home, but will also share it with my predecessor Dr.David Malone to show that we entertain a very good relationship with the foundation and acknowledge for the work he has done with you. Let me get a little bit more personal. I am from a family belonging to the first generation learner who went to university in Canada. I am a pure product of the Public University System and you know I am always pinching myself in the morning asking myself what I am doing right now working as president of the IDRC. I am pleased because I have long tradition of excellence that has been built in this organisation in maintaining and securing that we work

with the very best. I have been walking on the path where our first president David Hopper walked and I know how much he cherished the relationship in India. I had the opportunity to meet him. I also had the opportunity to meet Dr.Norman Bourlaug and regularly meet with Dr. Joseph Hulse who was the Vice President and maintained a very good relationship with MSSRF. I had the opportunity to interview Dr. M.S. Swaminathan once in a Public Lecture in Canada. I say all of this to indicate that I am privileged to be in this position. I was also privileged to have had the opportunity to meet each of these four persons who are global giants in agriculture for development. Walking in the path of giants mean that you need to have a lot of humility and their shoes will help you not to fall aside. I think that you have built and are pursuing to build a better world. The future is in our hands to make it better. You are an inspiration and your colleagues whom I have mentioned have been role models for us. My heartfelt thanks to you and your colleagues for showing us the way for pursuing this journey of make this world better. Thank you.

MSSRF is grateful to the IDRC and CIDA both for financial support and technical advice. MSSRF expresses its sincere thanks to the officials of IDRC particularly Dr. David Malone, Ms. Maureen O'Neil, Dr. Michael Clarke, Dr. Richard Fuchs, Dr. Renald Lafond, Dr. Bo Goransson, Mr. Roger Finan, Dr. Frank Tulus, Dr. Laurent Elder, Dr. Phet Sayo, Dr. Stephen McGurk, Dr. Rohinton Medhora, Dr. Anindya Chatterjee, Dr. Sara Ahmed and Dr. Kevin Tiessen and Dr. T. Sampath Kumar of CIDA for their active support and help to the MSSRF programmes.

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