Youth for Agricultural Transformation

Prof. M. S. Swaminathan

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"Free Enterprise was born with man and shall survive as long as man survives".

- A. D. Shroff
Founder-President
Forum of Free Enterprise

EDITOR'S NOTE

The rapidity of structural transformation of Indian economy since Independence, and especially over the last two decades of economic reforms, is one of most striking features of our process of economic development. At the same time, it has become a subject matter of some intense debate. Thus, in the first decade of economic planning, agriculture was considered as a way of life; the share of population dependent on agricultural occupations was predominantly large and the contribution of this sector to the overall national economy used to be well over 50 percent. But now the share of agriculture sector to GDP of the country has declined precipitously to around 15 percent, and the dependency ratio of labour force too on this sector has also dropped, but it still remains high around 55 percent.

There have doubtless been some major milestones in India's agricultural development and the most significant has been what is commonly acclaimed as the Green Revolution initiated since the mid-sixties. The beneficial outcome of this manifested in the subsequent two decades, enabling the country to not only secure major breakthrough in productivity growth, but also achieve self-sufficiency in food-grains production. This achievement was made possible by the application of high yielding varieties of crops together with a package of other inputs like chemical fertilizers and pesticides, irrigation water, agricultural equipments and improved agricultural practices, including enhancement of bank credit facilities.

The beneficial impact from this first Green Revolution started tapering off over the past many years. In spite of the Planning Commission and government's good intentions of proposing to raise agricultural growth rate to 4% per annum

and formulating the policy strategy for achieving this goal, the actual performance has been consistently falling short of the target. In the meantime, however, the cropping pattern has witnessed some noticeable changes with the expansion of horticulture, floriculture and cultivation of some exotic crops; dairy farming; and livestock farming. In the context of prevailing (a) virtual stagnant productivity scenario; (b) limitations on expansion of major irrigation projects and land under cultivation; (c) political pressures to introduce extensive food security; (d) growing concerns about the likely global food shortages in the coming years; (e) implications of climate change on agriculture; and so on, there is growing urgency in India for ushering the Second Green Revolution.

But in the oft-proclaimed official objective of pursuing such second green revolution, one of the most critical challenges is going to be about how to attract the youth for achieving agricultural transformation. There can be no better authority to deal with this hard core subject than Prof. M. S. Swaminathan. All of us are surely familiar with his extensive research, intense and incisive understanding and knowledge of Indian agriculture. And from time to time, he has written and spoken eloquently on various dimensions of Indian agricultural scenario with great passion and conviction. He is a phenomenon per se; and his contribution to Indian agricultural policy and development has been acclaimed not only in India, but internationally.

We are, indeed, very happy that Prof. Swaminathan has sought to offer his reflections on making educated youth, including farm graduates of this country to look upon agriculture as an attractive and challenging profession. He laments that "at present, we are deriving very little demographic dividend in agriculture'. Therefore, he offers a three-pronged strategy comprising suggestions to (a) improve productivity

and profitability of small holdings; (b) enlarge the scope for agro-processing, agro-industries and agri-businesses; and (c) promote opportunities for the services sector in agricultural operations.

Further, he goes on to offer multiple dimensions of these basic propositions, which cover issues of strengthening the role of women in agriculture, promoting climate resilient farming, sea-water farming, preservation of agricultural and bio-diversity heritage sites and promotion of global soil partnership initiatives – all of which will be of immense value in the formulation of micro policy measures. What also strikes us the most is his concluding message that "an effective method of monitoring the social impact of research and development programmes'' is to "Remember Your Humanity".

We are sure this booklet will be found very valuable by all concerned, especially by the educated youth of our country and equally importantly by the Planning Commission and policy makers, keeping in view not only the immediate perspective of the Twelfth Plan, which is currently under formulation, but also in the context of a longer-term perspective of next two decades or more when India would be endowed with the maximum potential advantage of demographic dividend.

Sunil S. Bhandare
Editor

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Prof. M. S. Swaminathan *

While visiting the National Dairy Research Institute, Bangalore, on 27 June, 1927 Mahatma Gandhi wrote in the Visitors' Book **"Farmer"** against the column titled "occupation". He also used to emphasise that **Gram Swaraj** is the pathway to **Poorna Swaraj**. Lal Bahadur Shastri later gave the slogan "Jai Jawan, Jai Kisan" to stress that Jawans and Kisans are the two pillars of our freedom. **The extreme volatility of the price of food grains in the international market emphasizes that the future belongs to nations with grains and not guns.**

For young people to take to agriculture, farming must be both intellectually satisfying and economically rewarding. This will call for a technological and managerial upgradation of farm operations. We have to harness the best in frontier

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science and marry it with the best in traditional knowledge and ecological prudence. Such a blend leads to the science of ecotechnology. In addition to ecotechnology, our Agricultural Universities should become leaders in biotechnology, space technology, nuclear technology, nanotechnology, renewable energy and management technology. **The University should enable every scholar to become an entrepreneur.**

During his recent visit to India, US President Barack Obama pointed out that India is fortunate to have over half of its total population of 1.2 billion under the age of 30. Out of the 600 million young persons, over 60 per cent live in villages. Most of them are educated. Mahatma Gandhi considered the migration of educated youth from villages to towns and cities as the most serious form of brain drain adversely affecting rural India's development. He, therefore, stressed that we should take steps to end the divorce between intellect and labour in rural professions.

The National Commission on Farmers stressed the need for attracting and retaining educated youth in farming. The National Policy for Farmers, placed in Parliament in November 2007, includes the following goal — "to introduce measures which can help to attract and retain youth in farming and processing of farm products for higher value addition, by making farming intellectually stimulating and economically rewarding". **At present, we are deriving very little demographic dividend in agriculture.** On the other hand, the pressure of population on land is increasing and the average size of a farm holding is going down to below one hectare. Farmers are getting indebted and the temptation to sell prime farmland for non-farm purposes is growing. Over 45 per cent of farmers interviewed by the National Sample Survey Organisation wanted to quit farming. Under these conditions, how are we going to persuade educated youth,

including farm graduates, to stay in villages and take to agriculture as a profession? How can youth earn a decent living in villages and help shape the future of our agriculture? This will require a three-pronged strategy.

(a) Improve the productivity and profitability of small holdings through appropriate land use policies, technologies and market linkages; develop for this purpose a "4C approach", i.e., Conservation, Cultivation, Consumption and Commerce.

(b) Enlarge the scope for the growth of agro-processing, agro-industries and agri-business and establish a "Farm to Home" chain in production, processing and marketing.

(c) Promote opportunities for the services sector to expand in a manner that will trigger the technological and economic upgradation of farm operations.

Some years ago, the Government of India launched a programme to enable farm graduates to start agri-clinics and agri-business centres. This programme is yet to attract the interest of educated youth to the degree originally expected. It is hence time that the programme is restructured based on the lessons learnt. Ideally, a group of four to five farm graduates, who have specialised in agriculture, animal husbandry, fisheries, agri-business and home science, could jointly launch an agri-clinic-cum-agri-business centre in every block of the State. Agri-clinics will provide the services needed during the production phase of farming, while the agri-business centre will cater to the needs of farm families during the post-harvest phase of agriculture. Thus, farm women and men can be assisted during the entire crop cycle, starting with sowing and extending up to value addition and marketing. The multi-disciplinary expertise available within the group of young entrepreneurs will help

them to serve farm families in a holistic manner. The home science graduate can pay particular attention to nutrition and food safety and processing and help a group of farm women to start a food processing park. The group should also assist farm families to achieve economy and power of scale both during the production and post-harvest phases of farming. Such an integrated centre can be named **"Agricultural Transformation Centre"**.

Opportunities for young entrepreuners are several. Climate resilient agriculture is another area that needs attention. In dry farming areas, methods of rainwater harvesting and storage, aquifer recharge and watershed management as well as the improvement of soil physics, chemistry and microbiology, need to be spread widely. The cultivation of fertiliser trees which can enrich soil fertility and help to improve soil carbon sequestration and storage, can be promoted under the Green India Mission as well as the Mahatma Gandhi National Rural Employment Guarantee programme. **A few fertiliser trees, a *jal kund* (water harvesting pond) and a biogas plant in every farm will help to improve enormously the productivity and profitability of dryland farming.** In addition, they will contribute to climate change mitigation.

The "yuva kisans" or young farmers can also help women's self-help groups to manufacture and sell the biological software essential for sustainable agriculture. These will include biofertilisers, biopesticides and vermiculture. The Fisheries graduate can promote both inland and marine aquaculture, using low external input sustainable aquaculture (Leisa) techniques. Feed and seed are the important requirements for successful aquaculture and trained youth can promote their production at the local level. They can train rural families in induced breeding of fish and spread quality and food safety literacy.

Similar opportunities exist in the fields of animal husbandry. Improved technologies of small-scale poultry and dairy farming can be introduced. Codex alimentarius standards of food safety can be popularised in the case of perishable commodities. For this purpose, the young farmers should establish Gyan Chaupals or Village Knowledge Centres. Such centres will be based on the integrated use of the internet, FM Radio and mobile telephony.

In the services sector designed to meet the demand driven needs of farming families, an important one is soil and water quality testing. Young farmers can organise mobile soil-cum-water quality testing work and go from village to village in the area of their operation and issue a **Farm Health Passbook** to every family. *Farm Health Passbook* will contain information on soil health, water quality, and crop and animal diseases, so that the farm family has access to integrated information on all aspects of Farm Health. Very effective and reliable soil and water quality testing kits are now available. This will help rural families to utilise in an effective manner the nutrient based subsidy introduced by the government from April 1, 2010. Similarly young educated youth could help rural communities to organise gene-seed-grain-water banks, thereby linking conservation, cultivation, consumption and commerce in a mutually reinforcing manner.

Young farmers can also operate climate risk management centres, which will help farmers to maximise the benefits of a good monsoon and minimise the adverse impact of unfavourable weather. Educated youth can help to introduce the benefits of information, space, nuclear, bio- and eco-technologies. Ecotechnology involves the blend of traditional wisdom and frontier technology. This is the pathway to sustainable agriculture and food security, as well as agrarian prosperity. **If educated youth choose to live in villages**

and launch the new agriculture movement, based on the integrated application of science and social wisdom, our untapped demographic dividend will become our greatest strength.

Mahila Kisans (Women Farmers) and Yuva Kisans (Young Farmers) will determine the future of our agrarian and rural economy. In the central budget of 2010-11, a *Mahila Kisan Shasaktikaran Pariojana* was introduced by the Finance Minister on my suggestion. The Home Science graduates participating in the Agricultural Transformation Centre movement should also organise a "Feeding Minds – First 1000 Days" programme to ensure that there is no maternal and foetal undernutrition and that every new born child has an opportunity for realising its innate genetic potential for mental and physical development. Babies with low birth weight, as a result of foetal undernutrition suffer from hadicaps in brain development and cognitive ability. **Our desire to become a Knowledge and Innovation Super-power can be realised only by paying attention to nutrition and education on a life cycle basis, i.e., from conception to cremation.**

Addressing the World Climate Conference held in Geneva in 1989 on the theme, "Climate Change and Agriculture", I pointed out the serious implications of a rise of 1 to 2 deg C in mean temperature on crop productivity in South Asia and Sub-Saharan Africa. An Expert Team constituted by FAO in its report submitted in September 2009, also concluded that for each 1 deg. C rise in mean temperature, wheat yield losses in India are likely to be around 6 million tonnes per year, or around $ 1.5 billion at current prices. There will be similar losses in other crops and our impoverished farmers could lose the equivalent of over US $ 20 billion in income

each year. Rural women will suffer more since they look after animals, fodder, feed and water.

We are now in the midst of a steep rise in the price of essential food items like pulses, vegetables and milk. The gap between demand and supply is high in pulses, oilseeds, sugar and several vegetable crops including onion, tomato and potato. Production and market intelligence as well as a demand – supply balance based an integrated import and export policy are lacking. The absence of a farmer-centric market system aggravates both food inflation and rural poverty. FAO estimates that a primary cause for the increase in the number of hungry persons, now exceeding over a billion, is the high cost of basic staples. **India has unfortunately the unenviable reputation of being the home for the largest number of undernourished children, women and men in the world.** The task of ensuring food security will be quite formidable in an era of increasing climate risks and diminishing farm productivity.

China has already built strong defences against the adverse impact of climate change. During 2010, China produced over 500 million tonnes of food grains in a cultivated area similar to that of India. Chinese farm land is however mostly irrigated unlike us where 60% of the area still remains rainfed. Food and drinking water are the first among our hierarchical needs. Hence while assessing the common and differentiated impact of a 2 deg. rise in temperature, priority should go to agriculture and rural livelihoods.

2010 was the International Year of Biodiversity. We can classify our crops into those which are climate resilient and those which are climate sensitive. For example, wheat is a climate sensitive crop, while rice shows a wide range of adaptation in terms of growing conditions. We will have problems with reference to crops like potato since a higher

temperature will render raising disease free seed potatoes in the plains of North-west India difficult. We will have to shift from planting tubers to cultivating potato from true sexual seed. The relative importance of different diseases and pests will get altered. The wheat crop may suffer more from stem rust which normally remains important only in Peninsular India. A search for new genes conferring climate resilience is therefore urgent. **We have to build gene banks for a warming India.**

Anticipatory analysis and action hold the key to climate risk management. The major components of an Action Plan for achieving a Climate Resilient National Food Security System will be the following:

- Establish in each of the 127 Agro-climatic Sub-zones, identified by the Indian Council of Agricultural Research based on cropping systems and weather patterns of the country, a **Climate Risk Management Research and Extension Centre**.
- Organise a Content Consortium for each centre consisting of experts in different fields to provide guidance on alternative cropping patterns, contingency plans and compensatory production programmes, when the area witnesses natural calamities like drought, flood, higher temperature and in case of coastal areas, a rise in sea-level.
- Establish with the help of the Indian Space Research Organisation (ISRO) a Village Resource Centre (VRC) with satellite connection at each of the 127 locations.
- Link the 127 Agro-climate Centres with the National Monsoon Mission, in order to ensure better climate, crop and market intelligence.
- Establish with the help of the Ministry of Earth Sciences and the India Meteorological Department an Agro-

Meteorological Station at each Research and Extension Centre to initiate a "Weather Information for All" programme.

- Organise Seed and Grain Banks based on Computer Simulation Models of different weather probabilities and their impact on the normal crops and crop seasons of the area.
- Develop Drought and Flood Codes indicating the anticipatory steps necessary to adapt to the impact of global warming.
- Strengthen the coastal defences against rise in sea level as well as the more frequent occurrence of storms and tsunamis through the establishment of bio-shields of mangroves and non-mangrove species. Also, develop sea water farming and below sea level farming techniques. Establish major Research Centres for Sea-Water Farming and Below Sea-Level Farming. Agri-aqua farms will have to be promoted along the coast. 2010 marked the 80th anniversary of Gandhiji's Salt Satyagraha. Gandhiji emphasized that sea water, which forms 97% of the global water resources, is a social resource. We should have a large programme to convert sea water into fresh water through halophytes.
- Train one woman and one male member of every Panchayat to become **Climate Risk Managers**. They should become well versed in the art and science of Climate Risk Management and should help to blend traditional wisdom with modern science. The Climate Risk Managers should be supported with an internet connected Village Knowledge Centre.

A Climate Literacy Movement as well as anticipatory action to safeguard the lives and livelihoods of all living in

coastal areas and islands will have to be initiated. Integrated coastal zone management procedures involving concurrent attention to both the landward and seaward site of the ocean and to coastal forestry and agro-forestry as well as capture and culture fisheries are urgently needed. A Genetic Garden for Halophytes is being established at Vedaranyam in Tamil Nadu. Biodiversity is the feedstock for a climate resilient agriculture and food security system.

Gandhiji pointed out long ago that the future of rural enterprises will depend upon our ability to marry intellect will labour. The Mahatma Gandhi National Rural Employment Guarantee Programme, which accords priority to water harvesting, aquifer recharge and watershed management, provides a unique opportunity for integrating brain and brawn. MGNREGA workers should feel that they are working for the important cause of water security. Government should institute on **"Water Security Saviour Award"** to recognise and reward the best MGNREGA Team in the areas of water harvesting and Watershed Management.

The challenging economic, environmental and social problems facing our country can be solved only with the help of science and technology. Technology is the prime movers of change, as will be evident from the impact of mobile telephony in our day-to-day life. Jawaharlal Nehru with his characteristic vision, said over 60 years ago, "the future belong to science and to those who make friendship with science". I therefore wish to cite for the benefit of young scientists a few examples from the work of the M S Swaminathan Research Foundation, Chennai, on the translation of vision to impact.

From Vision to Impact

During the last 21 years, the scientists and scholars of MSSRF have been working on the design and implementation

of projects which could have a large extrapolation domain in respect of imparting a pro-nature, pro-poor, pro-women and pro-sustainable livelihood orientation to technology development and dissemination. I would like to talk about a few of the MSSRF initiatives, which have now become State, national and global programmes.

Mahila Kisan Sashaktikaran Pariyojana: Strengthening the role of women in agriculture

MSSRF initiated the Mahila Kisan Sashaktikaran Pariyojana in the Vidarbha region of Maharashtra in 2007 for empowering women farmers, including the widows of farmers who had committed suicide, in areas related to enhancing the productivity, profitability and sustainability of small-scale rain-fed farming. The empowerment measures incorporated access to technology, credit, inputs and market. Separately, an education programme was introduced for the children who had lost their fathers due to the agrarian crisis. Encouraged by the results of this small programme, Finance Minister Shri Pranab Mukherji included funds in the Union Budget for 2010-11 for initiating a national Mahila Kisan Sashaktikaran Pariyojana.. The Ministry of Rural Development, Government of India, which is in charge of administering this programme, has made it an integral part of its Rural Livelihood Mission. Recently, MSSRF was invited to undertake the Mahila Kisan programme in the Wardha and Yavatmal districts of Vidarbha from 2011 to 2014. This will include both technological and organisational empowerment. It is anticipated that by 2014, a well-organised Mahila Kisan Federation with a membership of over 3000 women farmers will emerge. There is a growing feminisation of agriculture in India, and it is hoped that the Wardha-Yavatmal Mahila Kisan Federation will be a forerunner to others at State and national level, capable of securing women farmers their entitlements.

In addition to technology, inputs and market, women farmers also need services like crèches and day care centres. The gender-specific needs of mahila kisans, both as women and as farmers, will have to be met, if women are to play their rightful role in India's agricultural progress.

In addition to action at the grass-roots, MSSRF organised several consultations to prepare a draft Women Farmers' Entitlements Bill to be introduced in Parliament as a Private Member's Bill. The draft Bill is ready and is currently under circulation among women parliamentarians and gender specialists for their scrutiny and advice. It is hoped that this two pronged action — one at the village level, and the other, at the national policy level — will help the over 350 million women engaged in farming to contribute more effectively to agrarian prosperity and sustainable food security.

Pulses Villages: Bridging the demand-supply gap

To illustrate how the gap between demand and supply in pulses, which is one of the contributory factors to food inflation in the country, can be speedily bridged, MSSRF organised Pulses Villages in the Pudukottai and Ramanathapuram districts of Tamil Nadu over 15 years ago. In these Pulses Villages located in low rainfall areas, farmers undertook to harvest rainwater in farm ponds and cultivate pulses with appropriate varieties and soil fertility and agronomic management. Based on the success of this approach to accelerating progress in the production of pulses, a national programme for the establishment of Pulses Villages was recommended to the Union Finance Minister, who announced financial provision for starting 60,000 Pulses Villages in the country. A sum of Rs. 300 crore has been provided in the Union Budget for 2011-12 for organising 60,000 Pulses Villages. Already, the impact of this integrated and concentrated approach is becoming

evident from the increase observed in pulses production from 14.66 million tonnes in 2009-10 to 16.51 million tonnes in 2010-11. Under the umbrella of the Pulses Village programme, special *Arhar* Villages (pigeon pea; Cajanus cajan) are being developed based on hybrid *arhar* strains. High-yielding arhar hybrids have been developed at the International Crops Research Institute for the Semi-arid Tropics (ICRISAT) located in Hyderabad. Women's Self-help Groups will be trained to become hybrid-seed producers and some of the Pulses Villages will be developed into Pulses Seed Villages for this purpose. This will enable the rapid spread of a yield revolution in pulses.

Nutri-cereals: Role in strengthening food security and climate-resilient farming

Almost from the early years of its establishment, MSSRF started working on underutilised or orphan crops such as a whole range of millets belonging to *Panicum, Pennisetum, Paspalum, Setaria, Eleucine* and other genera. These crops, normally classified as coarse cereals, are very nutritious and are rich both in macro- and micro nutrients. In fact, a combination of millet and Moringa (drumstick) provides most of the macro- and micro-nutrients needed by the body. The widespread hidden hunger now prevailing in the country as a result of a deficiency of iron, iodine, zinc, vitamin A, vitamin B_{12} and other needed micronutrients in the diet can be overcome at low cost through the consumption of millets and vegetables.

In 1992, MSSRF initiated in Kolli Hills in Tamil Nadu a programme for the revitalisation of culinary traditions involving a wide range of millets. A four-pronged strategy involving concurrent attention to conservation, cultivation, consumption and commerce was initiated. Commercialisation proved to be a trigger in the area of conservation, since

farmers generally prefer to grow crops like rice, wheat or tapioca, for which there is a ready market. Similarly, in the Wayanad district of Kerala, tribal families were enabled to continue the conservation and consumption of tuber crops like *Dioscorea*. There is now a revival of interest in millets and other underutilised crops, both because of their ability to help in overcoming chronic and hidden hunger and their role in the design of climate-resilient farming systems.

In partnership with Bioversity International and the Agricultural Universities of Bangalore and Dharwar, and with financial support from the International Fund for Agricultural Development (IFAD) and the Swiss Agency for Development Cooperation (SDC), MSSRF has succeeded in introducing appropriate milling machines as well as markets for value-added products in a wide range of millets. Through several Policy Makers' Workshops and efforts in nutritional literacy, an understanding of the role of millets, tubers and other underutilised crops in improving rural nutrition and income in an era of climate change was promoted. Finance Minister Shri Pranab Mukherjee thus referred to *jowar* (sorghum), bajra (pearl millet), *ragi* (Eleucine) and minor millets as "nutri-cereals" and provided an allocation of Rs 300 crore in the Union Budget for 2011-12 for their popularisation.

In its draft National Food Security Bill, The National Advisory Council, headed by Shrimati Sonia Gandhi, has included millets among the staple grains that should be made available to food-insecure families, both in rural and urban India, at a highly concessional price through the public distribution system. If this Bill is approved and implemented, there will be a revival of interest in the cultivation and consumption of these nutrition-rich and climate-resilient crops. Agro-biodiversity hot spots can then become happy spots and will witness the dawn of an era of biohappiness

where rural and tribal families are able to convert bioresources into jobs and income in an environmentally-sustainable and socially-equitable basis.

Another significant recent development is the initiation of a project on "Alleviating Poverty and Malnutrition in Agro-biodiversity Hotspots" with financial support from the Canadian International Food Security Research Fund (CIFSRF). The project is administered by the Canadian International Development Agency (CIDA) and the International Development Research Centre of Canada (IDRC) and involves partnerships with MSSRF, the University of Alberta, Canada, Bioversity International, the World Agroforestry Centre (ICRAF) and the World Food Programme (WFP). This five-year project (2011-16) will help to revitalise the *in situ* on-farm conservation traditions of tribal and rural families in the Kolli Hills area of Tamil Nadu, the Wayanad district of Kerala and the Koraput district of Orissa. MSSRF has been working with them for over 15 years. The contributions of the tribal families of Koraput have been recognised through the Equator Initiative Award at the UN Conference on Sustainable Development held at Johannesburg in 2002, and the Genome Savior Award by the Plant Variety Protection and Farmers' Rights Authority of the Government of India in 2011. Thus, two decades of research and education carried out by MSSRF in the area of orphan crops have led to important research investment and public policy initiatives at the national and international level. The expansion of the food basket by increasing the number of crops which go into the daily diet will also impart stability to food security systems.

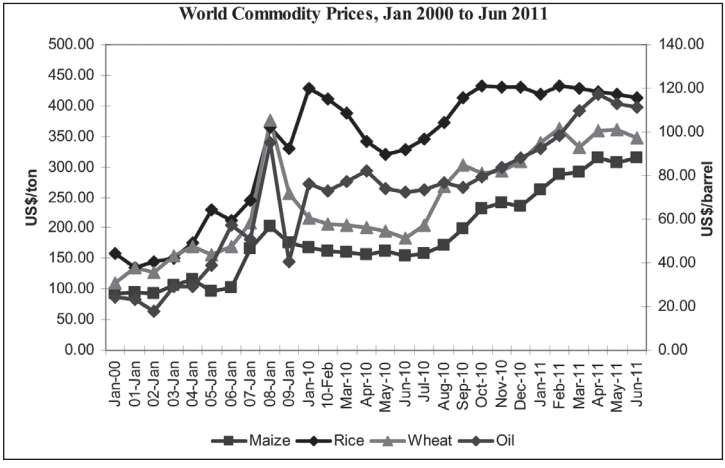
IDRC through CIFSRF is also supporting another project on strengthening rural food security through the production, processing and value-addition of nutritious millets. This project

is being implemented in collaboration with McGill University, Canada and the University of Agricultural Sciences, Dharwad. MSSRF also coordinates the project activities assigned to the Himalayan Environmental Studies and Conservation Orgnisation (HESCO), Dehradun. This project capitalises on the progress earlier made by MSSRF in these crops with support received from the International Fund for Agricultural Development and Bioversity International.

Price Volatility and Hunger: Operation 2015

Nearly 70 per cent of the income of the poor goes to buy food. High prices therefore tend to reduce food intake by the poor, thus leading to the persistence of hunger. The extent of price volatility in recent years with reference to rice, wheat, maize and oil (petroleum products) is indicated in Figure 1.

Figure 1



Source: *FAO and US Energy Information Administration (data updated as on 29/06/2011)*

The Agriculture Ministers of the G-20 Nations who met in Paris on 22-23 June 2011 have emphasised that "small scale agricultural producers represent the majority of the food insecure in developing countries. Increasing their production and income would directly improve access to food among the most vulnerable and improve supply for local and domestic markets." The Ministers also decided to establish an Agricultural Market Information System, to start with in wheat, rice, maize and soybean, in order to improve agricultural market outlook and forecasts at the national and global levels.

MSSRF's work in this area has three major dimensions. The first is the development of village-level food security systems based on community Gene, Seed, Grain and Water Banks, which will help to store and distribute local nutritious grains like millets and pulses; the second encompasses the training of a cadre of "Community Hunger Fighters" who will be well versed in the science and art of overcoming both chronic and hidden hunger. The third dimension of MSSRF's work in the management of price volatility is a dynamic and location-specific market information system through Gyan Chaupals or Village Knowledge Centres. Many of these centres, now operating for over 15 years, provide timely information on the monsoon and the market. The bahaviour of the monsoon and the market determines farmers' well-being. Hence, the Gyan Chaupals operated by local women and men give priority to empowering farm women and men with timely information on weather and market behaviour. Also, they provide information on food quality and safety, as well as on the entitlements of farm households to various government schemes.

The tribal areas where MSSRF is working in Tamil Nadu, Kerala and *Odisha*, as well as the Vidharba region

of Maharashtra, are yet to achieve the progress necessary in the reduction of hunger and poverty to reach by 2015 the target set under the first among the UN Millennium Development Goals. Therefore, MSSRF in association with other partners has launched a programme titled “Operation 2015” to help these areas achieve UNMDG 1 by 2015. The programme consists of the following features:

- Adoption of a lifecycle approach in nutrition support programmes
- Promotion of a “deliver as one” method with reference to nutrition, clean drinking water, sanitation, environmental hygiene, and primary health care
- Payment of concurrent attention to small farm productivity improvement and producer-oriented marketing
- Encouragement of a food-cum-fortification approach (especially fortification of salt with iron and iodine) in respect of fighting chronic calorie deprivation and micronutrient deficiencies
- Establishment of a cadre (at least one woman and one man in every village) trained as Climate Risk Managers and Community Hunger Fighters

Thus, MSSRF hopes that the challenge of price volatility can be fought at the local community level as well as at national and global levels.

Seawater Farming

From 1990 onwards, MSSRF has been working on integrated coastal zone management, involving concurrent attention to the seaward and landward sides of the shoreline. The aim has been to strengthen both the ecological security of coastal areas and the livelihood security of coastal communities. A Coastal Systems Research (CSR)

methodology was thus developed. The research activities included the conservation and restoration of mangrove wetlands, development of a Participatory Mangrove Forest Management System, generation of awareness of the importance of mangrove and non-mangrove bioshields in reducing the fury of coastal storms and tsunamis, and the breeding of salinity-tolerant rice, pulses and other crops of importance to coastal agriculture by transferring genes for salinity tolerance from mangrove species through marker-assisted selection of recombinant DNA technology. Eighteen years of sustained research in this field led to international patents being granted for the novel genetic combinations produced by MSSRF scientists for tolerance to abiotic stresses like salinity and drought. These include:

- US patent for the Dehydrin gene from *Avicennia marina* responsible for conferring salt tolerance in plants (Dr. Ajay Parida, Dr.Preeti Mehta and Dr. Gayatri Venkataraman)
- US patent for the Glutathione-S-transferase gene from *Prosopis juliflora* conferring drought tolerance in plants (Dr. Ajay Parida and Dr. Suja George)

Three more patents — for Phytosulfokine-ά precursor sequence from *Avicienna marina* conferring stress tolerance, Antiporter gene from Porteresia coarctata conferring stress tolerance and Superoxidase dismutase gene for conferring abiotic stress tolerance in plants — have been filed and are in the process of being granted.

Market-assisted breeding has resulted in developing location-specific transgenic lines in popular *indica* varieties (IR64, IR20, Ponni and ADT 43) showing 99.5 percent purity and enhanced salinity tolerance of 400mM of NaCl.

MSSRF's work led to the rehabilitation and replanting of 2400 ha of mangroves in Tamil Nadu, Andhra Pradesh

and Orissa. The 2011 Coastal Regulation Zone Notification (6 January 2011) by the Government of India derives its scientific basis from MSSRF's research during the past 20 years and from two reports submitted by committees chaired by me.

On the basis of the projects proposed by MSSRF, both the Ministry of Environment and Forests (MoEF) and the Department of Science and Technology (DST) of the Government of India sanctioned funds for making effective use of seawater not only to raise bioshields, but also to initiate seawater farming projects involving integrated agro-forestry and mariculture techniques. The support from MoEF is through the Society of Integrated Coastal Management (SICOM). Seawater constitutes nearly 97 per cent of global water resources and Mahatma Gandhi rightly emphasised that it is a very important social resource. In 1930, Gandhiji's salt march was to manufacture salt in the Dandi beach in violation of the then prevailing government regulations. In the same year, C Rajagopalachari and Sardar Vedaratnam Pillai organised a salt satyagraha at Vedaranyam in Tamil Nadu. MSSRF organised a workshop at Vedaranyam on 26 December 2010 to highlight the need for undertaking the conversion of seawater into fresh water through halophytes possessing food and other economic value. The seawater farming project was included by DST under its WAR for Water Mission (Winning, Augmentation and Renovation). Steps have been initiated for establishing a genetic garden of halophytes in Vedaranyam, both to conserve the genetic resources of halophytes and to spread economically-attractive and environmentally-sustainable seawater farming methods. Under conditions of a potential rise in sea level, halophytes will become crops of the future in coastal areas.

Preserving Agricultural and Biodiversity Heritage Sites

During 2010-11, two important initiatives of MSSRF achieved wider impact. First, the Government of Tamil Nadu established genetic heritage gardens based on the description of ecosystems in the classical Sangam literature. These were set up at:

Kurinji (hill)	*Yercaud, Salem District*
Mullai (forest)	*Sirumalai, Dindigul District*
Marudham (wetland)	*Maruthanallur, Kumbakonam, Thanjavur District*
Neithal (coastal area)	*Thirukadaiyur, Nagapattinam District*
Palai (arid land)	*Achadipirambu, Ramanathapuram District*

In such genetic heritage gardens, the flora and fauna characteristic of each ecosystem will be preserved, which will help to spread the understanding of the value of such ecosystems. The garden in the Taramani campus of MSSRF also contains a replica of these five ecosystems described 2000 years ago.

The other important initiative relates to getting recognition for two Globally Important Agricultural Heritage Sites (GIAHS) under FAO's GIAHS programme. The project proposal seeking recognition for the Koraput rice genetic heritage site in Orissa has been prepared and forwarded to FAO. Here, tribal families have conserved a veritable mine of valuable genes in rice for hundreds of years. Recognition under FAO's GIAHS programme will help to give prestige to those conserving vanishing varieties and dying wisdom.

Another globally important agricultural heritage site is the Kuttanad area of Kerala where, for over a century, farmers

have been practising farming below sea level. This system developed by farm families through practical experience involves the cultivation of rice during the monsoon season and fish during the non-rainy season. Unlike in the Netherlands, the Kuttanad farmers only put up low-cost temporary dykes. The GIAHS designation for the below sea level farming system developed by the farm families of Kuttanad will help to give recognition to the pioneers of this technology as well as refine it further. This will be particularly useful in the event of a rise in sea level as a result of global warming, as it now seems very likely. It is proposed to establish a Regional Training Centre for Below Sea Level Farming in Kuttanad, for the benefit of countries in this region — like the Maldives, Sri Lanka, Bangladesh and Thailand — which may have to undertake farming below sea level during this century.

Land and Water Care: Role of Global Soil Partnership

Since 2000, MSSRF, with financial support from the Tata Trusts and in association with the Punjab Agricultural University, Ludhiana and the Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, has been carrying out detailed studies on rainwater harvesting and efficient use, and watershed development and management. The emphasis in the current phase of this project is on maximising employment and income-generation opportunities for the watershed community through both on-farm and non-farm enterprises. The programme is hence known as “Bio-industrial Watershed” development. Small-scale market-linked enterprises supported by micro credit are promoted. Land-use decisions are also water-use decisions, and hence an integrated approach to land and water care is necessary to achieve an ever-green revolution leading to enhancement in productivity in perpetuity without associated ecological harm. Since land is a shrinking resource for agriculture and

since there is a growing tendency to 'grab' prime farmland for non-farm purposes, such as for real estate and biofuel production, I proposed in October 2009, in my capacity as Chairman of the FAO's High Level External Committee (HLEC) on the UN Millennium Development Goals, the establishment of a Global Soil Partnership (GSP) for Food Security and Climate Change Adaptation and Mitigation. Both HLEC and the Director General of FAO have accepted this suggestion The Ministry of Environment and Forests has invited MSSRF to assist in developing strategies for sustainable food and nutrition security within the framework of a green economy. Obviously, a National Soil and Water Care programme involving all stakeholders, particularly farmers' associations, has to be an integral component of India's Rio +20 programme.

Human Resource Development

MSSRF's institution building philosophy has always been to concentrate on brains and not bricks. The sustained growth of MSSRF's Gyan Chaupal movement is a good example of the value of this approach. It is equally important that initiatives like Village Knowledge Centres are based on the principle of dynamic and location- specific information delivered in the local languages, based on a demand-driven approach. Local communities should also have a sense of ownership, as otherwise it will not be sustainable. The Jamsetji Tata National Virtual Academy, which now has nearly 1500 rural women and men as Fellows as well as 35 foreign Fellows, has become a valuable institutional device to build the self-esteem and capability of rural women and men belonging to socially- and economically-underprivileged families. In a recent review of the project, the reviewers concluded that the Academy has helped to convert ordinary people into extraordinary individuals.

Remember Your Humanity

It will be clear from the foregoing that the bottom line of the programmes undertaken by MSSRF during the last twenty years has been the wellbeing of rural and tribal families in an environmentally and socially sustainable manner. Unless we place faces before figures in our programmes dealing with humanbeings, we will not know whether the steps we have taken are really beneficial to those for whose welfare they are intended. “Remember Your Humanity” is therefore an effective method of monitoring the social impact of research and development programmes.

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(24-12-1949 – 19-10-1988)

Late Mr. Shailesh Kapadia, FCA, was a Chartered Accountant by profession and was a partner of M/s G.M. Kapadia & Co. and M/s Kapadia Associates, Chartered Accountants, Mumbai.

Shailesh qualified as a Chartered Accountant in 1974 after completing his Articles with M/s Dalal & Shah and M/s G.M. Kapadia & Co., Chartered Accountants, Mumbai. Shailesh had done his schooling at Scindia School, Gwalior and he graduated in Commerce from the Sydenham College of Commerce & Economics, Mumbai in 1970.

Shailesh enjoyed the confidence of clients, colleagues and friends. He had a charming personality and was able to achieve almost every task allotted to him. In his short but dynamic professional career, spanning over fourteen years, Shailesh held important positions in various professional and public institutions. His leadership qualities came to the fore when he was the President of the Bombay Chartered Accountants' Society in the year 1982-83. During his tenure he successfully organized the Third Regional Conference at Mumbai. He was member, Institute of Fiscal Studies, U.K.; member of the Law Committee and Vice-Chairman of the Direct Taxation Committee, Indian Merchants' Chamber. He was also a Director of several public companies in India and Trustee of various Public Charitable Trusts.

He regularly contributed papers on diverse subjects of professional interest at refresher courses, seminars and conferences organised by professional bodies.

"People must come to accept private enterprise not as a necessary evil, but as an affirmative good".

- Eugene Black
Former President,
World Bank

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