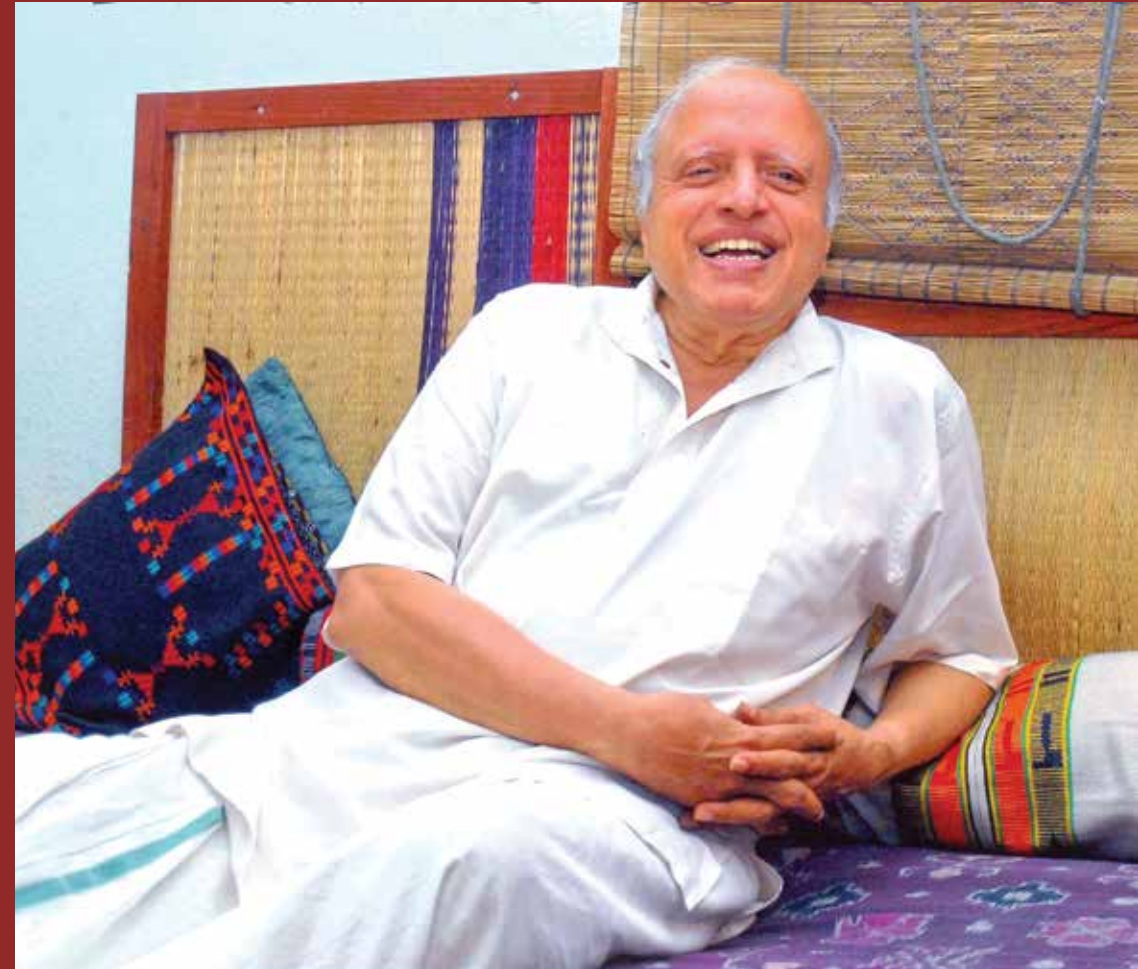


M.S. SWAMINATHAN IN CONVERSATION



Nitya Rao, the youngest daughter of MS and Mina Swaminathan, grew up going to fields and villages, observing interactions with farmers, scientists and dignitaries. As a student she engaged with a host of social ventures, including environmental activism and volunteering with small, rural NGOs, apart from pursuing her interests in history, Sanskrit and archaeology. With academic specialisations in Rural Management and Development Studies, she worked in the field of rural development in remote parts of MP, Bihar and Jharkhand, as a researcher, trainer and social activist for 15 years, between 1985-2000. She then did her Phd in Development Studies at the University of East Anglia, Norwich, United Kingdom, taking up for her thesis a study of women and land rights in tribal societies in Jharkhand, and entered academic life there in 2001. As a teacher and researcher, she has been concerned with developing strategies for women's empowerment, social equity and livelihood security through education, decent work and resource/land rights. She is currently Professor of Gender and Development at the same University, and was recently given the University's Engagement Award for linking her research to policy advocacy and development practice.



with Nitya Rao

M.S. Swaminathan:

In Conversation with Nitya Rao



M.S. Swaminathan Research Foundation

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Introduction

My parents walked with the cortege when Gandhiji died. He was a post-graduate student at IARI, and she still at school – they had not yet met. He had seen Gandhiji from close quarters; she had never had the opportunity to do so. He had grown up in small town and rural India, she in the urban metros. Yet they belong to a generation that was driven by a tremendous love for the nation and a strong sense of patriotism. They met in Cambridge a few years later. After their marriage in 1955, they followed different career paths. Despite their divergent interests and trajectories, there has always been a strong sense of partnership and mutual support, of shared values and philosophies, emerging from a desire to serve the country, especially the disadvantaged. Their respect and love for each other makes them bond, supporting each other in times of joy and grief, success and adversity. Their lives have been truly complementary.

In our home, Amma was discipline incarnate, but also full of creativity, play and adventure, while Appa's worst scolding took the form of telling us that we wouldn't be given chocolates if we were naughty! Despite his busy schedule, in our childhood, he always made time for our Sunday 'oil-baths' and 'made-up, bed-time' stories, as well as the full-day picnics organised by Amma. So when he was travelling, she was left with the additional burden of coping with our tantrums. I am told that when I was little and couldn't yet read, I would eat the postcards he wrote to me. She would raise her voice; he was always calm. His gentle personality and trusting nature extended beyond the home; when troubled by conflict and wrongdoing, he found it difficult to handle directly, and she had to pitch in.

As children, we went regularly to the labs at IARI, but also to villages and farmer's fields. Yet we three sisters were never directed on what we should do, but given every freedom to grow and pursue our own interests, which we have done, each in our own way. Seeing parents over-protective of their children today, I am amazed that they encouraged my interest in rural development when I was still a teenager at Delhi University, not objecting to my spending my summer holidays in rural Bihar, Rajasthan and Uttarakhand in the early 1980s – a time when there were no mobile phones or easy forms of communication. I have since experimented with many things in my own life, from grassroots organisation to activism in support of women's rights and advocacy, and now an academic career.

Though unplanned, my career has moved in a direction that combines their diverse interests: gender relations and rural development.

Supported by my mother, my father started the MSSRF in 1988. I really wanted to know what drove them, relentlessly, for the last 25 years, despite adversities and problems. What was it that led them to take up this project, and sustain it, through arguments and differences of opinion, especially as the organisation has grown rapidly and often in ways they would not have chosen? My seeking answers to these questions led to the idea of this book. I had thought that I would get them to dialogue with each other and be the scribe. Yet this became too complex a project, one that I was unable to handle at this juncture.

This short book therefore focuses primarily on the ideas and efforts of M. S. Swaminathan, bringing together insights on the human values and ethical principles that have been essential for realising his dream - that of securing human dignity through food sovereignty and security in India. Based on conversations with him over a period of two weeks in June-July 2013, this book seeks to engage with basic principles of life, with means and ends. Personal integrity emerges as perhaps the most important value, giving him the strength to stand up for justice, in support of the excluded and voiceless. The book documents how personal and professional lessons were learned and imbibed through life's diverse experiences, from childhood through adulthood. Equally important is how these lessons were translated into practice, with grit and determination, often against serious odds. The combination of intellectual capacity with social commitment and non-negotiable moral standards is a mark of leadership par excellence, rarely matched in the country in recent decades.

In his life's work, his wife, Mina Swaminathan, has been a firm partner and collaborator at every stage. She regularly provided the 'social glue', engaging creatively with the institutions he was leading, in particular, IARI, IRRI and MSSRF. In each, she organised a variety of social events and activities to build solidarity, 'interventions' that were not insignificant in supporting his characteristic style of leadership, and often did the first editing of his writing. At IARI, she hosted parties to felicitate students who successfully crossed certain milestones, as well as visiting scientists and dignitaries. They may have held opposite views during the day in the meetings they attended, but would end up laughing and playing games together. So, while not a dialogue any more, I do bring in comments from her now and again. Most

important, of course, is that as always, she has been the facilitator, making this book happen.

Rather than being arranged chronologically, this book highlights the underlying philosophy of M.S. Swaminathan's life and contributions, drawing on critical experiences that have shaped this process. In the form of short anecdotes and stories, drawn from different periods of his life, these demonstrate the clarity of goals, vision and purpose, the continuity and strength of his convictions. Yet he is not rigid, but willing to discuss, share and learn, confronting problems as they arise, adapting to the social contexts in which he is functioning. Taking him as an exemplar of the idea of lifelong learning, the book highlights his immense respect for people of all social groups and a recognition that no one is too small to contribute to the collective production of knowledge.

Putting people first

A key principle for MSS is not to see people instrumentally, but as human beings, with strengths and weaknesses, each having something to contribute to the collective good. He has experienced humility and encouragement first hand, seeing and learning from his father, his teachers, or indeed superiors, who gave him the freedom to work, rather than getting involved in petty jealousies. Be it drivers or cooks, students or colleagues, in India or abroad, he always treats them as people first; making them all remember him fondly. His immense faith in people has meant that, at times, he has been let down by some, yet in a majority of cases, this faith has paid off.

1. Secularism and the equality of all people – childhood memories

I remember Gandhiji coming to our town, Kumbakonam. He used to stay in our hospital, because my father, a well-known doctor, was a Congress leader. In those days, in middle class families in Tamil Nadu and Kerala, boys also used to wear earrings and a chain. One day my mother told us, 'He will ask for your chain and ear-rings, you must give them to him.' I didn't understand fully at the time, but because my mother said so, when Gandhiji asked for the gold ornaments, we gave it to him. Next day I asked her why he wanted them, and she said he would auction it and use the money for Harijan (Dalit) welfare, for helping those who don't have much. Gandhiji's principle of trusteeship has been one that I have followed in my own life. Whatever is surplus to your requirement, hold it as a Trustee rather than as an owner and use it for the welfare of those who are less privileged. When I received the Borlaug award, I gave it to Mobile Creches; all other awards after that too I have donated.

One of Gandhiji's programmes was temple entry for the Harijans, and my father was actively associated with it. He must have played an important part in convincing the Maharaja of Travancore, because he was his personal doctor. So in those days the priests wouldn't come to our house, because they objected to Dalits coming and eating, sitting with us, and of course the temple entry movement. When his mother, my grandmother, died, no Brahmin priests would come to the house, so he went to Banaras to perform her last rites, he didn't care whether the priests came or not. My father's brother was different; he tried to

make peace with them. My mother also wouldn't go so far, so slowly the priests were rehabilitated in the family.

These were formative years; they taught me the value of money, but more importantly, of being satisfied with what one has, rather than striving for huge surpluses. As Gandhiji said 'There is enough in this world for everybody's need, but not enough for anybody's greed'. Second, and more importantly, it ingrained in me principles of secularism and of fighting against injustice, always taking the side of the poor, and those denied an equal voice in society, whether small farmers or women. Dalits, Muslims, everyone was equally welcome in our house.

Mina: On August 14, 1947, we sat up at night to hear Jawaharlal Nehru's famous "Tryst with Destiny" speech on the radio at midnight and the fireworks and celebrations that followed. And then in January 1948, my parents had taken me one evening to the house of a colleague. All the kids were playing badminton in the garden. And suddenly, at about 5 pm, the adults came out of the house, and shouted, 'Stop playing children, Gandhiji has been killed'. We stopped playing at once and came and sat in front of the radio, to hear the news. The house was not far from the place where he was shot, Birla House; the adults went there, but didn't allow us to go. But two days later we all went for the funeral. There were huge crowds of people, most had walked from the surrounding villages. The streets were packed - people standing on the walls, climbing on trees - that's how we saw the whole funeral procession. And I think one of my greatest regrets as a great admirer of Gandhiji, has been, that though I was in Delhi at that time, I never saw him alive.

In 1955, I met one of those who influenced me a lot in my teaching career, Ayesha Jacob, who was the head of St. Thomas' School, at that time what is called an "aided school", a category where the bulk of the expenses are borne by the Government, though it is a private institution. The fees were very low and could attract all the children in the community, including those of low-level clerical and other Government employees who lived in that area, as well as children of petty tradesmen who lived in Paharganj, the girls from these families all being first generation learners. When I saw this place, I decided this is where I wanted to work, because it was for this community of children that I could do something. The school was located just next to the Bhangi Colony where Gandhiji had

lived, and where he took his morning walks. In fact, a play which I did there later, for the Gandhi Centenary Year, was titled 'Gandhiji Walked Here'. Over 1000 students from class 6 to 11 were involved; each given a segment of Gandhiji's life, from his days in South Africa till his death, to explore and dramatise, using methods of creative drama, so they would understand the spirit and feeling of the text. The pageant went on for two hours and was a beautiful spectacle.

2. Learning and Practising Personal Humility

In 1947, just after I joined IARI (Indian Agricultural Research Institute) as a student, a friend of the family, S. Y. Krishnaswamy (formerly Collector of Kumbakonam), suggested that I sit for the competitive examinations, as there was no future in agricultural research. I did, and to my surprise, was selected for the Indian Police Service. My uncle was delighted, saying that a bird in hand was worth two in the bush, and research would never bring me such an income. I was in a dilemma. Luckily, at about this time, in 1948, I got an offer of a Fellowship to the Agricultural University at Wageningen in Holland. This satisfied the family, and they agreed that I should accept it.

I went to Holland by a boat called *Jal Azad*, in 1949. It was a small boat and a rough journey. There were larger P&O liners, but somehow due to a nationalistic spirit, I chose *Jal Azad*. I reached Holland and started my work on potatoes. There was an interesting event when I arrived at the station in Ede-Wageningen. There was hardly anybody else getting out there. I had a big box. An old gentleman was walking towards me. He said, 'Are you Swaminathan?' I said, 'Yes.' 'Hand over the bag to me; I came here to take you'. Then he took me to his house and I found he was the Rector Magnificus! I felt so bad, handing over the bag to him, as if he was some porter. We had lunch and then he sent somebody with me to find accommodation. That was very nice of him.

I found a place in the house of a Mrs. Maarseveen. She was a wonderful lady. I was a pure vegetarian at that time. She felt bad that I was just eating cheese and milk. Suddenly I found she was cooking vegetarian dishes, and she told me she had joined a cookery class to learn these dishes. I found people very kind. I stayed one year in Holland. Then I went to Cambridge in 1950 to complete my Ph.D. at the Commonwealth

Potato Collection. I continued my work on the tuber bearing *solanum* potatoes, which came from the Andean region. I got my Ph.D. degree from Cambridge in two years.

My paper, published in the *American Potato Journal*, caught the eye of Prof. G. H. Rieman and Prof D. C. Cooper, who found it very interesting and invited me to Wisconsin. I travelled by the *Queen Elizabeth*, it took 7 days. It was very exciting to see the Statue of Liberty as one entered New York Bay. I stayed for a year and helped develop the station at Sturgeon Bay, but then I had to take a decision. The University offered me a tenure track position as Assistant Professor in Genetics with a good salary. But I told President Fred that it was not my intention to stay abroad, but to equip myself to serve my country. I could have lived with comfort in the United States, but my intention was always to serve Indian agriculture. What I learnt from Cambridge and Wisconsin, however, was how to articulate clear, goal-oriented research, and then develop a strategy to accomplish it. This helped me with my later work with dwarf wheats in IARI, as I had developed a clear idea of the end point and how to reach it, surely and speedily.

I returned to India without any work. I was staying at home in Kumbakonam, helping my brother Krishnamurthy pack drugs in the new pharmaceutical venture he had started. At Aduthurai rice station near Kumbakonam, there was a function to mark Farmers' Day, and they invited me. There I met Dr. N. Parthasarathy, my former teacher in Delhi. He asked what I was doing, and when he heard I was doing nothing, he asked me to come to Cuttack. There was a temporary job as part of the *indica-japonica* hybridization programme, which involved transferring genes for fertilizer response from *japonica* to *indica*. I willingly agreed, as it was no fun sitting at home. So I went to Cuttack, and while there, some of my applications matured. UPSC selected me for the post of Assistant Cytogeneticist at IARI, so in October I left for Delhi.

For the next 18 years I was at IARI. The Director, in my student days was Dr J.N Mukherjee, an eminent soil scientist, who encouraged me very much. He was one of the few who asked me not to accept the IPS, but continue my research career. When I returned, Dr. Pal had become the Director, I knew him well from my student days ; he was then the Head of

the Botany Division. He too was very encouraging, not one of those who suffered from 'retrospective jealousy'. He gave me a free hand to work.

3. Family life

My parents tell me they started their married life with a joint income of only Rs. 600-700 a month. But they were quite happy with simple living and so were we. Memories of my childhood are mostly of fun and games, picnics and holidays, puppet shows and Christmas parties. During the summer holidays we would go to Kumbakonam to be with our grandparents and spend time with cousins, uncles and aunts, playing with cows in the large garden and visiting the beautiful temples in the evenings. As we grew up, we developed our own interests, had our own friends, yet dinner was a time that we all came together, to eat and share what we had done during the day. We had an Alsatian dog, Diana, who, not to be left out, insisted on eating with us, rather than separately.

When I first joined service in 1954 at CRRRI, Cuttack and then at IARI, New Delhi, my starting salary was Rs 450 per month, with a small reduction for pension contribution. In 1955, when Mina and I got married we had to manage with this amount. The rent was Rs. 130 per month for a flat in Patel Nagar. Mina had also joined the Central Institute of Education that year for her B.Ed. degree, so she could contribute nothing, and even after she got a job the pay of a teacher was only Rs. 200! Yet we could comfortably manage with this amount. In 1956, when I became Cytogeneticist, the salary went up to Rs. 700 per month. As Director, IARI, my salary was Rs. 2000 to 2500. During the sixties, we had to take care not only of the household expenses, but also the upbringing of three children. Yet we never felt we had to sacrifice the care and comfort of our children because of lack of money. In addition, I used to get four or five thousand rupees each year from our properties in Kerala.

Later, when I became the Director General of ICAR the salary was Rs. 3,500 per month, but it went down to Rs. 2,250 when I became, first, Acting Deputy Chairman and later Member of the Planning Commission, because that was the allowance then for Ministers of State. Although in these circumstances, there was little possibility of saving money, there was enough to look after all our needs, because prices were very low in comparison to today. Our first priority was the children's education, as

we did not want them to feel handicapped because of lack of money. Our lifestyle was simple and expenditure restricted to essentials, like food and education. We travelled by cycle or bus, and got a car only in 1962.

It was only after I joined IRRI (International Rice Research Institute), that I could save some money to buy a house when we returned to India from the Philippines. Between 1970-2000, I received several prizes with substantial amounts in rupee terms. The very first award with cash was the Ramon Magsaysay Award for Community Leadership (1971), at that time ten thousand US dollars at an exchange rate of Rs. 7.50 per dollar. *The Hindustan Times* had an interesting article with the title "What will Swaminathan do with Rs. 75,000?" Today senior government employees and professionals earn more than this every month!

Mina: Balancing work with family has been a basic principle throughout my life, so as soon as my second daughter was born in 1961, I decided to go part-time, so that I could have more time for my young children, though I did have help, of course. But my part-time work was nearly full-time, because I worked only half a day but packed all my work, or 80 per cent of it, into that half-day. They were getting full time value for part time payment! But I got the experience and managed to find time for my family. By 1963, when our youngest daughter was born, MSS was getting increasingly busy. Though he found time for the children, I too had to give a lot of time, organising multiple activities, as well as picnics and holidays when we could all be together, even if in a village or in one of the research institutes affiliated to ICAR.

4. Looking for challenges, not power

In December 1981, Dr. Clarence Grey, Chairman, Board of Trustees, of the International Rice Research Institute, rang up and said he wanted to meet me. He came home for lunch, and said the IRRI Board had invited me to be the next Director General. I had not applied, but he insisted I was their first choice. I was tired of the Planning Commission. I had worked hard, the Sixth Plan had been finalised, and I wanted to go back to research. I told him I could not say Yes or No without the consent of the Prime Minister.

I went to her Secretary, P.C. Alexander. He said that she would never relieve me, so before meeting her I prepared a note on why I wanted to go. I

got an appointment to meet the PM. She said 'You are indispensable, we can't spare you. You have done so much important work in the Planning Commission. Why do you want to quit now?' I said that the Plan was ready and approved. Now it was a question of implementation. She asked if I had made them a commitment. I said 'No. I have clearly told them that I will have to get the approval of the PM! I was chairing a number of committees, so I said, 'If you approve, I will hold on for four months till all the reports are ready. I can go in April. But I must give them some date, I can't keep them waiting'. I also told her, 'You said I am indispensable. So I must go'. She asked if I was hurt. I said 'No. In fact I am elated that you consider me indispensable. I must go when I am wanted, not stay till I am not wanted'. She smiled and repeated that, and then offered her good wishes. Alexander was anxious to know what happened. I said she had kindly agreed to my going, and he was surprised.

I told Clarence Grey I could join only in April, because of commitments that I needed to complete. I could not leave overnight. He asked me to come for a visit to assure the staff that a new DG was indeed going to arrive. So Mina and I went there for a short visit. Leaving her work in Delhi and going to Los Banos was a very difficult and painful decision for her. But she enthusiastically endorsed my desire to take up the job, since she felt that this is what I wanted to do. Throughout her life, she has put her personal preferences aside for my sake, including our shift from Delhi to Chennai in 1989.

Mina: He asked me if I was ready to live abroad for several years, as he knew that I wanted to work only in India, and that probably I would be frustrated there without work. But, hard though it was for me to face that prospect, I had no hesitation in saying 'Yes'. In the event, those years proved productive, as well as a great learning experience, though in far different ways than I could have imagined. In the first year, I travelled up and down to Delhi, making sure the girls were okay, besides productively engaging with the domain of educational policy, joining the debates and discussions culminating in the National Education Policy, 1986, in which I wrote the chapter on Early Childhood Education, and then the NEP 1989, in which Anil Sadgopal and I included the demand for the right to education to be extended from birth to 6 years, as articulated in Article 45 of the Directive Principles.

Recognising women's contributions

MSS has been a consistent champion of women's rights and entitlements, introducing in the Sixth Five Year Plan, for the first time, a chapter on women and development. Despite some criticism from within the Planning Commission, he felt it important to signal the centrality of women's contributions and a commitment to gender equality. As a member of the Rajya Sabha he introduced the Women Farmers' Entitlement Bill in Parliament in 2011, calling for recognition of women as farmers, and as equals. The stories below give an insight into his deep faith in gender equality, attempting to advocate for women's equal recognition and rights, wherever he went, irrespective of how successful he was. While moved by a concern for women's tireless work and its invisibility, the strategies he has proposed have been empowering rather than welfarist, recognising women as thinking individuals, in control of their lives, not as receivers of doles and benefits. Deep down a concern for women, and their social invisibility, was already ingrained in me. After I completed my post graduate diploma at IRMA in 1985, the first job I took was with SEWA, a women's organisation.

1. Growing up in a joint family: the invisibility of women's work

When I was young, we used to go during every vacation to Moncompu. I knew that the family was rich in terms of land ownership, but they were very simple, didn't flaunt their money, and one couldn't make out the difference between the rich and poor in Kerala, whether Christians, Muslim or Dalit. Kerala culture was also simple then, not like today, with dowry, gold, drinking. It was also an area where we could go boating and swimming in the river. Since I was part of a joint family, during the vacation 30-40 children used to be there and poor Krishna Anna's mother and Ratnam's mother (my aunts) used to make so many good things for us to eat. They only thought about how to feed the boys and girls, totally sacrificing their own personal life for their families. My mother too used to spend hours cooking for the children. I used to admire them, but also felt sad that they should be spending their life like this. On the other hand, one could see the joy they derived by ensuring the children and others were well fed.

In the joint family system, all are equal, no distinction is made between one's own child and another's. In some ways, this provides

an opportunity for more humanistic values, trying to help each other, especially when someone is in distress. In fact, in relation to the Vidarbha suicides nowadays, the family system which provided social protection appears to have totally broken down. I remember, in those days, one of my father's sisters was not so well off, so his elder brother took them to Wayanad, gave them some land and settled them there. Within the joint family, they would not let you down.

Mina: When I got married and met MSS' family, it was a big surprise to me - it was another world, the world from which I had come was quite different. It was a huge, extended, rural family, with its many branches. I had to get to know them all, and it was a new experience, but I embraced this experience, with great joy and enthusiasm. I wanted to learn all about it, to be a part of it. I thought it was wonderful that they loved me so much in spite of the fact that I was so different. None of my sisters-in-law, neither the brides nor the daughters of the family, had any education beyond school leaving. Immediately after leaving school, they had all been married off and after that, it was only and totally a domesticated life. They found it interesting to explore my life and I explored theirs, and we all became great friends.

2. Women in rice farming and the Bellagio Conference

When I joined IRRI in April 1982, I found that IRRI organised an Annual International Rice Conference. For 1983, I suggested Women and Rice Farming as the theme. There was some opposition, and ill-informed questions and comments, such as 'What do women know? Why should the conference focus on them? Is this a kind of affirmative action?' I asked them, 'Have you ever gone to a rice field and seen who is working there?' That was a turning point. The Asian Network of Women and Rice Farming was formed and the Ford Foundation agreed to fund it. Earlier, affirmative action was only in terms of counting how many trustees and staff members were women. It was only number crunching, the research or training programmes were not engendered. We started mainstreaming gender in the whole production process of agriculture. This was a lasting contribution not only to IRRI but also to the CGIAR.

The Rockefeller Foundation had representatives at the Women and Rice conference. They were so impressed that they decided to sponsor a

meeting at Bellagio for the entire CGIAR network, most of which were gender blind institutions. I presented the Keynote Address and told them what we had done. That was a good meeting and a turning point also in CGIAR's history, what was later referred to by Fernando Bernardo in his book as 'the Swaminathan years'. Following this, the International Association for the Advancement of Women gave me their first International Prize for Service to Women. I am talking here not about the prize itself, but about 'leaving your footprints' on issues of importance. Gender is not just about getting a few women in here and there, but really impinging on the day to day lives of large numbers of women.

3. The gender challenge in North Korea

North Korea was a challenge for me as DG of IRRI. I could not get funds from anywhere to start work there. In 1985, Kim Il Sung invited me to visit--my predecessors could not go there as they were all Americans. North Korea was a clear case of feminization of agriculture – all able-bodied men above 16 years were required to join the military. They had a one million strong army, not at all necessary for a small country like North Korea. They put me up in a 7 star hotel in Pyongyang, a beautiful city, with many hotels, an Arc of Triumph, larger than that in Paris, and huge statues. But when you went out of Pyongyang, the conditions were miserable. No rural roads or markets; the women were full of complaints. How could they produce more, without any equipment or technical support? In fact, I had seen Russian tractors sinking in the paddy fields in Cambodia. They were too heavy and not designed for tropical countries. I met Kim Il Sung and said to him, 'Mr. President, you have made women the custodians of food production. That's fine. They will do the job. But you will have to equip them. Provide them with facilities'. The President of the Academy was with me. He said 'The problem is we don't have the money'. The only one who could help me was the UNDP Resident Representative in Pyongyang, a Turkish man. When I told him the problems, he agreed to give \$20,000. 'That's all I have. You select 20 women. We can arrange a travelling workshop'. They came to India, and the Government of India agreed to host them. So we had no problem concerning money. They visited the Bhopal Agriculture Engineering Institute, and when they left I requested the Government of India to gift them some implements. They were very happy. North Korea's recurrent

food crisis is in part due to inadequate attention to addressing the needs of the women entrusted with the task of producing food.

4. IT as a transformational technology: the MSSRF Knowledge Villages

When working with the poorest and asset less, especially women, a question that always came to my mind was: what kind of asset can we give them to enhance their ability to earn? That is why I thought of new technologies: information technology, biotechnology etc. The first dialogue we organised in MSSRF on Biotechnology led to the concept of 'Bio-village'. Biotechnology doesn't only mean genetic modification, but opens possibilities for the production of bio-pesticides, bio-fertiliser, vermi-culture and other technologies. At that time nobody had thought of using Information Technology to help farmers. So we were far ahead in 1992 when we had a seminar on Information Technology to discuss how what we called 'Information Villages' could be developed. I named them Village Knowledge Centres (VKC), rather than Information Centres, as knowledge is interactive and two-way, while information is passive. In most places, women were trained to manage the VKCs. That programme has developed into the 'Village Resource Centres' (VRCs), and today with satellite communication and mobile telephony has become a truly transformational technology.

Only last week, we had a meeting in some of the villages, where women said that this Information Technology has allowed them to come out of their homes: '*veetlarandhu veliyavanthutom*' – they felt liberated. Many people have come forward to support this initiative – IDRC, the Tatas – we set up the Jamsetji Tata National Virtual Academy with their help. The main idea behind the NVA is giving women self-esteem, recognising their contributions. As Academicians, even without formal degrees, ordinary women have blossomed into extraordinary women.

While championing women's equal rights and entitlements, especially in agriculture and the productive domain, over the years MSS has come to recognise that women are constrained not just by lack of access to technology, skills and productive inputs, but equally by lack of time, and the responsibility they carry, often unaided, for child care and reproductive work, which continue to remain unrecognised and unsupported. Sensitised

to women's work burdens and drudgery in significant ways by Mina, from her early interventions in Delhi villages to later engagement with women's issues, he is now a strong advocate of support services for women, including child-care, and has come to see reproductive work as being almost inseparable from productive labour.

The right to education, information and social mobilisation

Long before the RTI (Right to Information) and the RTE (Right to Education) became laws in 2005 and 2006, the important role of awareness, of making relevant information available to people, including children, and of mobilising them for socially relevant causes was clear to MSS. When I decided to work with SEWA, organising women bidi workers into cooperatives, while recognising the personal and practical difficulties I had to encounter, he and my mother were always very supportive. Three snippets from very different moments in his life demonstrate how goals can be achieved through taking people into confidence, whether children, farmers or local researchers and workers.

1. Mobilising school children for eradicating filariasis

As a young child, in the 1930s, filariasis was endemic in Kumbakonam. Almost every third person suffered from filarial infection, locally called *Yaanaikkaal* or 'elephant legs'. I always wondered how this happened. My father, a renowned surgeon, a graduate from the Vienna School of Surgery, taught me that it was a man-made problem, not God given. Hence only men could solve it by their actions, not by praying to God. He wanted some authority, just to eradicate the filarial mosquito, so he stood for the municipal elections, and in 1934, was elected Chairman of the Kumbakonam Municipality. He believed in providing high quality medical care at no or moderate cost. This was his work ethic; he would not accept money from those who could not afford to pay. I was in school then, and one day we were all taken to the street by the teacher. We didn't know what was going to happen. We walked through the street, with the teacher pointing out the places in the street where mosquitoes were breeding. (In those days there was no DDT, this came after World War in 1941-42.) We were asked to either fill up the breeding grounds,

or spray them with crude oil emulsion. Within one year the mosquito disappeared. We all enjoyed going around the street spraying crude oil on the mosquito breeding grounds. With a small amount of money, purely by education and social mobilization, the filarial problem was solved. This taught me that we can achieve many things by education and social mobilization, rather than in a technocratic way.

These days the government is buying fogging machines and spraying DDT, but the people are not involved at all. In fact, when I moved to Chennai in 1988, educated people didn't know that the malarial mosquito also breeds in good water. They thought only slum-dwellers were responsible, rather than themselves. But the mosquitoes bred in their own overhead tanks and fresh water open wells! That is why my father emphasised on awareness, starting with school children. The values learnt in my childhood have always stayed with me, particularly the inspiration that even seemingly impossible tasks like the eradication of the mosquito are achievable. I have followed these principles in developing my own programmes.

The ability to identify a problem, analyse its causes and find solutions, through critical and creative thinking, has been a hallmark of his life. One of his favourite terms, 'malady-remedy' analysis, draws its roots from medicine and his father, from whom he learned this lesson early in life.

2 Mobilising Farmers: National Demonstrations, Seed Villages and Krishi Darshan

While much has been written about the Wheat Revolution, popularly called the Green Revolution, the elements of information sharing through innovative communication strategies and social mobilisation are rarely discussed. As MSS notes, the yield revolution was only possible because the farmers were not merely conscientised, but could clearly see the benefits of the new technologies to themselves. Much before the debate on 'participatory development' began to be promoted by international agencies, he felt the need to engage with farmers in the villages, if a real difference was to be made. Working with the people, and community empowerment were part of Gandhiji's philosophy, which he had internalised early on.

Once we received the initial wheat genetic material from Norman Borlaug, a wheat breeder at CIMMYT, Mexico (awarded the Nobel

Peace Prize in 1970) in September 1963, it was clear to me that with this material a yield breakthrough was possible. Every year PL480 wheat was being received under very humiliating circumstances. It normally takes around 10 years to develop a variety, have trials and spread the information through extension agents. I wanted to use this opportunity to 'purchase time', to leapfrog in terms of spreading the new varieties. I wrote to the Ministry that as farmers are the best judges of the value of scientific work, we should start a National Demonstration Programme in small farmers' fields, because anything demonstrated in rich farmers' fields would be attributed to affluence and not to technology. This was driven by my experience in 1958, where brigades of scientists went to the farmers' fields for three to four months to check the acceptability of a pest-resistant variety. The Ministry wanted to demonstrate in progressive farmer fields; these were rich farmers who would give them tea when they went there. My proposal was not approved.

Fortunately, in August 1964, C. Subramaniam became Agriculture Minister under Lal Bahadur Shastri's Prime Ministership. He had great faith in science. So he told Dr. Pal, the then Director of IARI, that he wanted to meet his team of scientists. 15 or 20 of us met CS. He was very democratic, went from person to person. When he came to me, I mentioned that there was a great possibility of leap-frogging in production; I explained to him the potential of the dwarf wheat. I requested him to approve the National Demonstration in the fields of small and resource-poor farmers, rather than 'progressive' farmers, to find out their reactions to the new seeds. Within two days the approval came. It cost only Rs. 500 per hectare and 1000 National Demonstrations were organised. They were not only in wheat but also in rice, jowar, bajra and other high-yielding varieties. That was a turning point.

The National Demonstrations created a huge clamour for seeds. Jounti Seed Village was organised, all the farmers there took to seed production, and produced 3-4,000 tonnes of seeds from 800 hectares. 18000 tonnes of seeds were also imported from Mexico to condense the time. We started in 1964 and by 1967-68, saw a major breakthrough, production rising to 17 million tonnes from 6 million at the time of Independence. From 1947-64 wheat production rose to 12 million tonnes, mainly due

to irrigation. During 1964-68, we increased it by another 4 million tonnes. I took Indira Gandhi, then Prime Minister, to Jounti Seed Village. But people were very pessimistic about our ability to overcome the 'PL480 syndrome.' To change defeatist attitudes,, she agreed to my suggestion to release a postal stamp on the Wheat Revolution, and it was done in 1968.

Unfortunately CS got defeated in the 1967 elections, but the support given to pricing policy by Jagjivan Ram, the next Minister, was timely. Farmers will be enthusiastic about increasing yields only if they get decent prices for the surplus. Those three years, 1964-67, were critical in terms of political support in whatever we wanted - import of seeds, National Demonstrations. Otherwise we would still have made the breakthrough, but it would have taken longer. So, the 1960s was a very exciting period. Many authorities referred to India as living from 'ship to mouth'. We were able to change that. It was amazing, because people never thought it was possible.

Apart from demonstrations, it was important to share the information widely. In 1966, after Homi Bhabha's death in an air crash, Vikram Sarabhai succeeded him as Chairman of the Atomic Energy Commission. He was interested in the communication between scientists and the field and wanted to use the space programme to facilitate this. Vikram and I went to many villages. He was excited by what he saw in the fields, and wanted to share this information with Indira Gandhi. In those days it was not difficult to meet the Prime Minister, and he knew her very closely as Ambalal Sarabhai's family was one of the leading industrial families to support the freedom struggle. So we went to her house. 'We must start Krishi Darshan on TV. You have to inaugurate the programme', he told her. We were discussing this in the month of December, and Indira Gandhi gave the order to start Krishi Darshan immediately, she would inaugurate it on Republic Day. The bureaucrats came running to IARI the next day with a host of questions -how do we make the films, where are the cameras, where are the villagers, how to shoot etc.? Vikram Sarabhai was very generous and donated money for 200 TV sets from the Nehru Foundation. I asked the IARI Extension Division to take the cameramen to the villages, and help them shoot the films. Krishi Darshan was inaugurated on January 26th. Many thousands of farmers had gathered

in her house, and she told them about the new opportunities. Krishi Darshan slowly grew popular and became a household word.

The next step was to make farmers enthusiastic about the increased yields. Two things were necessary: if the produce increases, there must be a market for it at a fairly decent price. That is why the Prices Commission and Food Corporation of India were set up to purchase grain at reasonable prices. The decisions taken by C. Subramaniam and Jagjivan Ram were very helpful. Unfortunately, at the other end, post-harvest technology including storage and distribution, has been neglected, even till today. In my five-year programme for spreading dwarf wheats (1963-68), I had suggested proper silos for storage. Morarji Desai called a meeting in IARI to discuss my note on storage, but the Government did not do much. Farmers have two problems - seeds and markets. Both have to be solved, otherwise there is a problem, especially for small farmers.

3. Mobilising the capacity of locals: The Case of Afghanistan

Apart from children and farmers, he has been equally enthusiastic and willing to repose faith in local people – researchers, professionals and community members – even when, on the face of it, they seem to lack the capacity for the task at hand. Mobilisation to the cause and education appear as critical ingredients in achieving the goal.

The Ministry of External Affairs has recently set up a Task Force with me as Chair to oversee the implementation of agricultural projects in Myanmar and Afghanistan. A key proposal is the establishment of an Agricultural University of Afghanistan, on the model of Indian Agricultural Universities. By a decree, President Karzai has already transferred 1137 ha of land with irrigation facilities in Tarnak Farm, Kandahar, for the establishment of the Afghanistan Agricultural University, and the Governor of Kandahar has been appointed President of the University, which plans to have regional centres in the major agro-ecological zones of the country.

During discussions in Kabul in May, 2013, President Karzai pointed out that assistance to establish this University will be the most meaningful contribution that India could make to the food and livelihood security

of the people of Afghanistan, since nearly 80 per cent of the Afghan population depend on crop and animal husbandry, horticulture, forestry and agro-forestry and agri-business for their work and livelihood and nearly 60 per cent of GDP is from the farm sector. I felt we should start by establishing a Genetic Garden for Food and Livelihood Security, where a representative sample of the rich genetic diversity of Afghanistan could be cultivated and protected.

Rather than sending Indian scientists to Kandahar, given the security situation, I suggested that the best way forward would be to identify and nominate 25 Afghan scholars to undergo training in Agricultural Extension, Agronomy, Crop Protection, Horticulture and Livestock Management. IARI has already prepared an excellent training module for this capacity building programme. The 25 selected scholars include both senior and junior scientists, men and women, and following the six months training, will form the Faculty of the Agricultural University. The key here is to mobilise local capacities, support local researchers and scientists, as this will make the intervention sustainable in the long run.

Upholding human and national dignity

While in government, MSS often reacted adversely to the state terminology, which referred to the poor as 'beneficiaries'. A deeply ingrained Gandhian value system made him emphasise the concepts of human dignity and recognition. This vision was clearly articulated in the plan for making Wardha District Gandhi Zila during the Sixth Plan period. Yet good ideas can perish without political support. He could see early on the power of food self-sufficiency to enhance national dignity, giving the country considerable political clout globally. While the Emergency was a distressing period in modern India's history, he points to some of the positive contributions made by Indira Gandhi prior to this, and the differences between the two aspects of her political career.

1. Addressing the needs of the poorest – Antyodaya as the basis for Sarvodaya

Indira Gandhi met Vinoba Bhave in Pavnar Ashram soon after she became Prime Minister again in 1980. He asked her to convert Wardha district to

Gandhi Zila. I was in the Planning Commission then and was asked to chair a committee for this purpose, with Ramakrishna Bajaj, Devendra Gupta and Nandini Joshi as members. We worked hard developing the idea of Gandhi Zila. What is the definition of Gandhi Zila? It is easy to change the name, but the real idea was to eradicate poverty by enhancing the ability of the poor to earn their daily bread. Gandhi's idea was to enable the poor to feed themselves with human dignity rather than forcing them to beg. This was also my idea for the Food Security Bill; it needs to provide food with human dignity. At that time 70,000 families were classified as BPL (Below Poverty Line) in Wardha. Nandini Joshi developed a good programme with Khadi as an instrument to alleviate poverty; Bajaj helped in setting up small industries; Devendra came from *Magan Sangrahalaya* which had expertise in cottage industries. So we prepared a good plan, probably for the first time there was thought on how to eradicate poverty completely from a district, not through doles or patronage, but by providing income and work security. The former perhaps satisfies our own conscience, but it doesn't respect the poor as thinking people.

Indira Gandhi liked it. Unfortunately, there was some conflict between S. B. Chavan, who became the Deputy Chairman of the Planning Commission at that time and Vasant Sathe, the Member of Parliament from Wardha. Without telling me, the file was transferred to the Maharashtra Government. They did not want one of their senior IAS men in the Secretariat at Mumbai, so transferred him to Nagpur with the Gandhi Zila file. This was a punishment posting for him, so he asked me, 'How do you expect me to develop a plan?' This political fight killed the plan. But I think it can be revived even now. Of course it needs to be updated, but the principles were sound, as was the understanding of poverty and attention to human dignity. What the supporters of market reform today don't understand is that the market economy is more or less Darwinian, based on the principles of survival of the fittest. When you start with handicaps, how can you compete as equals? How can first generation learners, slum children, be compared with our children? We first need to equalise opportunities before free competition becomes a real possibility.

2. (Food)Self-sufficiency and National Dignity(sovereignty)

One thing I learnt during the 1960s and early 70s was the importance of food self-sufficiency in enabling Indira Gandhi to take independent foreign policies to uphold national sovereignty. Food grains are indeed a political weapon. Abdul Kalam later said that Pokhran would not have been possible without the Green Revolution. While I do not support the nuclear bomb, food self-sufficiency helped us support the liberation of Bangladesh and feed the newly united Vietnam. People do not often see this relationship, but these historic decisions would not have been possible without food self-sufficiency.

By the early 1970s, the Americans were not happy with India due to the liberation of Bangladesh from Pakistan, as they were supposedly close friends of Pakistan. They stationed one of their warships near Calcutta, almost threatening us. Soon after came the Pokhran implosions in 1974, and sanctions were brought against India. But these became irrelevant, since we had grains to feed ourselves, as well as more than a million refugees from Bangladesh. There was criticism that the camps were not good, and the food there was not nutritious. I was asked to go there. Of course in camps, there will be difficulties. But our government did the best it could in the circumstances.

But that year was a drought year. Jagjivan Ram was Agriculture Minister. Food stocks had come down and Indira Gandhi had started the Food for Work programme. We had to buy 2 or 3 million tonnes from USA on commercial terms. I went with Jagjivan Ram to meet the US Agriculture Secretary at the World Food Congress in Rome. He was rather rude. Jagjivan Ram told him very firmly, 'I have come here not to beg, but to buy. I wanted to buy some wheat. If you don't want to give it, someone else will', and he walked away. My estimation of him really went up. Some of the old Gandhians had a lot of self-respect, which many of our leaders' today lack.

Indira Gandhi has been criticised for the Emergency and many other things, but she also took some bold decisions prior to this. In 1974, the two Vietnams united, and the Americans left South Vietnam. They urgently sent Madam Binh as a Special Representative of Prime Minister

Pham Van Dong to meet Indira Gandhi. I was present at the meeting. She said 'We have no food. Lots of people will die of hunger unless India helps'. Indira Gandhi knew we had just bought 2 million tonnes of wheat from America. She quietly asked the Food Ministry to divert the wheat to Vietnam. The Americans were furious, but could do nothing. The wheat was ours, we had bought it. Then she said, 'Swaminathan you have to go there', and I did. When you flew over that country, you could see large orange yellow patches. During the War the infamous 'Agent Orange' was used and crops had been destroyed. The Minister in charge took me to Ho Chi Minh City (as Saigon had just been renamed) and we also visited the Mekong Delta.

In my report, I stated that the Mekong Delta, then with low yields, was a large untapped reservoir. North Vietnam had made some progress, but South Vietnam, because of the uncertainties created by the war, was not able to develop food production. I suggested the setting up of a Rice Research Institute in the Mekong Delta. The Prime Minister, repeatedly told me how much India's support meant to them. In a reflex action I said, 'Mr. Prime Minister, in your dictionary the word impossible doesn't exist'. He stood up, delighted, shook my hand and then spoke for one hour. That was the turning point. Once they knew how to handle the Delta, then they developed technology, their own varieties and their public policies. Today Vietnam is a major exporter of rice, next only to Thailand. My student from IARI, Bui Bong, played an important role in this. He became the Director of the Institute, and later Minister, because of his success in developing rice production technology appropriate to the Mekong Delta.

Westerners often criticize us for focusing on increasing food production to be food self-sufficient. They say that with resources, you can buy food anywhere. Yet food security is powerful, there is a larger dimension in terms of the role of agricultural advantage in global negotiations and national sovereignty, which critics of the technology, both national and others, fail to take into account. They never looked at the conditions we were living in. The rescue of Vietnam and Bangladesh and the Pokhran tests were possible only because we had food. I wholly support the anti-nuclear movement and do feel that Pokhran should not have happened.

But, right or wrong, the ability to perform those tests was facilitated by our independence in food requirements.

3. Farmers' Rights and the Right to Food

During colonial rule, Famine Commissions were appointed from time to time to address the problems created by recurrent famines. Between 1870 and 1900, nearly 30 million children, women and men died of hunger. A Famine Commission recommended the establishment of Departments of Agriculture by State Governments, and the strengthening of agricultural research and education. In independent India, several Commissions on Agriculture have been set up from time to time, however, neither in colonial nor independent India, has there been a Commission for Farmers. For the first time, in 2004, a National Commission on Farmers (NCF) was set up by the Government of India, which I had the privilege to chair. We submitted five reports between 2004-06 as well a draft National Policy for Farmers. These reports have received strong support from most political parties, farmers' associations and scientific organisations. The National Policy for Farmers was also finalised and placed in Parliament in October 2007.

To my sorrow, no action has been taken yet to implement the Recommendations, particularly those dealing with farm women and men as human beings and citizens of the country, not just "beneficiaries" of Government programmes. What is urgently needed is an attitude change in those Bhavans dealing with agriculture, to recognise farmers, men and women, as the custodians of our food security. International prices of food commodities are very volatile, so I always say that "the future belongs to nations with grains and not guns". The Food Security Bill, currently before Parliament, provides a legal right to food to 70% of our population, but it can be implemented only with the help of lakhs of farm families.

People Management: Motivation and Commitment

An important element of his attention to people, has been putting in place systems and procedures to motivate people to do their best, at the same time providing opportunities to enhance their capacities and sense of fulfilment. Here, Mina's support and interventions have been significant.

1. Team-building at IARI

In the 1950s and 60s, our research budget was very small and for every additional piece of work one had to prepare a project and get it approved through a long procedure, which could take a couple of years to fructify. In the early 1960s I was in a hurry and in every field we wanted to purchase time. This was particularly true in relation to the multiplication of seeds of the new high-yielding, semi-dwarf wheat varieties. Since IARI had very limited land, we decided to work with farmers to produce the required seeds. The Jounti village in Delhi State became the first Seed Village in the country. This work could be organised only with the help of research students. Led by the Student Union President, Dr Venkat Rao Gadwal, a large number of students willingly gave time to go to the village two or three times a week and work with the farmers on the new agronomic practices needed for making the semi-dwarf varieties express their yield potential. This exposure to rural problems and realities had a life-changing impact on the students. Importantly, it created a sense of bonding between the students and rural families, but also with the staff and the research community at IARI. We all felt we were working for a common purpose, irrespective of status.

Mina: I helped organise a group of staff volunteers to go to one of the nearby Delhi villages in the late 1960s, to explore what else the community, particularly the women, needed, apart from seeds and agricultural inputs. It was February. All the women, Jats and Dalits, left for the fields at 6 am, returning home by 11 am. The Social Welfare Board was running a balwadi, but the teacher came at 10 am, so it was no use to them. They challenged us to give them a balwadi that would run from 6-11 in the morning. This was indeed a challenge: how could we find a teacher who would reach the village that early in the morning? There were no buses running so early. We finally found the daughter-in-law of the village Pradhan (headman). The young woman was bright, interested and with high school education. She agreed to run the balwadi from 6-11 during the busy agricultural season from February to May. We didn't have money, but provided some snacks, and also taught her a lot of games and activities. The village people happily collected some money to give her an honorarium. It was a small amount, but recognition of her contribution, that she was providing a useful service. After May, the work eased off in

the fields, and the timings could be relaxed. It was a year of great learning for all of us. My only regret is that I could not do anything for the children of the women agricultural labour working on the IARI fields.

2. Establishing the Agriculture Research Service: From calamity to opportunity

When I became Director General in 1972, the personnel policies of ICAR were such that those who wanted a small increase in income, would have to change their jobs, unlike the IAS. Scientists were competing every month, jumping from post to post, just for a little more money. There was no continuity and much uncertainty. So I decided to develop an Agriculture Research Service (ARS) which would provide opportunities for professional growth and financial compensation, without changing one's post or line of work. Once in 5 years you get assessed on your work and can move to the next grade, without having to change your job. There were 400 scales when I joined. I reduced them to eight. A man or woman in S1 can climb to S8 by assessment. I quoted the example of Borlaug. He was a Nobel Laureate but remained a wheat breeder. He did not have to become DG to get the compensation due to him. I proposed a scientist-centred system, delinking salaries from individual posts. (I myself was recruited as Assistant Cytogeneticist, and at retirement, was confirmed only as Cytogeneticist). Getting this through however was not easy. Fortunately Jagjivan Ram and Indira Gandhi were supportive, while the Home Ministry was against such an all-India service. They emphasized that agriculture was a State subject, so it was not possible to set up a Central service. I said it was a service for the ICAR staff, not for the State Governments.

Today, all ICAR scientists recognize the value of the Agriculture Research Service; it has proved to be a great blessing for agricultural research and has helped to enhance the self-esteem of scientists. These reforms were driven by the unfortunate case of suicide by a scientist who was well known to me. He felt aggrieved at not being selected for a higher post in the Division of Agronomy at IARI. All kinds of accusations were made. I was also a target as the head of the organisation, although I had nothing to do with the selection, as there had been a duly constituted Selection Committee of very eminent scientists. Nevertheless I felt there should be

a proper enquiry into the points made by him in his last letter addressed to me. A very high level Enquiry Committee headed by a former Chief Justice of India (Justice P. B. Gajendragadkar) was set up. This Committee found that the choice of the scientist selected for the position had been a fair and correct one, and the most fitting candidate had been chosen.

At our request, the Enquiry Committee also examined many aspects of the management of ICAR, including the selection procedures, which consequently led to the setting up of an Agricultural Scientists' Recruitment Board (ASRB) on the model of UPSC; setting up a Department of Agricultural Research and Education (DARE) with governmental authority; and changes in management practices, including the adoption of the principle of rotation in the appointment of Heads of Departments.

Thus, a great human calamity which gave me intense grief was converted into an opportunity to address the issues which led to the calamity. I have always believed that for every problem, there is a solution. In fact when I developed ARS, I visited all ICAR institutions for a malady-remedy analysis so that appropriate policy and procedural remedies for the maladies from which scientists were suffering could be found.

For in-service training for ARS recruits, I set up a Staff College at Hyderabad, later renamed as the National Academy of Agricultural Research Management. The training was in three parts. The first one, 'Know your country', was provided by specialised Planning Commission members on a vision for the country, and problems of Indian agriculture. The next six months focused on 'Know your client, i.e. the farmer', and the final part was called 'Know your institution'. For many this was a life-changing experience, as they had come with M.Sc.s or Ph.D.s, but were neither aware of the larger vision and policy process, nor the ground realities. At the other end, Vice-Chancellors of Agricultural Universities too were invited, and case studies of good and bad practices discussed. I felt we should not have too many staff members of our own, so called upon the expertise of existing training institutions like the Administrative Staff College in Hyderabad and the Indian Institute of Management, Ahmedabad. Unfortunately, there is a proposal now to convert NAARM into a deemed University – its in-service training character will then

be lost. My hope has always been that NAARM would serve the same purpose in the field of agriculture as the National Defence College does in the field of defence.

3. IRRI: Building the Capacities of National Systems

The first month in IRRI, I did a gap analysis to identify which of the rice-growing countries did not have infrastructure for rice research, because my Indian experience had shown that only a strong national research system could take advantage of advances in international research. For example, when Borlaug sent material, we had the infrastructure, and could use it, but Pakistan, though it had the same material, couldn't do anything with it. So the national research system is very important. We must collaborate, not surrender. That is why I am sorry now that ICAR is handing over the national research system responsibility for important crops to international agencies.

In fact, I was asked by many countries, 'Will you open an IRRI in our country?' I said 'No, but I will help you start one of your own'. The first one was the China National Rice Research Institute at Hangchow, there is still a small plaque put up in Chinese, which thanks me for setting up this institution. In China, I helped develop four rice institutes—the second was for hybrid rice at Changsha; a third for *azola*, useful for biological nitrogen fixing, because when you get high yields, you need also to feed the plant appropriately. The fourth was the China National Gene Bank. Next was the whole of Indo-China - Lao, Cambodia, Vietnam- they are all rice-eating people, but there were no rice research institutes in the Mekong delta, they used primitive methods and got very low yields. In Vietnam, as I have already mentioned, India helped develop the infrastructure following the end of the war. I only supplemented this by training a large number of Vietnamese at IRRI.

Cambodia was the last one – in fact, the contact was established through Mina. She had gone to Cambodia as part of her work with UNESCO. I had sent a letter through her to the Agriculture Minister, and they responded positively and sent me an invitation when she returned. When I visited in 1987, it was in a bad condition. Due to Vietnamese presence, the Americans had asked all the Allies not to give money to

Cambodia. The only country I could get money from was Australia. Bob Hawke, the then Prime Minister, had come to Philippines to meet Cory Aquino when she became the President. I got ten minutes with him to explain the programme. He agreed, but said it should be called the Indo-China programme. He gave one million dollars very quickly. In fact there is a beautiful book on the entire Cambodian programme written by an Australian, Don Puckridge. The Cambodian government was so grateful for my support in building their national agricultural research system that they gave me their *Sahametrei* award in 2006 - the highest civilian honour for a foreigner.

When I was young, my mother used to tell me we were eating Burmese rice. In fact, a part of the Bengal famine was because when Japan occupied Burma, they stopped sending rice to areas controlled by the Allies. I visited Myanmar, it was under military rule. The Agriculture Minister was General Yu Gong. He too asked me to set up an IRRI. I refused, but instead, we helped set up a National Rice Institute at Yezin. Canadians were the only ones to give money to Burma, and Dr Umali, FAO ADG at that time, gave some money for training people at IRRI. That is doing well. There is now a new wave of Burmese development and I am associated with it on behalf of the Government of India.

In South Asia, the infrastructure existed; it was more a case of identifying gaps and building human resource capacity. Pakistan was very enthusiastic and we could make much progress there. My predecessor at IRRI, an American, had indicated that as an Indian I might find it difficult to work in China and Pakistan. It was the opposite - we had a very constructive and warm engagement in both places. For the inauguration of the Pakistan National Agricultural Research Institute, there were only three speakers. One was Zia-ul-Haq, the President; the American Ambassador, as the Americans had funded it, and me. Even the Indian Ambassador was surprised and asked how I was invited. We had good relations with Bangladesh too under Sheikh Mujibur Rahman, both during the Martial Law period, and later with an elected Government, and also with Sri Lanka. In the latter, I helped mainly with human resource development. We enabled a number of professors from Jaffna University to get advanced training with financial support from

Japan. We also provided them with some equipment to set up a Gene Bank. In these cases, it was only strengthening their capacity and adding more value. Unfortunately India was not interested, the then Minister was negative and would not allow scientists to go abroad.

One thing that disturbed me was that while IRRI was based in the Philippines, the country lacked its own national research capacity. When I went to Philippines, people used to say that their rice tragedy was represented by the three Ts: typhoon (cyclone), *tungro* (viral disease) and Tanco (Secretary in charge of public policy). Tanco told me once, 'You have a lot to do in developing appropriate varieties for us.' I said, 'The Philippines has over 8000 islands, and there are a lot of localised problems and variations, the varieties alone can't solve the issue'. But he was not convinced.

On the day of the EDSA Revolution, my friend Dr. Umali rang me up and said that *Radio Veritas*, a Catholic channel, was giving news of the Revolution. They were calling for "people power" to stop Marcos' tanks. The nuns were blocking the tanks; as religious people, they could not be shot easily. Around 11.30 pm, some 50 boys and girls from the University of Los Banos came to meet me. The security rang me up. I knew it must be urgent, so let them come. They had one simple demand. They wanted the buses from IRRI to go to Manila (the buses were meant for the children of the international staff to go to the international school in Manila). I had to take a split-second decision. On the one hand, we were in Philippines, and Marcos was in power. On the other hand, I could see the students were agitated and wanted to go and help the freedom movement. I rang up the security and asked them to mobilize the drivers available to drop them in Manila and come back immediately.

This news reached Mrs Aquino. When the government changed, and I met her, she said 'You helped our movement. What do you want me to do in return?' I asked her to visit IRRI. I had developed a blue print for *Phil Rice* - the Rice Institute in the Philippines. She asked what the problem was. I said we didn't have the money. They immediately provided it with help from Japan and the Institute was set up. The first Director was a good man, who came from the same province as Marcos; yet when I

recommended him as a suitable Director, she immediately approved his appointment. Conferring the Golden Heart Presidential Award on me on 10 November 1987, she cited my 'untiring efforts in pursuing the establishment of a national rice research institute in the Philippines' as one of the reasons for the award.

To sum up, if we wish developing countries to progress in agriculture, we must help them to build strong National Agricultural Research Systems. The stronger the NARS, the greater is the benefit of the International Agricultural Research Centres. Human resource development should receive high priority. These days there is greater worship of "bricks" rather than brains. In my view, IARCs should not set up their own institutes in developing countries. Instead, they should help in the establishment of strong, multi-disciplinary National Research Institutes, as I did in the case of China, Myanmar, Vietnam, Cambodia, the Philippines, and also Egypt, Madagascar, and Tanzania. This will confer long-term benefits and also help strengthen the morale and capability of national scientists, working on national salaries.

Mina: One of the many reasons for MSS' immense popularity at IRRI and the confidence that the Filipino staff and students had in him was my usual 'social lubrication', but this time with a difference - it was more a case of breaking status 'ice' between staff paid in dollars and those in pesos. At the time, all the senior scientific positions, about 40 only, were held by 'international staff', while there were more than 1000 Filipino employees, men and women, at all levels. The residences of the two groups were also physically separate, a kind social separation common in many international organisations.

I soon began relating to the Filipino community, from top to bottom. I started by learning the language, through private tuition, a language-learning programme on audio-tape, travelling to villages alone, making friends with people, and of course, watching boring TV shows because they were easy to understand! Soon I was fluent enough to take part in discussions, workshops and drama clubs, study Philippine traditional theatre, and could pass for a Filipina on the telephone. We began to invite Filipino staff home, in Asian style - the whole family from eldest to youngest - and not just the husband-wife couple as in formal Western-style entertainment. And to serve them not only Indian food, but traditional

Filipino food like roast sucking pig cooked for feasts, even giving them small portions of it to take home when they left, a Filipino custom, I learnt, similar to the Indian habit of giving sweets or *tambulam* when guests depart. The staff was thrilled to feel at home in the precincts of the expatriate 'compound', an enclosure where they had never before been allowed to set foot. The Union leaders became regular dinner guests, and there were no more labour troubles! MSS became the President of the Staff Football Club, though he has never played the game, and I, of course, of the Staff Drama Club. There were students of almost all Asian nationalities at IRRI, and we used to attend all their national day celebrations. Since I spoke the language and travelled widely, I was familiar with the political situation, though no one at IRRI confided in me their close links with the 'insurgency', as it was called (till after Marcos was overthrown, when I realised that we had been living right in their midst, so to speak) and they must have guessed our sympathies were with the Revolution. That probably emboldened them to ask for the buses! By the time we left, MSS was wildly popular and worshipped like a hero, while I made my farewell speech in Tagalog to thunderous applause.

4. Utilising existing expertise

I realised early on that there was a lot of expertise available; there were many people who were willing to make a contribution. My job was to facilitate this process. At MSSRF, we selected our Trustees very carefully. We were very lucky to have V. L. Chopra, V. K. Ramachandran, Kissen Kanungo, and Shyamsundar Nair as early Trustees. They gave a lot of time for the Foundation. For example, Kissen took charge of the Wayanad land on behalf of the Foundation, and Shyamsundar Nair provided guidance to the whole Bio-village project. This is a key strategy in building an institution. Apart from a clear goal, which addresses a gap in research, it should be - in my view, a 'centre without walls'. This follows Gandhiji's concept of keeping 'your doors and windows open', and getting ideas from everywhere. As our salaries were low at that time, we tried to have a blend of young people, who would be helped by senior people, like Kesavan, Balaravi, Velayutham, Arunachalam, John Joseph, Johnson, K. V. Raman, Sankaran, Rajagopal and many others. Many of them came as Guest Fellows, or accepted a small compensation and guided some of our key interventions. They had retired from government service and

had pensions, but were still active. The institution started growing faster than what I had thought, so drawing on their expertise was invaluable.

Science in the service of society

One of his key and early understandings was that to be both effective and transformational, science is essential, but science alone is not enough. People have to come first, in his words, we need to put faces before figures. This ability to understand and work across levels and scales has been central to his approach. When I returned from having spent a summer in Uttarakhand, observing closely the appalling state of health services in the mountains, I wanted to train as a doctor. In our educational system, however, this was next to impossible, as I had not studied science for at least four years and was half-way through a history degree at Delhi University. IRMA had recently been set up and he encouraged me to think about other skills that I could offer in working constructively with rural people. The message was clear – concern and commitment should come before any technical skill to be of any use at all.

1. The farmer, the scientist and the policy-maker: the Green Revolution experience

When I came to IARI from Cuttack, Dr. Pal was the Director. He was a breeder himself, and recognised that something needed to be done to increase wheat yields. A quantum jump of 200-300 per cent was needed, 2-4 per cent would not do. While distinguished economists in the Planning Commission like V.K R.V. Rao understood this point, they did not recognise what was happening in the farmers' fields. In 1965-66, Rao announced that he would be satisfied if India ever produced 15 million tonnes of wheat, but in fact we produced 17 million tonnes in 67-68.

The Planning Commission was obstructive in getting 18,000 tonnes of seeds. However, with the import of the needed seeds from Mexico, through Borlaug, a small government programme became a mass movement. Only then could it be called a revolution. You don't have revolution with small and incremental steps. You have to unleash the farmers' enthusiasm. Their enormous enthusiasm spread like wildfire. Wherever you went, farmers were happy because for the first time they saw their produce doubled. A farmer who produced one tonne, could

now produce 2-3 tonnes. So the combination of political will, scientific skill and farmers' own enthusiasm - this synergy formed the Green Revolution symphony. Farmers, politicians and scientists all played their part. Fortunately, C. Subramanian brought a very fine ICS officer, B. Sivaraman, as Secretary Agriculture (1964-70). Sivaraman was willing to go round the fields with me, deriving his information not from files but from the fields, and was able to give a lot of support. The Minister could give orders, but the Secretary must be capable of following them through answering the questions, allocating resources etc. People used to say that it was the good fortune of this country that it had the three SSS's: Subramanian, Sivaraman and Swaminathan. Each one played his part. So the lessons of this period were that science is a major trigger, but it must be rooted in the socio-economic reality of the farming world, with policy support. Unless you relate science to what is possible with farmers in their own conditions, how will they accept it?

This was an exciting period. In the 1950s, we had started a lot of work on the fundamentals and genetics of wheat through the use of irradiation and other technologies, and developed excellent capacity, with many Ph.D students. People worked not only on wheat, but also on crops such as barley and rice. In 1964, C. Subramanian set up a panel of scientific advisors. K Ramaiah, the first Director, CRRI, Cuttack, was the Chairman and I was the Secretary. I gave a note in the second meeting, saying that we have made a yield breakthrough in five crops – wheat, rice, jowar, bajra and maize. As several were hybrids, and seeds needed to be developed every year, the High Yielding Varieties Programme was approved. Wheat and rice did well, but not the others. There were several reasons, but a major one was the market. Today maize price is high, but at that time there was no market for hybrid maize. Jowar eating was coming down with the Noon Meal Programme and Public Distribution System (PDS) concentrating on wheat and rice. In the 1950s, when I used to visit Delhi and Punjab villages, *makki ki roti*, and *bajri ki roti* were very popular, but this has now declined.

In 1968, Indira Gandhi came to deliver the Convocation Address at IARI. C. Subramanian and Sivaraman came whenever we invited them. There was a strong relationship between science and public policy. Borlaug

wanted to reproduce the same experience in Africa; he got the money, but it didn't happen. This was one of his big disappointments in life. I used to tell him that in India it was not merely science, but assured and remunerative markets, and supportive policy that made the difference. Farmers could produce more, but this often results in further suffering due to the collapse of prices. Fortunately, in the 1960s, all links in the chain from production to consumption were pulled together in India. Today unfortunately this is no longer the case, responsibilities are fragmented - water is with one Ministry, land with another, and fertiliser and pesticides with yet another. There is no coherence in policy. It was the synergy between science and public policy in the 1960s that led to the spectacular progress.

Another thing I should mention here is the role of international collaboration. Borlaug's material saved us time; otherwise we would have had to extricate the genes for dwarfing from Vogel's material. Incidentally, Orville Vogel, a wheat breeder from Pullman, Washington State, was the first one to develop a dwarf variety outside Japan (Norin 10 is a short Japanese variety with a long panicle), but this was suitable for temperate, rather than warmer climates. We could still have done this, but it may have taken another three years. On our invitation, Borlaug visited India in 1963, we travelled across the Northern plains, and he then sent us a whole range of material from Pakistan, which was suitable to our conditions. We extracted some like *Kalyan Sona*, *Sonalika* and other amber grain varieties of soft wheat. In fact, we had such strong capacity, and Borlaug was so impressed, that he recruited many of them to the International Research Centres. I should particularly pay my tribute to the late V.S. Mathur, who developed outstanding semi-dwarf wheat varieties very speedily. I think him among the greatest wheat breeders of the world. International collaboration becomes most fruitful when we ourselves know clearly what we want to achieve and have our own well-thought-out strategy for it.

This early experience has led to the adoption of a two-pronged strategy in all his later work, focusing on both ends – the farmer and the policy-maker. One example is the work on biodiversity in Kolli Hills, Eastern Ghats which led to the formulation of the Plant Variety Protection and Farmers Rights Act in 1996, discussed later.

2. Link between knowledge and action

Very important is what I call bridging the Know-How Do-How gap – that between scientific knowledge and field-level action. There were at least three methods for bridging this gap that I developed - one was the *Krishi Vigyan Kendra*, next the land-to- lab and lab-to-land programmes, and third the creative use of agriculture students, especially in implementing drought management strategies. The KVKs involved high quality extension run by scientists, agricultural universities and NGOs. A large number of them conducted 'lab to land' demonstrations, but they emphasised agricultural machinery to reduce drudgery. Once, a bullock-driven machine was brought for the demonstration along with a bullock from IARI. I asked, 'Why have you not brought a farmer's bullock?' The person concerned, said, 'Farmers' bullocks are undernourished. They won't pull'. These were the problems we faced in linking local reality with scientific advances.

Later, I started a Whole Village Operational Research Project. The first was at Sukhomajri. I employed P. R. Mishra from the Soil Conservation Institute, who later became known as the Himalayan Gandhi. In this system, what I later called Rural Systems Research, you take an area and look at the totality of natural resources. It is a project looking not at individual plots (half to one hectare in size), as in the National Demonstration or Lab to Land programmes, but the whole watershed or the whole village. For example, if you want to promote ecological agriculture, then you need to understand the impediments in a holistic manner, because IPM (Integrated Pest Management), for instance, can't be done by a single farmer, it has to be done on a group basis. That's why the Chinese are successful, as they can generate group work without our problems. The 'whole village' idea was not just about increasing crop productivity, but also addressing non-farm and off-farm employment opportunities. Sukhomajri was an ecological project in water harvesting, the motivation being the silting up of the Sukhna lake in Chandigarh. We wanted to contain this and regenerate the lake through water harvesting by the local people themselves.

This was one of my first Whole Village Operational Research Projects. Similar projects were then taken up elsewhere, especially in stabilising

the desert areas of Rajasthan, where the Rajasthan canal was getting silted up with sand from the desert dunes, which needed to be controlled. I also gave funds to Virendra Kumar, a scientist at Delhi College, to study the Alaknanda flash floods of 1971. He did a good study, and alongside people's mobilisation under the Chipko movement, this ultimately led to a 30 year moratorium on tree felling in the entire Alaknanda valley.

3. Making law responsive to people's needs:

From my days in Cuttack in 1954, I had a fascination for Koraput, because Koraput is what is called a secondary centre for the diversity of rice. In those days over 3,000 varieties were cultivated in Koraput, now it has come down to 300. We started the biodiversity programme in 1994 in Koraput, and then further developed it in Kolli Hills, also in the Eastern Ghats and Kalpetta, Wayanad district, in the Western Ghats. This last came about because we had a family plantation in Kalpetta, which my brothers were planning to sell. Instead of selling it and getting some money, we decided to give our share to the Foundation, first on a 10 year lease, and now permanently. Thanks to Madhav Gadgil, there has been a lot of work on the Western Ghats, but there was comparatively little on the Eastern Ghats.

The biodiversity work has been conducted simultaneously at two levels: first at the grassroots level to ensure livelihood security. For example, in Kolli Hills, the people now make a wide range of value-added products such as ragi malt. The other is at the level of public policy, through legislation that recognises and protects farmers' rights. In 1996, I realised that the draft legislation I had prepared in 1994 didn't use the word Farmers' Rights in the title, but only spoke of Plant Variety Protection. So I renamed the second draft Plant Variety Protection and Farmers' Rights Act. Fortunately, Dr. Sahib Singh, the Chairman of the Parliamentary Committee on this legislation, visited MSSRF, and I made a presentation on the rationale for this Act. Some vested interests were trying to influence him not to include farmers' rights in this Act, but I felt strongly that it was important to recognise the rights of the primary conservers and strengthen their livelihoods, not just those of breeders, alongside biodiversity conservation. Both this and the Biodiversity Act, prepared in response to the Global Convention on Biodiversity (CBD) were first

drafted in the Foundation, with Joint Secretaries from the Ministries of Environment and Forest and Law participating, to ensure that the Act was compatible with other legislation. One reason for our success is that the knowledge is based on grassroots realities rather than purely theoretical speculation.

Dealing with Criticism

There have been many times in his life when he has faced severe criticism of his work. The Green Revolution was seen as helping elite farmers rather than the poor, enhancing income and social inequalities in its wake. His systematic effort to collect rice germplasm from across the world to be held in Gene Banks was similarly criticised. It was not in his nature to be aggressive in his response, yet his personal integrity and confidence that what he was doing was for the 'larger good' and followed ethical principles, helped him find ways of dealing with such situations. My mother's support at these times became very critical. One of the lessons he drew from these challenging times was to set up systems of accountability, of checks and balances, to make sure that systemic misuse of power and knowledge become next to impossible.

1. The Green Revolution Critique

One of the criticisms of the Green Revolution was that it was not resource-neutral and benefitted only rich farmers. Small farmers too can cultivate HYV, but lack the resources. Scale neutrality is not resource neutrality, and this is particularly severe for women farmers. They don't have Kisan Credit Cards, so cannot easily access other inputs.

To overcome this problem of resource inequality, in fact, on our insistence, the Government started the small and marginal farmers' programme in 1968-69. Its main aim was to supply credit needed to buy inputs, as without inputs there can be no output. If small farmers, who form a majority in India, were not involved, we could not have produced so much wheat - from six million in 1947 to 96 million tonnes in 2013. The only difference I would make is between farmers with water and without. Water is needed to apply nutrients, to absorb any form of fertiliser or manure along with sunlight and convert it into output. Our un-irrigated areas have therefore remained disadvantaged. When I was

at the Planning Commission, during the Sixth Plan, it was the only Plan where the agricultural growth rate at 5.7 per cent was higher than the general growth rate of 5.5 per cent, largely because of the allocation of over 12.5 per cent of the plan budget, the highest ever, to irrigation. If the allocations are correct, then there is no magic; we will see the returns in terms of equitable growth.

This is a problem I have also tried to grapple with in my later work. Not only small and marginal farmers, but at MSSRF we have also tried to address the needs of the landless in our 'bio-villages', as mentioned earlier. Most of the projects work with improving agronomic and other practices with small and marginal farmers, but equally developing non-farm and off-farm work for the landless.

2. Publication of False Data

In 1966, one of my Ph.D. students, George Verghese, developed by mutation breeding a new wheat strain with amber seed, *Sharbati Sonora*, from the red seeded variety *Sonora 64* received from Mexico. In 1967, with the help of the Rockefeller Foundation we had bought some new equipment from the US to measure the amino acid profile of crop varieties. Since this was a complex instrument in those days, the Head of the Cereal Quality Laboratory (Dr A Austin) was deputed to the company from where the amino acid analyser was purchased. On his return, he started analysing many varieties of wheat, maize and other crops for both their protein content and amino acid profile. During this work, Dr Austin found a higher lysine content in one sample of *Sharbati Sonora* as compared to its parent.

I was then the Director of IARI and in popular lectures I used to quote the findings of IARI scientists which might be of interest to the general public. At a gathering of vegetarians in 1967, I mentioned Dr Austin's findings. Later analysis revealed that the lysine content of both *Sonora 64* and *Sharbati Sonora* were more or less similar, although *Sharbati Sonora* had higher protein content. Although a popular lecture, Austin's findings were quoted in one journal with full acknowledgement. This experimental error was speedily corrected in the IARI Research Bulletin (No. 6 1971), nevertheless I was accused of publishing false data on the

lysine content in a wheat variety, an accusation that has since been repeated several times.

Science is the search for truth, hence I was very upset by these accusations. A detailed statement on the facts relating to this accusation was made in the Lok Sabha on 27.5.1976 by the Minister of State in the Ministry of Agriculture and Irrigation. The factual position was also published in the *Indian Journal of Genetics and Plant Breeding* (Vol 34, No.2, July 1974) and in *Science and Culture* (Vol 41 pp.43-47, Feb 1975). In the *Science and Culture* issue, Dr Austin had also described how this experimental error might have occurred in one case out of thousands of samples he had examined. Later, *The Statesman*, New Delhi in its issue of 17 May 1977 repeated some of the allegations. In a reply to *The Statesman* the next day, I reiterated my faith in the scientific integrity of my colleagues, while also clarifying the difference between errors and falsification of data. With this statement, *The Statesman* closed the debate.

Despite these detractors, I was happy that several key people recognised my contributions and the steps I had been taking to improve the system. I was particularly moved by a letter from Shri. Jayaprakash Narayan to the Prime Minister, Shri. Morarji Desai dated October 14, 1977, from Patna. In this letter, JP said: 'Dr. M.S. Swaminathan, DG, ICAR, is a renowned scientist who has ably served the nation in the field of agricultural research. I have come to know that some people are mounting political pressure against him. Pained by this he intends to relinquish his office. It is unfortunate that politics should be brought into the field of scientific research. It will be in the nation's interest if Dr. Swaminathan is allowed to continue his valuable work. I wish healthy traditions are established in the field of scientific research.'

Equally important was peer recognition after careful examination of my work, leading to my election to some of the world's leading scientific Academies such as the Fellowship of the Royal Society, London (FRS), National Academy of Sciences, USA, and the Russian Academy during the period 1973-77. I was also made a founder Fellow of the Third World Academy of Sciences (TWAS). Nothing gives greater satisfaction to a scientist than when his peers rate his work as worthy of recognition.

During the challenging times of the nineteen seventies, my wife Mina stood by me as a tower of strength. But for her support, I would not have been able to convert calamities into opportunities for progress. Another person to whom I owe much is the late Dr. K. Kanungo, a friend, philosopher and guide during the trying times I went through. So clearly one should not be afraid to face difficult periods in life. What is important is to follow Shakespeare's dictum: 'To thine own self be true, thou canst not then be false to any other man.'

3. 'The Gene Robbery' Debate

I am a geneticist, but this has always been an area that has evoked some criticism and controversy, including, at present, around 'genetically modified crops'. Much of this is due to lack of information and understanding on the one hand, and lack of transparency by research organisations on the other. An important priority for me as DG, IRRI, was to strengthen long-term services like maintaining the Gene Bank, as the loss of every gene limits our options for the future. When we first started the programme in Cambodia, mines had destroyed many of their varieties; we could reintroduce the original Cambodian varieties only because they were held in the IRRI Gene Bank. Today there are over 1,10,000 varieties of rice, out of a total of around 150,000 in the world, available in the Gene Bank at IRRI.

The Gene Bank often aroused ill-informed criticism and talk of bio-piracy. An accusation that I helped IRRI to get hold of valuable Indian germplasm in rice for conservation in their Gene Bank was made in an article in the *Illustrated Weekly of India* on 23 March 1986¹. The same journal had earlier carried an article by the same author titled 'The white revolution: a white lie' attacking Dr. V. Kurien and the Amul Dairy Cooperative. Scientific exchange of germplasm was referred to as gene robbery. Although I was personally named in the attack, the article referred to earlier events when I had no connection with either IRRI or ICAR management. My detailed reply, point by point, was published by the *Illustrated Weekly of India* with a comment that they were closing the debate with my reply.

1. This Journal ceased publication many years ago.

My philosophy has been one of transparency. Once, At IRRI, too, an Australian journalist came to write against the Gene Bank. I gave her all the facts, and said to her, 'If you have a doubt, please ask. If you are still not satisfied, you can criticize us, but please don't make ill-informed comments.' She became an enthusiastic supporter by the time she left. Apart from that, I also wanted to establish systems of accountability. Hence, I placed the International Rice Collection under the supervision of an International Rice Board, even though it was a part of IRRI. Apart from Cambodia, native varieties have also been provided to Rwanda and Burma from the Gene Bank.

I was also encouraged by the international recognition of my work on collection, conservation and sustainable use of crop genetic resources. I was elected as President of the World Conservation Union (IUCN) and also as Independent Chairman of the FAO Council, which established, at my instance, a Commission for Plant Genetic Resources. I also served as Chairman of the Keystone Dialogue on Plant Genetic Resources which helped to resolve several issues relating to exchange of germplasm. This public confidence in my integrity and dedication to the cause of biodiversity conservation and equitable sharing of benefits has given me the strength to continue to promote international cooperation in genetic resources conservation and utilisation.

Mina: Both these accusations disturbed him deeply at the time. On the Gene Robbery issue, he had the facts for the rebuttal, but seemed unable to put them together in a convincing way. I took all the material from him, shut myself up and rewrote it, using the two column table he has mentioned and writing up the rest in a more journalistic style suited to the publication. He signed it, and it was published. I think he was able to overcome the pain, because he knew that though some things had gone wrong, he had not contributed to wrongdoing in any way.

Dealing with the State: Issues of Governance

During the 1979-1980 period, when MSS held the position of Principal Secretary, Ministry of Agriculture, an administrative rather than research position, he confronted financial and moral corruption at close quarters. These too were stressful years; yet he found ways of dealing effectively with the situations in his usual upright style, upholding principles of transparency

and public accountability. The lesson, as he says, is to 'keep the interests of the country as the bottom-line'; officers should not be afraid to speak up against authority, in the interests of the country. One should identify with causes rather than individuals, for the success of institutional mandates, in this case, a hunger-free India, and the conservation of biodiversity, rather than personal gains.

1. The drought of 1979: dealing with bureaucratic opposition

In July 1979, an interim government took charge under the leadership of Charan Singh. Unfortunately this was a drought year. The Agriculture Ministry was at that time responsible for dealing with all natural disasters. I knew that this was an interim government, and if something went wrong because of the drought, they would blame me also. So I went to Charan Singh and said, 'I need political support. Please set up a Cabinet Committee headed by Yashwant Rao Chavan (a respected Congress leader) who has vast experience in handling drought in Maharashtra.' This was done and proved prudent. As soon as we knew that there was severe drought, I asked for two million tonnes of wheat for an open ended Food for Work programme. The Planning Commission wrote two pages against this project. I gave a note on the consequences of cutting the budget and asked the Secretary, Planning Commission to include it in the minutes. He asked me why I was getting annoyed. I said I was not annoyed, just asking him to include my note in the minutes. One has to deal with them, each one according to his/her personality.

Since I was the Secretary, I collected the comments and sent the proposal to the Cabinet Secretary, who asked the Prime Minister for advice in the face of many adverse comments. In this case, fortunately, Chavan immediately called a meeting on the proposal I had sent, heard the opposition from the Planning Commission and Finance, but finally managed to get the sanction for the two million tonnes of wheat. But they refused to sanction any additional staff. Then I spoke to the Vice Chancellors of the agricultural universities to help, and we mobilised agricultural students across the country to aid this effort. A journalist from London, the daughter of the then British High Commissioner John Thompson, wrote an article entitled *The Famine that might have been* in the *Economist* of September 1979. She described how the drought was

handled. I had a detailed drought management system; terminology like 'crop weather watch group', still in use, was coined by me.

The message is that if you have a clear idea of what you want, or what needs to be done, it makes sense to get support from politicians and also build bridges amongst other stakeholders. Jyotirmoy Basu, a Communist MP from Diamond Harbour, and a strong critic of mine, wrote me a nice letter when I became Agriculture Secretary, saying 'We have often disagreed. But one thing I like about you is that you function on the basis of agree to disagree.' In a democratic system, unless you carry the political system with you, you can't get support.

2. Dealing with financial corruption

The Charan Singh government had only six months in office; the elections had been announced for December 1979. The then Agriculture Minister came from the co-operative movement, but somehow seemed to be under pressure to make money in these six months. I received a file one day on the export of 25 crores worth of ivory from Rajasthan. This ivory consisted apparently of bangles and necklaces worn by poor women. But in 1972, the Indira Gandhi government had banned the export of ivory to prevent poaching, so I wrote this on the file. I had a suspicion that the Minister or someone close to him had been bribed. He then sent for Nalini Jayal, the Joint Secretary, and tried to convince him, saying they were poor widows and needed the money. Then I said, 'I have only written on the file, he can overrule me'. Jayal was a conservationist and supported what I had written, but the Minister used to call him directly. Once the Minister said to me, 'Swaminathan, there is a very big drought, and you are busy managing it. So don't misunderstand if I call your Joint Secretary directly. I want to relieve you of this burden.' I called all my officers and told them, 'This is an interim government. If the Minister asks you to do something wrong, don't do it. Papers with potential for problems should go through me, and not directly to the Minister.' Later they thanked me, saying 'We could have been in serious trouble.'

The Minister then complained to Charan Singh saying the Secretary was against the welfare of poor widows who wanted to sell their bangles, and was holding up the file. I got a call from the Prime Minister. I told

him 'Sir, this is very dangerous. Ivory export has been banned and this is a proposal to sell 20-25 crores worth of ivory.' So he asked what we could do. I suggested we set up a small investigation to find out where the ivory stocks came from. He asked who would investigate. I proposed three people and he signed it. The Minister was waiting anxiously to know the result of our meeting. When he heard that an Enquiry Committee had been set up, he was shocked, and no more was said about the matter.

In another case, \$250 million worth of fishing boats were to be purchased from the Japanese. Two companies were in competition, and again I suspected possible bribery of not one, but two Ministers. Unfortunately, they had invited me to a meeting to discuss this, where they were openly fighting with each other, accusing each other of taking money. I took it to Charan Singh, and asked him to set up a committee headed by a Vice Admiral or someone of that rank in the Navy. He said 'Give it to me in writing. I will sign.' He did, and the case was closed. But my respect for Charan Singh went up. The man himself had no stake in this.

3. Dealing with political differences

Another big problem I faced was with the Silent Valley Project. The Agriculture Ministry was in charge of forests at that time, the Ministry of Environment was set up later. There was a large electricity project of 200-300MW power coming up in the Silent Valley. I went there with the IG of Forests and wrote a report on it. The purpose for which the forest was being cut down was two-fold: water and power. I got information on ground water from the Coimbatore Central Groundwater Board. There was more water than needed. Also, the Idukki area was fortunately able to generate additional power. My report set out how to meet the water and power requirements without sacrificing the Silent Valley Forest.

When I went to Charan Singh, he said that the Silent Valley project was approved by the previous Morarji Desai government, so he could not reverse it. When Indira Gandhi came back to power in 1980, she was asked to visit many temples to give thanks. She visited Guruvayur in Kerala. She said she wanted to read my report on the plane and take it up with Karunakaran, a prominent Kerala Congressman. After reading the report she decided that the project must be stopped. She called a

meeting with the then Chief Minister of Kerala, Nayanar, of the CPI(M). He brought his own set of scientists who were in favour of the project. After an hour's discussion, no agreement was reached, and Indira Gandhi had to leave. She asked me to chair the rest of the meeting. We agreed to set up a committee headed by MGK Menon, an eminent scientist, who came from that region. Menon did a detailed study which took time, and I had left for the Philippines by that time; but when he did, the report noted that the Silent Valley was an ecological treasure that could not be sacrificed at any cost.

In the meantime, Karunakaran became the Chief Minister in 1982, the Silent Valley Biosphere Reserve I had recommended was set up, and alternate arrangements for water and power for the region negotiated. That was my last act before going to the Planning Commission - saving the Silent Valley with the help of Indira Gandhi.

4. Experiencing democracy first hand

I served as a Nominated Member of the Rajya Sabha from 2007-13, an experience which helped me understand the strengths and weaknesses of our Parliamentary democracy. Among the highlights of my tenure, was the opportunity to vote in favour of the Bill to reserve 1/3rd of the seats in Parliament for women (Constitution (Ninety Sixth Amendment) Act 2010). The socio-political empowerment of women, I believe, which started at the Panchayat level, needs to be extended up to the highest decision-making bodies of our country, to hasten the end of all forms of gender inequality and injustice.

While the issue-based support extended by all parties to important pieces of legislation gave me happiness. I feel sorry that my Private Member's Bill entitled 'The Women Farmers Entitlements Bill, 2011' could not come up for discussion before the end of my term. On two occasions, it was listed for discussion, but unfortunately, on both the occasions the proceedings were disrupted, leading to adjournment of the House. I hope soon a consensus will emerge among leaders of political parties that both the Question Hour and the time allotted to Private Members' Business should be out of bounds for disruption. In the latest Gender Inequality Index by UNDP, we occupy the 132nd position

among 148 countries. This is a sad situation and without attention to the problems of rural women and women farmers, who constitute the majority of women in our country, neither livelihood and food security, nor gender equity can be achieved.

In my farewell speech at the Rajya Sabha, I said "As a biologist, I wish to cite an outstanding example of democracy at the household level. Charles Darwin is well-known for his path-breaking work in elucidating the origin of species, including ourselves, through evolution. Darwin's wife, Emma, was a staunch Catholic and the theory of evolution was considered blasphemy both by Catholics and several other religious groups at that time. She was once asked how she managed to live peacefully with Charles, considering that his theory of evolution was unacceptable to her. She replied, 'Charles lives by reason and I live by faith; what leads to faith is feeling and not reasoning. We agree to disagree and live happily together.' This represents the very essence of democracy for me."

Contextual embeddedness and cultural diversity

Contextual awareness is a key principle of anthropology and the social sciences, but a rare sensitivity for a scientist. Perhaps the very nature of agriculture, and the differences in productivity based on different soil types and weather conditions, technologies and divisions of work, gave him the strong conviction that modern science cannot achieve change on its own, but needs to blend with the local cultural context. His belief that livelihood security of the poor has to go hand in hand with ecological security has informed programmes at MSSRF, but with fast changing contexts, driven by many external factors – education, markets, technologies and changing aspirations - he also recognises that needs change; hence programmes need to be reviewed periodically to check their continued relevance on the ground. Institutions, as they mature and get known, also tend to get complacent. Is there still a niche for the work, or is it merely routine, is a question always at the top of his mind.

1. MSSRF building – harnessing the sun and rain water

Tamil Nadu is in a rain shadow region. Water for both domestic and agricultural use is in short supply, and the aquifers near the coast are

being over-exploited. But, we have an abundance of sunlight. So when we designed our building in Chennai, our architect Venkat was asked to incorporate methods of harvesting both rain and sun. The building is designed to harvest all rain water and store it above or below ground. Likewise, the use of electricity for lighting rooms has been minimised by the use of natural light to the extent possible. In addition, a solar photovoltaic system was set up which provides uninterrupted power supply to all the computers. One of the objectives of this was to showcase the possibilities of such simple actions, especially for other institutions and for farmers and rural people who often visited us.

2. Finding an institutional niche through consultation

A key principle underlying the setting up of the MSSRF has been the effort to fill critical gaps in knowledge and practice. In my mind I was clear that there was no point in setting up one more Centre, because there are hundreds of research centres in India. The research has to be both anticipatory – anticipating farmers' problems – and participatory – finding collective solutions. I hence wanted land for a building, but not to develop our own farms, as I believed we should work with farmers in their own fields. By the end of 1989 we had land in Taramani, given by the then Government of Tamil Nadu under Karunanidhi's leadership.

But before the building could be designed and built, we needed a place to start work. IIT Madras invited me to be a Visiting Professor; they gave me two rooms, and this is where I met Rajeshwari and Raman. They had a project on sea grass beds in the Gulf of Mannar area. India has a vast coastline, but the sea and land interface has never been looked at in an integrated way. The Fisheries Institute and Department were looking at capture and culture fisheries, but not at coastal agro-forestry, or mangroves, which are good breeding grounds for fish. We organised a small dialogue in IIT, with 15-20 people, on the concept and design of a coastal systems research project.

Around this time, I had gone to Japan to deliver a lecture at the Climate Conference, chaired by Dr. Saburo Okita, Foreign Minister of Japan, who had received the Magsaysay Award along with me in 1971. At the end of the lecture, he seemed enthusiastic about the idea of anticipatory

research to develop material for salt tolerance, sea water tolerance, mangrove conservation and so on, and recommended to the Japanese Government to support such work. Unexpected support also came from a Japanese industrialist, who after listening to my lecture, invited me for breakfast and gave a cheque for US\$100,000 for our mangrove work. This helped leverage support from the Department of Biotechnology to establish a genetic garden of mangroves at Pichavaram. Apart from financing us through the International Tropical Timber Organisation (ITTO), the Japanese also asked me to chair the setting up of an International Society for Mangrove Ecosystems (ISME) at Okinawa, very rich in mangroves. From having earlier worked on rice, wheat and potato, this was a clean break for me, something new and refreshing, and clearly contributing to fill a knowledge gap. No one else in the country was working on this issue.

Mina: At about this time, I had made friends with a Kattaikoothu artist (a traditional theatre form of Northern Tamil Nadu) and became an impassioned student of the form, travelling to remote villages to see performances. My friend Rajagopal had got a small grant from the Ministry of Environment to develop a performance to create awareness on the theme of ecological sustainability, and I collaborated with him. I developed the story, while he developed the text, music, and dances, rehearsed the play with his groups, both adult and child, and performed it. We used the traditional concept of *Pancha Bhootham*, or Five Spirits, representing the five elements - water, fire, earth, air and space - and how they rebel as a result of Man's ill-treatment, leave earth and withdraw to heaven. They can only be persuaded to come back if a crore of trees, or a forest, is raised in one night. A young couple take up the task, and with the help of a bull who ploughs, a parrot who drops the seeds, an elephant who waters the field, and a dog who guards the seedlings all night (all the animals representing various Hindu gods) the forest miraculously rises up by dawn. This play has been sponsored by the Forest Department for countless performances in villages, schools and colleges, and a video has also been produced so that scientists and NGOs can use it where the drama group cannot reach. This was my 'value-addition' to the mangrove forest restoration programme!

3. Drawing on the military in contexts of conflict: a lesson from Burma

Burma, now Myanmar, has a lot of germplasm, similar to what we have in our North East. However, this was not collected because these were very disturbed areas. When I went to Myanmar from IRRI, I told General Yu Gong that he should give some protection to our collectors. 'Why Swaminathan, why do you want to send your people? You train my soldiers on how to collect and what to collect, and they will do this for you'. We made a very good programme, I was there for the first two days. T. T. Chang ran the programme, explaining to the generals and the soldiers how to collect what we call 'passport data' about the plant. They collected about 9,000 varieties. I must give credit to General Yu Gong for opening my eyes to this potential.

Many disturbed areas are very rich in biodiversity. It is not always possible to send scientists there, we cannot expose them to risks. I remember in the 1960s, when we started the Assam Rice Collection, there was a lot of disturbance in the North East, including in Nagaland. I stayed myself at Makokchung, in the midst of the forest, occupied by the Aos who engage in slash and burn cultivation. I didn't want to expose my scientists; rather I wanted to give them confidence by staying with them. We have a collection of 7-8000 varieties from there. I had met the General before going there, but at that time I never thought of using the army people. In fact, they were disliked and the General advised me to go into the forest without them – that way we would be safer. Now things are worse, war and weapons are much more sophisticated and ruthless. What is important, I think, was the use of creative strategies to initiate a systematic process of collecting varieties not just from established areas, but also 'hotspots', often disturbed. This helped us almost double the collection in the Gene Bank.

Maintaining the highest ethical standards

This is perhaps the most critical of all the principles, encompassing both scientific and intellectual ethics, displaying fairness and fair-play in credit-sharing and authorship arrangements, as well as financial integrity. Professional, financial and intellectual integrity form the bottom-line.

Only through strict adherence, can not only just and lasting relationships be built between both colleagues and collaborators, but meaningful constructive work undertaken. This was a principle strongly ingrained also by Dr V. Kurien, whom I often got chance to hear while at IRMA, and whose impeccable personal integrity and zero tolerance for any transgression, personal or financial, contributed to his success. Strong ethics can make a person unpopular, draw criticism, yet in the interests of the larger cause and for long-term sustainability, some sacrifices often become inevitable.

1. Challenges confronting a research organisation

A fundamental need for any good organisation, particularly one concerned with the development of new knowledge and technologies for the benefit of people, is a strong ethical foundation. In a scientific institution, ethical commitment has different dimensions. One is a purely scientific dimension, related to credit sharing. In fact, when we started the Foundation, I circulated a note saying 'honorary' authorship should be completely prohibited, but credit should be given where it is due. Leaders have to set the example in this respect, not let a student or research assistant feel obliged to add the leader's name as author. While these power relations remain and need to be negotiated all the time, I think today students and younger people are also getting bolder and more aware, and are able to talk openly to their Professors. Also many journals, including *Science*, now require the authors to certify that there are no honorary authors. So I do think awareness of ethics is spreading, yet we cannot take it for granted.

It is for this reason and the desire to share credit, that I have always avoided using awards for my personal needs or personal projects. Even if the idea has been mine, in an applied field, putting it into practice has required support from many research scholars. So while recognition of an individual is important, it is also important to acknowledge that this success is owed to a number of other people. That is what I have always thought, and hence whether it was the World Food Prize or the Honda Prize, every prize has gone towards a common purpose, rather than for personal use. A second part of scientific ethics is plagiarism; a lot of people now use the Internet to plagiarise. We had a few cases of plagiarism at MSSRF, and immediately dismissed the guilty parties.

Scientific research is for truth, scientific ethics therefore involves a very strong moral character.

At IRRI, while there was no Ethics Committee, people by and large demonstrated ethical behaviour. There was only one problem area, and that was credit-sharing, especially with the local staff and with national research systems. In India, even today, some people think that the science behind the green revolution began only with wheat. As I have explained in my article on the Yield Revolution (2013), this was not the case; in fact the seeds of the Green Revolution were sown in 1949, in the fields of the CRRI, Cuttack, by K. Ramaiah and his colleagues, with a breeding programme designed to impart responsiveness to fertilisers by crossing *japonica* and *indica* varieties. When scientists are well known and work at the international level, there is a tendency to take the credit for themselves. I often told the scientists at IRRI, whom I nominated for prizes – 'I am nominating you because you are the Head of the Department, but your work has been shared by many others. You have been drawing an international salary for your whole life, so at least you can share your award with those who contributed to these successes'.

A second aspect of ethics, especially for those in managerial positions, relates to financial integrity. Funds, particularly to a Foundation like MSSRF, come from different sources and with well-defined objectives - that money has to be used for the particular work for which it was obtained and not diverted to other purposes. So, financial integrity comes into play in two ways. First, making sure that money is used for the purpose for which it was given, and second, ensuring that no money is misappropriated.

Finally, it is important that staff have a feeling that lack of integrity will not be tolerated. The bottom line of the personnel and administrative policies should be a firm commitment to professional, financial and intellectual integrity. Then that institution will harbour lasting friendship amongst colleagues. I have seen colleagues fall out on the sharing of credit, parting ways when they feel that their contributions have not been appropriately recognised. So in MSSRF, we have tried to promote a culture of honesty, a culture of ethics and of financial integrity. Fortunately, in the first ten years, high standards were set. But this can be very fragile, if it is not nurtured and reinforced. Exceptions may

prove the rule, or undermine it. For example, if you know somebody has completely plagiarised and condoned it, others may follow suit; the same goes for financial misappropriation or sexual misdemeanour. So there must be a firm message, whenever there is a transgression of these fundamental ethical principles.

We are therefore now institutionalising the principles of ethics and have set up an Ethics Committee of the Board of Trustees. We already have some codes of conduct, such as the Gender Code, but the Ethics Committee is now tasked with clarifying guidelines on a range of issues – whether personal behaviour, professional ethics or financial dealings. As the organisation has grown, there needs to be a well-defined and transparent Ethics policy, which people should understand.

Mina: Having worked in several institutions at practical levels, by now I had enough institutional and managerial experience to contribute in that area, in addition to managing my own projects in child education, drama and gender. I began by introducing various activities for social mixing of the staff at different levels, like sports, picnics and exposure visits (including the ecological play), but their social and managerial value was not appreciated by the management and they were dropped after a few years. At first, the only interaction among staff was the formal scientific weekly seminar in Chennai, and the Annual Conference, which was also a series of scientific presentations with hardly any time for discussion. But I did succeed slowly in promoting regular exchange and interaction at various levels, horizontal and vertical, within and between disciplines, Programme Areas and field sites, through a number of planned theme-based workshops, inter-disciplinary discussions, inter-site meetings, and other non-hierarchical strategies, as well as staff participation in management. One of the results of the latter was a flexible system of support services for women staff working in rural areas. Another was the development of a system of annual staff evaluation as a participatory exercise, led by a well-known specialist in human resource management. Finally, as a Trustee, and Chair of the Personnel Committee of the Trustees, I led the development of a Personnel Policy, and also developed a Gender Code, both with organised feedback from the staff. Some of these developments have come to stay, others have not, but that is natural in any developing institution.

2. Government procedures: the civil services code of conduct

In my earlier career in the government, we were subject to the Government's Civil Service Code of Conduct, which provides an extensive set of rules and expectations around financial integrity, personal behaviour etc. There was also an annual Confidential Review (CR), which recorded any doubtful or unfavourable characteristics of the person. These CRs are examined during the promotion process, if you have worked beyond the efficiency bar for five years, you will be promoted; but if you have a few black marks, you can also be dismissed. So there were rules, and these rules were quite transparent. I think this is something we need to learn too – rules and procedures need to be clear and transparent, if we are to facilitate work that requires high levels of commitment. Ad hoc decisions, criteria for which are not clear, will only create discontent and de-motivate people from giving their best.

Unfinished Agendas

MSS has worked non-stop in the interests of India's agriculture, and more importantly, its farming men and women, over the past six decades. I started this project seeking to answer the question of what keeps him going, so at the end of our conversations, given the mass of information on all he has done, I asked if he still had any unfinished dreams. Unsurprisingly, he set out a huge agenda –that of addressing the Indian enigma of a high malnutrition burden in the midst of adequate grain availability.

From my childhood I have observed, both in Thanjavur district of Tamil Nadu and Kuttanad in Kerala, the widespread prevalence of anaemia in children and mothers in rural areas. Both these districts are granaries of their respective states. Why then such a high incidence of malnutrition? This has always bothered me. It is not just calorie intake, but clean drinking water and sanitation that constitute the basic requisites for a healthy life. Protein hunger and hidden hunger caused by the deficiency of micro-nutrients like Vitamin A, Vitamin B12, iron, zinc and iodine are also debilitating. We need a holistic approach to attacking the problem of malnutrition, with concurrent attention to calorie deprivation, protein hunger and hidden hunger.

My frequent visits to villages in Delhi, Punjab and other parts of North India from the mid-1950s also made it clear that attacking the malnutrition burden is a priority task for those working in the area of enhancing agricultural production. Evidence started coming in from the 1960s about the potential adverse effects of maternal and foetal under-nutrition on the cognitive abilities of the child in its later years. This led to my giving a talk on the threat of intellectual dwarfism in the mid 1960s at a Vegetarian Congress, where I emphasised that we should provide horticultural remedies, both through selection from nature, as well as by breeding, for major nutritional maladies. A food rather than a drug-based approach would be both effective and economical.

I am convinced that an innovative science-based marriage of nutrition and agriculture can make a significant contribution in this area. When I became the DG of ICAR in 1972, one of my early steps was to create a position of Assistant Director General, Nutrition in ICAR. We introduced a course on nutrition in the syllabus of the Agricultural and Veterinary Colleges in order to familiarise students with the opportunities available to overcome malnutrition through agricultural and animal husbandry pathways. Unfortunately, the curricula have not developed further to explore new opportunities for mainstreaming the nutritional dimension in farming systems research.

So I have now designed a Farming Systems for Nutrition (FSN) methodology. FSN will provide a mechanism for ensuring that small farm families, who constitute a considerable proportion of the malnourished, will be able to overcome the major nutrient deficiencies in their diet. Fortunately, we have some funding for such work from DFID, UK and I am quite excited about the possibility of making a major dent, not only on maternal and infant malnutrition, but also malnutrition in general among the rural population. Now that the National Food Security Bill will help us overcome poverty-induced calorie deprivation, the challenge of eliminating malnutrition in rural India through agriculture will probably keep me intellectually and emotionally occupied and satisfied for the remaining years of my life.

Conclusions: The making of a leader

What these stories and reminiscences demonstrate is a very particular style of leadership, made up of several key components. First of all, is a personal commitment to the cause of human dignity and social justice which forms the core philosophy of his life, driven by principles of trusteeship, secularism, inclusivity, equity and personal integrity. As a leader this has enabled him to develop a sense of commitment amongst his colleagues, facilitating their personal and professional growth, and motivating them to work together and give their best to the common goal. Work then becomes a source of joy and satisfaction, rather than an onerous responsibility.

Second, while the leader is clearly one in command, the authority emerges from a position of knowledge, from intellectual capacity, rather than hierarchy. It comes from generosity, from mentoring, from intellectual and personal support, rather than mere position. Respect is earned, not demanded. Alongside authority sits accountability. Unfortunately accountability, as MSS says, 'appears to be going out of our dictionary in India now, with people enjoying authority, centralising power in themselves, yet neither transparent nor accountable in their everyday practice'.

A third key quality of a leader is the personal example of ethical behaviour, including a strong commitment to the goals of the organisation, and to professional and personal ethics. Recognising collective contributions has meant that all the awards received by MSS over the years have been given to the Foundation, which today supports over 400 staff. Perhaps it reflects the Gandhian philosophy of trusteeship, that all property should serve the collective interest, especially of those who do not have it. Personal property, inherited from the family, was also given to the Foundation. His life has been one of simplicity, meeting basic needs, yet not coveting more than needed.

Fourth, a leader needs to recognise people and their contributions. In many places across the country, farmers, the poor, including women, remember his visits with fondness. This is because of a very personal quality – the willingness to speak to everyone, making sure that the cook, the driver, the watchman.., are all recognised and thanked for their service, making people feel valued for who they are. Once when he was DG of IRRI, one of his two Secretaries was on leave, so the other could not leave her seat to go for tea. He noticed this, and when he returned, had a packet in his hand for her - a little teacake which he had purchased in the cafeteria. She was very moved.

If you love people, and treat them as human beings, they love you back – relationships are always two-way and mutual. Little incidents like this stick in people's minds, and as they add up, they contribute to the making of a leader – a father figure who is truly cherished.

Fifth, while recognised as a giant in his field, he has remained open to new ideas, to debate and discussion, continuing to learn from life's everyday experiences. This is something I have experienced at close quarters – often, we talk about something, and then he will ask me to write it down for him. He thinks about it and adapts it in his own way. And this is indeed a remarkable quality. We often feel that once we have said something or made a claim, we need to stick to our position. However, circumstances change, life changes, and one survives only through the willingness to adapt and learn. The Yield Revolution in wheat played a significant role in the country's history at that moment in time; however, over the years, he has taken on board many of the critiques, engaged with them, and developed new strategies in response. This openness and ability to learn needs to be highlighted, as many 'experts' today believe they know it all!

Finally, and perhaps most importantly, a leader has a vision, a message for the world. In MSS' case, following many years of varied experience, this has been articulated in the mandate of the Foundation, a vision of equitable and sustainable development, based on a pro-nature, pro-poor and pro-women stance. In 1994, Dr. Gus Speth, the then head of UNDP, was invited to Pondicherry to inaugurate a threshing floor in one of the villages. He walked around the village, looking at the activities of the women, almost unable to imagine how women lived and worked in those conditions. On his return to Delhi, he wrote a letter asking MSS if he could use the principles of 'pro-nature, pro-poor and pro-women' as part of UNDP's definition of human development. MSS replied, 'When I do something, it is of local significance, when you do it, it assumes global significance. If you like this formulation, please do adopt it'. Not many in UNDP know where this definition came from – the point really was not personal name or fame, but influencing the world of ideas and knowledge, both at the grassroots and at the policy levels, in the cause of socially just development.

MSS' life has been an adventure in marrying science with societal needs, but equally developing methodologies and methods by which the livelihood security of local communities and the ecological security of the area can become mutually reinforcing - all with a very human and personal touch.

M. S. Swaminathan: Highlights of Career

Birth: 7th August, 1925, Kumbakonam, Tamil Nadu

Education:

- B.Sc. University of Travancore, 1944
- B.Sc. Agriculture from Coimbatore Agricultural College, Madras University, 1947
- Associate IARI in Genetics, IARI, 1947-49
- UNESCO Fellow in Genetics at the Agricultural University at Wageningen, The Netherlands, 1949-50
- Ph.D. from the School of Agriculture, University of Cambridge, U.K. in 1952
- Research Associate in Genetics at the University of Wisconsin USA during 1952-1953.

Key Positions:

- Teacher and Researcher, Indian Agricultural Research Institute, New Delhi (1954-66).
- Director, IARI (1966-72)
- Director General, Indian Council of Agricultural Research, and Secretary to the Government of India, Department of Agricultural Research and Education (1972-79).
- Principal Secretary to the Government of India, Ministry of Agriculture and Irrigation (1979-80).
- Member (Agriculture, Rural Development, Science and Education), Planning Commission, Government of India (1980-82).
- Director General, International Rice Research Institute (IRRI), Philippines (1982-88).
- Chairman, M. S. Swaminathan Research Foundation (1989-2012).

- Chairman, National Commission on Farmers, Government of India (2004-06).
- Member of Parliament (Rajya Sabha) (2007-2013).
- Member, National Advisory Council, Government of India (2010-2012).
- Founder Chairman and Chief Mentor, M. S. Swaminathan Research Foundation (2012 Onwards)

Recognition by Science Academies

- Fellow, Indian National Science Academy (1961)
- Fellow, Royal Society of London (1973)
- Fellow, US National Academy of Sciences (1976)
- Fellow, Russian Academy (1977)
- Fellow, Chinese Academy of Agriculture Sciences (1987)
- President, National Academy of Agricultural Sciences (1991 – 1996 & 2005-07)

International positions held

- Independent Chairman, FAO Council (1981-85)
- President, World Conservation Union (IUCN) (1984-90)
- President, Pugwash Conferences on Science and World Affairs (2002-2007)
- Chairman, High Level Panel of Experts on Food Security and Nutrition of the UN Committee on Food Security (CFS), Rome (2010 onwards)

Selected National and International Awards:

- Shanti Swarup Bhatnagar Award for contributions to Biological Sciences (1961)
- Padma Shri (1967)
- Ramon Magsaysay Award for Community Leadership (1971)

- Padma Bhushan (1972)
- Borlaug Award (1979)
- Founding Fellow, Third World Academy of Sciences (1983)
- First International Award of the International Association for Women and Development (1985)
- Albert Einstein World Science Award by the World Cultural Council (1986)
- The Golden Heart Presidential Award of the Philippines (1987)
- First World Food Prize (1987)
- Padma Vibushan (1989)
- The Tyler Prize for Environmental Achievement (1991)
- Honda Prize for Ecotechnology, Tokyo, Japan (1991)
- UNEP - Sasakawa Environment Prize (1994)
- Blue Planet Prize (with MSSRF) (1996)
- Volvo Environment Prize (1999)
- Indira Gandhi Prize for Peace, Disarmament and Development (2000)
- Sahametrei Medal of the Government of Cambodia (2006)

Recognition by Universities

- Honorary DSc Degree from 70 Universities in India and abroad

References

Bernardo, Fernando. A. 2010. *50 years of Progress : Fighting Poverty and Hunger*. IRRI-Philippines, Manila, Philippines.366 pp.

Govt. of India, Ministry of Water Resources 2006 *Report of the Sub-Committee on More Crop and Income per Drop of Water* New Delhi India 57pp.

Puckridge, Don. 2004. *The burning of the rice: a Cambodian success story*. Temple House Publishing, Victoria, USA. 326 pp.

Swaminathan, M. S. *From Bengal Famine to Right to Food*. The Hindu, 23 February 2013.

Swaminathan, M.S. 2013. *Genesis and growth of the Yield Revolution in Wheat in India: Lessons for Shaping our Agricultural Destiny*. Agricultural Research. Published online June 23, 2013, doi 10.1007/s40003-013-0069-3.

The International Rice Research Institute. 1985. *Women in Rice farming: Proceedings of a Conference on Women in Rice Farming Systems*. Manila, Philippines. 531 pp.

The Famine that might have been, The Economist, October 20, 1979.

How Not to Run Research Councils (Indian style), Nature. May 19, 1972. 237 (5351): 123.