

Interim Recommendations of the Karnataka Agriculture Vision Group

Shaping Karnataka's Agriculture Future

By

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1. A number of issues require urgent attention. Eternal vigilance is the price of stable and sustainable agriculture. Karnataka farmers are hard working and Karnataka's agriculture has also placed emphasis on high value crops like fruits, vegetables, flowers and plantation crops like coffee, citrus, pepper etc. Coconut is also an important crop. The major challenges ahead which merit attention are the following:

- Avoiding Food losses and Food Waste
- Climate change, temperature, precipitation, and sea level
- Shrinking per capita land and water resources
- Expanding biotic and abiotic stresses
- Adverse cost-risk-return structure of farming
- Market volatility
- Reluctance of youth to take to farming : leading to a lack of demographic dividend
- Diversion of prime farm land for non-farm use

2. Already parts of Karnataka are experiencing high temperature and drought. Adaptation to climate change through the development of **drought, flood and good weather codes** is an urgent need. Detailed project proposals will have to be prepared to meet each one of the above challenges. Maximising production is good

seasons and minimising loss under adverse conditions are the purpose of the Inter-disciplinary Drought, Flood and Good Weather Codes.

3. The most urgent need in agriculture is income orientation to farming, as emphasised by the National Commission on Farmers (NCF). Just as food grain reserve is important for food security, climate change adaptation is essential for crop security. In this context, some of the issues raised in the Union Budget of 2016-17 are relevant. Income security of farmers and doubling of farm income in five years are important goals as emphasised below

Doubling the Income of Farmers in Five Years

Giving an income orientation to farming is probably the most significant announcement made by the Union Finance Minister. He has said that the aim of government will be to double the income of farmers in five years. The economic survey however points out that the contribution of agriculture and allied sectors has been declining. It is in this context that the emphasis on income becomes urgent. The National Commission on Farmers (NCF) had recommended that hereafter we should measure agriculture progress by the growth in the real income of farmers and not just by gross production of wheat, rice and other commodities. **For achieving income enhancement, we need in my view, at least five major steps.** These are, first, higher productivity of small farms leading to larger marketable surplus – second, knowledge, skill, credit and land ownership empowerment of women farmers, who carry out over 60% of farm work, third, substitution of low value crops with high value ones like fruits, vegetables and flowers as well as animal products; four, promotion of biomass utilisation so that every part of the plant is utilised for

preparing value added products through initiatives like Rice BioPark and finally, the procurement price should be based on the NCF proposal namely, C2 plus 50 per cent.

In order for the MSP benefit to reach farmers, it is proposed to decentralise procurement, promote online procurement through FCI and effective arrangements for the procurement of pulses at an attractive MSP. Also, four new dairy programmes namely, animal health card, advanced breeding technology, E-market portal and the establishment of a National Centre for Indigenous Breeds with an allocation of Rs. 850 crore are timely, since we have nearly a billion farm animals.

An allocation of Rs. 80 lakhs per Gram Panchayat will now be available to assist villages to fill infrastructure gaps. As recommended by the NCF, **atleast Rs. 20 lakhs out of this amount should be reserved for meeting the gender specific needs of women.** Facilities will be created for an additional storage of Rs. 97 lakhs metric tonnes of food grains. Rural infrastructure will be improved by the allocation of Rs. 19,000 crore for the Pradhan Mantri Gram Sadak Yojana. The adverse impact of natural calamities will be minimised through increased agricultural credit and improved insurance. Rs. 5,500 crore has been provided for an enlarged crop insurance scheme.

As indicated above, a five point action plan is needed to achieve the goal of doubling the income of Karnataka farmers within five years. In this context there is urgent need for the technological and resource empowerment of women farmers. The broad strategy indicated in the attached Private Members Bill which I had introduced in the Rajya

Sabha could be suitably utilised for developing a **Karnataka Act for the Empowerment of Women Farmers** (*Annexure 1*).

Shaping Karnataka's agriculture future

Some of the more recent issues which need consideration while developing the detailed strategy for shaping the future of agriculture in Karnataka are given in *Annexure 2*.

The following three areas may be covered if the Karnataka's budget for 2016-17

- a. **Farm School** : Promoting farmer to farmer learning (Land to Land) – Farm school should be established in the fields of outstanding farm men and women, so that other farmers can come and stay and interact with the successful farmers. Farmer to farmer learning is a very effective method of spreading good technologies speedily.
- b. **Special Agriculture Zone (SAZ)** – We should establish in pre-urban areas adjoining major cities like Bengaluru and Mysore. SAZ for producing the commodities needed by the urban population like fruits, vegetables, flowers and eggs. The land in SAZ should be preserved for agriculture. On the model of Special Economic Zones (SEZ), incentives may be given to farmers in the SAZ areas. Through SAZ, a symbiotic relationship can be developed between urban and pre-urban areas.
- c. **Village Knowledge Centres (VKCs)** – These computer aided and internet connected centers could be developed jointly with MSSRF and ISRO, so that the latest scientific information could be conveyed to farm families. The monsoon

and the market are major determinants of a farmers' wellbeing. Therefore, information should be provided both on climate and market conditions at the right place and time and to the right people.

Pulses Mission

2016 is the International Year of Pulses. Union Finance Minister has provided Rs. 500 crore for initiating a Pulses Revolution in the country. Pulses and millets are high value but low water requiring crops. Therefore, they can be important ingredients of a climate smart agriculture.

Mandatory Water Harvesting

Natural resources management particularly rainwater harvesting will be important to give a crop live saving irrigation when needed. Therefore harvesting rainwater both in the farms and homes should become mandatory. Pani Panchayats and Community Water Harvesting and Management councils could be established.

Enlarging the Food Basket

The Central Food Security Act provides for including in PDS a wide range of underutilised crops like ragi, bajra, jowar, kodu millet and many other millets. It is very important that Karnataka which has already included ragi in PDS, should expand the food basket from the point of view of both MSP and PDS. Also value added products should be prepared from the nutri-millets just as being done already by a few food

processing companies. Karnataka should adopt methods by which there could be value addition to primary products. This will also help to create more skilled jobs and additional income.

Technological upgrading of farming

In order to attract and retain youth in farming, agriculture has to become both intellectually satisfying and economically rewarding. For this purpose, an Agriculture Technology Group may be set up for recommending how to benefit from new technologies like space, bio, nuclear, and information technologies. Agriculture engineering particularly implements which can reduce drudgery and improve the efficiency and timeliness of farm operations must be given priority in investment and manufacture.

Precision Farming

Precision farming provides opportunities for attracting and retaining youth in farming. It can be adopted by a group of farmers who can organise themselves into a precision farming group. This will help to reduce expenditure and enhance productivity and profitability. It will also be an appropriate way for launching the International Decade of Sustainable Development (SDG). Among the 17 goals of SDGs, sustainable agriculture forms part of Goal 2. Precision farming will help to promote ecologically sustainable agriculture.

Biosaline Farming

Recently, Kerala Chief Minister Shri Oommen Chandy inaugurated at Moncompu in the Kuttanad region of Kerala an International Research and Training Centre for Below Sea Level Farming. This is one of the important steps taken in our country for anticipatory action to meet the potential challenge of a rise in sea level caused by global warming. The Kuttanad farmers developed over 150 years ago a technology involving Biobunds for taking good crops of rice during the southwest monsoon period. Their fields were often 4-5 meters below sea level. This method of below sea level farming received recognition from FAO which designated the Kuttanad area as a Globally Important Agricultural Heritage Site (GIAHS).

The Kuttanad below sea level farming system involves fish production through aquaculture during winter months and rice and pulses production during the southwest monsoon period (June – October). Coconut is often planted on the bunds. It is anticipated that with an increase in sea level, as a result of the melting of snow in the Antarctic and Arctic regions, there will be need for more attention to biosaline agriculture. Biosaline agriculture involves the management of water salinity and the cultivation of varieties of rice which are tolerant to sea water stress. This kind of biosaline agriculture is also referred to in Kerala as Pokkali rice cultivation.

Globally, 97 per cent of water is sea water. For a long time, there has been interest in the cultivation of crops with sea water in the Middle East and Israel. This is now referred to as Biosaline Farming. MSSRF has a large biosaline farming research, training and demonstration programme in the Nagapatinam and Vedaranyam areas of Tamil Nadu.

For facilitating biosaline agriculture, MSSRF has established a **Genetic Garden of Halophytes** (i.e. salinity tolerant plants). Systematic studies on diversity and ecology of halophytes are very limited due to lack of appreciation of the importance of halophytes as crops of the future. However, most of the floristic and ecological studies in mangrove environment indicated the presence of halophytes such as *Suaeda maritima*, *Suaeda monica*, *Suaeda nudiflora*, *Sesuvium portulacastrum*, *Arthrocnemum indicum*, and *Salicornia*. The Central Soil Salinity Research Institute, Karnal has conducted a study of halophytes in Sunderbans.

In India, most of the research relating to halophyte cultivation is conducted by the Central Salt and Marine Chemical Research Institute (CSMCRI), Government of India. In order to utilize coastal saline soils CSMCRI has selected *Salicornia brachiata* as candidate halophytic species and developed agrotechnology for its cultivation under seawater irrigation system. *Salicornia brachiata* is an edible oil producing halophyte and also used as salad. It can also be used to extract vegetable salt which is less in sodium chloride and thus suitable for heart patients. Techniques to cultivate *Salvadora persica*, a halophytic tree species, have also been developed.

Integrated Mangrove Fish farming system: In India, *Pokkali* system, where cultivation of paddy and shrimps are integrated but in separate seasons, is followed in low lying coastal areas of Kerala. *Pokkali* is a paddy variety resistant to salinity. The rice is cultivated from June to early November when the salinity level of the water in the fields is low. From mid-November to mid-April, when the salinity is high, shrimp cultivation takes over. The prawn seedlings, which swim in from the sea and the backwaters after

the rice harvest, feed on the leftovers of the harvested crop. However the application of this method is yet to be tested in other parts of India. Similarly, in Sunderban mangroves of West Bengal another method that integrates cultivation of paddy and shrimp namely, *bheri* is followed traditionally. However, the production from the "*bheries*" has been declining gradually over the years owing to various reasons, such as silting (which reduces the tidal flow), scarcity of seed and socioeconomic conditions of the fishermen. Many of these techniques can be adapted to suite the conditions of coastal Karnataka.

MSSRF has recently developed modes of Integrated Mangrove Fishery Farming System. In this system, nearly 30 to 35% of the space is left for planting saline tolerant plants including mangroves and halophytes whereas remaining 70 to 65% is left for holding seawater for fish culture. Physical space for plantation will be created in the form of inner bunds) or mounds within the farm. The farm can be designed in such a way that it is filled with seawater or brackish water during high tide and drained out during low tide. Mangrove trees are planted along the banks of the outer and inner bunds and mounds. Fish, prawn or crabs are cultured in the standing water. No artificial feed or chemicals are used in fish culture. Biosaline farming can enhance the income and livelihood security of coastal communities.

Fish for All and for ever

Karnataka has a long coastline and opportunities for increasing fish production are abundant. A large number of fishermen operate with small country boats. It is important that they are empowered with information on wave heights from different

distances from the shoreline and location of fish shoals. Such fisher friend applications of mobile telephony will have a transformational impact on small scale fisheries. Such small scale fisher families must be supported with a Fish for All Training Center like the one established by MSSRF at Poompuhar in Tamil Nadu. This will enable the adoption of scientific and sanitary fish processing methods. The blue revolution will then be a reality.

Conclusion

The above are steps which need immediate attention to enhance agricultural income and agrarian prosperity. The benefits of the new crop insurance scheme and other central schemes should also be taken to the farmers in every village of Karnataka. Income security of farm families and attracting youth in farming constitute the vision for the next phase of Karnataka's agriculture.

M S Swaminathan
1 March 2016

Encl: *Annexure 1* – The Women Farmers' Entitlements Bill 2011
Annexure 2 – Nutri-Agriculture : Pathway to a Zero Hunger India

Bill No. LV of 2011

THE WOMEN FARMERS' ENTITLEMENTS BILL, 2011

ARRANGEMENT OF CLAUSES

CHAPTER I

PRELIMINARY

CLAUSES

1. Short title, extent and commencement.
2. Definitions.

CHAPTER II

CERTIFICATION OF WOMAN FARMER

3. Certification of Woman Farmer.
4. Acceptance of certificate as evidence.

CHAPTER III

LAND RIGHTS

5. Equal land rights to women farmers.

CHAPTER IV

WATER RIGHTS

6. Equal right to water resources.
7. No discrimination for irrigation purposes.

CHAPTER V

LEGAL ACCESS TO CREDIT AND OTHER AGRICULTURAL INPUTS

8. Entitlement of women farmers to get credits, loans and other financial supports.

CHAPTER VI

FUND FOR SUPPORT SERVICES TO WOMEN FARMERS

9. Establishment of Fund.
10. Women farmer friendly technology.
11. Market facilities.
12. Training and capacity building.

CHAPTER VII

IMPLEMENTATION AND MONITORING AUTHORITIES, THEIR RESPONSIBILITIES

13. Responsibilities of Central Government.
14. Responsibilities of State Governments.
15. Responsibilities of local authorities.
16. Women Farmers' Entitlement Board.
17. District Vigilance Committees.
18. Redressal of grievances.

(ii)

CHAPTER VIII
PENALTIES AND PROCEDURES

CLAUSES

19. Penalty for non-compliance of provisions of this Act.
20. Cognizance of offences.
21. Actions in good faith.

CHAPTER IX
MISCELLANEOUS

22. Overriding effect.
23. Power to give directions.
24. Power of State Government to restrict the application of the Act to certain Areas.
25. Power to remove difficulties.
26. Power of Central Government to make Rules.
27. Rules, regulations and schemes to be laid before Parliament.

AS INTRODUCED IN THE RAJYA SABHA
ON THE 11TH MAY, 2012

Bill No. LV of 2011

THE WOMEN FARMERS' ENTITLEMENTS BILL, 2011

A

BILL

to provide for the gender specific needs of women farmers, to protect their legitimate needs and entitlements and to empower them with rights over agricultural land, water resources and other related right and for other functions relating thereto and for matters connected therewith.

WHEREAS women constitute more than fifty per cent of Indian farmers and about sixty per cent of the workforce in the farming sector; and in view of the increasing feminisation of agriculture as a result of out-migration of men, entitlements for women farmers are essential for the future growth and health of agriculture, as well as protection of food security in an era of climate change;

AND WHEREAS it is necessary to recognize and protect the gender specific needs and rights of the women by empowering and entitling them with enforceable rights over agricultural land, water resources, credit and other related rights;

AND WHEREAS the Married Women's Property Act, 1874 recognised the wages, earnings and other property acquired by an married woman in any employment, occupation or trade carried on by her in her individual capacity as her separate property; the Hindu Succession (Amendment) Act, 2005 entitled the daughter of a Joint Hindu family governed by the Mitakshara law, to become a coparcener in her own right in the same manner as the son and clothes her with the same rights and liabilities in the coparcenary property as she would have

had if she had been a son; the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 recognised the rights of forest-dwelling communities to the forest land and other forest resources;

AND WHEREAS the Government of India has recognized the special needs of women farmers by initiating a "Mahila Kisan Shashaktikaran Pariyojana" programme under the National Rural Livelihood Mission;

AND WHEREAS India is a party to the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), 1979 which calls for elimination of all forms of discrimination of women by ensuring equal access to agricultural credit and loans, marketing facilities, appropriate technology and equal treatment in land and agrarian reform as well as in land resettlement schemes;

AND WHEREAS the Fourth World Conference on Women in September, 1995, in which India participated, called for legislative and administrative reforms to give women equal rights with men to economic resources, including access to ownership and control over land and other properties, credit, inheritance, natural resources, and appropriate new technology, etc. as embodied in the Beijing Declaration and Platform for Action;

AND WHEREAS it is considered necessary to implement the decisions in so far as they relate to the women farmers' entitlements under Article 253 of the Constitution of India.

BE it enacted by Parliament in the Sixty-Second Year of the Republic of India as follows:—

CHAPTER I

PRELIMINARY

Short title,
extent and
commence-
ment.

1. (1) This Act may be called the Women Farmers' Entitlements Act, 2011. 5

(2) It extends to the whole of India except the State of Jammu and Kashmir.

(3) It shall come into force on such date as the Central Government may, by notification in the Official Gazette, appoint.

Definitions.

2. In this Act, unless the context otherwise requires—

(a) "*agriculture*" means and includes, all activities related to cultivation of crops, animal husbandary, poultry, livestock rearing, apiculture, gardening, fishing, aquaculture, sericulture, vermiculture, horticulture, floriculture, agro-forestry, or any other farming activity carried out through self-employment, tenurial cultivation, share cropping, or other types of cultivation including shifting cultivation, collection, use and sale of minor or non-timber forest produce by virtue of ownership rights or usufructory rights; 10 15

(b) "*agricultural activity*" means any activity related to agriculture;

(c) "*farmer*" means any person who is, individually or jointly with any other person,—

(i) engaged in agriculture directly or through the supervision of others; or 20

(ii) contributes to conservation or preservation of agriculture related varieties or seeds or breeds of farm animals; or

(iii) contributes through traditional knowledge to any type of innovation, conservation or to propagation of new agricultural varieties or to agricultural cultivation methods or practices or to the practice of crop-livestock integrated farming system; or 25

(iv) promotes agro-processing, and value-addition to primary products.

Explanation.—The term "farmer" will include, but not limited to, agricultural operational holders, landless cultivators, agricultural labourers, planting labourers, pastoralists, sharecroppers and tenants. The term shall not include corporate entities operated by or involving farmers. In case of landless farmers migrating or moving from one state to another, if anyone stays in a state for at least six months, such person may be considered as a farmer in that particular state.

(d) "*guidelines*" means the guidelines framed by the Authority under this Act with the previous approval of the Central Government by notification in the Official Gazette.

(e) "*land*" means any land or water body utilised for the purpose of agriculture.

(f) "*woman farmer*" means and includes, irrespective of marital status or ownership of land, any woman who is a farmer as defined in sub-section (c) of section 2 and includes—

(i) any woman living in rural area and primarily engaged in agricultural activity, though occasionally engaged in non-agricultural activity; or

(ii) any woman living in urban or semi-urban areas and engaged in agriculture; or

(iii) any tribal women directly or indirectly engaged in agriculture or shifting cultivation or in the collection, use and sale of minor or non-timber forest produce by virtue of usufructory rights.

(g) "*Rules*" means rules notified by the Central Government under this Act.

CHAPTER II

CERTIFICATION OF WOMAN FARMER

3. A Woman Farmer Certificate issued by the Gram Panchayat, after the approval of the Gram Sabha and authenticated by the Village Administrative Officer or an authorized officer of the Gram Panchayat as may be prescribed in the Rules, shall be the conclusive proof of declaring a person as a woman farmer.

Certification of Woman Farmer.

(2) For urban or peri-urban areas, the Certificate shall be issued by the urban local body with the approval of any corresponding authority as notified under the rules:

Provided that a group of women farmers may obtain the Group Women Farmers' Certificate in the same process as may be prescribed.

4. The woman farmer certificate issued under section 3, shall be accepted as evidence for the purposes of establishing the status of a person as a woman farmer under this Act including in all administrative and judicial proceedings.

Acceptance of Certificate as evidence.

CHAPTER III

LAND RIGHTS

5. Notwithstanding anything contained in any other law for the time being in force, every woman shall have equal ownership and inheritance rights over her husband's self acquired agricultural land, or his share of family property, or his share of land transferred by the Government under land reform or resettlement scheme:

Equal land rights to women farmer.

The provided that concurrence of both the spouses shall be necessary in the case of land transfer or acquisition as per the provision of the provided hand acquisition and rehabilitation law.

Explanation.—By virtue of this section, a woman farmer is deemed to have ownership and possession of equal and proportional share of agricultural property in her husband's property even, if, it is not mentioned in any of the relevant documents and the fact that she is the wife of a particular person is the conclusive proof to claim ownership and possession of her share of property and to have effective control over such share of property.

CHAPTER IV

WATER RIGHTS

Equal right to water resources.

6. A woman farmer shall have equal right, as enjoyed by male farmers, to all water resources connected with the agricultural land to which she is the owner, share holder, possessor or uses for farming activity and shall have access to water, water resources and irrigation facilities for carrying out agricultural activities as defined in this Act. 5

No discrimination for irrigation purposes.

7. The woman farmers shall not be discriminated on the grounds of marital status, religion, caste, ownership or possession of agricultural land while accessing water resources for irrigation purposes.

CHAPTER V

10

LEGAL ACCESS TO CREDIT AND OTHER AGRICULTURAL INPUTS

Entitlement of women farmers to get credits, loans and other financial supports.

8. Notwithstanding anything contained in any other law for the time being in force and subject to the provisions of this Act,—

(i) every woman farmer or group of women farmers who have a Certificate of Woman Farmer from the appropriate authority shall be entitled to Kisan Credit Card now available mainly to male farmers. 15

(ii) a woman farmer or group of women farmers shall be entitled to borrow money and other financial support for agricultural activity either on her own capacity or as a member of a women group as may be prescribed in the Rules without any discrimination on the grounds of marital status, place of residence, caste, religion, or absence of collateral security. 20

CHAPTER VI

FUND FOR SUPPORT SERVICES TO WOMEN FARMERS

Establishment of Fund.

9. (1) The Central Government shall set up a Central Agricultural Development Fund for Women Farmers (CADFWF) under this Act, which shall be used to empower women farmers like, incentives for development of women farmer friendly technologies, training and capacity building, creation of market facilities, organization of creches and day care centres, social security for women farmers, old age pensions and other related issues as may be prescribed in the Rules. 25

(2) The Fund shall operate at the Central, State and District levels and shall be administered under the guidance of an appropriate Authority appointed by the Central Government at the central level and offices of the authority appointed in consultation with the State Governments at the State and District level in such manner as may be prescribed. 30

(3) The Fund shall receive contributions and grants from the Central and State Governments, user fees, etc., as specified under the Rules and guidelines framed under this Act. 35

(4) The Authority shall support individual and groups of women farmers organized in the form of registered women's cooperatives or *Mahila Kisan Kendras* as per the guidelines framed under the Act.

(5) The appropriate authority shall frame guidelines with the previous approval of the Central Government by notification in the official gazette for distribution and utilization of the Fund. 40

(6) The Central Government shall frame a scheme for social security of women farmers, especially old age pension as may be prescribed in the Act.

(7) The appropriate authority of the Fund shall also have the power to secure lands from the Government and other sources for distribution of lands to women farmers as prescribed under this Act. 45

10. Any person who wants to develop women-friendly technology, may qualify for short term and long term loans or grants or subsidies or venture capital from the Fund as per the guidelines framed under the Act. Women farmer friendly technology.

Explanation.—The terms 'any person' in this section means individuals and small and medium scale industries.

11. The appropriate authority of the Fund shall create and facilitate market facilities for woman farmers with the assistance of group of woman farmers or of its own in different parts of the country including the establishment of rural godowns. Market facilities.

12. The appropriate authority of the Fund shall organise regular and periodical training and capacity building programmes for woman farmers in different parts of the country to make them aware of the provisions of this Act and to help them in realizing their entitlements and empowerments envisaged under this Act. Training and capacity building.

CHAPTER VII

IMPLEMENTATION AND MONITORING AUTHORITIES, THEIR RESPONSIBILITIES

13. The Central Government shall be responsible for overall implementation and monitoring of the Act, except as provided in this Act. Responsibilities of Central Government.

14. (1) The State Governments shall be responsible for implementation and monitoring of provisions relating to certification of women farmers, realization of land and water rights, operationalization of the Fund at the State and District levels and other responsibilities as mentioned in this Act. Responsibilities of State Governments.

(2) The State Government shall appoint appropriate authorities for carrying out such functions.

(3) The offices of the authority set up in consultation with the State Government shall ensure that the land rights and water rights of the women farmers are institutionalized within the state with suitable amendments to the laws and/or Gazette notification.

15. For implementing different provisions and schemes of this Act, the local authorities like the Panchayati Raj Institutions in rural areas and Urban local bodies in urban areas shall be responsible for discharging such duties or responsibilities as may be assigned by notification to them by the concerned State Governments. Responsibilities of local authorities.

16. (1) Each State Government shall set up a Women Farmers' Entitlement Board at the State level to advise the State Government in implementation and monitoring of the Act. Women Farmers' Entitlement Board.

(2) The Board shall consist of a practicing woman farmer as its Chairperson and two other members dealing with or experienced in technology, credit, inputs and marketing.

(3) The tenure of the Board members shall be such as prescribed under the Rules.

(4) The Board shall follow such procedure in its proceedings as may be prescribed in the rules.

17. (1) For ensuring transparency in functioning of this Act and accountability of the functionaries, every State Government shall set up a District Vigilance Committee in every district. District Vigilance Committees.

(2) The Composition of the Vigilance Committee shall be such as may be prescribed.

(3) The Vigilance Committees shall look into effective implementation of all the provisions of the Act at the district level.

18. For expeditious and effective redressal of grievances of women farmers, each State Government shall set up effective institutional mechanisms at the taluka or tehsil or block level and an appellate mechanism at the District level in such manner as may be prescribed under the Rules. Redressal of grievances.

CHAPTER VIII

PENALTIES AND PROCEDURES

Penalty for non-compliance of provisions of this Act. **19.** Whoever fails to comply with provisions of this Act, rules or guidelines made under this Act shall be punished with imprisonment for a term which shall not be less than six months but which may extend to one year and with fine, or with both. 5

Cognizance of offences. **20. (1)** Any person aggrieved by violation of any provision of this Act, rules or guidelines made under this Act may file a complaint, within ninety days from the date of such violation, to a Court not inferior to that of a Judicial Magistrate of the first class or a Metropolitan Magistrate:

Provided that the Court may entertain any complaint after the expiry of the said period of ninety days if it is satisfied that the complainant was prevented by sufficient cause from filing the complaint within time. 10

(2) For the purposes of sub-section (1), person means—

(a) any woman farmer who is affected;

(b) husband or representative of the woman farmer who is affected; 15

(c) any association of persons or farmers (whether incorporated or not), if it is affected or on behalf of an affected woman farmer;

(d) any local authority within whose local limits the affected woman farmer or association of persons or farmers live.

Actions in good faith. **21.** No prosecution or other legal proceedings shall lie against any person for anything done or intended to be done in good faith. 20

CHAPTER IX

MISCELLANEOUS

Overriding effect. **22.** The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force other than this Act. 25

Power to give directions. **23.** Notwithstanding anything contained in any other law for the time being in force but subject to the provisions of this Act, the Central Government may, issue directions in writing to any person, officer or any authority in order to give effect to the provisions of this Act and such person, officer or authority shall be bound to comply with such directions.

Power of State Government to restrict the application of the Act to certain Areas. **24.** Notwithstanding anything contained in this Act, if the State Government, after consultation with, or on the recommendation of, the local body or authority, is of opinion that certain provision or provisions of this Act need not apply to certain areas of the State, it may, by notification in the Official Gazette, restrict the application of such provision of this Act to such area or areas as may be declared therein and thereupon such provisions of this Act shall not apply to such area or areas. 30 35

Power to remove of difficulties. **25. (1)** If any difficulty arises in giving effect to the provisions of this Act, the Central Government may, by order published in the Official Gazette, make such provisions not inconsistent with the provisions of this Act to remove the difficulty:

Provided that no such order shall be made after the expiry of a period of two years from the commencement of this Act. 40

(2) Every order made under this section shall be laid, as soon as may be after it is made, before each House of Parliament.

Power of Central Government to make Rules. **26. (1)** The Central Government may, by notification in the Official Gazette, make rules for carrying out the purposes of this Act.

(2) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:—

- (a) issuance of Woman Farmer Certificate under Section 3;
- (b) facilitating financial support for woman farmers under section 8;
- 5 (c) utilization of Central Agricultural Development Fund for Women Farmers (CADFWF) under section 9;
- (d) functions and proceedings of the Women Farmers' Entitlement Board under sub-section (3) of section 16;
- 10 (e) Composition of District Vigilance Committee in every district under section 17;
- (f) institutional mechanisms for expeditious and effective redressal of grievances of women farmers under section 18.

27. Every rule made under this Act shall be laid, as soon as may be after it is made, before each House of Parliament, while it is in session, for a total period of thirty days which
 15 may be comprised in one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both Houses agree in making any modification in the rule or both Houses agree that the rule or regulation should not be made, the rule shall thereafter have effect only in such modified form or be of no effect, as the case may be; so, however, that any such modification or
 20 annulment shall be without prejudice to the validity of anything previously done under that rule.

Rules to be
laid before
Parliament.

STATEMENT OF OBJECTS AND REASONS

With a gradual decline in the size of farm holdings, small and marginal farmer families are in need of multiple sources of income to come out of the poverty trap. Rural men belonging to resource poor families increasingly tend to go to towns and cities seeking work and income earning opportunities. Consequently, there is an increasing feminization of agriculture. While women farmers are extremely hard working and are also conversant with sustainable agriculture practices, they suffer from several handicaps such as title to land, and access to credit, inputs, insurance, technology and market. As early as 1995, the Fourth World Conference on Women held in Beijing urged developing countries to pay attention to the gender specific needs of women farmers.

India is on the threshold of enacting a landmark Food Security Bill. Legal entitlements to food can be implemented only by improving the productivity, profitability and sustainability of small farm holdings, since small and marginal farmers produce nearly fifty percent of the foodgrains in the country, as well as milk and a wide variety of vegetables and fruits. The need for paying special attention to the needs of women farmers has been recognized by initiating a "Mahila Kisan Sashaktikaran Pariyojana" in the Union Budget of 2010-11. In order to safeguard national food security, and to strengthen the livelihood security of rural women, a majority of whom are engaged in crop and animal husbandry, fisheries, agro-forestry and agro-processing, the Bill is being proposed. It is necessary to implement the aforesaid decisions under article 253 of the Constitution of India in so far as they relate to the women farmers' entitlements.

Hence, this Bill.

M.S. SWAMINATHAN

FINANCIAL MEMORANDUM

Clause 9 of the Bill provides for Establishment of a Central Agricultural Development Fund for Women Farmers.

Thus, the Bill, if enacted, would involve a non-recurring expenditure from the Consolidated Fund of India which may be to the tune of rupees one thousand crore as a part of contribution from the Central Government. A recurring expenditure of about rupees ten crore is also likely to be incurred per annum to meet the salary and other allowances of the central implementing authorities other recurring expenditure by way of rent, maintenance, meetings, office expenses and contingency, etc.

MEMORANDUM REGARDING DELEGATED LEGISLATION

Clause 9 of the Bill empowers the Authority to make guidelines with the previous approval of the Central Government by notification in the Official Gazette. Clause 26 of the Bill empowers the Central Government to make rules for carrying out the purposes of the Bill.

The rules and guidelines made under the proposed legislation shall be required to be laid before Parliament. The matters in respect of which rules, guidelines may be made or framed relate to matters of procedure or administrative detail and it is not practicable to provide for them in the Bill itself. The delegation of legislative power is, therefore, of a normal character.

RAJYA SABHA

A

BILL

to provide for the gender specific needs of women farmers, to protect their legitimate needs and entitlements and to empower them with rights over agricultural land, water resources and other related right and for other functions relating thereto and for matters connected therewith.

(Prof. M.S. Swaminathan, M.P.)

Nutri-Agriculture: Pathway to a Zero Hunger India

Introduction

Our agriculture is now facing three kinds of problems. First, monsoon behaviour is erratic probably because of events associated with climate change. Secondly, the International and national markets are very volatile thereby endangering the stability of farmers' income. Thirdly, we face serious problems of malnutrition caused by both protein hunger and hidden hunger. Therefore in the further development of our agriculture we should give attention to these challenges. There are also challenges beyond our control like the regulations of the World Trade Organisations. All these problems can be dealt with only by the application of science and technology supported by appropriate public policies. I would like to deal with them briefly.

India is described as the country with the largest number of hungry people by most international agencies. Therefore, our government is told by foreign experts that we must give the highest priority to ending hunger and malnutrition. Both agrarian prosperity and national food security depend on the economics of farming. We have now come to the stage of giving legal right to food through the National Food Security Act 2013. Thus, our country has evolved from a "ship to mouth existence to a right to food commitment. To fulfil this commitment, we have to give concurrent attention to production, procurement, and public distribution. The difference between agriculture as a commercial occupation and agriculture as a means of abolishing hunger and malnutrition will have to be clearly understood at the 10th ministerial Meeting of WTO scheduled to be held in Nairobi this December. It is a matter of pride and satisfaction that the Union Minister for Commerce and Industry Smt Nirmala Sitaraman has clearly tried to convey the message that support policies for food security and abolition of malnutrition are non-negotiable. The industrialised countries should understand and acknowledge the human dimensions of trade in food grains. Developed countries have safeguarded the extensive financial support they are giving to their farmers through the green box provision. It is high time that there is

also a Food Security Box which can help countries to adopt farm support policies which can help them to achieve the zero hunger challenge launched by the UN Secretary General.

World Trade and National Food Security

The World Trade Organisation (WTO) is an inter-governmental body to promote free and fair trade. In developing principles for assessing what is fair and what is unfair in trade, a global view is normally taken. This is where the problem arises. Agriculture is essentially a commercial occupation in developed countries where hardly 5% of the population depend on agriculture for their livelihood. On the other hand, agriculture in many development countries including our own is the principal occupation of a majority of rural families who depend upon crop and animal husbandry, fisheries, forestry and agro-processing for both their livelihood and household food security. Also, the farm size is small and the marketable surplus is low. As a result, farm families require social protection. It is wrong to designate the limited support given to them as subsidy. It will be more appropriate to refer to the assistance given as support to sustainable farming.

Sustainable water security

It is therefore appropriate that we develop a sustainable water security system for agriculture, industry, domestic needs and ecosystem preservation. In my view our national water security system should consist of the following six essential action points: first, is the augmentation of supply through mandatory rainwater harvesting, and politically, ecologically and economically feasible inter-basin transfer. Second, the efficiency of water use through appropriate land use planning which involves the choice of crops suited to the local water availability conditions. Third, there is need for involving local communities and panchayats in the co-governance of land, water and energy, the efficacy of which has been demonstrated by several grassroots workers including Salunke in Maharashtra, who promoted pani panchayats, and Rajendra Singh in Rajashtan, who showed the power of community water harvesting. Fourth, the popularisation of technologies like sprinkler and drip irrigation on a large scale particularly for perennial horticultural crops. Fifth, sea water constitutes 97 per cent of the world's water resource. Nearly 25 per cent of our population live near the coast. There are ample opportunities now for bio-saline farming using sea water and available fresh water. Finally, public policies should aim at the sustainable use of

groundwater resources since nearly 60 per cent of the irrigation water now comes from tubewells. Demand management is even more important than increasing supply.

Smart villages

The late Dr Abdul Kalam stimulated widespread interest in rural development by emphasising that our villages should also have access to urban amenities like energy, water, sanitation, healthcare, education etc. Of late, there have been several initiatives both in India and abroad on methods of achieving this goal. A recent one is the initiative of a group in Cambridge, UK, in the form of organisation of 'Smart Villages'. Smart Villages under this programme consider "access to sustainable energy services as a catalyst for development, enabling the provision of good education and healthcare, access to clean water, sanitation and nutrition, the growth of productive enterprises to boost incomes and enhanced security, gender equality and democratic engagement". Sir Brian Heap of Cambridge University, a prime mover of this concept, wishes to extend the Smart Village movement in India. Since the government is now actively promoting Smart Cities, it is important to also promote Smart Villages.

Agriculture as the engine of job-led growth

Recent media reports suggest that increasing demands for reservation in the public sector may be linked to the stagnation of agriculture and growing agrarian distress. Agriculture promotes job-led growth, if there is integrated attention to on-farm and non-farm employment in rural areas. In the Sixth Five Year Plan (1980-85), I had introduced a sub-chapter on 'A New Deal for the Self Employed'. Unless opportunities are created for economically rewarding and intellectually satisfying self-employment for youth, competition for jobs in the organised sector will grow, as will the clamour for reservation. At the national level, the share of agriculture to GDP has come down to 13%. However the onus of providing employment rests with the farm sector which caters to the livelihood security of nearly 75% of population in rural India. The National Commission on Farmers has made detailed recommendation on how to serve farmers and thereby save farming. Even in the Punjab nearly 80% of farmers do not want their sons to be agriculturists. The immediate implementation of NCF recommendations in their totality will help. Meanwhile, to minimise the incidence of farmers' suicides, there is need for establishing of **Agrarian Distress**

Counselling Centres wherever feasible in Krishi Vigyan Kendras. I hope that the responsibility of safeguarding farmers' welfare given to the Union Ministry of Agriculture will help to improve the livelihood security of rural families and thereby save their lives and livelihoods.

Saving livestock under extreme drought conditions

Shri Sharad Pawar, former Union Agriculture Minister, has drawn attention to the severe drought conditions prevailing in the Marathwada and Nashik-Sangli regions of Maharashtra. He has pointed out that there is extreme water and fodder shortage and that the livestock wealth may be lost. Since livestock and livelihoods are closely related, particularly in the case of small farm families, immediate action is needed to save the livestock. Fortunately, there is very good opportunity today for ensuring adequate nutrition to the livestock. What is needed is the organisation of cattle camps near water sources, and feed the animals with straw enriched with urea and molasses. The paddy harvesting season is starting in Punjab, Haryana and Rajasthan, where the paddy straw is not usually used to feed animals, but is burnt. Therefore, the Government of Maharashtra should make immediate arrangements with the Governments of Punjab, Haryana and Rajasthan for sending the rice straw, to the severely drought affected areas of Maharashtra. Other biomass (cellulosic material) can also be used. Maharashtra has adequate quantities of molasses because of the cultivation of sugarcane. The detailed biomass enrichment technology can be obtained from the Indian Veterinary Research Institute (IVRI), Izatnagar, UP. The Agriculture and Veterinary Universities and Krishi Vigyan Kendras can organise the cattle camps for feeding the animals with the enriched straw. This is based on my personal experience during the recurrent droughts of the 1970s.

Nutri-farms: An idea whose time has come

Experts from India, Pakistan, Bangladesh and Afghanistan are discussing ways to mobilise the agricultural pathway for overcoming the widespread malnutrition in the region. This work is being done under a multi-country consortium supported by DFID. The strategy consists of three main components: mainstreaming nutrition in crop-livestock farming systems (nutri-farms), organising genetic gardens of naturally occurring biofortified plants like moringa to demonstrate the options available to local communities, and creating a

cadre of community hunger fighters, well-versed in leveraging agriculture for overcoming nutritional maladies. Bringing agriculture, nutrition and health together will make a major contribution to achieving the goal of freedom from malnutrition.

Need for a Kisan Security Bill

In my view, there is need for legislation to protect the security of farmers' livelihoods in order to ensure that food for all and forever becomes a reality. The Kisan Security Bill can be modelled on the Private Members Bill I had earlier introduced in the Rajya Sabha on the empowerment of women farmers. Such legislation will consist of five components viz. soil health care; water security; availability of appropriate technology and inputs; credit and insurance, and assured and remunerative marketing. In addition, small farmers should be provided with opportunities to tap the power of scale through producer companies.

Culinary diversity and agrobiodiversity

Among the methods of protecting community knowledge and technologies under WTO, Geographic Indication (GI) is an important one. UNESCO's World Heritage Site and FAO's Globally Important Agricultural Heritage System (GIAHS) are other forms of recognition of the conservation ethos of local communities. In this context, the Government of Paschim Bangla has done well in seeking GI protection for *Rasagulla*. Odisha feels that it has also a claim on *Rasagulla* from the point of view of GI. Similarly, there is need for according recognition to communities which have conserved agro-biodiversity, i.e., biodiversity used for various human needs. Such diversity can take the form of cultural, culinary and curative (i.e. medicinal plants) diversity. Thanks to the work of MSSRF, the agro-biodiversity based farming systems in the Koraput region of Odisha and the below sea level rice cultivation of Kuttanad in Kerala have both received GIAHS recognition from FAO. We should make similar efforts to get global recognition for the work of rural and tribal communities in areas of significance to human quality of life.

Do Ecology for achieving the UN Sustainable Development Goals (SDG)

Recently Members of the UN adopted 17 Sustainable Development Goals. These goals can be achieved if we integrate the principles of ecology in all development and social protection measures. "Do ecology" involves education, social mobilisation and essential regulation.

Sustainable development also involves concurrent attention to environmental, economic and social sustainability. In agriculture, evergreen revolution is the means to achieve sustainability. In the area of ending hunger, achieving food security and improved nutrition, adopting the farming system for nutrition (FSN) approach together with the establishment of genetic gardens of biofortified crops and training of a cadre of community hunger fighters will help. Since the 17 goals are at the moment in the form of generalised objectives, every Panchayat in our country should develop its own operational plan for achieving the goals relevant to their socio-economic and socio-cultural conditions.

Biotechnology and UN Sustainable Development Goals

Two important SDGs are “**End hunger, achieve food security and improved nutrition, and promote sustainable agriculture**” and “**Take urgent action to combat climate change and its impacts**”. Several scientists are of the view that the use of genetic engineering techniques will be important to develop crop varieties which can help to achieve these goals. There are however difference of opinion on the value and safety of such biotechnological tools. I would suggest the following steps for coming to a consensus on this question.

1. Develop scientific guidelines for the choice of the problem to be taken up for genetic modification. Is there an alternative to recombinant DNA technology like marker assisted selection, genome editing etc?
2. Develop procedures for field testing of the GM material in the breeders' assembly line based on the principles contained in the Cartagena protocol on biosafety. The field testing should be done in full consultation with State Governments and in the fields of public good institutions such as Agricultural Universities.
3. Develop science based methods of assessing risks and benefits. Such procedures coupled with the results of field trials can help to decide whether the GMO pathway is the safe way for achieving the desired end result.
4. Promote biotechnology literacy and establish resource centres for the mass media. Such media resource centres should help to promote public information and education and not become propaganda agencies.

5. Develop a suitable insurance policy to small farmers, so as to insulate them from risks beyond their control, such as drought.
6. State Governments and State Agricultural Universities should be involved at all stages, both in field testing and approval for cultivation.
7. Introduce a Parliament approved National Biosafety Act.

Eternal vigilance is the price of stable agriculture

Recent reports indicate that a devastating whitefly attack on cotton is reducing yields drastically, in Punjab and Haryana. The introduction of Bt cotton helped to overcome the problems of bollworms which are also serious pests. Today the cotton farmers are suffering from the twin problems of whitefly attack and low prices. Adopting measures for effective plant protection against all the important pests and reducing price volatility are essential for the cotton farmers to get a steady income and the textile trade to get a steady supply of raw material.

The whitefly attack should not come as a surprise since whenever one dominant pest is controlled, the pest which was not important earlier becomes serious. For example, when dwarf wheats were introduced in the early 1960s, the wheat rust problem became less serious since the new varieties were resistant to the prevailing races of stem, stripe and leaf rusts. However, soon 'loose smut' in wheat may become a dominant disease. I have pointed out that if the average temperature goes up by 2 deg C as a result of global warming and climate change, we will have to cultivate potato through true sexual seeds and not through tubers as is the case, now. This is because aphids which are vectors of virus diseases will multiply fast with a higher temperature and cause severe viral infection. If we want to insulate our agriculture from violent undulations in production and prices, we should adopt the principle of eternal vigilance and undertake continuously an action-reaction analysis and appropriate proactive action.

Funding "public good" National laboratories

Scientific research is increasingly becoming oriented towards immediate commercial profit than on short and long term public good. A recent report suggests that CSIR laboratories have been asked to find funds for their research. This approach can help to promote

research on topics of current market interest but research dealing, with issues requiring sustained long term commitment will suffer. In agriculture for example, public good research institutions are essential for developing technologies relevant to resource poor farmers operating small holdings. Such farmers constitute the majority of our farming population. Public good research involves more investment on long term basic and strategic research. For example, National laboratories can cooperate with private sector laboratories in the area of translational research, i.e. converting scientific findings into field level applications taking into account considerations of ecology, economics and social and gender equity. The Science Advisory Committee to the Cabinet should go carefully into this question and recommend to Government a long term funding strategy, which will help to achieve a balance between public good and private profit.

Insurance coverage to save farmers from loss arising from the breakdown of resistance to pests

A recent report refers to the collapse of resistance to the pink bollworm in the cotton variety Bollgard II. Bollgard II was released after the breakdown of resistance in Bollgard I. Both Bollgard I and II have been developed by Monsanto through genetic modification. The Genetic Engineering Appraisal Committee (GEAC) of the Ministry of Environment approved the commercial release of Bollgard II in 2006. Because of the breakdown of resistance, Gujarat farmers have suffered seriously both in production and income. The company has pointed out that it is imperative to stay ahead of insect resistance through the periodic replacement of cotton varieties. While this is company's research strategy, farmers are left to bear the loss.

Resource poor farmers with small holdings borrow money for buying seeds every year. In a report submitted to the Ministry of Agriculture, Government of India in 2004, a Committee chaired by me had emphasised the need for seed companies providing insurance cover to farmers in order to insulate them from loss caused by the breakdown of resistance to pests and diseases in the varieties. Unfortunately no steps have been taken and the attack on Bollgard II by the pink bollworm has caused immense hardship to the cotton growers of Gujarat. The need for providing low risk technologies protected by adequate insurance coverage to farmers has become urgent particularly in the context of the growing agrarian

distress. Until such arrangements are made, high risk technologies should not be recommended to farmers.

Towards a Pulses Revolution Symphony

A study by Assocham Chamber has indicated that India may have to import 10 million tonnes of pulses to achieve a balance between demand and supply. This reminds me of the situation in 1966 when we had to import 10 million tonnes of wheat largely under the PL480 programme of USA. Internationally we were then described as a “**ship to mouth nation**”. We were determined to change this situation and before the end of the 60s, the country witnessed the Wheat Revolution and the more general Green Revolution. Such a change in our food situation came about through a combination of scientific skill, political will and farmers’ toil.

The same symphony approach could bring about similar results in the case of pulses. In all our major pulse crops namely, chickpea, pigeonpea, lentils, urad and moong bean, our average yield is less than one tonne per hectare. The average yields can be easily doubled with technologies on the shelf. This will require attention to improving soil health enhancement, seed conservation and supply, appropriate mechanisation, improved post-harvest technology, community management of plant health and disease control, and appropriate import-export policies. There are also opportunities for expanding the area under pulses in rice fallows and through inter- and multiple cropping.

2016 is the International Year of Pulses

We should try to make 2016 a significant landmark in our efforts to achieve self-sufficiency in pulse production, just as we did in the case of wheat in 1966. MSSRF has initiated a programme of promoting the concept of **Pulse Panchayats** where all the farmers in the Panchayat cooperate in areas like rain water harvesting and efficient use, crop health management and safe storage and value addition to primary products. The first such Panchayat is in the Edaiyappatti village of Tamil Nadu. I hope such Panchayats will result in the origin and growth of pulse revolution symphonies, just as Seed Villages and national demonstration did, in the case of wheat fifty years ago.

Generating Synergy among central universities and in university – industry partnerships

The President of India in his capacity as Visitor of Central Universities and Institutions had convened a meeting of Vice Chancellors at Rashtrapati Bhavan from 4-5 Nov 2015. I was invited to speak on the engagement of institutes of higher learning with community and society for sustainable and inclusive development. This is a timely conference since among the 17 sustainable development goals, the 4th goal relates to ensuring inclusive and equitable quality education and promotion of lifelong learning and opportunities for all. In my address, I requested the VCs to organise courses in the field of sustainability science which involves a multidisciplinary approach including social sciences. I also reminded the VCs that lifelong learning has to be an integral part of the academic culture as emphasised by Gurdev Rabindranath Tagore in Gitanjali

“A candle which is not lit, cannot light others

A teacher who is also not learning, cannot teach others”

The course in the field of sustainability science prepared for IGNOU by the MSSRF may now be adopted by other universities and will provide the scientific basis for developing the work plans for achieving the SDGs.

Public good research to the rescue of resource poor cotton farmers

In the absence of alternative choices, cotton farmers have been taking to Bt hybrids which recently have also been affected by white fly. Fortunately, the Central Institute for Cotton Research (CICR) of ICAR, Nagpur which I established in the 1970s has come out with a cotton variety which is ideally suited for small farmers with limited coping capacity in case of crop failure. The new cotton variety has triple strengths namely, crop duration is reduced to 150 days from 200 days, secondly, there will be increased yield because of the opportunity for growing more plants per square meter and thirdly, farmers can keep their own seeds unlike in the case of hybrids where they have to buy seeds every year. The CICR has in the breeders' assembly line about 21 high yielding pest resistant cotton varieties suitable for cultivation in Maharashtra and Telangana. Our gratitude goes to Dr K R Kranti, Director, CICR and his colleagues for orienting the scientific strategy to suit the needs of resource poor

farmers who normally have to buy seeds every year by taking loan from either banks or money lenders.

Rice – Saviour of Food Security in an era of Climate Change

World requires 50% more rice in 2030 than in 2004 with approximately 30% less arable land of today. Rice was one of the early green revolution crops because of the changes made in plant architecture and water and nutrient use ability, first through the indica – japonica hybridization programme and later through the use of dwarfing genes. Rice has a wide adaptation as evident from its cultivation below sea level in Kuttanad in Kerala and in the high Himalayas. More recently, rice has also been enriched with micronutrients like zinc and iron as well as Vitamin A. There are over 150000 varieties of rice with varying degrees of adaptation to temperature, precipitation, sea level and grain quality. India has the largest area under rice and since long, tribal families like those cultivating rice in Koraput in Odisha have preserved for posterity a wide range of rice germplasm. Wheat is very sensitive to night temperature and has more limited adaptation than rice. We should develop research and extension strategies for producing 150 million tonnes of rice from 30 million hectare by 2030.

Water security in an era of climate change

We need to develop a strategy for mobilising the available water resources of the country in a most economical and effective manner. I emphasised that those involved in developing programmes for river linking should ensure that the projects take into the account the following five E's

- Economics – Economic viability is essential for investment
- Ecology – Environmental impact of river linking has to be carefully considered so that the programme is in conformity with the sustainable development goals and does not lead to deforestation
- Equity – both social and gender equity should guide the development of the project so that a win-win situation is created for all participating in such a programme.
- Energy – The project should generate additional renewable energy

- Employment – the project should so designed as to generate more employment in all the sectors of the economy, namely agriculture, industry and services sector

In addition to river linking, the country needs to develop local level *pani panchayats* for harvesting and using effectively the major sources of water, namely rain, ground water, rivers and lakes, snow, treated effluents and sea water. Such action will help us to enhance our coping capacity in relation to the weather abnormalities associated with global warming.

Social Protection against hunger

India occupies a low position in relation to the elimination of widespread hunger. We however know that undernutrition has multiple adverse impact on human development and economic growth. Therefore, it is good news that the Union Food Minister has asked all States and Union Territories to implement the National Food Security Act by 31 March 2016. Tamil Nadu already operates a universal PDS and is hence ahead of other states in the matter of extending social protection to the hungry. The effective implementation of the provisions of the National Food Security Act will help to eliminate calorie deprivation in nearly two thirds of the population. What is now important is also to integrate this programme with attacking protein hunger through pulses and hidden hunger through biofortified crops and multiple fortified salt. If all this is done, India's position in the Global Hunger Index will show a marked improvement and the goal of providing every child, woman and man an opportunity for a productive and healthy life, can be realised.

Management of the Northeast monsoon

The recent unprecedented rains in coastal Tamil Nadu including Chennai have highlighted the need for an urgent mapping of hotspots in terms of human suffering. The problem has to be viewed in a decentralised manner with the involvement of the local communities. The major cause of flash floods is the lack of proper drainage arrangements. Naturally occurring drains have become clogged and there is no way for the water to recede. Infiltration into the soil is also poor due to a variety of reasons including the hardening of the top soil. Also the surplus water should be saved in aquifer, wells, ponds, reservoirs and other storage

structure to overcome water scarcity in later months, thereby making heavy rainfall a blessing, instead of a curse.

Green Revolution : 50 Years Later

The green revolution helped us to move from a ship to mouth existence to being able to make a right to food commitment to nearly 75% of our population. The major problems associated with the green revolution related to environmental factors like depletion and pollution of groundwater, soil erosion and loss of biodiversity. It is these deficiencies that can be remedied through the evergreen revolution pathway developed by me over 30 years ago. Therefore 50 years later we should work for a transition from the green to an evergreen revolution leading to an enhancement in productivity in perpetuity without ecological harm. The evergreen revolution technology involves the mainstreaming of ecological factors in technology development and dissemination.

Human Development is the foundation for a healthy and happy country

UNDP's 2015 Human Development Report indicates that India ranks 130 out of 188 countries with reference to the Human Development Index. Although we have shown a little progress, we are still occupying a low position which is inexcusable considering our resources and capability. We should revisit our strategy for improving human development. There is need to pay greater attention to education, gender equality and poverty. In my view, the time has come for making every Panchayat calculate its own human development index. Unless action is decentralised, the present situation may continue with only marginal improvement. In education we should use the latest technology to achieve rapid progress. In the area of gender equality the time has come to revisit my private members' bill titled "The Women Farmers' Entitlements Bill, 2011" which I introduced in Rajya Sabha in 2012. Empowerment of rural women will make a great impact on gender justice and equity and thereby on Human Development Index.

Kerala takes an important step in post Paris action

A major consequence of global warming will be a rise in sea level. Fortunately, the Paris agreement calls for limiting the rise in mean temperature to less than two degrees centigrade and preferably 1.5 degree centigrade. Nevertheless, some degree of rise in sea

level seems inevitable. The Kerala Government is to be complimented for establishing an International Research and Training Centre for Below Sea Level Farming at Moncompu in Kuttanad. Kuttanad is both a Ramsar site as well as a Globally Important Agriculture Heritage System (GIAHS). The Institute will undertake national and international capacity building programmes in both adaptation and mitigation. It was formally inaugurated on Feb 6th by the Chief Minister of Kerala at Moncompu. The first International Training programme will be for Maldives, Sri Lanka, Bangladesh, Sunderbans of both India and Bangladesh and coastal regions of India. The International Centre will specialise in biosaline farming and in developing Biobunds to keep saline water away. The management of water salinity will be a priority task, with rice being grown during the monsoon season and fish during the winter season. Semi-dwarf coconut varieties will be planted in the bunds. Thus, the establishment of this new institution is a major contribution to the management of sea level rise and for avoiding the exodus of climate refugees from the sea coast.

Combating Tsunamis of the Future

The following three steps taken by MSSRF are designed to safeguard coastal communities from the adverse impact of the tsunamis of the future. First, the advance warning system has been very much improved and a "fisher friend" technology for giving information on wave heights at different distances from the shoreline has been introduced. The area under mangrove forests which serve as bioshields has been further enlarged. Finally, methods have been developed for promoting silvi-aquaculture farms and biosaline farming along the coast. A Genetic Garden of Halophytes has been developed at Vedaranyam for ensuring that adequate genetic material is available for breeding varieties of rice and other crops possessing tolerance to salinity. Thus, we will be in a better position to safeguard the lives of fisher and other coastal families and at the same time, strengthen their livelihood security.

International Year of Pulses and Ending Protein Hunger

In recent years, each year is devoted to a particular cause of global importance. Thus the year 2013 was designated as the International Year of Quinoa (*Chenopodium quinoa*). Rich in protein, quinoa has played an important role in food and nutrition security among the Andean people. The diversification of dietary components has become urgent since recent reports suggest that climate change may result in crops like wheat and rice becoming less

nutritive, with particular reference to iron and zinc. The year 2014 was commemorated as the International Year of Family Farming, while 2015 was the year of the Soil. All these years have helped to focus global attention on specific issues like soil health care and enhancement and strengthening family farming, with special attention to the role of women.

Organic Agriculture : Pathways to Success

Our Prime Minister in his recent address in Sikkim has advocated the adoption of organic farming methods throughout the country. This will ensure the environmental sustainability of agriculture and thereby help to achieve Goal 2 of the UN Sustainable Development Goals ("End hunger, achieve food security and improved nutrition and promote sustainable agriculture"). Several steps are needed to make organic farming economically viable particularly for small and marginal farmers. These are : The replenishment of soil fertility by giving back to the soil what we take out of it through measures like green manuring, introduction of both grain and fodder legumes in the crop rotation and mobilisation and application of all available organic sources of manure including animal waste and compost. It is also necessary to provide the soil with bio-fertilizers using efficient microorganisms and vermiculture. Most of the farmers of our country have small holdings and may have only one or two farm animals like cows and buffaloes. Therefore, it is essential they have an integrated nutrient supply strategy based on the available organic sources of manure and biological nitrogen fixation. The other aspect of organic farming is plant protection using biological control methods and the use of pesticides of plant origin. Finally, there is need for providing a premium price taking into account the long term benefits to the nation. Integrated nutrient supply, integrated pest management and remunerative pricing and marketing are the three pillars of successful organic farming. Farmers should become familiar with organic certification procedures, thereby spreading knowledge of successful marketing strategies.

Education for the UN SDG in the field of Sustainable Agriculture

The initiative of the Avittam Thirunal Government Vocational Higher Secondary School, Moncompu is a path-breaking adventure in education for sustainable agriculture. This school is initiating on February 6th, courses in different areas of agriculture which are

designed to promote training which will help to achieve Goal No.2. A sustainable agriculture course will be introduced at the 10 +2 level. The school is located at the Kuttanad region of Kerala which has been designated by FAO as a Globally Important Agricultural Heritage Site. The additional facilities including new laboratories for soil and plant health were constructed at a cost of Rs. 57 lakhs provided from my MPLAD funds. I hope this will be an example for other schools located in agriculturally important areas, so that sustainable agriculture becomes the norm in Rural India. Dr Bruce Alberts, one of world's leading biological scientists and former President of the US National Academy of Sciences, has emphasised the urgency of empowering great teachers' in order to improve the quality of education. I quote from his editorial in *Science* (15 Jan 2016) ***“Unless the United States can make dramatic advances in empowering its teachers, the nation will never have public school systems that make the best decisions for their students. Nor will it be able to attract and retain the highly talented teacher corps that every nation needs”***. This is what an old Chinese Proverb stresses, ***“If you are thinking one year ahead, plant rice; if you are thinking ten years ahead, plant trees; if you are thinking a hundred years ahead, educate the people”***.

We recently organized the Make in India week (13-18 February 2016). This is a welcome revival of the Swadeshi Approach of Mahatma Gandhi of which the Charka and Khadi became the most powerful symbols. Hence these soil enriching, climate resilient, and nutrition enhancing crops should lead the way in the programmes for Make in India in Agriculture.

- **Quality revolution** (involving widespread quality literacy among producers, consumers and exporters)
- **Income revolution** through farming systems intensification, diversification and value addition and through concurrent attention to on-farm and non-farm employment

If there is convergence and cohesion leading to synergy among the packages of technology, services and public policies, progress will be both speedy and sustainable. Continuity in policy is essential for sustained progress.

5. Components of the Farm Symphony

A. Research

Technology is the prime mover of change. Ecological agriculture strives to substitute knowledge and farm grown biological inputs for capital and market purchased chemical inputs. Priority setting in research is hence important. **Youth can be attracted and retained in farming only if agriculture becomes both intellectually stimulating and economically rewarding.** A dynamic research system is a must for a dynamic production system.

It may be useful to consider developing existing institutional structures into a **Sri Lanka Council for Agricultural Research and Rural Technology**, so that the prevailing gap between academic **know how** and fields level **do how** can be eliminated. Linking agricultural and rural technologies will help to improve concurrently opportunities for skilled on-farm and non-farm employment. Such a Council should have the needed financial resources and functional autonomy.

The proposed Sri Lanka Council for Agricultural Research and Rural Technology could have concurrent responsibility for research, education, extension education (CART) and policy advice. It can operate the Sri Lanka Agricultural Research Service (a scientist and not a post-centered system of career development) and help to build the morale of farm scientists through opportunities for professional growth and a work culture which fosters the linking of authority and accountability at all levels. The Council could initiate a few **National Challenge Projects**, such as the following.

- Promoting Precision Agriculture, in order to ensure high factor productivity (like water, nutrients, etc) and low cost of production.
- Harnessing biotechnology, information and space technologies for promoting productivity, while conserving and enhancing environmental capital stocks.
- Promoting both strategic research as well as participatory research with farming families
- Promoting research on technology delivery systems which can help to reach the unreached and include the excluded, particularly women.

- Fostering the growth of agro-aqua farms in coastal areas and crop-livestock integrated production systems in inland areas.
- Preparing the country for the challenges and opportunities which a globalized economy and trade environment present.
- Fostering anticipatory research to meet the challenges of adverse changes in temperature, precipitation and sea level, as a result of global warming.
- CART should accord priority to increasing investment in Research and Development through bilateral and multilateral partnerships, sponsored research and institutional consultancies.

B. Extension

Redesign and retool the existing extension machinery in order to meet the challenges of knowledge intensive precision agriculture.

Harness the power of modern information, communication and space technologies for promoting the establishment of user driven and user controlled Rural Knowledge Centers, capable of providing location specific generic and dynamic information; concentrate as much as demand driven content creation, as on digital connectivity.

C. Economics and agri-business

Promote institutional structures like Agri-clinics and Agric business Centers, which can enhance the cost and quality competitiveness of Sri Lankan farm products. At the same time, such institutional structures can help to provide the power of scale to small scale producers both at the production and post-harvest phases of farming. Agri-clinics can cater to the needs of farm families at the production phase, while Agri-business Centers can help them at the Post Harvest phase. They can be operated by self-employed educated youth with institutional credit. A Small Farmer Agri-business Consortium (SFAC) can be organized in each of the 9 provinces in order to achieve synergy among the programmes of the private, public and academic sectors.

D. Trade

An urgent need is a system of rendering proactive advice to farmers on land use, so that a beneficial match between production and potential demand in both home and external markets can be achieved. This is the only way of avoiding a boom and bust situation in agricultural prices. Under the WTO agreement, any expenditure incurred for this purpose is not counted as subsidy.

At the same time, the prevailing mismatch between production and post-harvest technologies should be ended. In addition to strengthening sanitary and phytosanitary measures, a massive effort to impart quality literacy will have to be launched in order to sensitise producers and exporters on food safety and codex alimentarius standards.

The forward and backward linkages in agricultural trade need concurrent attention. Assured and remunerative marketing opportunities hold the key to sustained agricultural progress.

E. Role of Private Sector

The private sector, through technology upgrading, contract cultivation and helping to improve management efficiency can play an important role in taking Sri Lankan agriculture to new heights of achievement.

Questions relating to patents, IPR and their misuse will have to be dealt with in a manner that the goals of public good and commercial profit are not antagonistic to each other. For this purpose, the Small Farmers' Agri-business Consortium (SFAC) set up in each of the 9 provinces, can organize multi-stakeholder consultations committed to advancing both agricultural progress and agrarian prosperity. The private sector can help the Agribusiness Centers set up by farm and home science graduates through buy back arrangements.

F. International Collaboration

International linkages should be based on Sri Lanka's needs and should not become donor driven. Partnership with public good research institutions like those belonging to CGIAR needs strengthening. Expertise has to be strengthened in dealing with issues relating to WTO, Climate and Biodiversity Conventions and technology forecasting and updating, so that the interests of Sri Lankan farm families are not only safeguarded but actively promoted.

6. Building a National Food and Water Security System

The food security system will have the following three major components.

- Food availability, which is a function of home production and imports (where necessary)
- Food access, which is a function of livelihood opportunities and purchasing power.
- Food absorption, which is a function of safe drinking water, environmental hygiene, primarily health care and education.

Sri Lanka has already established a Food Security Committee to provide integrated attention to all aspects of sustainable food security, designed to provide every child, woman and man an opportunity for a productive and healthy life.

In the area of sustainable food production, there is need for greater attention to soil health management and the conservation and efficient use of water. In this context, it will be useful to strengthen soil testing facilities (both for macro and micro-nutrients) particularly in the Mahaweli area and provide to each farming family a Soil Health Card

which will help farmers to monitor the health of their soils. An ever-green revolution can be achieved only if soil productivity is maintained at a high level and water use efficiency is enhanced considerably. Sustainable use of ground water and its conjunctive use with surface water will have to be ensured. Building a sustainable water security system will need integrated efforts in the areas of education, social mobilization and government regulation.

In the area of access to food, it will be useful to introduce a whole life cycle approach to nutrition in order to address all nutrition related health security problems in an integrated manner. Starting with fighting maternal and foetal under - and mal-nutrition, the whole life cycle approach will cover pregnant and nursing mothers, infants, school going children, adults and old and infirm persons. All that will be needed is the introduction of horizontal linkages among existing vertically structured programs.

The Nutrition Security program can help to address all the three major forms of hunger.

- Endemic hunger caused by inadequate purchasing power
- Hidden hunger, caused by micro-nutrient deficiencies, like iron, Vitamin A, etc.
- Transient hunger, caused by natural and other forms of calamities

Sri Lanka can show the way to building an enduring and inclusive national nutrition security system, since it has already all the major ingredients for launching such a program.

7. Raising the productivity and profitability of irrigated agriculture

Sri Lanka has one of the lowest rural to urban migration rates among developing countries. This is probably due to the additional employment opportunities created by irrigation projects. The time is now appropriate to develop the Mahaweli Project area into a major center for agricultural diversification and value addition through agro-industries since farmers are currently finding paddy cultivation economically unattractive. There is need for enhancing productivity and profitability in an environmentally sustainable manner.

Innovative strategies for the modernization of irrigation technologies and promotion of multiple livelihood opportunities are urgently needed. There is a critical need for better basin level management of water resources to mitigate the growing water scarcity in the dry zone districts.

The following two Pioneer projects could be considered in the Mahaweli Project Area.

(a) Small Farmers' Horticulture Estates in 5000 ha of newly cultivated area

Crops like banana, tomato, onion and other crops for which there is a market can be grown, supported by drip irrigation and post harvest processing facilities. A Small Farmers' Horticulture Estate can provide essential common services to support

decentralized and efficient production by small farm families. This will help to reduce transaction costs in relation to the provision of appropriate support services. Production, processing and marketing can be organized as an integrated end to end system.

(b) Rice Refineries (entire biomass utilization system)

These could be organized in 11000 ha of new irrigated land. Scientific rice farming technologies, including the cultivation of appropriate rice hybrids, can be popularized in order to get at least 6 tonnes of rice per ha. In addition, the Rice Refineries can help to produce value added products from the straw, bran and husk. Modern Rice Mills can be established as well as support services like soil test and seed technology laboratories, including the provision of testing facilities for micro-nutrients. A Soil Health Card can be issued to every family.

Rice Farming Systems involving the integration of livestock like cattle and poultry will provide additional income. The cultivation of Quality Protein Maize (QPM) in the crop rotation will help to provide nutritious feed to poultry. Thus, a well planned **Mahaweli Rice Farming and Refinery Program** will help to improve the profitability and sustainability of irrigated agriculture and help to create more jobs opportunities. Educated youth can set up Agri-Clinics and Agri-business Centers in such areas to ensure both crop and income security.

Sri Lanka has a unique opportunity of making the Mahaweli Development Area the flagship of an ever-green revolution movement.

8. Rice Farming Systems : The next phase

Rice is the most important food crop of Sri Lanka. The country has made impressive progress in increasing the production and productivity of rice since independence. In contrast to a production of about 3 lakhs tons at the time of independence, the production is now reaching 3 million tons. The per hectare yield is approaching 4 tons per hectare (paddy). During the next few years the average yield can go up to 5 tons per hectare with the varieties and technologies on the shelf. Since Sri Lanka has achieved a demographic transition to low birth and death rates, it will be easy for the country to produce the rice it needs for home consumption.

So far, undulations in rice production have been largely caused by aberrant rainfall and monsoon behavior. **Hereafter, economic factors related to the cost of production, risks involved (climate and marketing) and the expected net return** are likely to influence progress in rice production. Through mutually reinforcing packages of technology, services and public policies (input and output pricing), it should be possible to maintain self sufficiency in rice.

Some of the major issues needing attention are:

- Improving yield for hectare to 5 tons/ha by 2005
- Testing the 3 promising rice hybrids now available in compact **yaya** type of block demonstrations, so as to assess their economic superiority.

- Achieving stability of production through carefully planned compensatory production programs to offset losses either during the Yala and Maha seasons.
- Ensuring that new varieties satisfy the quality preferences of consumer
- Improving productivity while reducing the cost of production.
- Avoiding environmental pollution and damage
- Minimizing post harvest losses and introducing modern rice milling
- Enlarging storage capacity and developing a system of decentralized community Food Banks

Fertilizer pricing policies should aim at the adoption of balanced soil nutrition (both macro and micro nutrients). Investment in research also needs to be stepped up considerably. Farmers feel that the future of rice will be bleak if steps are not taken to elevate and stabilize income from rice cultivation. If this is not done, the younger generation will not take to a career in rice farming. In this context, it would be useful to design a research cum development strategy on an eco-regional basis to ensure the stability and profitability of rice farming systems.

- (a) Enhance productivity using eco-friendly practices so that small farmers have higher marketable surplus, without incurring large additional expenditure. Also test the best available rice hybrids in compact blocks, based on the yaya type of demonstrations in small farmers' fields.
- (b) Adopt a crop-livestock-fish integrated rice farming system approach, so as to increase the net income of farming families through multiple livelihood opportunities. For example, there are over 11,000 tanks in the rice areas and they can become sources for aquaculture, using modern polyculture techniques. Backyard poultry farming can be promoted by establishing feed banks and by introducing quality protein maize (CPM) in the crop rotation, wherever feasible.
- (c) Establish in compact areas, Rice Refineries, in order to promote the commercialization of all parts of the rice biomass – straw, bran and husk. The hub of the Rice Refinery could be a modern rice mill.
- (d) Examine the scope for developing specialty rices for the export market. For example, Sri Lanka has native rice strains rich in iron and medicinal properties. By carrying out research and validation studies, it should be possible to develop specialty rices for niche markets abroad.
- (e) Examine the scope of marketing organic red pericarp rice in foreign markets, through collaboration with the private sector
- (f) Develop land use advisory systems capable of giving farmers proactive advice on matching production with likely demand, based on meteorological and marketing forecasts.

The above 6 point strategy for ensuring both the security of rice production in Sri Lanka and the prosperity of rice farming families could be considered for immediate

implementation in the Mahaweli and other high yield potential cum low risk areas, based on micro-level participatory planning with farming families.

Need to strengthen research in rice farming systems

Fortunately, the Ministry of Agriculture in Sri Lanka has concurrent responsibility for livestock. This unique opportunity should be used to strengthen and modernize crop-livestock integrated farming systems. The rice crop provides excellent opportunities for such an integrated approach, thereby and strengthening both the nutrition and livelihood security of small farm families in addition to improving the ecological security of rice growing regions.

Sri Lankan rice scientists have made admirable contributors to making the country self-sufficient in rice. They however need immediate additional financial support for strengthening the research infrastructure and field work. The Rice Research and Development Institute, Batalagoda, deserves additional facilities and support. Incentives like permitting research institutes to redeploy their farm income to build scientific and experiment station infrastructure could be introduced to promote the efficient utilization of the available land.

The next phase of Sri Lanka's rice history will depend greatly on the introduction of new science, including biotechnology and information technology, and appropriate public policies which will help to improve the economic well being of small farm families.

9. Malady – Remedy analysis

For every problem there is a solution. Maladies like small and fragmented holdings, low productivity and profitability, poor post-harvest technology, inadequate input supply services (seed, credit, insurance, etc), can all be overcome through appropriate remedies. Sri Lankan experts and farmers know both the problems and their solutions. What is now important is to start applying the solutions which are both economically and socially feasible.

In the case of credit, the feasibility of introducing credit cards for farmers, on the model of the Kisan Credit Cards used in India, can be examined. The control of money lender cum merchant nexus should be reduced.

There is need for creating space for innovations and enterprise in agriculture for self-employed educated youth. Farming is the largest private sector enterprise in the country, since land is individually owned.

There is need for market driven short term non-degree training programmes for building the managerial and technological capacity of self employed educated youth in areas like crop-livestock integrated production systems, codex alimentarius food safety standards, improved irrigation water management and post-harvest technology. Such non-degree training programs should be based on learning by doing.

10. Livestock and Livelihoods

Dairy Cattle (cow, buffalo), goat, poultry and pigs help to strengthen both household nutrition and income security. There is need for Technology dissemination Centers based on integrated attention to breed, feed, health care and marketing. Producer-oriented marketing is particularly essential, since currently producers often get only 30 percent of consumers' money. Services like Fodder and Feed Banks will help small producers.

A beginning for a scientific crop-livestock integrated production system can be started under the proposed Rice Refinery Project areas of the Mahaweli region.

11. Managing Change in the Farm Sector

Comments like "our scientists are good but their research priorities are not oriented to field problems", "there is both a policy vacuum in agriculture, as well as lack of continuity in policies", "there is a big gap between planning and implementation", "there is no clear articulation of the concepts of food self-sufficiency and food security", etc are voiced in meetings.

There is also concern that the policy environment for the private sector to play a greater role in the technological upgradation of Sri Lankan agriculture, is not yet in place. Seed imports and quarantine arrangements need streamlining.

The new agricultural strategy should address the issue of **managing change**.

The institutional structures designed to manage and master change should address the following challenges.

- **The technological challenge**: Biotechnology, information technology, space and meteorological technology, etc.
- **The ecological challenge**: Need for the conservation and enhancement of the ecological foundations for sustainable agriculture – land, water, forests, biodiversity and the atmosphere and coping with potential changes in climate.
- **The economic challenge**: Liberalization of trade and globalization of economies and their impact on the livelihood security of the poor.

A National Consortium for the Management of Change in Agriculture with multi stakeholder participation could be organized to address such issues on a continuing basis. With a highly literate population and with excellent progress in human and social development, Sri Lanka is in an ideal position to demonstrate how the digital, genetic and gender divides in agriculture can be bridged speedily and sustainably.

Summary

Challenge and Response

Challenge	Proposed Response
1. Lack of institutional structures for continuous and coordinated thinking and action to address inter-related issues of poverty, food security and environment protection.	<ul style="list-style-type: none">➤ National Consortium for the Management of Change in the Farm Sector➤ Sri Lanka Council for Agricultural Research and Rural Technology
2. Small land holdings and fragmentation	<ul style="list-style-type: none">➤ Yaya type of Group cooperation➤ Small Farmers' Agri-business Consortium
3. Educated unemployment and poor income from rice cultivation	<ul style="list-style-type: none">➤ Agri-Clinics➤ Agri-business Centers➤ Rice-livestock-fish integration➤ Rice refineries (straw, bran, husk as sources of value-added products)➤ New technologies (including hybrid rice)
4. Enlarging agricultural exports	<ul style="list-style-type: none">➤ Sanitary and phytosanitary measures➤ <u>Codex alimentarius</u> standards and spreading quality literacy➤ Specialty rices (medicinal, iron-rich strains) and non-conventional avenues
5. Credit availability and reducing the money lender-merchant nexus	<ul style="list-style-type: none">➤ Credit cards for farmers
6. Pioneer Projects in the Mahaweli Project Area	<ul style="list-style-type: none">➤ Small Farmers' Horticulture Estates➤ Rice Refineries➤ Precision Farming including drip irrigation and provision of soil health cards

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Challenge	Proposed Response
7. Reducing cost of production and increasing farm income	<ul style="list-style-type: none"> ➤ Computer aided and user-driven and controlled Rural Knowledge Centers ➤ Feed and Fodder Banks involving quality protein maize and other nutritious grains and fodder ➤ Biological software production for sustainable agriculture (e.g. bio fertilizers, bio pesticides and seed technology)
8. Strengthen individual and institutional capability	<ul style="list-style-type: none"> ➤ Short term market-driven non-degree training programs
9. Avoiding violent price fluctuations through matching production with potential demand in the home and external markets	<ul style="list-style-type: none"> ➤ Land use Board to give proactive advice on the basis of market outlook and meteorological factors
10. Enlarging financial support	<ul style="list-style-type: none"> ➤ Permitting research institutions to redeploy their earnings for strengthening research and training infrastructure ➤ Preparation of compact proposals like Small Farmers' Horticulture Estates, Farmers Credit Cards, Rice Refineries, sanitary and phytosanitary measures, anticipatory action to meet the challenge of a potential rise in sea level, etc for support by bilateral and multilateral donors

Figure 1

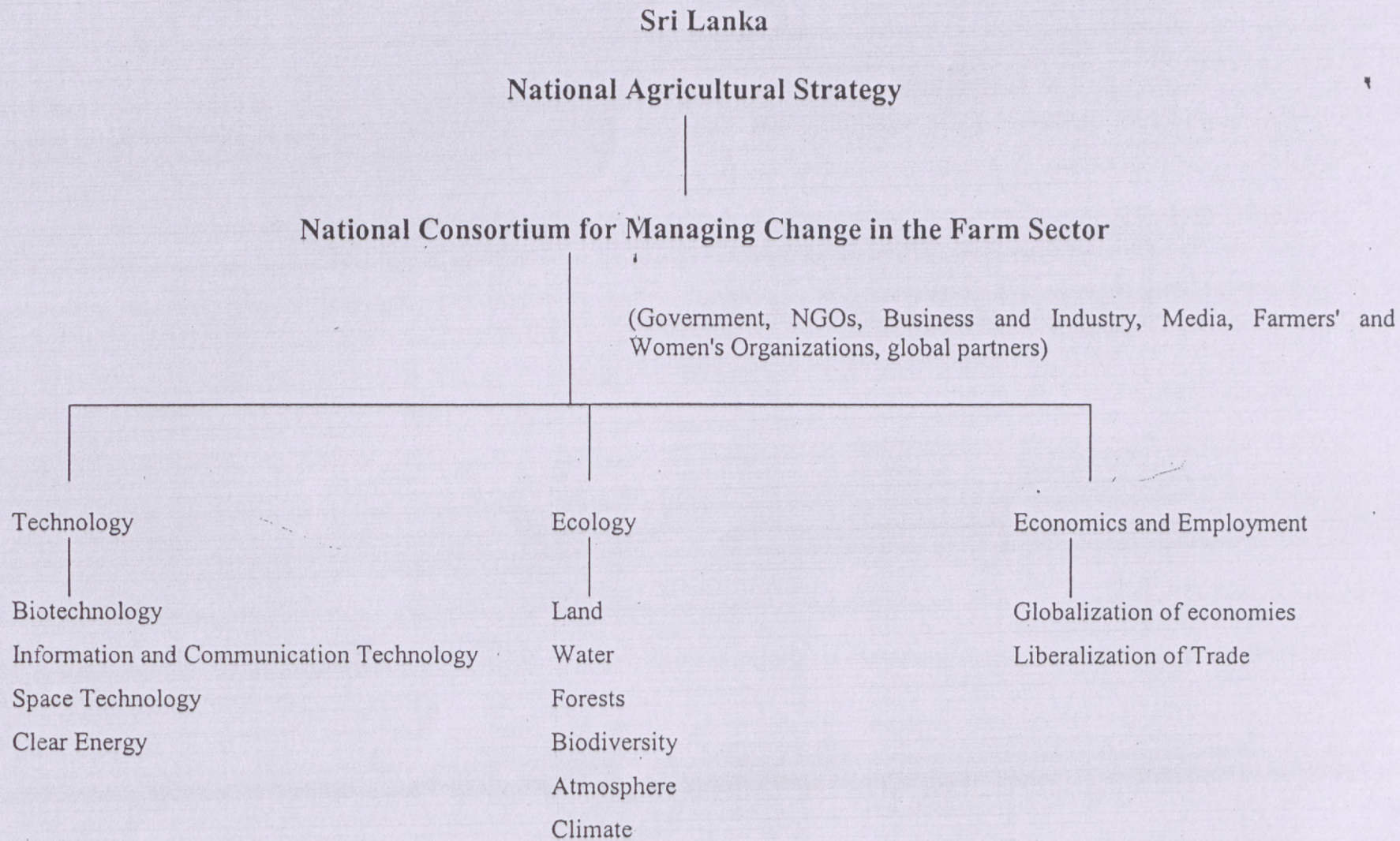


Figure 2

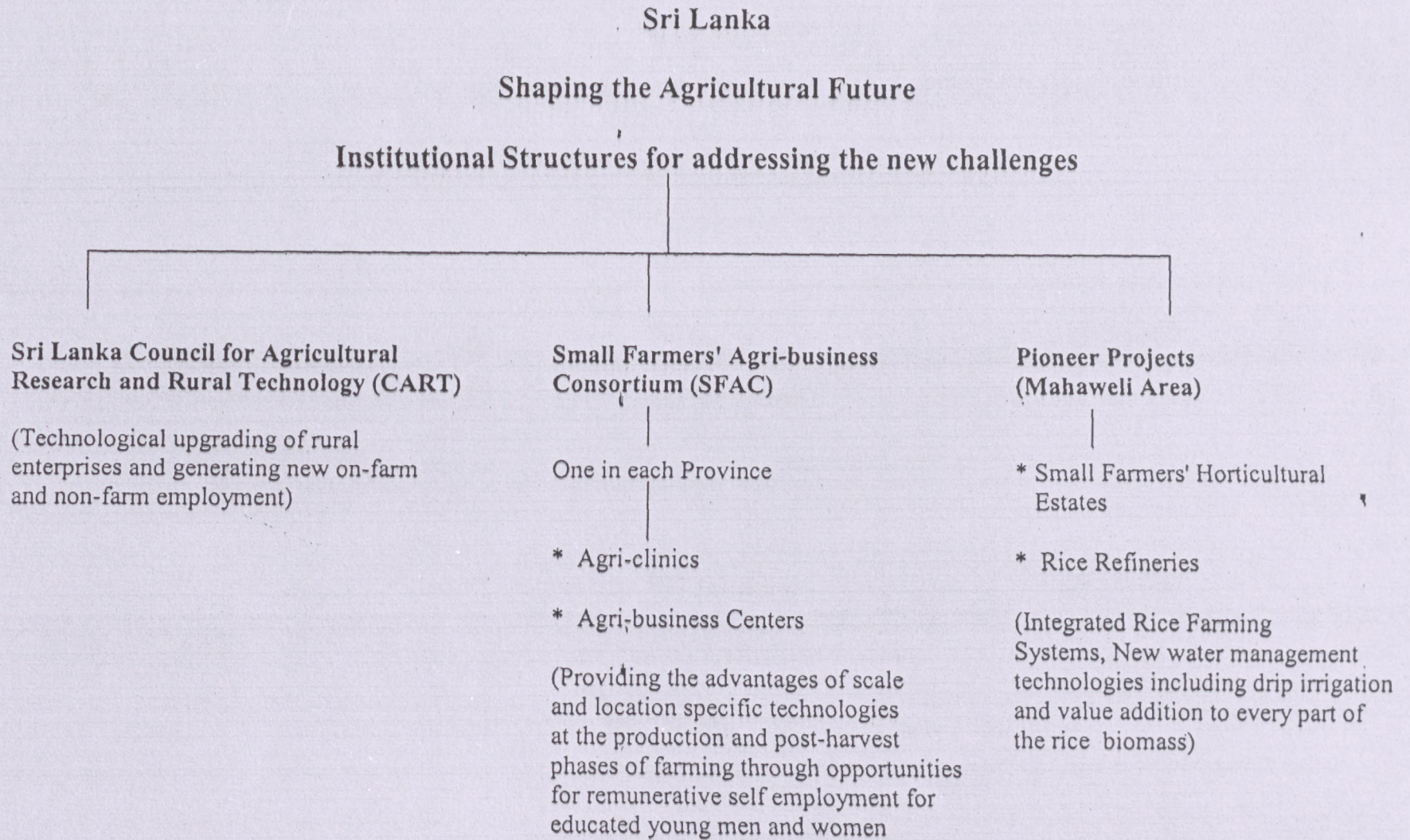
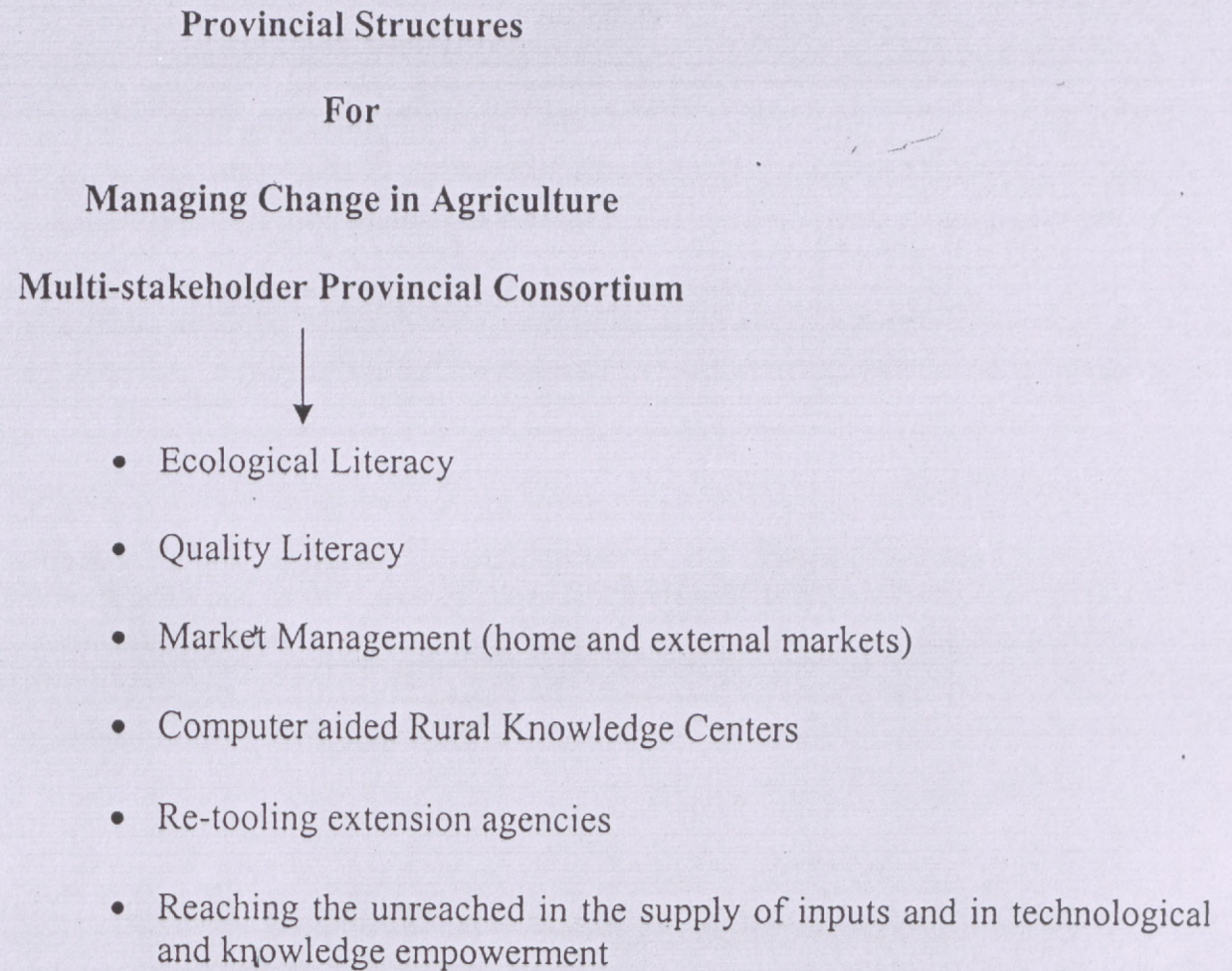


Figure 3



Strengthening Sri Lanka – India Partnership in the Farm Sector

A few suggestions

1. Food for Peace and Sustainable Development

- Food for work programmes for strengthening the ecological infrastructure essential for higher and sustained productivity. Such programmes can be initiated in areas where labour unemployment is high and where there is scope for afforestation, reclamation of wastelands, water harvesting and watershed management, organic recycling, reclamation of ponds and tanks for aquaculture, etc.

2. R&D Collaboration

- Medium term weather forecasting
- Land Use Planning, Precision Farming, Remote Sensing and GIS applications
- Organisation of Small Farmers' Agri-business Consortium, Agri-clinics and Agri-business Centres

3. Consultation on Quarantine Arrangements

A consultation could be organised between concerned Indian and Sri Lankan authorities (which involves also the participation of the private sector) on methods of streamlining quarantine procedures, without diluting the purpose of sanitary and phytosanitary measures.

4. Livestock and Livelihoods

In order to arrest the declining trend in milk production in Sri Lanka and the corresponding expansion of milk imports, it will be useful to organise a visit to Sri Lanka by Dr (Ms) Amrita Patel, Chairperson of the National Dairy Development Board.

During Dr Patel's visit, an *Integrated Dairy Development Programme* involving concurrent attention to breed, feed, health care, processing and marketing could be developed for being initiated in suitable areas in Sri Lanka including the Mahaweli project area. In addition to cattle (cows and buffalos), there is need to upgrade Sri Lanka's growing poultry industry. Hence, it will be useful if **Ms Anuradha Desai, Chairperson, Venkateshwara Hatcheries Group, Pune**, could also visit Sri Lanka during the visit of Dr Amrita Patel, so that an integrated strategy can be developed for strengthening rural livelihoods through a dynamic livestock sector.

5. Small Farmers' Hi-tech Horticulture Estates

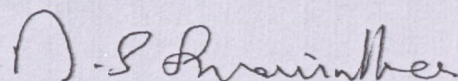
Sri Lanka offers ideal opportunities for the production of horticulture crops like vegetables, fruits and flowers. There are opportunities in the Mahaweli and other areas for promoting Hi-tech Horticulture, involving drip irrigation, low-cost greenhouses, soil health cards, fertigation and improved processing, storage, transportation and marketing. Sri Lanka is ready for a Horticultural Revolution of the type which has taken place in Maharashtra and several other parts of India. It would be useful if experts of the National Horticulture Development Board of India, ICAR, a few representatives of the private sector (like Indo-American Hybrid Seeds, Bangalore, headed by Dr Manmohan Attavar and some horticulture growers from Maharashtra) could visit Sri Lanka soon and develop jointly with Sri Lankan experts and private sector representatives, a *business plan* for organising Small Farmers' Horticulture Estates (providing key-centralised services to support efficient and economical decentralised production by individual farm families).

6. Supply of Research Material

Sri Lanka needs the following material urgently -

- Seeds of Large Onion
- Seeds of Chickpea variety *Swetha* from Andhra Pradesh
- Seeds of Quality Protein Maize of feed and fodder crops

7. Information and Communication Technologies for poverty eradication, on the model of the Pondicherry Village Knowledge Centres, established by the M S Swaminathan Research Foundation.
8. Institution development relating to the establishment of a Sri Lanka Council for Agricultural Research and Rural Technology. Experts from ICAR and CAPART could help in developing this institutional structure for improving on-farm and off-farm employment and income.
9. Farmer Credit Cards based on the *Kisan Credit Cards* introduced by Government of India.
10. Establishment of Community Food Banks for local level nutrition security. Madhya Pradesh Government and the M S Swaminathan Research Foundation have the requisite expertise.



M S SWAMINATHAN

1 June 2002