

Can we have an Organised Sustainable Agriculture System that can Ensure Food Security in Over Populated India? - An Overview

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Submitted: 22 Sep 2018; Accepted: 29 Sep 2018; Published: 16 Oct 2018

Abstract

Agriculture practices vary from place to place. Even concepts and methodologies need to be changed, taking in to consideration a region's ecosystem peculiarities and socio-economic aspects. From time to time decisions are taken by the concerned focusing on the problem on hand, ignoring or not worrying about repercussions of any decisions taken to overcome the problem on hand. At a later stage when setbacks of significant nature crop up critics pounce on the decisions taken earlier, forgetting decisions and execution mechanisms do change with time and our focus should be to take steps that can improve the situation, instead of wasting our energies in finding reasons for spilled milk.

Green Revolution was hailed in India for bailing us out of a tricky situation in 1960s and 1970s. In the process the introduction of chemical fertilizers, chemical pesticides led to deterioration of soil fertility and overall environmental degradation. While there is a definite necessity to improve our soil fertility and proper usage of depleted water resources, it is essential to take up any steps that can help India as a single entity and not a disjointed forty and odd independent segments. Stringent measures are needed to ensure proper Food Grain production and distribution, eliminating various bottlenecks. This aspect is detailed explicitly in the present article.

Food Security, in its real sense, can be achieved only when affordable nutritious food is available to one and all. If mal nutrition continues to exist India cannot achieve sustainable Food Security. India needs to address this basic aspect in a focused way. At the same time it has to be vigilant in meeting World Trade Organisation (WTO) requisites to overcome unpleasant criticism by WTO fellow members. A detailed overview of this aspect along with steps needed to overcome bottle necks using viable area specific low cost technology is covered in this article.

Keywords: Food Security, Green Revolution, Sustainability, Chemical Fertilizers & Pesticides, Soil Fertility, Organic Farming, ICRISAT, WTO, Malnutrition, Nutritious Food

Preamble

It is the intellect of an individual that makes his way of logical analysis more impressive, rather than the merits and demerits of the subject during a debate. Majority of the present day problems faced by us needs an in depth understanding of the problem before taking up apt preventive and curative measures. In the absence of such a measure the intellect can hoodwink a routine planning, administrative and execution mechanism and makes his business choices get the needed support compared to more useful sustainable measures. These intellectuals have been invariably responsible for setbacks noticed in the present day local, regional and global food production and environmental degradation. Overcoming these manipulations at different levels can probably ensure an organised sustainable agriculture system in the foreseeable future amidst various setbacks. To have an in depth analysis of the problem let us look in to various aspects.

Agriculture practices vary from place to place. Even concepts and methodologies need to be changed, taking in to consideration a region's ecosystem peculiarities and socio-economic aspects. Ecological or sustainable agriculture, as the name suggests, is a kind of farming that is sensitive to local conditions. It makes judicious use of available resources and tries to bind locally available plants, trees, birds, animals, insects and micro-organisms to interplay in a mutually beneficial fashion - one that results in nutritious, rich and chemical-free crops. An organised approach pays attention to soil fertility, agricultural biodiversity, climate mitigation and adaptation, green knowledge development, a decent living for farmers and gender inclusiveness. Sustainable agriculture can essentially be described as the practice of farming ecologically. Rather than focusing only on the economic viability of the crops, sustainable agriculture also involves using non-renewable resources effectively, growing nutritious foods and enhancing the quality of life of the farmers. Besides the obvious benefits, sustainable farming also allows farmers to transform their farms into giant recycling centres. They can turn crop waste and animal manure into fertilizers, use crop rotation to enrich the soil and reroute rainwater

to fuel the irrigation system. Not only does this save money, but it also conserves natural resources. Sustainable farming also lowers the need for chemicals and pesticides, and it makes the transition to a more organic, clean farming process a lot more feasible. It is basically aimed at stimulating green and rewarding small holder farming by supporting and scaling up promising approaches. With the above criteria gaining importance we come across a significant number of articles supporting or opposing “Green Revolution” measures introduced in 1960s in India that bailed us out from food deficient country in to a self sufficient one by 1970s. The resultant adverse effect on soil productivity capacity and overall negative impact on our ecosystem adversely affected our food production by 2000. Various remedial measures have been suggested by learned scientists for ensuring sustainability of agriculture. This could be true. But, we would not have survived but for “Green Revolution”. The words of Noble Laureate and father of the Green Revolution Norman Borlaug, “You cannot create a peaceful world on empty stomachs,” ring true in the current situation when we are faced with the mammoth task of feeding a growing population expected to reach 9.7 billion by 2050. The challenge of nutritiously feeding the skyrocketing population will be even more severe for developing nations. For instance, in the case of India, the recently released National Nutrition Atlas from the National Institute of Nutrition and the Indian Council of Medical Research highlights that majority (two-thirds) of the states have a high percentage of malnourished children and high level of wasting. This is mainly because of the non-availability/non-accessibility of/to enough amounts of proteins and micronutrients for pregnant women and children under the age of five. The recently released 2017 Global Hunger Index also highlights that the situation is serious for India.

Securing food security with biotechnology is considered very useful in over populated developing countries, including India. According to Rajeew Varshney there are a range of biotechnological approaches, including both traditional ones like selective breeding and fermentation techniques, and modern ones such as genomics, molecular breeding and genetic engineering, that can contribute towards achieving food and nutrition security [1]. Varshney further states that at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), ICRISAT scientists together with their partners from the Indian Council of Agricultural Research and state agricultural universities, have developed improved lines of chickpea (tolerant to drought), groundnut (resistant to foliar disease and having high Oleic acid content), pearl millet (resistant to downy mildew and having high iron and zinc contents) and sorghum (tolerant to drought) [1]. Some of their recent works on molecular breeding at ICRISAT have led to the development of chickpea lines with enhanced drought tolerance that can provide 10-20 per cent higher yields than the existing drought-tolerant varieties under rain-fed conditions.

However, in some cases, the available options for improving crops are only genetically modified (GM) crops. For instance, in the case of insect resistance in chickpea, pigeon pea, brinjal and cotton, we need to embrace GM technologies, as enough amount of natural variation is not present for resistance. Scientists of ICRISAT have already seen the success of Bt cotton in our country, as India from being an importer a few years ago has now become a major exporter (Status Paper of Indian Cotton—National Food Security Mission, 2017). The other potential GM crop to help the farming community is GM mustard. Biotech crops can play a significant role in this,

which is substantiated by the report of the International Service for the Acquisition of Agri-biotech Applications that suggests that historically biotech crops are the fastest adopted crop technology, giving farmers satisfaction about their benefits and high adoption rates.

There have been significant increases in global planting of biotech crops in 2016 that reached 185.1 million hectares as compared to 179.7 million hectares the previous year. In India, 7.2 million farmers planted more than 10.8 million hectares of BT cotton in 2016. Globally, from 1996 to 2015, biotech crops generated economic gains at the farm level worth US\$ 167.8 billion. Biotech crops have reduced the amount of pesticides used by 620 million kilograms. In 2016 alone, fewer volume of insecticides reduced carbon dioxide emissions by 26.7 billion kilograms, equivalent to taking 11.9 million cars off the road for a year. Biotech crops helped alleviate poverty by helping 18 million small farmers and their families, totalling 65 million people.

Varshney participated in FAO’s regional meeting on agricultural biotechnologies held in Kuala Lumpur, Malaysia, from September 11-13, 2017, as a member of the advisory panel of an internationally recognised expert group to provide advice and guidance to the task force on biotechnologies. As a speaker, he presented his views regarding how to enhance the adoption of agricultural biotechnologies to feed a growing population of 1.3 billion in India. He stated that we have to bear in mind that any technology has seen reluctance in acceptance when initially introduced, but the entire world today has already seen the impact of technology in day-to-day life. Similar is the case with biotechnology crops as well. Given the current situation of feeding the world we need to produce more with limited available natural resources (land, water etc).

While these new approaches are being implemented through focused laboratory testing some experts advocate going back to traditional agriculture practices, to ensure eliminating biodegradation of soils. As per one school of experts it is advisable to re-introduce the traditional agriculture to make our agriculture sustainable. A highly respected agriculture and climate expert pointed out “The traditional agriculture was soil and climate driven farming system that encompasses the animal husbandry [2,3]. It provided socio-economic, food and nutrient security with the healthy food. Those were the “Golden Days” in the history of farming. It was an environment-friendly system and was highly successful & sustainable. No pollution, no worry about seeds and fertilizer adulteration as they used good grain as seed and compost of farmyard manure and green manure as fertilizer. Following growth in population the food production balance got disrupted and in order to find a solution to ever-growing problem, 1960s saw the chemical inputs technology and genetically modified seed technology entering India in the form of much eulogised “Green Revolution Technology”. With the help of those technologies, food security was achieved to a considerable extent. But, it came at huge costs with negative impact on environment. The Green Revolution increased the production substantially in terms of quantity but could not achieve the quality of traditional agriculture in terms of food and fodder. The technology includes high yielding seeds, chemical inputs (fertilizers & pesticides, insecticides, herbicides, etc) and irrigation; all of them increased the cost of agriculture. To reduce the burden on farming community the government introduced input subsidy, a huge component. Studies on paddy/rice production figures

of 1970s & 1980s in Andhra Pradesh (one of the rice producing states of India) revealed that the traditional paddy under irrigation yielded 1300 kg/ha; by adding high yielding seed this increased by 500 kg/ha; and by adding chemical fertilizers the yield level rose further by 2000 kg/ha. That means total yield achieved was 3800 kg/ha under farmers' fields. This was far less than research station yields of 5000 to 6000 kg/ha. The present average yields of farmers' field are 2600 -2800 kg/ha as the yield curve flattened since 1984-85. Only increase in area under irrigation contributed to additional increase in production after 1984-85. Studies clearly reflect that high yielding seeds were tailored to chemical fertilizers under irrigation. This severely affected dry-land agriculture that constituted around 60% of the cultivated land. This forced dry-land farmers migrating to urban areas as the dry-land agriculture with high input costs became unsustainable and non-remunerative. S.J. Reddy further states that to achieve meaningful food security the governments must change the agricultural policy. It must include low input costs, pollution free quality food technology such as organic inputs under cooperative farming setup. This not only brings down the cost of production, improves the utilization of natural resources and put a full-stop to farmers' suicides. Better water management plays a crucial role by diversifying through less water intensive crops under climate change. We need crop rotation and intercropping systems to reduce the risk under cash crops. However, the success depends upon: better post-harvesting technologies including sufficient storage facilities, export facilities, transport facilities, food processing industries, better education and health care facilities, which might reduce the migration to urban centres. Need to establish commodity boards – already existing for some cash crops – with powers to regulate the area to be sown. In fact progressive farmers with traditional wisdom have developed technologies and achieved far higher yields than the research station yields and received national and international awards/rewards and recognition but neither the government nor the scientists showed any interest, though there is a mechanism in government departments, to stabilize that technology and provide packages to farmers to achieve environmental friendly progress in agriculture.”

Even though what has been stated above was true, to meet our ever increasing demand for quantity of food products the steps taken during “ Green Revolution” were to a large extent necessary at that phase . As we look in to various negative impacts due to chemical fertilisers, chemical pesticides, high yielding seeds it is clear that none took in to cognizance the negative impacts, as the focus at that time was on higher production to cater to the needs of ever increasing population. Lack of co-ordinated monitoring system that brings in to light area specific soil and water role in our food production resulted in depletion of soil fertility and non-availability of sufficient water for irrigation. Even though the increase in production, as stated above, after 1984-85 was attributed to increase in cultivable land we are alarmed by conversion of fertile lands in to urban conglomerations from Kashmir to Kanyakumari shrinking the cultivable land steadily from around 2005. To ensure re-emergence of free pollution environment and sufficiently good agriculture land with fertile soil it has become necessary for a proper co-operation between farmers of different segments of our country; a necessity. Instead of assuming our country is made up of 40 isolated segments with conflicting interests it is essential to bring together all the states in developing a beneficial sustainable food security package that can help every Indian. Such a development alone can help us to survive and grow amidst number of hurdles faced by our agriculture based economy.

A sustainable approach to farming:

A sustainable approach to farming (which can lead to Food Security) is economically viable, environmentally sound, and socially beneficial: it works for the farmer, the land, and the community. Sustainable agriculture is grounded in the idea of stewardship: preserving the resources that allow us to meet our own needs, so that future generations can meet theirs too. This idea might seem too obvious to need stating, but its implications are far-reaching. If we are serious about sustainability, we cannot continue to farm in ways that deplete soil, pollute water, reduce biodiversity, and impoverish rural communities. We need a new agricultural toolkit. And farmers across America, with the help of science, are developing that toolkit. Crops require fertile soil and protection from weeds and insect pests in order to produce the food we need. Sustainable agriculture meets these requirements with sophisticated management practices grounded in the science of agro-ecology, which views farms as ecosystems made up of interacting elements-soil, water, plants, and animals-that can be modified to solve problems, maximize yields, and conserve resources. Research has shown that agro-ecologically based methods-such as organic fertilizers, crop rotation, and cover crops-can succeed in meeting our food needs while avoiding the harmful impacts of industrial agriculture. As farmers incorporate these practices into their work, many benefits emerge: Less pollution, healthier and more fertile soil that is less vulnerable to drought and flooding. Also it can result in a lighter impact on surrounding ecosystems and greater biodiversity, reduced global warming impact and less antibiotic and pesticide resistance. This checklist of benefits adds up to more than the sum of its parts. The ultimate benefit of adopting sustainable agriculture is that in doing so, we make it more likely that our farms will remain healthy and productive for future generations. Ultimately, it is farmers themselves, by adopting sustainable practices, who will turn sustainable agriculture from a movement of forward-thinking innovators into standard operating procedure for U.S. food production. But consumers and policy makers have a role to play as well. The current system in practice in different parts of the world is the result of policy choices-and we will need to make better policy choices to move that system in a new direction. And as citizens, we can call on policy makers to increase funding for research to improve sustainable practices, provide incentives and support for farmers to adopt or expand their use, and invest in local and regional food systems, which connect farmers with consumers while creating jobs and stimulating rural economies. The current system is the result of policy choices-and we will need to make better policy choices to move that system in a new direction [4].

Even though what is pointed out above is the right path, we find difficult to switch over to pure organic cultivation in India. as farmers from different segments of the country are more interested in producing more to gain financially at the expense of quality. Soil fertility and depletion of ground water are going to adversely affect our food production, in the near future, unless the experts convince the farmer the necessity to change the age old cultivation practices.

Malnutrition - an impediment to achieve Food Security

One of the confounding features of the era of rapid economic growth in India since the 1990s has been the stubborn persistence of malnutrition. It is well known that across a range of indicators of nutritional status of adults and children, India is a laggard among fast-growing economies. While improvements in nutritional status have occurred, they have been marginal relative to the pace of

economic growth. India faces today what is known as the triple burden of malnutrition—the coexistence of inadequate calorie intake and under-nutrition among a large section of the population, excess intake of dietary energy leading to obesity and related health issues among another section of the population, and pervasive micronutrient deficiencies. Evidence from both nationally representative surveys as well as smaller studies underscores these phenomena. In general child nutritional status and child-mortality rate, India is doing worse than some Sub-Saharan African countries and south Asian neighbours. While each aspect of the triple burden of malnutrition is relevant and demands specific attention, the prevalence of under-nutrition and micronutrient deficiencies among vast numbers of people despite impressive economic growth remains among the most important challenges for policy-makers. Under-nutrition is a consequence of a multiplicity of factors but food security as it is currently understood lies at the very heart of it. Food security is characterised as: ‘a situation ... when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life’ [5]. This understanding of food security incorporates the idea that access to food includes not just physical availability and affordability, but also requires that individuals do not face social barriers in feeding themselves. Food security implies nutritional security and further acknowledges that in its attainment, it supports the actualisation of individual capabilities. It is important to note too that individuals are the focus, although household-level or community-level food security is an appropriate concern.

As such for Food Security it is not enough if we produce Rice and wheat but we need to produce also adequate safe and nutritious food. Unfortunately, our farming community has not been properly motivated to grow in addition to food grains, nutritious and safe food for various reasons that are discouraging the farmers to shift their focus from food grain production. While overcoming international trade policy in safe guarding our food sovereignty, we need to ensure sustainable nutritional security. All the stake holders should support the positive attribute that Indian agriculture can provide and support in sustainable ways diets that are both adequate in quantity and quality, even though it involves an effort that goes well beyond food grains.

There is a perception that China has, by and large, solved its ‘food problem’, whereas India has not. This rings true in a very specific sense. The crux of India’s food problem today pertains not so much on increasing food availability or production but with the distribution of food. This is not to suggest that the challenges associated with ensuring food availability in sustainable ways is not a policy concern, but rather, in terms of the immediacy of challenges, ensuring food access would appear to score over concerns over food availability. For example, despite flagging growth rates in the agricultural sector relative to targets, India has seen impressive growth in food grain production in recent years. The National Food Security Mission has played a key role in augmenting production in cereals and pulses. Much of this has come from yield increases in the eastern regions in the country where the Green Revolution did not take place. At the same time, there has also been a strong and continuing trend for diversification into non-cereal and high-value commodities such as dairy, fruits and vegetables, which implies the possibility of higher quality diets. Investments in the agricultural sector have been especially strong after 2004-05, both public and private, with

private gross capital formation accounting for an increasing share of all investment.

Despite the large increase in production, access to food continues to be a serious issue especially in the context of extraordinarily high-inflation rates in food commodities in recent years and limited access in large parts of the country to high-quality diets. The imperative that the challenge of food security derives also from recent evidence from India and elsewhere suggests that income growth might not always translate fully or quickly enough to improvements in the health nutritional status [6].

After learning about an in depth account of importance in improving nutritional status, let us look into what needs to be done to make our food production initiatives sustainable.

What we need to make our initiatives sustainable?

Take the roads of Punjab during the monsoon and you will find most fields turned into pools of water. It’s mainly the water pulled out from the underground vault to support the kharif crop of paddy (rice). Paddy has pushed out maize and cotton, which were common in the pre-green revolution era. From 2, 27,000 hectares in 1960, the area under paddy rose to 26,12,000 hectares by the year 2000; a growth rate of 1,050 percent. In fact, estimates by the Commission for Agricultural Costs and Prices suggest that to grow one kilogram of rice, 5337 litres of water is required, which is double the figure for West Bengal (2605 litres), a natural habitat for the crop. The conventional method of rice cultivation requires flood irrigation (730 mm per hectare) as it helps check the growth of weeds. This is why paddy was traditionally grown mostly on floodplains of rivers and around drains, even in Punjab. Expansion of irrigation canals and accessibility to groundwater through pump sets meant more area could be brought under this crop. The DSR rice cultivation technique, which involves sowing the seeds instead of transplanting saplings, is practiced in central Punjab district of Moga to save on labour and fuel used to power pump sets when power supply is erratic. It is noticed that introduction of a machine that drills the seeds in the soil can be profitable, but one has to take extra care for one and a half months as weeds may flourish due to less water. In addition, DSR does not work everywhere [7].

It needs good loamy soil. Also, farmers are wary of this technique as they are more in groove with the conventional practice. Infestation of weeds requiring regular monitoring is another reason that DSR got restricted to few pockets. Most of the Punjab farmers now practise system of rice (or root) intensification (SRI), which has many takers across the world. SRI involves plantation of saplings 10-12 days old instead of three weeks in a grid pattern with space of eight inch on all sides. The idea is to get better nourishment for the roots which can support a strong plant. The soil moisture is maintained through irrigation every four to five days instead of keeping the fields flooded all the time [8].

If better water availability pushed paddy, assured procurement made it stay. The green revolution, introduced in India in 1960s, came with high-yielding varieties of wheat and paddy meant to make the country self-sustaining in food production. Assured procurement of these two crops by government agencies for distribution to other states fetched better prices for farmers. Over time, paddy dovetailed well with wheat, a major winter crop of Punjab. Consequently,

machinery was also specifically designed for wheat-paddy cycle, which further pushed the combination. Even though the economics reveals paddy cultivation in Punjab is flourishing it has pushed back Maize, Cotton and other irrigated dry crops leading to an imbalance in the agriculture output. No one is ready to convince the Punjab farmer the need to grow the nutritious Maize and other ID crops along with Paddy. A time may come when a Punjab farmer while ready to import his favourite staple food of Makki ki roti and Sarson Ka Saag, would be competing with the conventional rice growing farmers of West Bengal, Orissa, Andhra Pradesh, Tamil Nadu and other states, leading to unhealthy competition. In areas where one can grow rice due to presence of thick loamy soils, as all along the east and west coastal belts, in major river basins these techniques can be used by gaining needed knowledge through proper interaction between Punjab and other farmers, especially when monsoon aberrations have resulted no assured water supply to practice conventional flow irrigation.

Any planned initiative aimed at in ensuring food security should be termed as an Indian initiative and not x, y and z state initiative. This aspect assumes importance if we go through the recent study on "Virtual water trade". Due to lack of a properly planned export and import of food products we are running India dry, while China is conserving its water supply by importing water intensive crops such as soya. Concerns over looming water scarcity in large tracts of Asia and Africa, especially due to climate change, have led researchers to develop new analytical approaches to quantify expected water losses. One such concept is 'virtual water trade', which refers to the water embedded in commodities. A country that exports wheat, for example India, is in effect exporting the water needed to grow it. When states like West Bengal and other states along the coast as stated earlier, use half the quantity of water for growing one kg of rice compared to Punjab our agriculture scientists encourage rice cultivation in Punjab, setting aside clear warnings that India will be deprived of precious water much faster compared to China. If such short sighted approaches are allowed to continue we would face many setbacks in ensuring food security [9].

In nutshell it is essential to take proper care of our water, soil and other essential components for achieving sustainable agriculture amidst monsoon vagaries. Everyone needs to focus on this important approach. To a considerable extent our dedicated experts tried to introduce the state of the art technology, hoping the steps introduced would meet our food needs. They succeeded to a considerable extent but failed to visualise the negative impact of the production enhancement chemicals on soil fertility and quality of the product. Instead of criticising their initiatives, as now we know what ails our food production, let all the experts' pool in their energies and expertise to take immediate and long standing preventive and curative measures to ensure food security.

Conclusions

Food security needs close co-ordination between various stake holders. The stake holders need to be brought on to one platform by a subcommittee comprising experts in Food Production (for ex: researchers from ICRISAT), irrigation experts and Secretaries holding charge of key ministries. Once this subcommittee identifies the weak links everyone should work in unison and achieve positive results. The arrived at results should then be made necessary inputs by both Central and State level execution channels .A fool proof monitoring system should be evolved and made functional. This

would give better results. However, to meet the needs of ever increasing population, whether we like it or not, we need to introduce at strategic locales genetically modified crop in puts and use the output as supplementary food packages along with mass scale food products that can be produced by following tailored traditional agriculture practices that are strengthened by nano technology. The latest opinion of researchers is agriculture must become more resilient, efficient and sustainable in order to both adapt to and mitigate climate change; in turn, society must embrace actual behaviour change toward more diverse and plant-forward diets. Research shows that the majority of people know they should be eating more fruits and vegetables as a percentage of their diet, but there still exists a huge gap between that knowledge and people's actions. Relating this back to the purpose of the Global Climate Action Summit of September, 2018, in San Francisco, USA, embracing more plant-forward diets is crucial to societal resilience from both a nutritional and climate change perspective. The resilience of our global food system depends on not only resource conservation and environmental health and stability, but also human behaviour, socioeconomic, and socio-cultural factors. This is evident when we look into the present positive trend of nourishing food products production. Researchers advocate that a proper global food system can sustain in future , especially when population is booming and water scarcity is enhancing linearly, with improved resource footprint, greater uses of technology (everything from individualized diets based on consumer biometrics and genetics to field-level metrics collection on farms), and increased diversity of foods in our diets. Lastly, all of that would be achieved while preserving the important area specific cultural facets of food [10-11].

Greater use of an organised high precision technology is difficult to achieve in over populated India due to various factors including absence of effective usage of limited resources. As such it is essential to use indigenous technology that can meet the aspirations of majority. As an effective strategy it is essential to grow food products developed by ICRISAT, especially in drought prone segments of India. Usage of low cost implements, developed in cottage industries, in Tamilnadu, Punjab and other parts of India for tilling, weed removing, harvesting, storage, transportation and marketing purposes can lessen the burden on farmers and help in growing better quality product and meeting food security targets. Government should ensure quicker procurement of harvested food products and quicker disposal of the procured product by exporting the surplus quantity to African and Middle East countries, as a part of global food system.

The immediate challenges for India lie in revisiting operational aspects of food procurement and distribution for a more cost-effective and nimble system. On the international front, as India seeks to defend its food policies in the WTO, rather than seeking protection for its policies, India should seek to leverage provisions within the Agreement on Agriculture (AoA) and negotiate for changes in some of the most problematic aspects of the AoA involving the metrics for computing indicators of trade distortionary support. With the spectre of climate change and the concomitant impact on agricultural production, there is a growing view that there must be a refocusing of priorities to leverage local agro-food systems to address nutritional concerns. Finally, as explicitly explained in the last subsection of this write up our food export and import trade policies should be periodically monitored introducing apt mid course corrections. To execute these suggestions, all stake holders should voluntarily come forward and through mutual co-operation

introduce effectively all the suggestions made in this write up. If this is found beyond our capability, it may be very difficult to achieve sustainable Food Security.

Acknowledgements

I made use of many web links and some important references in preparing this write up. I place on record my thanks to many learned researchers for emphasizing the need to co-ordinate various new management approaches and focused new research aspects of sustainable Food Security.

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