



Connecting the Dots

Evolving Practical Strategies for Adaptation to Climate Change

Food and Nutrition Security and Climate Change: Strategies for a Sustainable Future



Watershed Organisation Trust



Food and Nutrition Security and Climate Change: Strategies for a Sustainable Future

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Foreword

Climate change is already happening and its effects, especially on rural communities in India, are particularly adverse. The need is to highlight the key issues and understand the practical challenges that must be addressed if India is to build the capacities of rural communities to robustly adapt to climate change and realize the National and State Action Plans on Climate Change (NAPCC and SAPCC).

Since the last 4 years, WOTR has been implementing a large scale integrated project on climate change adaptation in rural Maharashtra, Andhra Pradesh and Madhya Pradesh in collaboration with National Bank for Agriculture and Rural Development (NABARD), the Swiss Development Cooperation (SDC), the Indian Meteorological Department (IMD), the Central Research Institute for Dryland Agriculture (CRIDA), the International Center for Research in Agroforestry (ICRAF) and the Mahatma Phule Krishi Vidyapeeth (MPKV).

This experience has catalyzed insights, learnings and experiences from multiple stakeholders which we have formulated as Position Papers across 12 thematic areas: Watershed Development, Water, Food and Nutrition Security, Agriculture, Livestock, Biodiversity and Ecosystem Services, Disaster Risk Reduction and Risk Prevention, Alternate Energy, Economics and Livelihoods, Health, Gender and Governance.

These papers assess and analyse the key policy and operational challenges faced in building adaptive capacities across sectors, from the perspective of different key stakeholders; aim to contribute towards formulation of an enabling policy and operational framework that would facilitate effective implementation of the NAPCC and SAPCCs in rural India; and hope to trigger creative dialogues between key stakeholders with a view for providing effective support to efforts that seek to build the adaptive capacities and resilience of rural communities.

The paper, "Food and Nutrition Security and Climate Change: Strategies for a Sustainable Future", examines the existing supporting systems - institutional and social - especially in the semi-arid and dryland regions in India. It pinpoints key approaches within the system that work and those that require further improvement. It further proposes the approaches needed - at community as well as policy level - towards food and nutrition security.

Key Messages

Food and nutritional security (FNS) is a complex issue given its reliance on climatic as well as non-climatic factors that are intertwined and interdependent. When climate change is added, it further worsens the situation as food production, one of the critical ecosystem services, is impacted the most.

- Participation of rural communities, specifically the poor, women, and smallholder farmers who are food growers, is the key in addressing climate change related threats to food and nutritional security.
- Communities should participate in FNS related governance processes of decision-making, planning, implementation, monitoring and evaluation. It includes government efforts for FNS such as the public distribution system (PDS), Integrated Child Development Scheme (ICDS), mid-day meal scheme etc.
- There is a need to empower rural communities through information and knowledge transfer, capacity building and reinstating of social capital in FNS-related aspects.
- There is a strong case for decentralising purchase, storage and distribution of food grains by government at the district level as this would value local grains, enable quick response to needs, reduce the carbon footprint, meet local tastes and promote local markets - key ingredients in strengthening FNS.
- Regenerating watersheds in a holistic manner (watershed development) helps in revitalizing the ecosystem, the base of food sources and addressing biodiversity and sustainability concerns.
- Reducing market dependability and achieving food sovereignty is possible through a sustainable farming approach - a mixed farming system which includes livestock and emphasises organic processes and use of indigenous cultivars and breeds. Sustainable farming promotes optimal and efficient use of resources, is environmentally friendly, suited to the local climate, reduces exposure to market volatility and promotes a balanced diet.
- The proposed Food Security Bill (draft) undermines the food sovereignty of people and ignores the fact that food is rightfully a personal concern. A major criticism is that it promotes and perpetuates food dependencies instead of empowering people to produce, source and afford their own foods as per their preferences and tastes. This, in turn, puts at risk not only the country's food sovereignty and agro-biodiversity, but also that of households, smallholder farmers and food producers.
- The enormous challenge of addressing FNS in India can only be addressed through a collaborative partnership between all stakeholders - local communities, government agencies, academic and research institutions, financiers and donors, business and civil society.

Food and Nutritional Security and Climate Change: Strategies for a Sustainable Future

1. The Context

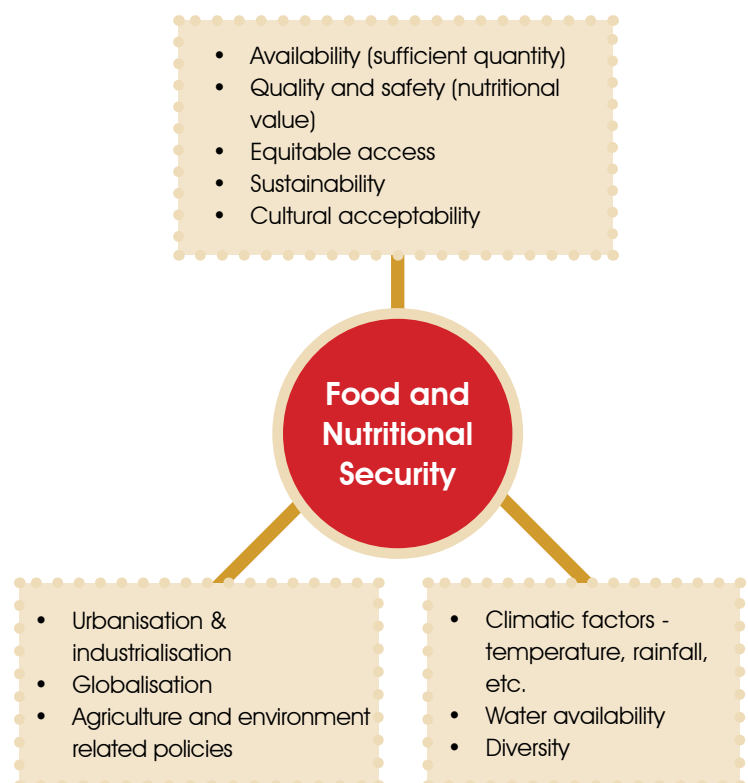
There is growing acceptance that climate is changing, and will impact ecosystems and food production all over the world; in most cases, irreversibly. Food is an ecosystem service, which is mainly sourced from land and water ecosystems. While its availability and production depends on the health of an ecosystem, access to food depends on sufficiency of production as well as effectiveness of market and non-market distribution systems. Clearly, any change in these, especially decreasing production induced by climate variations or change would lead to food and nutritional insecurity. People living in resource-fragile areas such as arid and semi-arid regions (drylands) in developing and emerging countries, who earn their food and livelihood from the surrounding ecosystem, as also people living in low-lying plains, coasts, deltas, and islands would be particularly vulnerable.

There has been a lot of debate on the definition of food and nutritional security (FNS); the most widely accepted is that of the Food and Agriculture Organization of the United Nations (FAO). "Food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 2009).

Food security is a function of different factors for different communities in India. For the urban rich it is a function of availability through the market, but the urban poor require support from the public (non open-market) distribution system. Similarly for a majority of the rural rich it is a function of self-sourcing through farm-production, common/

community owned resources such as forests and water ecosystems, and through the open-market; whereas the poor and marginalised additionally depend heavily on the public distribution system.

Addressing food and nutritional security is already a complex issue given its reliance on many factors and the interconnections and interdependencies between them. These factors include availability (sufficient quantity), quality and safety (nutritional value), cultural acceptability, equitable access, and sustainability. These factors are further determined by urbanisation and industrialisation, globalisation, government's agriculture and environment related policies and most importantly by water availability and climatic factors like temperature, rainfall, etc. Climate change is an additional burden as it makes the food and nutritional security situation more complex since it directly



impacts the ecosystems from which various food production systems are sourced. Therefore, given the criticality and complexity of food and nutritional security in the context of climate change, it demands a holistic approach.

In this paper, we have attempted an analysis of the current situation including climatic factors and their impacts on the ground. We then present the approach adopted by the Watershed Organisation Trust (WOTR) as it seeks to address the food and nutrition crises in rural India.

We begin by presenting a brief review of India's food and nutritional security situation and the factors responsible for it.

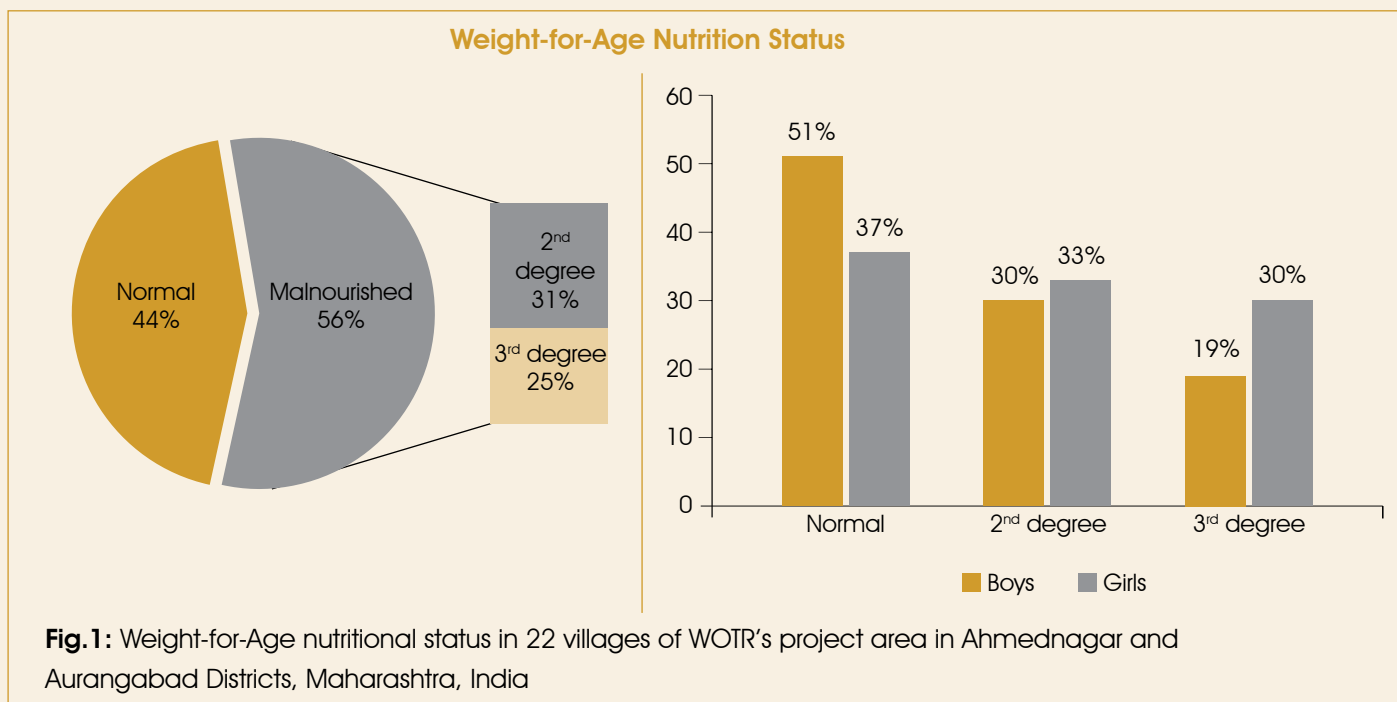
The Changing Pattern of Food and Nutrition Security:

Despite its earlier history of famines and the continuing patterns of droughts, India has made remarkable progress towards achieving food security at the national level. Green revolution strategies - manufacture of chemical fertilisers and pesticides, development of High Yielding Varieties (HYV) of hybrid seeds, and ensuring that farming communities had access to these at subsidised prices, coupled with large-scale canal irrigation systems, has led towards increase in food production and helped India meet the national food-production goals (Ziegler, 2006). Additionally, employment oriented drought-proofing programmes, together with watershed approaches and extension activities such as agricultural credit-cooperatives, and increased food productivity contributed towards this end in the rain-fed areas of the country. While these ensured self-sourcing at the micro level by improving farming and agriculture, the open-market and non open-market distribution system ensured food-access to urban and rural areas on a macro scale.

The Public Distribution System (PDS), a nationwide network of low priced food grain shops regulated by public authorities, plays an important role in providing access to the urban and rural poor. In addition, targeted programmes such as Integrated Child Development Scheme (ICDS) and Mid-day Meals in school programme were started to reach out to the vulnerable, especially children and pregnant women. This was a major shift in the policy focus, from mere supply of food to a child-care approach, aiming at provision of nutritious food to children through schools, and providing neo-natal and post-natal care, including facilitation of institutional, rather than home-based, birthing service.

India's Nutritional Status Report Card 2011:

Yet today India faces some of the greatest challenges in terms of food security on a wide range of indicators such as availability, access, balanced diet, diversity and equity in consumption of nutritious food at sufficient levels. Mass hunger, starvation deaths, food-stress, and inequitable access to sufficient food indicate a serious situation of food insecurity in India (Narayan, 2011; Narain and Ghosh, 2009). The global hunger index 2009 (IFPRI, 2009) has placed India in the 67th rank out of 84 countries, which is much below poorer Asian countries such as Pakistan and Nepal. The share of the population that is undernourished rose from 17 per cent in 1995–97 to 21 per cent in 2005–07 (Souza, D and Chemielewska, D, 2011). At 43%, the percentage of children underweight in India is twice the average prevailing in sub-Saharan Africa (22 per cent) (HUNGaMa Survey, 2011). A pre-project assessment (Nov 2009) of growth-monitoring of children in 0-5 age group in 22 villages of Ahmednagar and Aurangabad districts was made where watershed development projects were being implemented by WOTR. The weight-for-age nutritional status showed 37 percent girls and



A pre-project assessment (Nov 2009) of growth-monitoring of children in 0-5 age group in 22 villages of Ahmednagar and Aurangabad districts was made where watershed development projects were being implemented by WOTR. It showed alarming trends of malnutrition. Especially among the girl children, 63% were malnourished and almost half of them were suffering from 3rd degree malnourishment.

51 percent boys weighed normal; 33 percent girls and 30 percent boys were in 2nd degree and 30 percent girls and 19 percent boys were in 3rd degree malnutrition.

"Anaemia is more prevalent in women who are breastfeeding (63 percent) and women who are pregnant (59 percent) than for other women (53 percent). The prevalence of anaemia is also high for rural women, women from scheduled tribes, women who smoke, and women belonging to 'other' religions" (National Family Health Survey [NFHS], 2006).

As regards equity, it is observed that nutritional deficiencies are more prevalent amongst disadvantaged groups such as Scheduled Castes and Scheduled Tribes (Dohrmann and Thorat, 2007). Gender concerns are equally critical in accessing sufficient and nutritious food. Women and children's food and nutritional security is determined by their economic, educational, social, and health status within the family and in society (Ramchandran, 2008).

2. The Price of 'Progress'

2a. Economic, Population, and Urban Growth:

The economic reform introduced in India in the 1990's helped speed up liberalisation, privatisation and greater integration with the global economy. This spurred economic growth and gave a boost to urbanisation as people began moving from rural areas to places offering employment. Urbanisation has adversely impacted agricultural land use with prime land being converted into residential, commercial, and industrial spaces. Natural and biotic resources are being rapidly depleted, some irreversibly so, as industry and commerce seek to meet the ever expanding aspirational needs of a growing and economically progressing population.

With India's current population of 1.21 billion projected to increase to 1.53 billion by the year 2030 (if the population rate continues at 1.58 percent), and the projected plan for a 38 percent¹ (600.4 million inhabitants)

urbanised population, there is much that India needs to do so as to have adequate food for its people. However, as plans move towards urbanisation, changes are being introduced and/or are inadvertently stimulated by various factors and reactions.

i. Food Demand for a Growing Population:

India reached its food-production goals with a combination of the green revolution and other efforts towards overcoming famine. Drought-proofing programmes based on employment schemes, together with watershed development approaches, agricultural credit cooperatives, and increased food productivity, contributed towards increasing availability of food in the rain-fed areas of the country. On the micro level, these steps ensured self-sourcing by improved farming and agriculture; on the macro level, food access to urban and rural areas was ensured by the open-market and non-open market distribution systems.

However, after initial successes, India soon started experiencing the limitations of resource-intensive and chemicals-based agriculture. The pursuit of increasing production and widespread inappropriate use of chemicals has degraded lands resulting in lowering *in-situ* productivity². This has dragged farmers and cultivators into a vicious cycle of worsening land degradation with increasing chemical inputs, leading to further degradation of the ecosystems. This, together with the dependency on high-yielding variety (HYV) of grain, has led to an ever-increasing dependence on external inputs which is making agriculture unviable. Besides, reduction of soil fertility and the damage to agricultural ecosystems has also contributed to reduced crop-biodiversity.

ii. Urbanisation-induced Changing Land-use Patterns: As industrialisation and

urbanisation expand, there is a decrease in area under cultivation and a depletion of natural resources. The loss of agricultural land to human settlements is rapidly increasing. In India about 1.5 million hectares of land (mostly agricultural) went to urban growth between 1955 and 1985 and a further 800,000 hectares was expected to be transformed between 1985 and 2000. Under this threat, agricultural and social scientists are expressing a concern as to whether India will be able to feed its population (Fazal, 2000). Alongside, there is continued reduction in forests and common lands which are parcelled out, converting them to land under agriculture.

iii. Changing Food Habits due to

Urbanisation and Globalisation: To meet the food needs of the urban population, value additions are required. Food has to be moved long distances from source to consumer. Processing prolongs the shelf life of food and makes it available over distances; it is useful in reducing the burden on women, making cooking easier. However, the nutritional value of the food is reduced during the manufacturing process, though attempts are made to add supplements. Increased international trade in the wake of the globalisation, and de-regulation under the auspices of the World Trade Organisation (WTO), has intensified this process. The food-processing industry invests heavily in the promotion of processed foods. In the recent past, these markets have also penetrated rural areas where there is a limited requirement but a growing inclination towards buying and consuming processed food. Processed food is like a two-edged sword for rural areas. On the one hand it reduces the nutritional value of food during the manufacturing process, and on the other it promotes monoculture through contract farming. Monoculture farming is vulnerable to

¹ <http://geography.about.com/od/obtainpopulationdata/a/indiapopulation.htm>

² The term 'in-situ productivity' means per-unit production of a piece of land without application of external inputs of any type, such as chemical or other fertilisers or pesticides.

"The Forest Rights Act grants legal recognition to the rights of traditional forest dwelling communities, partially correcting the injustice caused by the forest laws. No one gets rights to any land that they have not been cultivating prior to December 13, 2005 (see section 4(3)) and that they are not cultivating right now. Those who are cultivating land but do not have documents can claim up to 4 hectares, as long as they are cultivating the land themselves for a livelihood (section 3(1) (a) and 4(6)). Those who have a patta or a government lease, but whose land has been illegally taken by the Forest Department or whose land is the subject of a dispute between Forest and Revenue Departments, can claim those lands (see section 3(1) (f) and (g)) (<http://www.foresightsact.com/what-is-this-act-about>).

losses due to weather variations. Processed food changes traditional food habits, and together with monoculture, results in loss of diversity of locally available nutritious food that is consumed. It has greatly reduced the agro-biodiversity and the diversity of food grown on farms - both of which are local, climate friendly, and are a fall-back in times of weather variation. Contract farming for processed foods promotes mono-cultivation which affects soil health. Farmers of the Akole block of Ahmednagar district have indicated that during the last six to seven years, traditional crops (finger millet, native paddy and others) have been reduced to 25 per cent of what was grown earlier. Now external varieties of paddy (that have a better market) replace these. Today, even the supplementary food programmes (ICDS,

school mid-day meal programmes) provide processed foods (biscuits, food mixture packets, etc).

2b. Food Processing and Accompanying Adulteration:

Urbanisation and industrialisation promote a large industry of processed food (FAO, 2004), especially for perishable products such as milk, vegetables, and meat. The minimal standards of regulation are difficult to monitor even at the best of times. This creates easy conditions for adulteration of food, processing ingredients, and overall quality, especially in times of scarcity. Unregulated food processing to a large extent has created space for food adulteration.

2c. Food Waste - Across the Value Chain and in Transportation:

Characteristic of these changing habits is the transportation of food over long distances, even by air. The process itself increases costs, and also leaves a large carbon footprint. Attendant issues are wastages all along the chain from the point of production, the storage chain, at the points of retail sales and consumption. We have created a culture of unprecedented levels of waste, particularly of cooked foods in the urban areas. The same is observed when food under the ICDS is processed and transported over relatively long distances.

Macro factors such as market demands are intertwined with this.

2d. Pressure on Ecosystem:

Demands induced by the processes of urbanisation, industrialisation and increasing population have also led to exploitation of forest and water ecosystems for both dietary and non-dietary (e.g. furniture, raw material for industries) needs. The forest-based food systems are almost on the verge of extinction. Forest-based food collection, which was once a rich source of nutrition, is now rarely practiced in India; and that too limited to a

Under ICDS programme, the food packets distributed to children, pregnant and lactating women, come from outside the village. The data from WOTR's implementation area in Sangamner block in Ahmednagar district showed that an average distance from where these packets are transported to the village is over 150 kilometres.

few tribal communities. Similarly, water bodies, a source of proteins, vitamins, and minerals through fish, crabs, and other animals, also have been considerably degraded. Depletion of forest and water ecosystems has gravely impacted the availability of nutritious fodder and food for livestock. Similarly, due to cross-breeding, livestock find it more and more difficult to adapt to the changing weather conditions and are more susceptible to diseases. They are dependent on stall-feeding practices as well as special animal (processed) food for nutrition, thus increasing the costs of rearing.

Thus, all four food production systems, i.e. forest-based, water-based (rivers and lakes), agriculture-based (mainly subsistence farming), and allied (livestock and animal husbandry) food systems are experiencing degradation and face severe challenges of sustainability at the local level.

2e. Impact of Overexploitation of Groundwater on Food Production:

India has become the largest groundwater based food-growing country in the world. Today 60 percent of the irrigated farming is groundwater based (Tyagi, Datta, et. al., 2012). Easy credit for installing bore-wells and free or subsidised power (electricity) for running pumps have in equal measure led to this situation. Pressure to increase agricultural production is leading to more and more groundwater extraction, which is already

In Malegaon Pathar and Kothe Budruk villages (Sangamner block), in Ahmednagar district of Maharashtra due to withdrawals of groundwater on one hand and reduced number of rainy days in the recent years on the other, streams and river that flowed perennially dried up soon after the monsoon affecting the food source obtained from water as well as the rabi crops.

diminishing. This will have a decisive impact on the food security of the people in the coming years.

With the depletion of the ground water and the reduction in number of rainy days predicted for the semi-arid areas and for India as a whole resulting from climate change, food security will be severely affected.

3. Limitations of Current Systems in Meeting Food Security Targets

While economic barriers such as un-affordability and price volatility hinder access to food from the open-market systems for

Reports from project villages in Ahmednagar district indicate that although there is no difficulty in accessing the prescribed quantity of food grains from the PDS, there are problems regarding the quality. Often, the PDS food grains are of poor quality. In the villages women have said, *"The grain is very dirty. Sometimes the quality is so poor that it is not edible. We mix it with better quality food grains so that it can be eaten"*.

the poor and the marginalised (National Mission for Sustainable Agriculture, 2010), the subsidised supplementary food systems such as PDS, ICDS and mid-day meals continue to be plagued by corruption and inefficiency (Dev and Sharma, 2010). Food adulteration (replacement of good quality food-stocks with lower quality food-grains) and black-marketing are some common patterns of misuse and mismanagement.

An important lacuna in the subsidised systems is the limitation regarding cereal grains only (wheat and rice) and the lack of supply of the equally important lentils and pulses, which are extremely necessary for meeting the protein needs of a diet.

Another limitation is that the grain provided in the PDS as well as the ICDS is wheat and rice, which often are not the staple food of a region; as well as provision of processed foods. The continuous use of these leads to changes in food habits, dependence on external food items, a larger, unnecessarily complex delivery chain, and increased burden on the government. Besides, it promotes a depreciation of the traditionally grown local food crops, which are often of high nutrient content. Women in Ahmednagar district stated that "rice and wheat have replaced other traditional varieties like horse gram and finger millet, while pulses and vegetables are purchased from the market depending on affordability" (Brahme, 2011).

Despite the often negative effects of the processes explained above, urbanisation and industrialisation are growing at breakneck speed. These processes are enormously boosted by globalisation-induced structural reforms in India. However, macro interventions have limited impact in achieving FNS at the micro-level.

The ICDS meal provisioning experience of the women's SHG in Bhose village, Ahmednagar district

A women's Self Help Group (SHG) of Bhose village took up the responsibility of preparing meals for the Anganwadi under the ICDS in December 2008. A loan taken from their SHG was given as an advance for purchases from a wholesale grocery shop located three kilometres away from their village. The group bore the regular cost of Rs. 50 for transporting the provisions. The list on the menu provided by the ICDS was followed in preparing the meals. The growth-assessment survey conducted by WOTR found that the nutritional status of children had improved. Many children attending the Anganwadi won prizes in a healthy baby village competition. This was an encouragement to the SHG and the parents.

While the impacts on their children encouraged the SHG to provide this service, problems began to creep in. There were delays of over five or six months in receiving repayments from the ICDS. As a consequence the wholesale grocery dealer denied further provisions as the credit to him

was long overdue. It backfired on the monthly loan repayment to the SHG. Another unforeseen cost emerged. When payments were received from the ICDS, they were informed that 10% of the total sanctioned amount was to be given to the Anganwadi supervisor and other Rs 500/- to the Anganwadi teacher for filling in the records. Because of the interest in their children and hoping that the ICDS would improve the repayment schedules, the SHG continued working on the scheme. Over a period when calculations were made, the expenditure was found to be much more than the repayments received. The group was unable to repay the loans. Sadly, in December 2010, two years later, the group decided to discontinue this activity which was beneficial for their children.

Today the children of Bhoose village and other villages get packaged food - sheera, sukadi, lapshi, sattupith. Similar food packets are also given to pregnant and nursing women. It is observed that children refuse to eat this packaged food and pregnant and nursing women do not accept these packets, either. The reasons given are that it is not palatable, the odour is unpleasant, and at times insects are found in the packets. The women of the village have stated, "It

is not even worth feeding the cattle, as it causes problems like stomach pain, gas trouble, and dysentery, and we have to spend money on the veterinary doctor and on medicines." Similar experiences were narrated by women in other villages as well.

Reflection: A local initiative using local products and having proven results was defeated due to lack of timely re-payments (inefficient management) and proper information (regarding percentage payments to the Anganwadi supervisor and worker) not being provided. The objectives of the ICDS – reducing malnutrition³ and improving the knowledge and information of mothers⁴ has taken a blow as the shift is back to the regular externally provided meals, which are not consumed by children. But most of all, the confidence that the women had developed - in obtaining good results in the improved nutritional status of children and in managing a good service and income generating activity - has been destroyed.

The latest information received from the WOTR field area is that 'nutritious biscuits' are being distributed under the ICDS programme in the urban Anganwadis of Ahmednagar district. (Maharashtra state).

³ Objective 1: To improve the nutritional and health status of children in the age-group 0-6 years

⁴ Objective 5: To enhance the capability of the mother to look after the health and nutritional needs of the child through proper nutrition and health education.

4. Policy Contributions and Challenges to Food Security

Government policies pertaining to food security have made discernible improvements in aspects of food security, but continue to be beset with problems.

These pertain not only to design and implementation issues, but also to the choices made at the outset, some of which are direct challenges to food security (eg. biofuels), and others in their long-term effects (eg. centralised PDS, promotion of chemical fertilisers, etc.).

4a. Food Security Bill and Revamping the PDS:

Government policy attempts at achieving FNS are certainly creditable. However, the policies seem inadequate in terms of design as well as scale of implementation. Some of the lacunae in the current PDS include: the entire system is centralised; it has a huge carbon foot print as the food grains procured from surplus producing areas and transported over long distances (from one place to another); it ignores local realities; it hurts the traditional diversification in the food basket as it only includes wheat, rice and coarse cereals; it has leakages and wastages; the quality of food grain is poor; it creates dependencies; and it is not agile enough to cope with non-normal local weather variations. The National Food Security Bill recently tabled in the Parliament in December 2011 has been subject to severe criticism. Some critics say that it is too expensive and therefore unsustainable. Other say it kills the spirit of universal public distribution system (PDS) which entitles every citizen to subsidised food (Dev and Sharma, 2010). There are reservations about dividing the households into 'priority' and 'general'

categories. Besides, by linking minimum support price (MSP) with PDS prices it is feared this will prove detrimental to farmers as the current MSP itself does not cover input costs of farming (Sood, 2012). Another major contention is that the bill indirectly promotes artificial fortification of food items through food-processing industry by allowing ready-to-eat meals and food coupons, thus giving entry to corporations like Sodexo. The proposed Food Security Bill (draft) undermines the food sovereignty of people and ignores the fact that food is rightfully a personal concern. A major criticism however is that it promotes and perpetuates food dependencies instead of empowering people to produce, source and afford their own foods as per their preferences and tastes. This, in turn, puts at risk not only the country's agro-biodiversity (with consequent implications for food sovereignty) but also that of households, smallholder farmers and food producers.⁵

4b. Government Programmes to Enhance Food Purchasing Power:

In the post-independence period policy interventions have the objective of alleviating rural poverty. Amongst various poverty alleviation schemes and programmes, the Employment Guarantee Scheme (EGS) of Maharashtra state and the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) are two important schemes that have contributed towards enhancing purchasing power of people which work towards improving household level food consumption. Mahatma Gandhi National Rural Employment Guarantee Act, 2005, (MGNREGA) is largely based upon Maharashtra's innovative employment guarantee scheme (EGS) which was introduced in 1972. Maharashtra was the first state in India to guarantee statutorily the

⁵ <http://www.navdanya.org>, The National Food Security Bill, 2011

principle of right-to-work making employment an entitlement to empower the rural poor. During the severe droughts experienced from 1971-73, it acted as one of the key relief programmes and prevented people from starvation. It is creditable that through these two schemes, durable assets have been created and many households have been kept away from hunger. However, it must be also recognised that there are limitations to these schemes in terms of achieving food and nutritional security, as it is not the *direct* objective of these schemes (Dev, 2002).

4c. The Quest for Bio-fuels:

With increasing pressure from a rapidly growing energy requirement and the declining reserves of crude oil, bio-fuels are gaining prominence. Already in North and Latin America large quantities of grain are being diverted to produce bio-fuels. This is one of the elements that have caused food prices to rise dramatically in the recent past. Some states in India have already instituted bio-fuel boards to promote the planting of bio-diesel species. There is a grave threat of diversion of food grains, as well as diversion of cropland, to produce bio-fuels in the future, unless good planning is done.

5. The Impact of Climate Change on Food Sources

Against this background, it is feared that climate change will superimpose its impact on existing problems and exacerbate the situation. Scattered rains, the switchboard effect of having droughts and floods in the same year, and high weather-variability would result in intolerable food-stress on the already vulnerable communities by affecting their food sources.

5a. Agriculture and Farming:

Changing agro-climatic patterns would have direct impacts on food production. The projections pertaining to temperature

increase indicate major declines in agriculture production, especially in rice and wheat (MOEF, 2012; Kelkar and Bhadwal, 2007), as also in cash crops. Adverse temperature and moisture conditions would result in yield losses and would affect quality of food grains as well. Sudden variations in temperature, e.g. frost, can destroy crops overnight. India is among 27 countries that are most vulnerable to increase in the frequency and intensity of extreme events such as heat waves, storm surges, droughts, floods, etc. that can hamper or wash away crops (National Mission for Sustainable Agriculture, 2010).

5b. Forest-based Food Sources:

The process of degradation of forests would be hastened due to climate change impacts. Changing rainfall patterns and temperature shifts can increase erosion of already degraded forests and lower yields of the many forest based leafy or wild vegetables and mushrooms and other types of food. It is also feared the climate change impacts will reduce the restoration possibilities of forest ecosystems to the original state. As it is, afforestation programmes suffer from poor planning, have a bias towards promoting monocultures of alien species, and deny access to local communities.

5c. Water-based Food Sources:

In the same way, changes in water temperature can affect spawning of fish and other water-species. Flash floods and large monsoon breaks can disturb life cycles of many species. Linking river basins can aggravate the situation through transfer of invasive species to native habitats. This can severely damage water-based food sourcing. "It has already been observed that the breeding of Indian major carps as well as the distribution of important fish species and plankton has been affected due to changes in temperature and rainfall patterns over the catchments of the Ganga" (National Mission for Sustainable Agriculture, 2010).

5d. Animal-based Food Sources:

Livestock would be affected in two ways. Firstly, by increasing food and fodder shortages, particularly in semi-arid ecosystems. According to the perception of villagers in Ahmednagar district, "due to reduced rainfall there is scarcity of fodder, which has resulted in substantial reduction in the number of large ruminants with a shift to sheep and goats". Secondly climate change would lead to an increase in animal diseases, particularly as cross-bred and large ruminants are promoted. This in turn will affect the quality of the livestock and its value as a food source in future.

6. The Food and Nutrition Security Connect - Emergent Insights and Challenges

FNS continues to be a major and a macro problem found in almost all states of the country, and which is observed at the micro (household) level as well. Looking at India's Health Score Card and the nutritional status, little has changed in decades. The stats quo since the green revolution calls for a fresh look at the way FNS is being addressed.

FNS of a people / country is directly affected by four important factors (Refer Fig 2: The Food and Nutrition Security Connect) : (i) The Population as a whole and in particular, the Urban Population; (ii) Food Availability; (iii) Food Habits of the People (iv) Food Production (the amount and types produced); In addition, (v) Government Policies and the (vi) forces of Globalization have an indirect impact on FNS as they influence these four factors. Moreover, in recent years, the (vii) impacts of climate change are beginning to be felt which have a direct impact on the Food Production system.

6a. Population and Urbanization: A balanced diet throughout the year is required for a population to become food and nutrition secure. As populations increase, especially urban populations, the need to increase food production and its availability increases. Unlike

in the case of rural population who grow their own food, generally use freshly available farm products, and have or require little storage facilities, food for the urban population has to be brought in from distant places, thus increasing the need for food storage facilities as well as facilities to preserve and process foods. Transportation, storage, and food processing affects the quality and availability of nutritious foods. Access to a balanced diet is also influenced by purchasing power - the urbanite needs to earn more cash in order to realize a balanced diet as compared to rural inhabitants, who are also producers of some types of foods and can resort to barter, if required, to cover shortfalls. Knowledge of a balanced diet and healthy eating habits depends on the information that the individual and households have. Without this, even if the purchasing power exists, food and nutrition security cannot be achieved.

6b. Food Availability: To meet the huge food demands of growing urban populations, throughout the year, especially of perishables, food processing and enhancement on an industrial scale (the "industrialization of food") is resorted to. However in the course of food processing, preservation and value addition, the natural nutrients are degraded or lost, while others are artificially added. For raw and processed foods to reach across distances from rural areas to industry and urban settlements, often, long and complex supply chains are required. Because of lack of adequate storage, handling and transport facilities as well as inefficiencies in the supply chain and distribution system that makes food available from 'farm to plate', there is much wastage of food as well as increase in the carbon footprint. Thus, urbanization leads to growing demand for "industrialized foods" which in turn results in increased pressure to produce more food to compensate for the huge losses experienced across the value chain, not to mention the wasteful food habits of urban populations.

The Food and Nutrition Security Connect

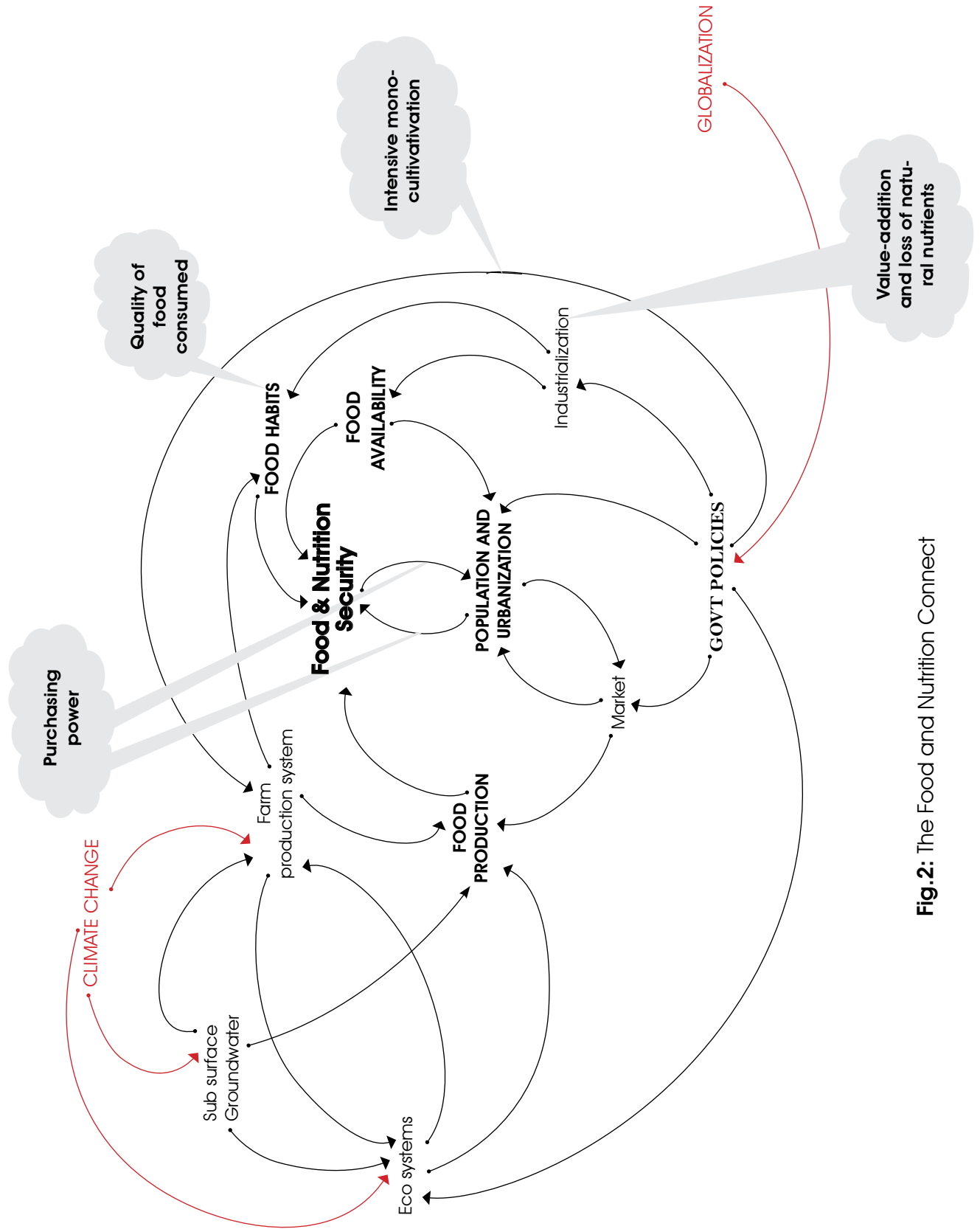


Fig.2: The Food and Nutrition Connect

6c. Food Habits: Food habits determine the quality of food consumed. Generally food cultures develop around food biodiversity particular to an agro-climatic zone. However, market strategy (advertisements) and mass media (TV in particular) greatly contribute to changing life styles and food habits especially of the growing urban population and the increasing affluent classes.

When industrialized /processed foods are marketed in rural areas, there is a shift (not always beneficial) from using fresh foods to processed and urban-centric food products. Moreover, for food security of the poor (both rural and urban), the public distribution system (PDS) makes selective grains and food products available. Farm products acquired for the PDS as well as the newly acquired food habits promoted by industrialized foods greatly influence agriculture pushing it towards intensive mono-cultivation of a few selective crops and products. Thus, food habits affect the farm production system and also reflect on the FNS of the population.

6d. Food Production: This is fundamental to the FNS of people and a country and is particularly important to agrarian India. Food production is greatly affected by the farm production system which in turn is dependent on the robustness of the ecosystems and water availability.

Each ecosystem - forests, agriculture, pasture lands, horticulture water bodies - and its climatic conditions is predisposed to the provisioning and growing of particular food products. Communities living within the ecosystem also source different foods during various seasons of the year. As more forests and grasslands are destroyed for agriculture and agriculture lands near urban areas are absorbed into cities, ecosystems get degraded and become vulnerable, and their ability to produce food is rapidly reduced.

When the farm production system is holistic and environmentally friendly, it maintains and improves the health of the soil and the local

ecosystem and becomes sustainable. However, food production is greatly affected by the demand - the market - for particular types of produce. Food habits of the growing population and expanding urbanization (favoring quick-to-cook foods and those with long product shelf life) require large quantities of selective farm products. These selected varieties and products are now beginning to dominate agricultural production systems and numerous valuable and nutritious indigenous food varieties are lost. In order to increase cash earnings from agriculture, farmers move to selective high yielding crops varieties. Thus intensive mono-cultivation of selective crops and varieties are grown year on year, with increasing use of chemicals to retain and enhance productivity. This in turn destroys soil health and gradually, land productivity drastically reduces. The farm production system begins to decline and with it production too. With the younger generation of farmers not having had the experience of growing traditional crop varieties, the knowledge of these production systems is lost forever.

Food production is dependent on water availability. With increasing demand and the desire to enhance agriculture production, sub-surface (wells) and ground water (bore-wells tapping into aquifers) is being unsustainably extracted, often to the point of water mining, especially in rain deficient regions. With increasing water use and expansion of irrigated agriculture, deeper bore-wells are sunk each year and more and more aquifer sources are being tapped, greatly reducing underground water reserves. And as more lands come under agriculture, more bore wells are sunk, further depleting the water sources.

The greater the demand for increased food production and industrialized / processed foods due to growing populations, increased urbanization and changing food habits, the more land, water, and ecosystems come

under stress which in turn adversely affects farm production systems.

6e. Government Policies: Government policies play a major role in influencing the various factors that affect Food and Nutrition Security. Policies and various schemes of the government that result in short term benefits may end up causing long term negative impacts undermining the FNS of the populace.

With the growth in India's population expected to reach 1.53 billion by 2030, and an expanding urbanization expected to cover 40%⁶ of the population by then, more agriculture lands are being taken up for urban and peri-urban settlements; forests, pastures, wetlands and water bodies (that provide other foods and ecosystems services) are reduced. On the other hand, irrigation schemes, watershed development projects across the country and promotion of technology that enhances agricultural productivity is enhancing water harvesting potential, bringing thousands of hectares of lands under agriculture and also increasing agricultural production particularly of selective crops.

To address the food and nutrition security of the people, stave off hunger and malnutrition and have a healthy people, the PDS makes an important contribution to meeting the needs of the poor (rural poverty is 33.8%, and urban poverty, 20.9%⁷). The Integrated Child Development Scheme (ICDS) reaches children, pregnant and nursing mothers. Besides, the various government poverty alleviation programs provide cash and 'food-for-work'. The availability of food grains (for a large population) is essential to avoid famine and hunger in unforeseen calamities, natural or otherwise. Hence, storage of huge amounts of grain is essential. However, since Government purchases only selective food grains and varieties for supply through

the PDS and proactively promotes the industrialization of food - food processing and the attendant value chain - largely for economic reasons, a powerful incentive is created that promotes intensive chemical-based mono-cultivation.

To reach food grains and food products from 'farm to plate', as and where required, road and rail transport are major contributors. The price of diesel, which is determined by Government, impacts the cost of foods as well as the purchasing power of the people, which in turn affects their FNS.

In order to increase food production and reduce input costs government supports farmers with subsidies for chemical fertilizers and other inputs as well as with free or cheap water and electricity for irrigation and farm operations. Government policies regarding ownership of water resources (surface and groundwater), their use and allocation (urban and rural settlements, industry, agriculture, ecosystem requirements, recreational or cultural purposes) also have a bearing on FNS of the populace.

All these factors have contributed to changes in the crop production and farming systems, availability of food as well as food habits and consequently in the FNS status of the people.

6f. Globalization: Today, no country can survive in isolation. We are all interconnected and influenced, particularly through financial markets and communication networks - a phenomenon often referred to as globalization. Globalization impacts FNS primarily through two channels - financial and technology investments on the one hand and on the other, by what can be broadly described as a process of "cultural internationalization" that influences lifestyle choices and food habits. But these drivers of

⁶ <http://www.nbr.org/research/activity.aspx?id=195>

⁷ http://planningcommission.nic.in/news/press_pov1903.pdf

globalization need governmental clearances and regulatory approvals in order to enter a country. Hence, business, international commercial and financial bodies and their sovereign backers engage with governments and local business interests to influence government policies so as to create a more favorable investment and market environment for their business interests. And policy changes have a direct and significant impact on the FNS situation especially the poor. In emerging markets such as India, agriculture, a growing population with rising aspirations, urbanization, increasing electronic connectivity and the food industry including the entire value chain and logistics network, offer vast markets and investment opportunities. Investments in these areas significantly impact land use, farm production systems, water availability, ecosystem well being, the type, quality and availability of food, aspirations, lifestyles and food habits.

6g. Impacts of Climate Change: The FNS needs of people primarily depend on Food Production within the country. While natural factors affect it, various human interventions have a far greater influence on FNS. As seen above, human actions aimed at enhancing food production have played a major role in reducing the robustness of the resource base – water, ecosystems and the farm production system.

Climate change casts a direct shadow over FOOD PRODUCTION and the three components that form the resource base - water, ecosystems and the farm production system. The impacts of climate change in India vary for the different agro-ecological regions. In the semi-arid and arid zones, warmer temperatures, more scanty rainfall, longer dry spells during the monsoon, unseasonal heavy showers and unexpected cold spells are predicted. This

will worsen water scarcity as low recharge will not be sufficient to replenish already depleted ground water aquifers and fully refill surface storages. The various ecosystems, which, by and large, are degrading and under severe stress, will become even more vulnerable to extreme climate events, thus further compromising their food provisioning capabilities. Resource-intensive mono-cultivation farm production systems will yield declining returns due to deteriorating soil health, changes in rainfall and weather regimes, reduction in related ecosystem services and increased vulnerability to pest and disease attacks; they would be able to adapt to climate induced changes only by conserving and promoting local crop biodiversity and adopting environmentally friendly cropping patterns and practices. Thus climate change will strongly influence FNS and unless we make a paradigm shift in our lifestyles, production and consumption patterns, the dark, looming and growing shadow of climate change will severely threaten the FNS status of the vast majority of the Indian populace, especially the poor.

7. Towards Food and Nutrition Security in a Climate Change Regime

In today's context the FNS situation calls for urgent attention. This is particularly so, as India is a large sub-continent, confronted by a variety of challenges that are faced by a large vulnerable population. However, the diversity of the agro-ecological zones is an opportunity at hand.

The FNS Connect chart (Fig.2) highlights the interconnectedness and leverage points, and indicates directions for going forward. The response must necessarily have short-term, medium, and long-term objectives.

The WOTR Approach: Our Recommendations

7a. Enhancing and Sustaining the Quality of the Resource Base-the Watershed Approach:

The restoration and protection of watersheds is the mainstay for FNS. This has repeatedly proved itself in the last few decades. The impacts observed from WOTR’s various projects show that when degraded ecosystems have been revitalised, two of the three factors directly impacted by climate change, namely the ecosystems and water are addressed. It is further enhanced when biodiversity concerns are included. Fig.3. below shows the impacts of watershed development on water availability and agricultural productivity. It has improved food availability around the year. However, one cannot assume that water availability is automatically ensured. Water budgeting and the judicious use of water requires special attention, and the village consistently needs to work towards this end. Necessarily self-reliant and sustaining impacts are observed when the local people own and implement the project themselves.

Improvement in the nutritional status of children and adults can be easily achieved when this is included as an expected outcome of watershed development (WSD) and natural resource management (NRM) projects, especially publicly funded national programs, like the Integrated Watershed Management Program (IWMP). This is easily do-able as enhanced land productivity (agriculture) is an expected outcome of WSD, and all projects have a component for women’s involvement (women have particular interest in childcare and nutrition). This will result in a significant improvement in nutritional status as compared to that in the current HungaMa Report.

7b. Food Production: A Sustainable Farming Approach (SFA):

The main objective is to achieve food sovereignty. When climate plays truant, a “safe-fail” approach is required.

(i) While agriculture planning for household consumption still has place in most rural households, planning in terms of quality and quantity to meet the balanced diet needs of all members of the household need to

Graph 1: Impacts of water availability and land productivity following watershed development (consolidated for 10 project villages)

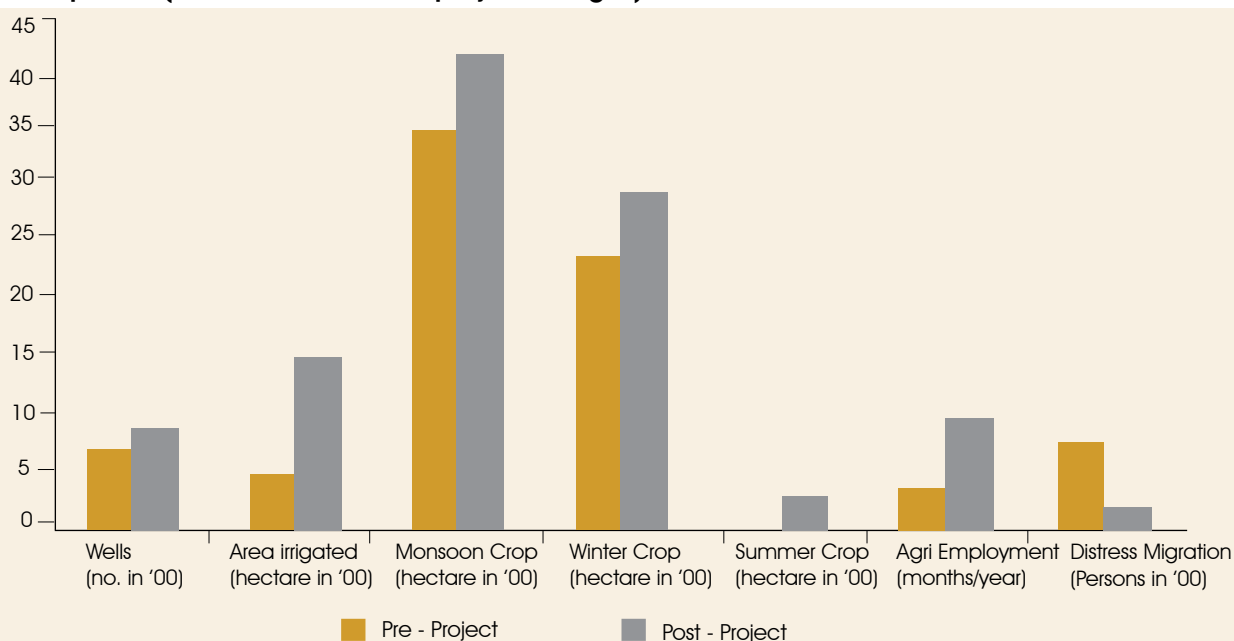


Fig.3: Wells, Area under Cultivation, Employment & Distress Migration

⁸ Dhanashree Brahme, Gender Dimensions in Climate Change Adaptation, WOTR.

be included. Mixed farming systems are important as they provide for plant and animal products in the food basket. It sustains the ecosystem through organic processes. (For more details refer WOTR's Position Papers on 'Agriculture' and 'Livestock'.)

(ii) Indigenous varieties of grain and livestock (including backyard poultry) have an important place in FNS, as native species and varieties are generally best suited to the particular agro-ecological zone. Besides, culture and food tastes of the local community have grown around native products.

*The women of Wankute stated, "Food today does not satiate hunger. One feels hungry sooner. This wasn't the case before; men and women used to have a full meal in the morning and worked in the field the whole day and did not need to eat until dinner."*⁸

(iii) Locale and need specific agro-meteorological advisories provide timely information and are necessary for climate-smart agricultural planning and operations, care of livestock, as also for water budgeting.

In Wanjulshet village of Akole on the 2nd April 2012, the local weather data (generated from the automated weather station situated in the village) forecast rainfall. This information was communicated to the villagers who were harvesting wheat. Some took the advisory seriously and covered the harvested crop with a plastic sheet, while some others questioned the accuracy of information received. It did rain and some had their harvest saved. (WOTR records)

(iv) Water, which is becoming a scarce resource in India today should be optimally used in food production by increasing its efficiency and by re-use of waste water e.g. using waste water from households for kitchen gardens, etc.

(v) Urban areas would be greatly benefitted by the promotion of terrace and vertical vegetable gardens which contribute towards the household's fresh nutrient intake.

7c. Food for the Next Half Year, for Public FNS Schemes, for Times of Calamities:

Food sovereignty requires that local products meet the local needs throughout the year as far as possible. Proper storage facilities would be required at households, in villages and within the district.

At the household level, it would call for going back to traditional practices for conserving grain and food products. It requires prevention or at least reduction of distress sales, and that storage is given preference to purchasing food products later, which are more costly. Hence, household grain bins and community warehouses must be given importance.

WOTR emphasizes the need of re-institutionalising the social capital (socio-cultural traditions of sharing and mutual support) of rural communities as a means of disaster preparedness (a non-financial insurance) that would absorb the shocks and stresses affecting FNS. It is envisaged that villages or a cluster of villages rely upon their stocks of food grain of adequate quantity and quality, to tide over times of drought, shortages or other crises.

Lessons learnt from the current government practice of purchase, storage and distribution of food grains indicate that a decentralised system may be more effective. Storage at the district level would value local grains, respond

to needs within a short span of time and with a reduced carbon footprint. A decentralised system would be more manageable. This decentralised system would best respond to the PDS as also the ICDS and school programs while meeting local taste demands and promoting a local market.

For the public FNS schemes (mid-day meal program, the ICDS) the Supreme Court orders of permitting village communities and local SHGs to purchase and prepare food for the children is strongly supported (banning external contractors). While local women's groups are enthusiastic, and can work effectively under supervision it is the local administration that would need to be more efficient so that the expected outcome of 'well nourished children' is achieved. This is crucial in a climate change scenario. A gradual weaning off the PDS, retaining it for times of stress, would strongly encourage self-dependence and dignity. Locally produced, nutritious, and varied food items should be the mainstay for FNS.

7d. Empowering the People and Village Community through Information, Knowledge and Capacity Building (IKCb):

- i. Emphasis should be given to information and knowledge transfer (to individuals, household and village), as this can be key to self reliance for FNS. IKCb is required for all aspects of FNS: protection of the resource base (watershed development and water budgeting); appropriate agriculture and livestock planning and production using agro-advisories; market intelligence that will assist in ensuring income. Knowledge will put value on indigenous food biodiversity and will ensure its inter-generational transfer and protection.
- ii. IKCb contributes greatly through community efforts and its planning. While some individual households may be slow in responding,

making it a community effort will speed up the process. When growth assessment of children is done as a community effort (rather than being merely an Anganwadi project), and the analysed results of the village as a whole are displayed, it results in better project performance. It would help to prepare FNS agriculture plans at the level of village and village-cluster, determined by information of the nutritional status of the most vulnerable section of the population-the children. This will promote intra- and inter-village exchanges, coordination and cooperation.

Results from a nutritional intervention that included adults conducted in 21 project villages of Ahmednagar and Aurangabad districts (Table. 1) indicated improvements in the haemoglobin (Hb) status for both male and female populations (WOTR, unpublished). Following assessment (Hb testing), supplementary iron tablets were initially provided for the first 3 months by the government programme. Simultaneously continuous nutritional education promoting locally available green leafy vegetables and foods resulted in sustained improvement as was observed three years later, at the end of the project.

A study was conducted by WOTR to understand the impacts of child growth and nutrition inputs that were given to children aged 0-5 years as part of a watershed development project. The Concept Point Scale (helps understand the perceptions or concepts of the community regarding child nutrition) revealed that communities given inputs of growth monitoring and nutrition had much more awareness as compared to the communities that had no growth monitoring inputs given (Pandit, 2010).

Table 1: Haemoglobin Status of Men and Women in Pre- and Late-Project Stage in 21 villages of Ahmednagar and Aurangabad districts

Hb % (range)	Females (Nos.)		Males (Nos.)		TOTAL (Nos.)	
	Pre-project	late-project	Pre-project	late-project	Pre-project	late-project
< 9 gms%	51 (18.3%)	8 (2.9%)	20(10.1%)	0 (0%)	70 (15%)	8 (1.7%)
9-11 gms%	108 (38.7%)	77 (27.6%)	54 (29.3%)	21 (11.1%)	163 (34.8%)	98 (20.9%)
>11 gms %	120 (43.0%)	194 (69.5%)	115 (60.6%)	168 (88.9%)	235 (50.2%)	362 (77.4%)
TOTAL	279	279	189	189	468	468

iii. The importance of the involvement of women cannot be overstated. Despite women and the female child being the primary victims of food and nutritional insecurity due to the gender inequities in our society, WOTR believes that women have solutions to the FNS problems they face. Empowering a woman through knowledge, information and by improving her financial self-reliance will contribute towards her active involvement in decision making at the household level and will also ensure the inter-generational transfer of knowledge. Hence women’s involvement will always be central when addressing FNS. Working with their local organisations-the SHGs and the Samyukt Mahila Samiti (apex body of women’s SHGs of a village) will speed up the process of reaching the tipping point.

7e. Partnerships and Coordination with the Local Community, Government and other Agencies:

Faced with this colossal problem of achieving FNS , which is a fundamental driver of progress and which will be worsened by climate change, WOTR believes that a coordinated multi-agency effort is required, with each partner contributing its strengths. The local people are central to this effort. Without their active participation FNS will be but a distant dream. Towards this end, WOTR works in close coordination with appropriate government departments, academic institutions, development partners and other donor agencies. Its field engagement and action-research studies are intended to contribute to in enabling policy framework and improvement in the manner programs are implemented.

Conclusion: In order to fulfil India’s aspirations to developed nation status, it will need to benefit from the “demographic dividend” (a large and growing population), evolve a social and political consensus and secure internal peace and stability. A healthy and well nourished population is a critical requirement for achieving this goal. And India’s record in this regard is dismal with millions of hungry and malnourished citizens not being able to contribute to social and economic advancement. This is a task that will require the forging of a strong political will, an intelligent pooling of resources and the coming together of all related sectors and groups, from the village to the national level, with one single objective in mind: ensuring that no person should have to go to bed on an empty stomach and hunger, malnutrition and undernourishment are eradicated by 2025.

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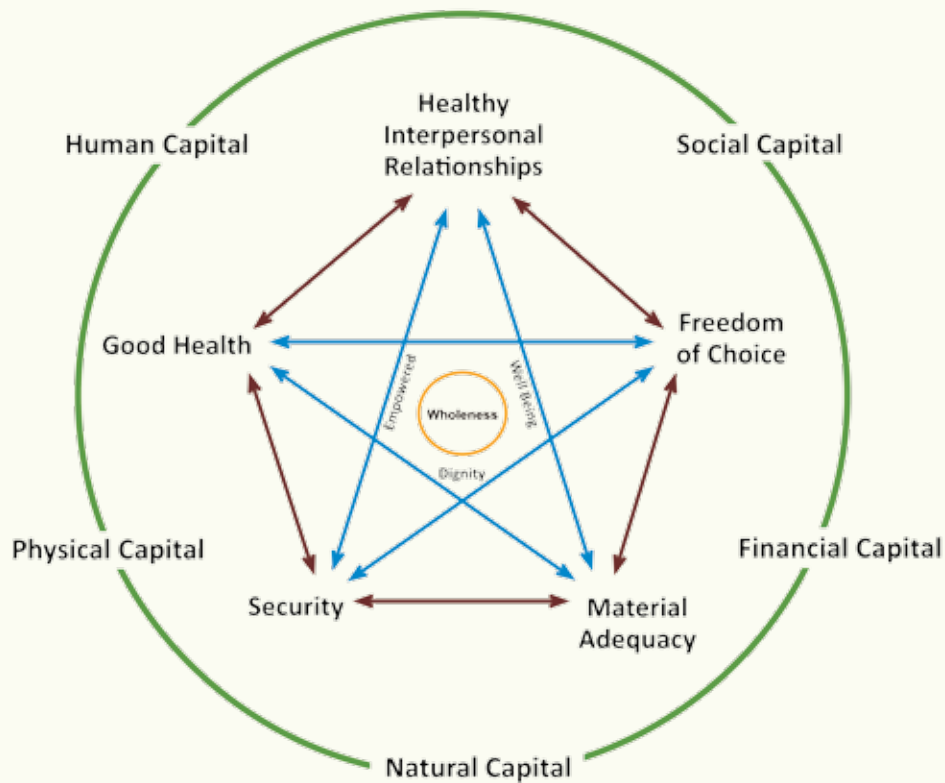
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Engine for Adaptive Sustainable Development



The outer circle, comprising of the five capitals, are the tangible frame within which human life unfolds. The five capitals – the physical, financial, social, human and natural – have to grow and develop simultaneously and harmoniously to have sustainable growth.

A set of five important conditions, essentially interconnected, that are necessary – material adequacy (not merely 'increase'), security (freedom from fear of insufficiency, discrimination and conflict), freedom of choice, healthy interpersonal relationships and good health. These result in an empowered community that lives in dignity and that enjoys well-being.

In the centre is WHOLENESS – a body, mind, spirit integration – a harmony rooted in centredness; the space within which the individual and the community are one with the universe.

When we work to conserve our Earth for the 7th generation, we will be conserving it for ourselves. It requires that we sense, understand and respect the interconnectedness of the various components of the engine and take the necessary steps (adapt) so as to strike the balance that will maintain the equilibrium. We would necessarily need to work together as a community and as a group of communities to achieve sustainability.

ACKNOWLEDGEMENTS: This image emerged within WOTR after years of deep reflection, while we were trying to find congruence in the way we need to go forward. The thoughts, ideas and mainly sensing of the various components of "The Engine for Adaptive Sustainable Development" comes from the contribution of many across the globe and across times. We thank each of you, some known, most unknown, for permitting us to take your thoughts and to weave it into a meaningful link as we look towards the future of our great, great grandchildren's children.

About WOTR

Aware of the fragility of ecosystems and our symbiotic link with it, WOTR has historically applied a systems-based approach to watershed development, focusing on people-centric participatory interventions. With more- than- normal weather variations now being experienced, WOTR has moved into **Ecosystem-Based Adaptation (EBA)** - an emerging approach that helps vulnerable communities build resilience of their degraded ecosystems and livelihoods threatened by climate change impacts. This approach also generates significant multiple benefits – social, economic and cultural.

Since 2008, WOTR has been reorienting, re-organising and equipping itself with respect to focus, strategy and interventions in order to specifically address the challenges (and opportunities) posed by climate change to vulnerable rural communities. In the process, WOTR has introduced a bottom-up, holistic and integrated approach with appropriate interventions, towards **Adaptation and Resilience Building**.

Constantly learning from experience, we have been **rethinking conventional development**. We have introduced **Systems Thinking and Complexity Analysis** in program design and are developing strategies to incorporate these into action plans, leading to new **tools and frameworks** while adapting the existing ones. This helps us move to **Framework-Based Management**, in contrast to activity based project design and management.

Applied Research is a constant companion. The WOTR team, guided by experts, helps local communities become researchers - observing, measuring, and assessing for themselves not only problems but also the improvements that a project brings about. And having tested methodologies, WOTR disseminates the learning through **Capacity Building Events** to reach implementers and donors, far and wide, so as to benefit rural communities across India and countries in the South.

As of now, WOTR's Climate Change Adaptation project is currently being implemented in 65 villages of Maharashtra, Madhya Pradesh and Andhra Pradesh covering an area approximately of 41,000 ha (410 km²), directly benefitting over 63,000 people from around 12,000 households.

Since its inception in 1993, WOTR has carried out developmental work in over 2,500 villages in six states - Maharashtra, Andhra Pradesh, Madhya Pradesh, Rajasthan, Jharkhand and Odisha (Orissa). It has organized over 1,100 watershed development (which are also climate adaptation projects), covering nearly 700,000 hectares and impacting over 1,000,000 people. Its involvement in over 8,300 women's Self Help Groups (SHGs), micro-finance, trainings and other initiatives have benefitted over 100,000 women. Similarly, over 320,000 people from 27 states in India and 35 countries have participated in WOTR's Training and Capacity Building programs.

Today, the WOTR Group consists of 4 not-for-profit institutions – the Watershed Organisation Trust (WOTR); the Sampada Trust (ST) for women's empowerment and micro-finance; Sanjeevani Institute for Empowerment and Development (SIED) which is the implementation wing of WOTR; and Sampada Entrepreneurship and Livelihoods Foundation (SELF) that has recently been set up to promote social enterprises and livelihoods.



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