Global Food Governance Systems

Narrative from the India Chapter by Development Alternatives

1. Introduction

The food governance systems at the national level (India) witness some of the most persistent challenges of development. Mapping these challenges will also determine the scope of the food governance systems that the paper will delve deeper into. The key challenges identified:

- **Malnourishment is a serious problem for India**

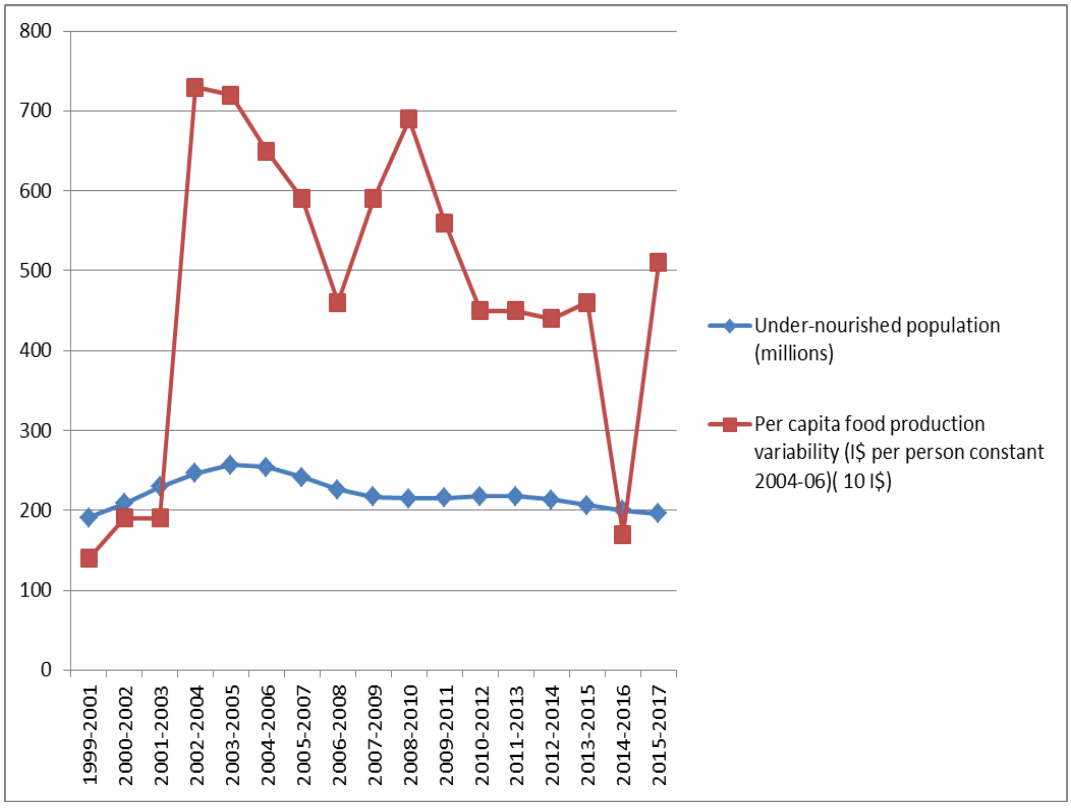

Figure 1: Trends of under-nourished popultation and per capita food production variability in India, 1999 - 2007 (Data: FAO, 2017)

India has 195.9 million under-nourished people - quarter of the world's under-nourished population (FAO, 2017). Over the decade (2005-15), the country is housing about 50 per cent of undernourished children of the world, according to a study by Assocham and EY. (Live Mint, 2017) In case of women, over half of women of reproductive age (51%) suffer from anemia — a serious condition that can have long-term health impacts for mother and child. (Hindu Business line, 2017) In India, there is realization today that the increase in rural malnutrition may not be only due to a decline in calorie consumption. This stems from evidence about the limited increase in aggregate cereal availability in the country since independence (Patnaik, 2007), inadequacy of per capita cereal or calorie intake as an indicator of nutrition (Vaidyanathan, 2003), increasing incidence of Zinc deficiency in cereal growing crop lands and cereal consuming populations in the country (Stein et al, 2007), the evidence of micro-nutrient and vitamin deficiency and inadequate protein intake, not only among the poor but also among middle income families (Gopaldas, 2006), and the alarming proportion of anaemic women being a major cause

for pre-and post-natal morbidity and child malnutrition (Ramalingaswamy et al, 1996). Only about a quarter and less than 44 percent of all cultivator households are net sellers of main food crops, making them vulnerable to food inflation, and accentuating the disconnect between food production and nutrition in India . (Raina, 2013) While there is significant concern of providing accessible and affordable nutritious food to all, there has also been evidence of increased pesticide in the vegetables and fruits for consumption in India. 509 samples out of 16,079 were found above maximum residue limit (MRL) as prescribed under Food Safety Standard Authority of India (FSSAI) under Ministry of Health." (PTI, 2015)

- **Small-holder farmers & landless agriculture labourers struggle to meet their basic livelihood needs**

58% of India's population is dependent on agriculture and 85% of all farmers – 138 million – are small holder farmers (Farmers with average land holding with less than 2 hectares of land). These small holder farmers have 45 per cent of the total land under agriculture (Ministry of Agriculture, 2013). Further, the number of landless agricultural labourers in the country rose to 144.3 million in 2011 from 106.7 million in 2001. (Economic Times, 2016) Some of the facts below highlight the increasing difficulty to be a small-holder farmer, agriculture labourers today in India:

- About 53.37% of farm households earn income lesser than poverty line income. 52% of farm households were under debt in 2012-13 while 49% farm households were under debt in 2001-02. (IEG, 2015) The wages for an agricultural labourers, the lowest in the country, grew from INR 137 per day in 2002-03 to INR 178 per day in 2011-12. (Venkatesh, 2013)
- The ratio of income per non-agriculture worker to income per cultivator ranged between 3 and 4.08 (1990s – 2018), causing adverse effect on the future of agriculture in the country. (NITI, 2017) While national income continued to grow in real terms at 7% over all three periods, this growth rate in rural wages was over 8% only between 2010 and 2014. In the first period (1999-2010), wage rates grew on average at 0.33% pa, while after 2014, they grew at 1.7%. (Live Mint, 2017)

- **The current agriculture paradigm has led to high levels of degradation of natural resource base**

Agriculture systems, being heavily resource-intensive, interact with natural resources and environment at a large scale. Around 50 per cent of India's total land area is under agriculture, using around 90 per cent of the total water withdrawals in the country (FAO, 2015). Agriculture sector is the third-largest consumer of power in India; it accounted for 19% of the total power consumption in 2011 (D & B). Apart from the high use of resources by agriculture systems, agriculture also contributes to 19 per cent of the total greenhouse gas emissions from India, where by India's greenhouse emissions are the third largest in the world (Ministry of Environment, Forest and Climate Change, 2007). It is one of the sectors that not just contributes to causing climate change but also faces one of the worst impacts from the same due to the variability in weather conditions that can disrupt crop cycles. Natural resources are also witnessing resource degradation due to various anthropogenic factors that affect the quality of resources available for practicing agriculture. About one millimetre of top soil is being lost each year due to soil erosion and the rate of loss is 16.4 tonnes per hectare (The Hindu, 2010). Introspection on results from the multiple long-term fertiliser trials in rice-wheat systems have revealed gradual deterioration of soil health and thus long-term productivity due to overuse and imbalance use of synthetic fertilisers (Roy , Chattopadhyay, & Tirado, 2009).

2. Systems Diagnostics: Drivers

The section highlights the current systems and structures that drive Indian Food Systems towards the trends of malnourishment, livelihood insecurity and environment unsustainability.

- **Input driven and Productionist approach to agriculture**

The major sources of growth operating within agriculture sector, according to a recent report by NITI Aayog (2017) is improving agriculture productivity, resource use efficiency, increase in cropping intensity; and diversification towards high value crops. (NITI, 2017) The Government of India launched a National Food Security Mission (NFSM) in 2007-08. The objective was to achieve food security by increasing the production of rice (by 10 million tons), wheat (by 8 million tons) and pulses (by 2 million tons) in 2007-12. (Raina, 2013) The case for higher productivity/production driven approach has two key arguments: India's production needs are going to rise and available land for agriculture is limited along with the facts of comparative lower productivity in India compared to other countries – gives an opportunity to invest in increasing agriculture productivity. The second argument for productivity is its potential impact on higher incomes of the farmers. Such an approach to food production systems is problematique to malnourishment, livelihood insecurity and environment unsustainability:

- ***Increase in productivity is not a key determinant of the food and nutrition security***

Globally, the four pillars of food and nutrition policy do not include food production; the pillars are nutrition, food safety, sustainable access to food, and healthy lifestyles (WHO, 2008 as quoted in (Raina, 2013)). Production is only a necessary condition for one pillar, i.e., sustainable access to food, and is not in itself a policy goal to be pursued. Selective modern technological interventions for enhancing food production co- exist with increasing hunger and malnutrition. (Raina, 2013) There can be correlations made from the fact that increase in food production is accompanied with increased agriculture exports and imports of India; while no substantive reduction in malnourishment (See Figure1). Total agriculture imports have increased by 116.67 times from INR 12 billion (1990) to INR 1.4 trillion (2015); while agriculture exports have increased by 52 times from INR 325 billion (1990) to INR 17 trillion (2015)

- ***Production based approach did not translate to higher incomes for small holder farmers***

Production based approach that drives current food production system in India is input intensive. Approximately 50% of the Annual Budget of the Ministry of Agriculture is spent on fertilisers, pesticides, high yielding seeds varieties, insurance in addition to big-machine based practices of agriculture. (Ministry of Finance, 2017) Data shows that average monthly expenses for crop production in India is INR 2,192 and average total receipts for crop production is INR 5,542 per agriculture household. (Ministry of Agriculture, 2017) The data shows a dismal state of income derived; despite farmers' and government's investment in input intensive, productionist approaches to food production systems.

- ***Production based approach compromises the environment sustainability of the production system***

Production based approach has least amount of focus and investment on the quality and management of natural resources; as the model is driven by adding high-end inputs to enhance production. India is losing 5,334 million tonnes of soil every year due to soil erosion because of indiscriminate and excess use of fertilisers, insecticides and pesticides over the years. (The Hindu, 2010) Soil and water conservation cumulates to less than 1% of the total annual budget of Ministry of Agriculture. (Ministry of Agriculture, 2017) All of this corroborates the evidence of resource degradation or ignored resource health due to production driven agriculture.

- **Fragmented Markets**

Small and marginal holder farmers face immense challenge in getting the right price for their produce. Some farmers are connected to public procurement systems of the Central and State Governments; some other small farmers are also connected to international markets through trading companies and NGOs. Most of the small holder farmers are dependent on local markets to sell their produce. Local markets are usually monopolized by few traders which give very limited bargaining power to small holder farmers to negotiate the price for their produce. *These asymmetries in the market affect the actual earnings and income of the farmer and thus pose a challenge to the* ***livelihood security****.*

There are many policy instruments used to ensure that farmers get right price for their produce. For example there is Minimum Support Price (MSP) for 24 crops and Market Intervention Scheme for other crops. The implementation of MSP, however, has been weak, except for a few crops in a few regions, and has often failed when farmers were most in need of it. (Singh, 2012)Since MSP is available on only few crops and in certain states only, most of the farmers are dependent on local market for selling their produce. The market place is an increasingly skewed place against the small holder farmers. There is much evidence around it. First, the price small producers receive are lower than most of the larger farmers because of their weak bargaining power and holding capacity. In wheat, marginal holders had the highest yield per hectare compared with all other categories in India; however, they realised the lowest prices per quintal and sold the lowest percentage of their output in grain markets (Gandhi and Koshy 2006). Secondly, in the retail chain-led trending market, preference to procurement of fruits, vegetables and other agriculture produce is given to medium and large growers who are contract growers. Retailing is a growing sector with about 15% contribution of India's GDP and 8% of employment; and this market opportunity remains untapped by the large number of small holder farmers. (Quoted by (Singh, 2012)) MSP is also criticised for being too low and in some cases, not covering the cost of the production. In 1970, the minimum support price (MSP) for wheat given to farmers was INR 76 per quintal. By 2015, the MSP for wheat had increased a mere 19 times, to INR 1,450 per quintal. In the same period, the basic salary (plus dearness allowance) of government employees has increased by as much as 150 times, for college teachers and university professors by as much as 170 times, for school teachers by up to 320 times and for top corporate executives by a whopping 1,000 times (Sharma, 2016).

- **Consumer/User demand**

Food production systems drifted towards rice and wheat based production systems post the green revolution era. In 2016-17, the area under millets stood at 14.72 million hectares, down from 37 million ha in 1965-66, prior to the pre-Green Revolution era. This decline was largely due to change in dietary habits (induced by a cultural bias against millets post-Green Revolution), low-yield of millets, and conversion of irrigated area towards rice and wheat. (Hindu Business Line, 2018) The trends have impacted the nutrition security of the population, livelihood security of the small and marginal holder farmers; and environmental sustainability of the system:

- ***Food and nutrition security:*** There is a great Indian paradox that has been baffling the researchers and policymakers for quite some time. The calorie-intake in rural areas has waned down from 2683 kcal/consumer unit/day in 1993-94 to 2489 kcal/ consumer unit/day in 2009-10. Similarly, in the

urban areas also it has declined from 2542 to 2385 kcal/ consumer unit/day. The protein-intake has also followed a similar suit. The decline in calorie-intake levels over the years is hard to explain when most of the factors affecting the intake levels - the rising income, better productivity, availability and accessibility of food grains and government schemes and policies - have shown a positive trend. (Meena et al, 2016) The rice and wheat based diet which replaced the millets from the plate is one of the critical shift in food habits. Millets are more nutritious than rice or wheat as they are rich in protein, fibers and micronutrients like ircon, zinc and calcium. (Rao, 2017) The fat-intake, on the contrary, has been rising. This reflects the increase in consumption of fatty processed foods and increasing popularity of such foods across masses, especially among the youths.

- **Livelihood security and sustainability in agriculture** Rice and wheat based production systems were highly water intensive and very sensitive and vulnerable in the semi-arid regions of the country. Rice take 3 to 15 times more water than any varieties of millet. (Hindu Business Line, 2018) Vulnerability of rice and wheat is also higher especially in semi- arid regions as they cannot tolerate temperatures more than 38 degrees centigrade. (Rao, 2017) Due to low vulnerability and high nutrition value, millets are very important crop for small and marginal holder farmers, especially in rain-fed semi-arid regions of the country. Suicide rates amongst millet growing farmers is none, suicides are most common among farmers who buy costly Bt cotton seeds and among potato farmers who sometimes have to sell their potatoes at as low as INR 10 for 50 kgs. This is contradictory when in the parallel market; urban consumers are buying a 50gms packet of chips at INR 20. With climate change now complicating things further, having a greater variety of staple crops could make India's agricultural sector more resilient–whereas relying on just one or two major staple crops would leave the agricultural system vulnerable to drought and other threats. (Bryce, 2018)

- **International Trade Regulations and Trends**

International demand of produce and thus international trade is a major driver to food production systems in India, with India being one of the top 10 global exporters and importers of agriculture commodities. (Ministry of Agriculture, 2016) Several studies suggest increase of certain food production like cereals, meat, frozen fish, oilseeds, coffee and tea because of India's competitive advantage in producing these goods. There are also indications to develop infrastructure in order to develop the competitive advantage in exports of fruits and vegetables. (Ansari, 2015)

Trade and international market is a big opportunity for many farmers to get a premium price for their produce and thus enabling higher income opportunity for small holder farmers. However there are concerns on how trade can heavily distort the environmental sustainability, nutrition security and in the long run, even livelihood security of the small and marginal holder farmer. The production in developing or under-developed countries for consumption at the international developed countries' markets distances the consumer and the producer. In such cases, most of the times, water intensive or high risk commodities are grown by the farmers without shared risks with the consumers. Further, this kind of arrangement allows exploitation of environmental resources of developing countries to produce food that may not be most suitable for these regions to grow, given the food dietary habits and environmental endowments of the region. Added transportation, adds further to the environmental costs from such trade. In the long run, due to exploitation of environmental resources, the farmers become worse off, even in terms of their livelihood security.

3. Pressures

- **Additional Risks due to Changing Climate**

Drought events, temperature fluctuations, increased precipitation events, floods, other direct weather events are some of the climate induced pressures on the crop systems along with some non-direct events such as pest and disease incidences due to variation in climatic conditions. Studies indicate that increases in climate variability and average conditions may extend the geographic range of some insect pests causing serious damage (Oxfam, 2013). The impact on yield is further depleting the physiological potential of plants, for instance each degree Celsius of global warming would lead to overall yield loss of 5 percent (National Research Council, 2011). All these factors are causes of higher risks, especially to small holder farmers pursuing single crops as the chances of crop damage and no alternative source of income is very high.

- **Urbanization competing for resource demands**

As per the census data, the urbanization rate has increased from 27.81% in 2001 to 31.16% in 2011. With increasing population and socio-economic development needs, constraint on access and availability of resources for food production is expected. Finite resources like fresh water shall compete for its usage for drinking, sanitation, agriculture, construction and industrial purposes. Similar shall be the case with land, energy and other finite natural resources. Such resource demand may raise the prices of resources, making agriculture more expensive and thus affecting food prices. On the other hand, rapid rate of urbanization and rising buying power have made people to move up in the food chain thus changing food baskets; affecting what is produced.

- **Governance of Trade systems**

According to the study conducted by OECD, farmers in India are impacted by a combination of complex domestic market regulations and by import and export trade restrictions, which together often lead to producer prices that are below comparable international market levels. Given a large number of malnourished population in India, a major strategy of the government has been to put food prices under control through the Public Distribution System. Therefore, India's agriculture policy has focused most on the Minimum support price and subsidy system to incentivize higher production. Thus, the input subsides available amounted to USD 27.6 billion during 2011 which is 15 percent of the total value of agriculture output. However, a 10 percent fix in the WTO agreement on agriculture for developing countries restricts the volume of subsidy. Further there is a commitment to reduce 13% in the total aggregate measure of Support (AMS) over a period of ten years. The article 6.2 of the WTO agreement exempts the nation on ground of "low income" and "resource poor" farmers but this Definition is restricted only to the size of land holding of farmers and not on the basis of entitlements they receive such as critical irrigation. (Gulati, Hoda, 2013)

- **Depleting efforts to maintain soil health**

Out of 350 million hectares of soil in India, 120 million hectares are problematic soils producing less than 20% of its potential yield (India Water Portal, 2011). In order to promote balanced nutrient management practices, the ministry of agriculture is implementing the soil health card scheme however, several loop holes to this programme exists in terms of the technical complexity and too much scientific information which is beyond a small farmer's understanding. For instance, a focus group discussion carried out by cereal system initiative for south Asia reveled that farmers could not understand the recommendations from the card. Furthermore, the existing efforts of government focuses mostly on the health indicators of soil in terms of soil chemistry (micro and macro nutrients) rather than the microbiology and overall health of soils. Also, the recommendations are mostly provided for application of fertilizer combination rather than on soil moisture, biomass and microbial activities. There is a need to see Soil biota as a biological universe than just a chemical composition.

- **Bad/Incoherent policies**

Several experts and researchers have stated the need to increase production of cereals and non-cereals agricultural commodities and expansion of livestock population to be critical drivers for food security through increase in intensity and productivity of farming. However, there is no comprehensive policy which makes agriculture risk free to the small holder farmer and agriculture labourers with respect to environment, food security, animal welfare and public health. In the current policy framework, it is easy to be a farmer that uses fertilisers and pesticides (as you get subsidies and benefits for doing so) than to be a farmer that grows organic food, with added institutional costs of getting organic certifications. Such mechanisms disincentivise farmers to opt for a sustainable and healthier food production system.

4. Our Vision for Global Food Systems

While the canvas of the food challenge has been laid out, we now portray against this backdrop, a vision of and elements thereof of a New Agriculture and Food System. The governance frame for this New Agriculture and Food System will have to extend from the global to local levels. These systems are such:

- Where the producers of food are conscious of the ecological and health parameters of their produce and are enabled to make decisions in consideration of these parameters, facilitated by market, technology and information systems
- Where livelihoods of producers of food, especially small-holder farmers are not just secured with appropriate production, institution and market models but enhanced to ensure prosperity
- Where markets promote and enable healthy food choices, by incentivizing safe and sustainable food production
- Where every citizen is aware of healthy food choice and future generations have secure access to safe and nutritious food

The Vision is cognizant of global nature of the systems given the fluidity and inter-linked nature of labour, capital, products, services, technology and knowledge systems. Further it takes into account, various international commitments, with special reference to Sustainable Development Goals and Nationally Determined Commitments at the COP21. The non-negotiating principles derived from these global relations and nature of sustainable development committed by the nations is premised on integration of livelihood-environment-nutrition objectives in the Food Systems. Research, analysis, programme and policy design cannot look at farmer livelihood, environment sustainability and nutrition needs of the country in isolation. That translates into five key principles.

- *Systems thinking approach:* Food Systems are linked with various social, ecological and economic systems and it is important to pursue a vision and approach in cognizance with all of it. The table below summarises some of the links of food production systems with Sustainable Development Goals. This is also to indicate the breadth of connections and the need to take into account all players who determine the decision flow. Resilience further is considered as an important attribute of a stable and sustainable system in the long run. Any favorable system for the triple bottom line benefits need to ensure its resilience capacity for it to be able to provide benefits in the long run.
- *Equity and Inclusiveness:* The principles of equity requires due acknowledgement of the roles and conditions of the most marginalized in the sector. Women and agriculture landless labourers are two important categories in this case. The New Vision aims to begin with recognition of their work and contribution and move towards a more targeted policy and governance design especially assessing their betterment through a development action.
- *Ceilings and floors of our environment and social systems:* Recent study on the sustainability by Kate Raworth defines parameters of environment and social well-being, and in this way elaborated on the optimum size and mix of the three circles. The nine boundaries (Rockstrom et al) constitute an environmental ceiling, also called 'a safe operating space for humanity'. Raworth's research combined these environment boundaries with social boundaries. Just as there is an environmental ceiling, beyond which lies unacceptable environmental degradation, so too there is a social foundation, below which lies unacceptable human deprivation. (Kate Raworth, 2012)
- *Sustenance of small and marginal holder farmer* is instrumental in sustaining favorable food systems; and for reducing abject poverty and enhancing benefits of economy to all. Bruno Dorin's work, 2013 on Lewis Path and possibility of a world without farmers finds much of the employment in developing countries like India will only come from enhancing labour productivity of the farmers since most of the manufacturing and services sector is not labor intensive and will not be able to create jobs to absorb the excess of labour in agriculture. While sustaining small holder farmers is critical for inclusive economic development, small holder farmers also represent pockets of diversity in agriculture. Diversity in agriculture is critical for nutrition security and ecological sustainability; and this is only possible in small farming models.
- *Transformational Change, towards radical alternatives:* Some of the changes from current systems will require radical shifts in production systems and consumption patterns. This would mean changing rules and systems of trade and governance from local to global food systems. This will also mean changes in dietary patterns across the world. The Vision explores ways to doing this within existing systems and certain actions required in re-designing the food systems.

SDGs	Logo	Linkage with Food Production Systems
SDG 1		- Small and marginal holder farmers, agriculture labourers in India constitute the higher percentage of poverty stuck population. Actions towards designing food production systems will determine the poverty levels of the region as a whole.
SDG 2		- This is central goal to food and nutrition security; and sustainable agriculture practices. It includes issues of access to food, nutrition, small and marginal farmers' income and environment sustainability of agriculture systems.
SDG 3		- Nutrition and food security determines levels of anemia, stunting and undernourishment in the population; thus connected with the health goal.
SDG 4		- Education system will determine how youth of the population looks at agriculture and two, what becomes the underline premise of agriculture research.
SDG 5		- Women are considered to be doing most of the agriculture labour required in farming based households. Much of it goes unaccounted. Recognising women as farmers in the country can enable better equity of access and opportunity to women farmers.
SDG 6		- Water management is central to agriculture systems, especially rain-fed regions of the country. Goal 6 on water is instrumental in designing appropriate agriculture solutions.
SDG 7		- Food-Water-Energy Nexus has been explored through various research exercises. Energy use is highest in the food sector, inclusive of production, distribution and storage usage.
SDG 8		- Millions of population in developing countries like India, depend on agriculture for their livelihood; and limited evidence that other sectors can provide that number of jobs. Exploring economic growth options that can be inclusive needs to be central to the economic strategy.
SDG 10		- Income inequalities between agriculture dependent small farmers and labourers as against other service and manufacturing sector jobs have been increasing. Corrective measures at both ends can determine India's inequalities trends.
SDG 13		- The changing patterns of agriculture systems have made them more input intensive and high on carbon emissions, given the increased use of fertilisers. With added culture of mono-cropping, the sector has increased its risk to weather aberrations, etc due to climate change.
SDG 14		- Forests, grazing lands and wastelands are instrumental in designing agriculture systems of any regions.

5. Levers of Change to the alternative paradigm

A. Alternatives to Industrial-led input intensive agriculture model

The powerful technocratic vision of science-based development interventions for poverty reduction and food security and the institutions that govern them, make it impossible for S&T to engage with, analyse and solve problems that are not articulated as problems within this paradigm, like that of food and nutrition security. As a first step, it is important to acknowledge that the rules we create shape how we produce access and consume food. Some of the critical shifts that need to be designed include:

- To begin with, the neglect of the environmental consequences of the 'productive power' unleashed on agriculture is acknowledged by the state, and there is a policy demand for correcting these knowledge and administration systems. This offers opportunities for decentralized natural resource based location-specific agricultural production programmes. The state also recognizes the evidence that these environmental impacts cause an overall decline in the incremental response to input use (irrigation and chemical fertilizers in particular, thereby demanding new ways of working or institutions of agricultural research, modified contents and partners in knowledge.
- An explicit and dedicated focused policy is required for the marginalised rural poor especially small farmers, women, herders, pastoralists and landless labour who constitute over 80 percent of the poor anywhere in the developing world as in India.
- The new system will have to base itself on institutional innovations, including design of new scientific research coalitions, support for short value-chains, more local employment generation, local information collection and analysis, to emphasise a production paradigm that was integrated with human and ecosystem health.
- Distribution of productive assets like land and skills must be more equal, and enabled thus by the state, region-specific access issues must be addressed on an urgent basis compared to national food production targets, and regions and populations with chronic hunger and malnutrition must receive special attention. The persistence of minimal calorie intake, unsafe drinking water, inadequate sanitation and highly anemic women and children, demands that water and sanitation be included in the institutional framework for food and nutritional security.
- The knowledge system needs to be transformed. The current systems of research and development in agriculture are driven by lab based experiments in controlled conditions. These experiments are not taking into account the constraints, risk and conditions of resources variations faced by small holder farmers. Such research experiments should be done with farmer communities; to develop appropriate models in partnership with small holder farmers. The second level of shift is needed in education systems of the country. The modern education system does not recognises agriculture as a subject. Any child enrolled to school develops a natural disconnect with knowledge of agriculture systems. According to Rossetti, Padilla, and McCaslin, "Agricultural Education at the middle school can help increase the number of individuals in our society that may become more agriculturally literate" It is instrumental to recognize agriculture as a subject at the school and college level.

  Ranging from organic farming, agro-ecological systems, SRI (systems of rice intensification), to niche ecosystem-specific tribal production cultures, the rain-fed croplands, dry lands, coastal and mountain agriculture systems have generated several alternatives.

B. Valuing Good/Nutritious/Safe Food and Ecosystem Services

India has been quite successful in controlling the food inflation but it must be recognised that the actual cost of producing nutritious safe food is quite high. Safe healthy nutritious food, not just today but in the long run includes costs of:

- *Knowledge and labour invested in growing nutritious food:* Nutritious and healthy food cannot be produce in the industrialized approach which uses standard chemical fertilisers, pesticides and weedicides. A production system that thrives on closely exploring the potential of biological connections both above and below the soil surface requires much higher investments by small farmers. It requires small-holder farmer to invest his knowledge to identify, develop and use locally available fertilisers and pesticides. Further, it is more labour intensive as weeds in such cases are usually removed manually; and the system involved multi-cropping patterns of production. Systems also need to be set up such that profits are shared fairly with landless agriculture labourers.
- *High risk taken by small-holder farmer:* Unlike in other business ventures where high risk comes with possibilities of higher profits; the small holder farmer usually faces multiple layers of production and market related risks. These risks only add to higher costs and losses to the small holder farmers. Systems need to be built where higher risks are compensated with higher returns for the small and marginal holder farmers.
- *Ecosystem services (biodiversity, carbon):* By choosing a model or approach of farming, a small holder farmer chooses its relation with the ecology, including water, soil and carbon sequestration of the system. Farmers are the only active 'care' takers of soil and water systems, maintain biodiversity; and also maintain the carbon holding capacity of the soils. All of this is mostly without any compensation by the consumers, stakeholders, government. There are number of agricultural practices known to reduce emission or sequester carbons in the soil.

These three are broadly the aspects to be considered while conducting valuation of price to be offered by farmers. In the current system, small holder farmer is not even compensated for the costs that he incurs (excluding knowledge, labour, risks and ecosystem services) because of the various factors. Systems have to define where consumers, government and corporate structures compensate the farmers duly for the real value of the food produce. This would also mean revisiting incentives structures placed in the government through subsidies and investments that promote sustainable practices in agriculture, keeping livelihood of small and marginal holder farmers at the centre.

C. Redesigning markets

The current market system in India involves a large number of intermediaries, fragmented scope, high transaction costs, poor marketing infrastructure, skewed & crop specific pricing policies. Some of the critical aspects of the new market systems are as follows:

- *Connecting producers of food to end consumers*: The growers of food should be connected with the end consumers of the food. Such connections can be beneficial for both parties. Consumers will get the healthy and nutritious food of their choice responsibly grown by the producers; and producers will be able to realize better returns their investment. These models can be developed at a community level, keeping the same principles for larger ecosystems.
- *Promoting local food production and food habits*: Food habits of a certain region will have to be driven by what is available in local food production systems. This has two imperatives. First, this will

prevent consumption patterns distant from their production systems resulting in labour exploitations, resource exploitations, and ecological destruction especially by consumers in developed countries of farmers in developing and under-developed countries. Second, this will also promote and incentivise all regions to diversify their production systems at the local level.

- *Farmer Collectives and Group Contracting System for marketing:* In order to reduce the cost of grading, value addition and marketing; working in collectives is economically viable for small-holder farmers. This is also useful in mitigating risks due to market fluctuations in prices. There are many existing models that are successful like Cooperatives and Producer Companies in India; Group Contracts in Thailand. Experimenting new crops, putting capital together, access to trainings, access to subsidies and other value additions can be planned and done together in Group farming. This might be a possible solution for making agriculture economically affordable and sustainable for the small and marginal framers. This might also maximize the usage of technology or machines which was otherwise difficult for small farmers to access and use.
- *Incentives systems driving locally produced, healthy and sustainable food options:* Public procurement systems influences production as well as signals choice of crops for production and techniques and practices used for agriculture. Public procurement systems must therefore prefer local grains like millets over large scale wheat-rice based procurement systems. It is further important for government and decision makers to recognise informal markets and explore ways to systematize the process in the favour of small producers.
- *Land Rights:* Market systems have to be backed with a strong land tenure policy which would enable the tenants to avail necessary subsidies as well as enhance their accountability and ownership over the farm by contracting for a longer period (10 years).

D. Measuring what matters:

Measurements of expectations and outcomes of the food systems in many ways determine the direction of progress in the system. Current food governance systems measure land productivity and efficiency as critical indicators to measure the state of well-being of the food system. This is very limited in the inter-connections food systems involve, as productivity and efficiency cannot be core to the food system. (Refer to Drivers Section) Further the current metrics to measure productivity is suitable for monoculture based systems. Productivity calculations do not account changes in productivity measures if there are multiple crops coming from the land in the same time period. It is important therefore, even within the paradigm of productivity, to include cumulative yield of multiple crops when such indicator is studied in a diverse set up. Further to that, what can be more important is to study the nutrition value generated by the farm, which will depend on the crop choices made the farmers.

Measurements of agriculture systems need to also measure labour productivity and the income generated for the farmer per unit land; and/or return on investments to the small-holder farmers. Measures of effectiveness and inclusiveness that includes impact on marginalised communities like agriculture labourers, women are instrumental for a comprehensive valuation of food systems. [i]

[i] *This document is developed by Development Alternatives by reaching out to their experts, partners and utilizing the knowledge of programmes run by Development Alternatives on the ground. It benefitted from discussions, forums at Revitalising Rain-fed Agriculture – a network of 2000+ civil society members, experts working on agriculture systems in India. Some of the experts we connected and learnt from include Ashish Gupta, Bablu Ganguly, Bruno Dorin, K Murali, MV Ashok, Rajeshwari Raina, Sukhpal Singh.*