20 years
Gene Campaign

Brainstorming Session

Finding Solutions
To
Problems in Indian Agriculture

India International Center, New Delhi
9 November 2013

India is largely an agricultural country. 60% of her vast populations live, directly or indirectly, on income derived from agriculture. But to say that India lives by agriculture does not mean that India is agriculturally advanced. Agriculture contributes just 14% to the gross domestic product (GDP) of India; however, 60% of India's population is directly or indirectly involved in it. The share of GDP in agriculture, which was 80% at the time of independence, has come down to 14% now. The investment in agriculture in the 1980s was 15.4% and it is down to 8.4%. The question that arises is why?

Some of the major problems with Indian agricultural sector are:

1. The **minimum support price (MSP)** is not decided by the farmer and instead the government decides a minimum support price (MSP) for his produce. Farmer's Commission recommended that the MSP should be fixed at 50% above the input cost but no action has been taken.

2. Presently, the **agricultural budget** is business-as-usual budget. Agriculture sector growth was 1.9% in 2012-13 as compared to 3.6% in 2011-12. The main focus of the budget should be to increase the annual growth rate of agriculture and allied sector at 5% of GDP.

3. Farmers lack access to **credit** because of his lack of knowledge about banking procedures, his inability to reach the market without middlemen, failure of banking correspondents in rural areas and unawareness about facilities like Kisaan credit cards. This is the reason why the informal sources, i.e. the money lenders, are more popular with farmers rather than the formal sources.

4. There is a lack of grassroot level agricultural **extension systems** to work at panchayats or village level. Also, the majority of farmers in India do not have access to any source of information even with the variety of agricultural extension approaches. There is a need to develop an extension service incorporating solutions from indigenous knowledge and highlighting the innovation among rural communities themselves.

5. 1997 witnessed the first emergence of **farmer suicides** in India and 17,368 Indian farmers killed themselves in 2009. Unable to pay off debts, crop failure, inability to sell good harvest at a reasonable price and denied access to credit are some of the reasons that lead to farmer suicides in India.

6. The **fragmentation of land** holdings in agriculture has reached a critical stage. The land assets get smaller with every generation. These small holdings have not expanded the total acreage under cultivation. Rather, has very slightly shrunk it by 0.16%.

7. The farm sector remains non-remunerative, risky and not so attractive since the farmers still follow old practices and mono crop. This has led the **youth** to choose other job opportunities rather than agriculture.

8. Various **policies and legislations** have certain problems in them, for e.g., the Food Security Bill doesn't provide nutritional security to the farmers, the Public Distribution system is mired in corruption, similarly the farmers are unable to receive fair price for their produce because of some flaws in the Agriculture Produce and Marketing Committee Act including inefficient market mechanisms and too many middlemen and the Land Acquisition Bill doesn't address the issue of forceful acquisition.

9. Agriculture **productivity** of India is less than 40% for most of the world's highest in field crops, vegetables, plantation crops and livestock products. The main reasons for low yield per unit area is the lack of irrigation facilities, fragmented land holdings, inadequate non-farm services, poor post-harvest and processing facilities, etc.

10. **Costs of inputs** have risen due to increase in international prices of fertilizers, raw materials and diesel and also due to increased wage rates leading to costlier labour. Increasing production costs however is leading to increase in food prices.

11. Indian **irrigation** systems are facing problems like the huge backlog of incomplete schemes, the increasing neglect of existing systems, poor condition of large-scale canal systems, water supplies that do not reach the end of systems and over-exploitation of groundwater.

12. The farm **subsidy** should not be withdrawn, as suggested by many economists. Rather it helps productivity and ensures low food prices. However, other subsidies such as **Nutrient-based subsidy (NBS)** need to be revised. Subsidy under the NBS should be extended to urea as well as other organic manures, instead of restricting it to a few micronutrients.

13. There is an ongoing dispute about the advisability of approving **transgenic crops** for cultivation in India. Taking the example of Bt Cotton, the farmers have got better yield and they also have gained considerably from the increase in price of cotton over the years. However some of the concerns with using Bt cotton are higher price for hybrid Bt Cotton seeds and also it requires more water which makes it unsuitable crop for a small or marginal farmer.

14. Over the years, there has been a gradual realization about the key role of **women** in agricultural development. However, women still are absent from decision making

process. Even with women performing all un-mechanized agricultural tasks, they are still being discriminated against gender and not given joined rights in land or right to access to farm credit.

15. The developing countries in the tropics are less able to adapt and are more susceptible to **climate change**. Changes in the rainfall patterns and the temperature regimes are influencing the local water balance and this disturbs the optimal cultivation period of particular crops, leading to low productivity of crops.

16. Within the government there is a disagreement. The farm ministry wants to **export food,** but the food ministry doesn't, because it is worried about inflation. However, the grain traders and the livestock traders (and not the farmers) are the ones that are benefitting from being able to sell on the world market, while Indian consumers are facing rising prices.

17. While people go on without food and remain undernourished, India remains one of the countries with a high rate of **food loss**. The amount of food that goes waste every year was more than 40% valued at 58,000 crore. The majority of the food loss in India is due to the bad post-harvest management and lack of infrastructure facilities.

18. Over the years, the country's landmass has suffered from different types of degradations. Intensive agricultural practices that rely heavily on water, chemical fertilizers and pesticides have caused water-logging and salinity in many parts of the country. Afforestation activities, agro-forestry, reclamation of saline soils, etc. are some immediate actions that need to be taken for **restoration of degraded lands**.

19. **Rainfed areas** currently constitute 55 per cent of the net sown area of the country. Rainfed areas face various problems like variations in rainfall patterns, land degradation and soil erosion leading to poor productivity of crops and low profitability for farmers in these areas.

20. **Institutional agricultural research** has been focusing vastly on creating new varieties of seeds when the potential of the traditional sources have not been fully realized yet. The research being done is crop biased (focus is on major crops like rice and wheat) and also there is a huge gap between "Lab and Land".

21. Almost 80% of the public expenditure going to agriculture is in the form of input subsidies (fertilizers, power and irrigation) and only 20% as investments in agriculture. **Public sector investment** needs to focus on building effective and efficient value chains and linking farmers to market.

22. Food crisis is leading to **food inflation**. Climate change, rising input costs and low productivity of farms due to issues like farmer suicides, denied access to credit, etc. are the major causes of food inflation.

23. Degradation of **agro-biodiversity** is affecting the agricultural sector due to factors like loss of area under grasslands and pastures, pollution, soil erosion, deforestation, overuse of groundwater, global climate change, etc.

24. **Livestock and Animal Husbandry** have been supporting livelihoods of more than two-thirds of the rural population, however some of the issues faced by farmers rearing livestock are infertility in cattle, promotion of cross breeds which is leading to decline in number of indigenous cattle, certain diseases and climatic conditions, shrinking pasture lands, etc.

25. **Biomass fuels** are predominantly used in rural households for cooking and water heating, etc. Though, biomass delivers most energy for the domestic use (rural - 90% and urban - 40%) in India and biomass production can be a new source of revenue for the farmers, however, initial investments in biomass production is large as well as they may not be able to afford and may not yield much profitable results as expected.

26. **Peri-Urban agriculture** contributes to food security in urban areas. It also contributes in providing environmental benefits to the cities. It provides habitat for urban wildlife and conserves biodiversity.

27. The farmer should be made an **entrepreneur**. He should be trained to be involved in the value chain of his produce. A marketing committee should be set up by the farmers themselves which will be responsible for coordinating production and marketing activities thus linking the farmer to the market.

1. **MSP**

A system of procurement and distribution of major food grains was introduced and statutory minimum prices were set. The support price is generally announced at sowing time, and the government agrees to buy all grain offered for sale at this price. These prices guarantee to the farmer that, in the event of excessive production leading to oversupply in the market, prices of his produce will not fall below the support price. Support prices generally affect farmers' decisions indirectly, regarding land allocation to crops.

The minimum support price was aimed to:

i. Assure remunerative and relatively stable price environment for the farmers by inducing them to increase production and thereby augment the availability of food grains.
ii. Improve economic access of food to people.
iii. Evolve a production pattern which is in line with overall needs of the economy
iv.

The country has been facing large shortages of pulses and edible oils and now has to meet about one-tenth of its demand for pulses and close to half of the demand for edible oil from imports. These imports are in turn having an adverse impact on producers in the unfavorable dry-land areas These changes necessitate a fresh look at the role and relevance of the Minimum Support Price system in the country.

The farmer doesn't have the right to choose his profit margin and decide a maximum retail price. The government decides a minimum support price (MSP) for his produce, which has gone up by a huge sum in the last five to six years but it is still pre-determined by the government and is not decided by the market forces. The Commissioner of Agricultural Costs and Prices was requested by the Farmer's Commission to fix the MSP at 50% above the input cost, to which he replied that they had to go by the prescribed mandates.

When the farmer goes to sell, there is hardly any agency to buy his crop, forget about an agency that gives the MSP. Agencies usually tell him that the produce is wet or spoilt so he is forced to leave his produce at the middleman's shop and hence go in for distress sale, at a **price much below the MSP**. Therefore the government needs to work on changing the pricing policy, conduct research and make arrangements for marketing the produce for the farmers.

2. Budget

The agricultural budget of 2011-2012 had been a mixed bag. The good things are that the budget has addressed the issues of storage of food grains and increased farm credit. The budget has nevertheless reduced subsidies on petroleum as well as three 'F subsidies-food, fuel, fertilizer, by 14%.

The bad thing, however, is that it is a business-as-usual budget.

- For the entire year, **agriculture sector growth has been lower at 1.9 per cent in 2012-13** as compared to 3.6 per cent in 2011-12.
- **Civil unrest** brewing in Chattisgarh, Jharkhand, Andhra Pradesh and now Uttrakhand is the reaction to the wrong agricultural policies of the government that does not address the needs of the people.
- **Women** constitute a major work force in agriculture but unfortunately**, are almost invisible** in the agricultural budget. The budget should be supportive of her needs in terms of agricultural implements especially access to farm credit.
- The budget should also have **addressed the climate change**, which demands resilient seeds, new varieties of crops, alternative cropping patterns, etc. that can withstand the vagaries of weather. Our agricultural research systems must be oriented to monitor and evaluate climate change and recommend changes in agricultural practices accordingly.

The overall thrust of the budget should be to modernize Indian agriculture and uplift the socio-economic status of the farmers.

Issues that need to be tackled by 2013-14 budget are:

- The agricultural budget needs to **increase the growth at 5% of GDP for the next 10 years** to fight hunger and malnutrition.
- **Boost public investment in agriculture**, especially in areas such as irrigation, land and water conservation, agricultural services, marketing, post harvest value chain, animal husbandry and most importantly, R&D.
- **Ensure farmer's access to cheaper credit** and also give a boost to the use of modern post-harvest technology for reducing losses and enhance farmer's income.
- **Encourage expansion of irrigation** and efficient use of available water, besides **promotion of dry-farming technologies**.

- **Soil health management** is another area that needs attention. The nutrient status of Indian soils is fast declining due to continued farming for centuries and inadequate replenishment of the consumed nutrients through addition of organic and inorganic manures. Incidences of both NPK and micronutrient deficiencies are also on the rise.
- **Bringing down prices of farm machinery** by reducing duties on them since the shortage of labour and high wage rates is a major problem faced by the farmers.
- Considering that animal husbandry is truly the livelihood mainstay for a sizable chunk of rural households, especially small and marginal farmers, this sector needs financial and infrastructural support. An **effective health cover for animals** is vital for boosting this sector. Facilities for genetic up gradation of unproductive or low-yielding cattle and other farm animals though artificial insemination needs to be expanded substantially.
- **Need for rationalizing duties on imports and exports of agricultural commodities**. Higher import duties need to be imposed on items that can easily be grown at home, whereas, agricultural exports need to be encouraged to ensure remunerative prices to farmers.

3. Credit

Even though the target for agricultural lending has been increased to Rs. 5,75,000 crores, however the recipients of this loan are only those who are literate, can fill forms, get no-objection certificates, get all the paperwork done, which means **only a better off farmer can succeed** and not the small and marginal ones. Capital, i.e. the credit required for the purchase of inputs and machinery is a critical constraint. The agricultural credit system of India consists of informal and formal sources of credit. The informal sources include commission agents, traders, private moneylenders, friends, relatives, etc. and the formal sources include commercial banks, co-operatives and micro-finance institutions (MFI). However **the informal sources, i.e. the money lenders, are still more popular with farmers rather than the formal sources**. NSS 59th Round (2003) revealed that only 27 per cent of all cultivator households received credit from formal sources while 22 per cent received credit from the informal sources.

This is because:

- The **farmer's lack of knowledge**, where the farmer doesn't know what rate of interest is being charged and the date of repayment of loan taken from the bank
- There is **little provision to cover the farmer** in case of natural calamity or crop failure due to some reason
- **To repay loan from one source farmers seek loans** from other sources and the spiral keeps building up
- Also the credit taken from financial institutions in the name of agriculture and related activities is not spent on crop cultivation, rather **used for other reasons like health or social functions**

Since 84% of all cultivators are either small or marginal farmers, credit is an essential requirement for revitalizing agriculture. However, the outreach of the formal institutional credit structure is very limited. Small and marginal farmers can only borrow small amounts or less than Rs. 25000 in order to remain within their repayment capacity. For such farmers the alternative sources of finance are expensive but, easier to access, loans from moneylenders. Direct finance to agriculture under priority sector lending includes credit for the purchase of trucks, jeeps, and other transport equipment – which small/marginal farmers cannot afford, and for which alternate sources of funding are available. **Credit to small/marginal farmers can only increase if the share of direct accounts with a credit limit of Rs. 250,000 is sharply increased.**

As per information obtained by the government of India in 2009, less than 1.5% marginal farmers and less than 3% small farmers got loans from commercial banks. A study shows that the farmers of Chandigarh and Delhi get more credit than those of Bengal, Bihar, Orissa and Uttar Pradesh. Large corporate banks are not designed to look after the needs of small farmers; requirements of a small farmer are met by localized institutions but unfortunately, **India has not been able to develop a network of such institutions**.

The RBI tried to introduce a concept of '**banking correspondents**' in rural areas to attract farmers for credit. However, due to the petty commissions they were getting, they did not even open their offices. Even so, they were considered competitors by the branch manager banks in that particular area, so this concept failed entirely.

The government introduced **Kisaan credit cards** for and the **proposed solution** that could have been adopted by the bank was to have a limit of Rs. 50,000 in that card, the bank would be ready to give up to Rs. 50,000 for buying fertilizers and other inputs for sowing. Once the crop had been brought home after the harvest, the farmer should be able to draw another 25, 000 so that he doesn't have to sell in distress.

However, none such measures were taken and this concept of kisaan cards still remains an unknown phenomenon.

The possible solutions for helping the farmer from this ever increasing debt trap could be:

- Offering him **remunerative prices** for his produce and keeping him secure from the price fluctuations in the open market

- **Insuring the farmers** against the natural calamities that destroy their crops

- **Providing alternative employment opportunities** for farmers to supplement their earnings from the field

- **Contract Farming**: The firm controls the production process without owning or operating the farms but ensures assured procurement of output and remunerative prices. It allows for compressing the supply chain by reducing the number of intermediaries, so that allegedly the farmer receives a higher share of the final consumer price. It can make input supply easier for the farmer and guarantee an outlet at a fixed price, thus overcoming the shortage of capital and information that many small holders suffer from. However it has its pros and cons. The **pros are the high yields and fixed prices**. The **cons, however, are also present as both production risk and market risk**. Production costs in contract farming are higher as the standard expected is higher. No company offers protection for crop failure. No crop insurance is given and thus production risk is not covered most of the time. As said earlier, many companies take advantage of the clauses in the contract in case the harvest does not meet their requirement; they tend to buy it at a lower price or reject it altogether.

- **Producer Groups and Cooperatives** can allow economies of scale and prevent smallholders to be alone while bargaining an agreement with a wholesaler or a corporate company. Already, dairy and vegetable firms are today contracting through farmers' associations rather than with individuals. E.g. - Amul Milk Cooperation in Gujarat has been a huge success.

4. Extension Systems

Despite the concerted efforts made by Public as well Private Extension systems to put in place an effective extension mechanism, the present extension systems appear to be

inadequate to address the challenges faced by the farmers in the context of changing agricultural scenario. There is very little penetration of extension system below the taluka level. The major reason is the **lack of grassroot level extension functionaries to work at panchayats or village level**. Even with the variety of agricultural extension approaches that operate in parallel and sometimes duplicate one another, **the majority of farmers in India do not have access to any source of information**. This severely limits their ability to increase their productivity and income and thereby reduce poverty.

To be effective and to remain relevant in the years to come, the state extension departments should initiate the following structural reforms:

- **Develop an extension service incorporating solutions from indigenous knowledge and highlights the innovation among rural communities themselves**. There is a need to deploy trained man power at grass root for ensuring effective extension. Experience of RBRC project has amply demonstrated that **Commodity Based Farmers Associations** can be effective in providing required backward and forward linkages, besides addressing end to end issues. Such associations empower farming community with required decision making abilities and reduce the dependence on external sources. This innovation model needs to be replicated in other locations to serve the needs of the farming community.

- Extension services need to **Demand Driven, Location Specific and address the Diversified Demands** as well as those of marketing and value addition which calls for organized arrangement of farmers, since small and marginal farmers find it difficult to address range of issues required for sustained development.

- **Decentralized, democratic, farmer centric, demand driven, vibrant and participatory institutional mechanism** have to be ensured at the lowest cutting edge administrative level (Panchayat level institutions) to cater to the needs of the farming community.

- Strengthen its understanding on matters with respect to **technology, markets, prices, demand and policies**. Departments have to either recruit specialists or have to hire the services of professionals in these areas.

- **Recruit better qualified staff** - initiate (as Punjab has done) measures to ensure that, the minimum essential qualification for an extension staff should be a graduation in agriculture.

- **Improve social science skills of extension personnel**. Apart from technical skills, extension personnel needs several social science skills with respect to need assessment, group formation, negotiation, conflict resolution, mobilisation, management of CPRs, use of IT, data collection, analysis and documentation.

- **Increase the allocation for operational expenditure**. Allocation of operating expenses in State Departments of Agriculture is around 15% whereas a fully functional extension system should have 30-35% of its total expenses as operational expenses.

- **Improve the capabilities of extension managers**. They need skills to operate effectively in the pluralistic extension environment. They need to know, how their organization can do better or cheaper than other organizations, how can it co-operate with other actors in this system to provide all farmers better knowledge to survive and succeed in a competitive society and how to create the social climate for a successful learning organization?

- **Research needs to be done to understand why farmers are not accessing information** will be useful in designing an extension system that adequately caters to the information needs of farmers in rainfed and irrigated regions, in different agroclimatic zones, with various sizes of landholdings, and of both genders.

- **Knowledge sharing should go beyond the formal public-sector extension system** and utilize the various agents and intermediaries who interact with farmers and other stakeholders in the innovation system so that the knowledge and information required by farmers to innovate can be provided and linkages developed. In this respect, the organizational innovation presented by **agriclinics** in integrating the provision of several services to farmers, including advisory services, is worthy of study

5. Farmer Suicides

In 2006, the state of Maharashtra, with 4,453 farmers' suicides accounted for over a quarter of the all-India total of 17,060, according to the National Crime Records Bureau (NCRB). NCRB also stated that there were at least 16,196 farmers' suicides in India in 2008, bringing the total since 1997 to 199,132. According to another study by the Bureau, while the number of farm suicides increased since 2001, the number of

farmers has fallen, as thousands abandoning agriculture in distress. At least 17,368 Indian farmers killed themselves in 2009, the worst figure for farm suicides in six years, according to data of the National Crime Records Bureau (NCRB).

These regular annual occurrences of farmer suicides are prompted by reasons such as:

- **Crop failure**
- **Inability to sell a bumper harvest at a reasonable price**. The suicides of cotton farmers in western India bear testimony to crop failures and suicides of paddy farmers in eastern India stand witness to both
- **Denied access to credit**
- **Unable to pay off debts**: 70%-100% farmers are in a debt-trap owing to **rising prices of agricultural inputs and lack of support prices** for their produce.
- **Farmers with small or marginal land holdings** find it difficult to produce enough food grain to feed their families and also save some cash at the end of the year. This desperation situation leads to suicides. Farmers with marginal holdings do not have the collaterals for borrowing money. What government needs to do is to design a scheme for consolidation of holdings.

Some solutions that can be applied for farmers are:

- Intensifying agriculture by **adopting green house techniques** or special focus for production of high value crops such as fruits, vegetables, flowers and medicinal herbs;
- Promoting **livestock based mixed** farming and in addition, poultry and fishery can also be considered wherever possible
- Organizing small farmers into **Producer Groups (informal SHGs)** linked to Farmer's Federation or Producer Company;
- Appointing of **local para-technicians / field guides** who will work mostly as volunteers to motivate, mentor and provide critical inputs and services to small farmers
- Identifying **Women Champion farmers** who can serve as source of inspiration and guidance in remote villages as well as **empowerment of women as farmers**
- Development of **value chain** to bring all the players under one platform to facilitate development of farmers

6. Fragmentation of Farmlands

The number of **'operational holdings'** in India rose over a ten year period from 119.9 million to 137.7 million (up 14.8%). Whereas in three categories of the size of holdings (large, medium and semi-medium) the number of operational holdings dropped; in the categories of small and marginal the number rose (by 8.8% and 22.4% respectively). The rise in total operational holdings of 17.8 million is due mainly to the **increase in the number of marginal holdings, that is, below one hectare**, and these account for more than 95% of the all holdings added to the total in this ten-year period. The **fragmentation of holdings in agriculture has reached a critical stage**. The land assets get smaller with every generation.

At a national level, the addition of such a large number of small holdings has not expanded the total acreage under cultivation. Rather, all cultivated land - in all size categories - has very slightly shrunk (by 0.16%) to 159.1 million hectares. However, the total masks both one large deficit and one large addition - a 17.5% decrease in the total operating area of large holdings (10-20 hectares, and above 20 hectares), and an 18.7% increase in the total operating area of marginal holdings (below one hectare). The total area operated as marginal holdings has risen from 29.8 million hectares in 2000-01 to 35.4 million hectares in 2010-11.

7. Role of Youth

India is fortunate that over half of its total population of 1.2 billion is under the age group of 30. A high percentage of youth in the age group of 26 to 35 years are presently in the country who can undertake work on agriculture including production increase, processing in value added products and marketing of various products if their potential is tapped properly. Having a sizable population of youth - over 45 per cent of the total (in the age group of 15 to 34 years), is a national asset. The rural youth population, both male and female, is higher than the urban population. **Yet the youth is keener on getting the job of a *chapraasi* rather than go into the farming sector.**

The farm sector is still **non-remunerative, risky and not so attractive** since the farmers followed old practices and mono crop system especially the small scale and marginal farmers. Also excessive **fragmentation of farmland** has led the youth to choose other job opportunities rather than agriculture.

The reforms and solutions that need to be applied to tackle these issues and lure the youth into the agricultural sector are:

- **Improve the skills of rural youth in diverse sectors related to agriculture**. If training and capacity building are focused on developing skills of the rural youth in accordance with the demands of the agricultural sector, they will begin to see agriculture as a skill-driven and feasible employment option
- **Provide training in agricultural practices specially relating to climate change**
- **Provide training in minimizing post harvest losses and developing value chains for farm produce**. Information and technology interventions with youth inclusion are also offering greater opportunities for changing the present scenario. The youth has far more exposure, willingness and capacity to adopt and adapt to technology than the older generation
- **The youth seva sanghs or clubs** already in existence in some Universities need to be strengthened. Some youth in Puducherry are doing such activities successfully.
- **Young farmers with leadership quality** should be identified, trained and that young farmers' platform/forum/council have to be created to ensure the active participation of young female and male farmers in policy-making bodies
- **Agriculture is included as a compulsory topic starting from primary education curriculum** in order to promote interest in farming for youth and that informal informal education programmes are implemented in rural areas to change the mind set of parents
- Agricultural universities, research institutes, mobile camps are established in rural areas to which youth **should have access to scholarships and quotas mechanisms**
- **Frequent youth-participatory realistic data collections** for monitoring and evaluation on the above aspects are conducted to ensure timely reforms and updates of the knowledge-systems and structures and that these data are made available and discussed with the youth
- A higher percentage of **national agricultural budgets should be dedicated to improve youth access to agricultural activities**

8. Policies and Legislations

A. The Food Security Bill

The National Food Security Bill that came up in July 2011 is considered a significant step towards ensuring the fundamental Right to Life. It has focused on the importance of having access to food and appropriate nutrition.

The Food security bill however, in its present form, has **certain problems:**

- First, it reinforces the targeted approach of above the poverty line (APL) and below the poverty line (BPL) and makes matter worse than they currently are. The Bill says that 28% of the urban population and 46% of the rural population will get 35kgs of food grains at Rs. 3 (rice) or Rs. 2 (wheat) or 1.44% of the urban and 22% of the rural population will get it at half the MSP while 10% of the urban and 15% of the rural population will be completely excluded. Why do they have such a complicated formulation?
- Secondly, there is no talk about nutrition security and neither is there a package for farmers.
- Thirdly, there is the clause which says that in case of a natural disaster, the government will not be accountable for delivery of food. This clause allows the state to walk away when it is required the most.
- Finally, the ordinance does not assure an individual of having two meals a day as well as proper calorie intake.

In January 2013, the National Human Rights Commission (NHRC) organized a one-day meet to discuss the Right to Food. **Some important suggestions** that emerged at the conference were:

- Full nutritional security commitment in the National Food Security Bill has to be incorporated immediately
- Food will not be available unless adequate quantities are produced, properly stored and efficiently distributed
- Food availability cannot be restricted only to cereals; it must include pulses, oils, vegetables, fruits and animal-based proteins
- Balanced diet should be provided in ICDS centres and midday meal schemes.

While the standing committee claimed that it was consulting with several groups and individuals on the National Food Security Bill, the **Chhattisgarh government quietly passed its own Food Security Act** in December, 2012. This state legislation is much more comprehensive than the standing committee recommendations, conforms to, and in some instances, goes even beyond the provisions of the NAC draft. The most progressive feature of this state Act is its move towards a universal PDS. If a state like Chhattisgarh can legislate a comprehensive Food Security Act, there is no reason why the central government – which has far greater resources at its disposal – cannot do the same for the entire country. There can be few more urgent claims to India's public money than ensuring the nutrition and health of millions in the country, especially of children, who are among the most malnourished in the

world. We can only hope that the government salvages this bill and delivers on its long-pending promise of ensuring food security for all.

B. The PDS

The public distribution system (PDS) is supposed to distribute foodgrains to the poor people at one kg per person per month. However, it is alleged that **inferior food grain is often distributed** due to manipulation by fair price shop owners. **The use of bogus cards** is another allegation against the PDS in the absence of vigilance. It is estimated that **only about 42% of the subsidized grain reaches the target group**. Reports suggest that the PDS is mired in corruption.

It is estimated that Rs. 15,000 crores worth of foodgrain is distributed to 160 million households every year. The food subsidy bill in 2010-11 is estimated at Rs. 60,000 crores. But the question that arises is: who are the real targets?

According to the Food and Agriculture Organization (2008), India ranks 66 amongst 88 nations on the Global Hunger Index. Half of the children below the age of five reportedly remain malnourished. The Right to Food Bill ensures subsidized food to 75% of the rural population and 50% of the urban population. It is supposed to provide 7 kgs of rice, wheat and coarse grains per person per month at a very low price. Besides the targeted poor, the bill also ensures a minimum of 3 kgs of food grains per person per month under general household category at 50% less than the market price. **However, the vexing questions of entitlement and the identification of deserving people living below the poverty line remains.**

The standing committee made several recommendations for reforming the PDS, however these recommendations are somewhat flawed:

- *The inclusion of fortified foodgrains and atta (flour) in the PDS*. However, this will open the door for commercialization of agriculture and the food system, which can threaten the country's food sovereignty, further impoverish farmers and increase food prices.
- *Fortification of foodgrains* would also allow for controversial, yet-to-be-proven safe technologies like genetic engineering, with several potential hazards to livelihoods, health and the environment.
- *The replacement of PDS with cash transfers*. Given the high levels of poverty, illiteracy and inequality in gender relations and insufficient banking infrastructure in the country, India is currently ill-suited for the replacement of services with cash transfers.

C. The APMC Act

The APMC Act, designed to protect farmers from the vagaries of the market, has been turned on its head to enrich traders & politicians and harm farmers. It prohibits directly selling agriculture produce to consumers by mandating sales through regulated government mandis. However, the loopholes in the Act are:

- According to APMC Act, broker charges and market fees are fixed. However, **broker rates differ significantly** and are charged from the farmer against regulation.
- **Farmers incur labour cost for loading and off loading produce** and pay for weighing it, thereby increasing their total cost of selling their agricultural produce. However, a farmer doesn't get this difference in his earnings and has to face this loss.
- APMC officials give two licenses, one for the broker and other for the wholesaler. However, in many cases. The **same person takes the licenses of both broker and the wholesaler**.
- There is no effective mechanism, to look at food quality and safety in wholesale markets. **Lack of information integrity** leads to farmers getting paid less for their high quality agriculture produce.

D. **<u>Land Acquisition and the Land Acquisition Bill: Archaic and Revised</u>**

It is one of the most contentious issues for the political economy of India. In most cases of compulsory acquisition, agricultural land is transferred to industrial, commercial sectors as well as to other developmental activities. Invariably, land is acquired without prior consent of the farmers. This has come to raise serious concerns about the food security of the country. Popular projects against land acquisition have delayed many infrastructure projects. Therefore, the issue of land acquisition concerns not only farmers but the country as a whole.

These issues demanded the abrogation of the Land Acquisition Act, 1894 (LA Act, LAA). The LA Act 1894 states that it is *"an act to amend the law for the acquisition of land for public purposes and for companies"*. However this Bill had many problems with it. According to this Bill, there is no need for landowner consent if land is acquired for government projects. **Six million people have been displaced by government projects till date**. This Bill doesn't address the issue of forceful acquisition. Another question that arises is whether the state should be acquiring the land for private industry? What should be the definition of public purpose? Should the unutilized land be returned to the farmers?

According to the Ministry of Rural Development, Government of India introduced in Parliament the "Land Acquisition and Rehabilitation & Resettlement (LARR) Bill" in 2011, to rectify the failings of archaic Land Acquisition Act 1894. The new Bill will

facilitate transfer of land from agriculture to other developmental activities while protecting the interest of the farmers and the affected people.

The desirable features of the Bill are:

- It creates legal entitlement to compensation and rehabilitation and resettlement (R&R) for not only the owner farmers but for all livelihood losers.
- It also restricts the scope of the notorious emergency clause.

However, the bill has several limitations too:

- The Bill completely ignores the causes behind the **grossly inadequate compensation** provided to the acquisition affected parties and the resulting litigation.

- It also fails to address some of the on-going abuses of the eminent domain-that is, the **power of the state and its agencies to compulsory acquire private property** for 'public purpose' activities.
- The Bill also offers various opportunities for the **states to favor powerful private companies at the expense of the rights of the farmer and forest dweller**.

9. Productivity

Food security is more important than energy security. India is the largest producer of milk and milk products in the world, second largest in terms of fruits and vegetables and third largest in production of food grains, but yet **46% of India's children below the age of five are under-nourished or malnourished**. India's productivity per hectare is dismal and doesn't leave room for complacence.

The problem of food security has 3 basic components:

- The **availability** of food in the market (production)
- **Access** to food (capacity to buy it)
- **Absorption** of food in the body-which depends on non-food factors like sanitation, drinking water, primary health care, environmental hygiene, immunization and such others

Low yield per unit area across major crops has become a regular feature of Indian agriculture in recent years. This can be attributed to structural weaknesses of the agriculture sector reflected in low level of public investment, exhaustion of the yield potential of new high yielding varieties of wheat and rice, unbalanced fertilizer use, low seed replacement rate, an inadequate incentive system and post harvest value addition.

Some of the other reasons that can be attributed to the low agricultural productivity in our country are:

- Lack of irrigation facilities in major part of the cultivated land
- Small and fragmented land holding with the cultivators
- Lack of timely availability of quality seeds, fertilizers for providing all major and minor nutrients for the crops and insecticides in many parts of the country
- Shift in priorities of India's political leadership and bureaucracy in terms of allocation. As a result, agriculture got neglected and matters like appointing extension officers and budgetary allocations suffered.
- Poor post-harvest and processing facilities sometimes lead to glut in the market and force the farmer to go for a distress sale, which demotivates them.
- Declining public investments in agriculture.
- Lack of Non-farm Services due to which the farmers are subjected to exploitation by middlemen and moneylenders.

For 2012-2013, there is already a shortfall of food. The government's projected rice shortfall is 2.8 million tones. For sugar, it is 7.5MT, for pulses, it is 2.3MT and for oilseeds it is 6MT. To overcome this shortfall, first, the government needs to spend more on irrigation, since what agriculture in India needs are water facilities. From 1970 to 2000, the amount of land holdings irrigated by government canals has come down to 29%. Tube-wells however have gone up from 38% to 62%, however, only a medium or large farmer can install a tube-well.

Things that need to be done to overcome this shortfall:

- The government needs to spend on irrigation, not on research institutes. The present budget allocates Rs. 14,000 crores for irrigation, which is just 1% of the total budget (i.e. is Rs. 1,490 lakh crores). In the last 20 years, government funding has not created a single additional acre of irrigated land in this country.
- The government also needs to design a scheme for consolidation of holdings. The fragmentation of holdings in agriculture has reached a critical stage.

- The slowing-down of emphasis on extension will further widen the gap in the adoption of technology. Extension services need to be strengthened by scaling-up investment levels and improving the quality of extension.
- There is a need for appropriate technology interventions, judicious use of natural resources and harnessing biodiversity.
- There is also a need to emphasize on increasing productivity of millets such as Jowar and Bajra. The productivity of other crops such as oilseeds, pulses, and horticulture also needs to be improved.

10. Rising Costs of Input

The cost of chemical agriculture advocated by the green revolution has gone up while yield per unit area is coming down. Recent reports show that while the fertilizer use has gone up threefold, the yield has come down to nearly 50%. The Fertilizer Association of India (FAI) says: "**High international prices of fertilizers and raw materials**, weakening of Indian rupee, non availability of funds for subsidy and delays in processing and payment of fertilizer subsidy bills pose many challenges to the industry in ensuring availability of fertilizers to the farmers."

The use of diesel in Indian agriculture is much higher than its use in the industry and probably second only to the transportation sector. **Agriculture accounts for 12% of the total diesel usage**. Farming finds both direct and indirect use of fossil fuels courtesy diesel to run tractors, pump-sets, generators, tillers, harvesters and use of kerosene. There is also the indirect use of naphtha and natural gas used as feedstock for fertilizers along with coal and diesel as a source of power. However, the price of diesel has gone up in recent months and is expected to go up further. This in turn would be reflected in the higher costs of inputs in agriculture and higher costs of cultivation/production on farms.

Agricultural labour also has become expensive due to the success of MNREGA in some states and this is an issue especially for the small and marginal farmers. Even the solution of mechanization fails for small farmers since not many machines have been designed to operate in small holdings. The main factor explaining the wage increase is probably the **deficit of labour**. This deficit has two reasons – one is the growing disdain of agriculture; educated people are more and more refusing to take on farming. The other reason is migration, people migrating from rural areas to cities, from an agricultural job to a non-agricultural job.

11. The Irrigation System

There has hardly been any extension of our irrigation system over the 9th and 10th plans. A number of check dams need to be built to counter the scarcity of water. Gujarat has constructed thousands of check dams and tapped local water sources but that is not possible geographically in all regions. The Teesta Project, which is very important for five or six districts of North Bengal, has been stuck for the last 20 years. Similarly, many reservoirs constructed during 1st and 2nd plans are now suffering from decelerated capacity of silting, eg- Tilaiya, Mython and Panchet, which were constructed in 1950s.

The major issues with irrigation today are:

- In many water scarce areas, **groundwater capacity is nearly fully utilized**; additional wells cause water tables to fall, in some cases depleting aquifers or leading **to saltwater intrusion**. Serious efforts are needed in water scarce areas to link pumping charges to the volume pumped, and to develop effective property rights to groundwater. Little effort has been made in **reforming power prices and water property rights**.
- The status quo in well irrigation in dry areas potentially is highly inequitable, since it **favors farmers who can afford to continually deepen existing wells or dig new ones**. Water markets are a mitigating factor that enables farmers without wells to enjoy the benefits of groundwater. Groundwater markets have developed rapidly in some areas but slowly in others, and their competitiveness varies as well.

- Protective or supplementary irrigation of dryland crops is potentially a powerful mechanism to spread the benefits of irrigation over a much larger area and to increasing numbers of farmers. Many dryland crops show substantial yield increases resulting from one or two protective irrigations, yet in many water-scarce regions, **irrigation water is used intensively for such crops as paddy, sugarcane and horticultural crops, while dryland crops remain purely rainfed**. Further work is needed to understand the private and social costs and benefits of extensive vs intensive irrigation, the circumstances under which farmers practice one as opposed to the other, and policy tools that can be taken to encourage the most efficient use of irrigation water.

- **Groundwater irrigation is less developed in many more favorable rainfed areas, such as eastern India**. This is partly due to the fact that water is less limiting to crop production in such areas, but also possibly to complex tenure

relations that inhibit long term land improvement investments such as wells. Irrigation development would increase dry season cultivation in these areas, with potentially strong implications for increased production.

- In canal irrigated areas, the area that actually receives irrigation water can be increased through **better management of canals that leads to a greater transfer of water from "front end" to "tail end" water users**. Engineering and social organization solutions can be combined to organize water users into smaller, more cohesive groups in order to facilitate more efficient and equitable distribution of irrigation water.

Many changes in the present concepts of water supplies need to be made, particularly in regard to:

(a) Increasing irrigation intensity
(b) Recycling surface irrigation water
(c) Improving canal efficiency
(d) Improving water management at chak level and ensuring simultaneous completion of on farm development works.
(e) Reforming the State Irrigation Department by putting them on a sound financial basis and improving their linkages with the agricultural institutions
(f) Establishing the water rights
(g) Rehabilitating and modernizing the irrigation systems

12. Subsidies

An unfortunate trend over the past two decades has been that budgetary subsidies to agriculture have increased from around 3% of agriculture GDP in 1976-1980 to about 7% in 2001-03. During the same period, public investment in agriculture declined from 3.4% of agriculture GDP to 1.9%. Most of the subsidies are on fertilizer, power and irrigation water and have actually contributed to the degradation of natural resources. Further, a considerable amount of Plan expenditure on agriculture is not on investment but on subsidies not accounted for in the above list.

Farm subsidy is one issue that is drawing a lot of attention lately. Every **economist seems to be demanding that farm subsidies be withdrawn** or capped. However farm subsidy is not charity or wasted expenditure. It helps productivity, generates farm employment and ensures low food prices.

- Farm subsidies come in various forms and globally, the total subsidy per hectare during 2009 was $988 in EU but only $149 in India.
- Most parts of India suffer from fertilizer use being much less than the optimum level. To achieve the targeted agricultural growth rate, fertilizers consumption needs to be increased. **Reduction in farm subsidies will lead to reduced consumption and complete removal will cause an 18% drop in farm production.**

The Fertilizer subsidy also has a lot of issues:

- The first problem is the adverse impact on soil health due to imbalanced use of chemical fertilizer, on account of the fertilizer subsidy rising, leading to a decline in fertilizer response in the fertile irrigated regions.
- Nitrogenous fertilizers are subsidized more than Potassic and Phosphoratic fertilizers, the subsidies tend to benefit more the crops and region which require higher use of Nitrogenous fertilizers

Looking at the rising prices of fertilizers, the government must thus restructure fertilizer subsidy by increasing the urea price and reallocating the resulting subsidy savings to **Nutrient-based fertilizers**. The Nutrient-based subsidy (NBS) allows companies to decide the retail price of fertilizers, because the subsidy on them has to be fixed and linked to global prices. The "floating" price scenario is likely to drive up the cost of non-urea fertilizers. If the price increase is disproportionate with the 10 percent hike in urea, the imbalance in NPK ratio may become even more pronounced. NBS can succeed only when urea is brought under it. In fact, unsubsidized organic fertilizers as well as bio-fertilizers should be brought under NBS.

13. GM Crops

There is an **ongoing dispute about the advisability of approving transgenic crops for cultivation in India**. The argument that arise that GM crops might diminish the genetic diversity of that particular crop or of biodiversity in general. The GM crops tend to monoculture genes not only in one crop but across crops.

- The contention that movement of trans-genes doesn't impact the biodiversity is untrue. The trans-gene transfer via pollen flow is an established fact. It may be transferred to wild varieties whether the farmer wants them or not.
- Some traits like herbicide resistance may create super weeds as well.

- Theses trans-genes come with patents/proprietary rights attached, laying farmers/ other scientists open to legal action. This has put farmers at risk.
- GM crops have not shown to boost productivity much.

Considering the extensive farming of **Bt cotton** by many farmers, its pros and cons were reported by a study. Bt technology doesn't increase yield but only **enables more cotton balls to mature per acre than before with reduced pesticide usage**, delivering a higher net yield and profit per acre. Apart from better yield, farmers have also gained considerably from the increase in price of cotton over the years. However there still are farmers who cultivate non-Bt cotton. Some of the concerns with using Bt cotton are:

- Higher price for hybrid Bt Cotton seeds
- Requires more water

In June 2012, the Ministry of Consumer Affairs, Food and Public Distribution notified mandatory labeling of all genetically modified (GM) foods sold in a packaged form – "Every package containing the genetically modified food shall bear at the top of its principal display panel the words '**GM**'". The regulation has come into force from 1st January 2013.

14. Feminization of agriculture

Women today play a pivotal role in agriculture - as female agricultural labour, as farmers, co-farmers, female family labour and (with male out-migration, widowhood, etc) as managers of farms and farm entrepreneurs. Three-fourths of women workers are in agriculture. Women work extensively in production of major grains and millets, in land preparation, seed selection and seedling production, sowing, applying manure, fertilizer and pesticide, weeding, transplanting, threshing, winnowing and harvesting; in livestock production, fish processing, collection of non-timber forest produce (NTFP) etc. In animal husbandry, women have multiple roles ranging from animal care, grazing, fodder collection and cleaning of animal sheds to processing of milk and livestock products. Landless women agricultural labourers play a pivotal role as they are involved in most of the agricultural operations. Landless women also lease in land for cultivation. Women also augment family resources through tasks such as collection of fuel, fodder, drinking water and water for family members and domestic animals. The majority of farmers in India are marginal and small farmers of whom women dominate.

Some proposed solutions to this issue are:

- **Land holding rights for women** in agriculture have to be safe guarded.
- **Adequate training** in use of modern tools, equipment and technology need to be imparted.
- Latest plantation methods with high yield have to be introduced.
- Post Harvest technologies must be ensured.
- Storage, Preservation, Packaging and processing provided for.
- Policies regarding gender within agriculture have to be made.
- Equal right to property (inheritance).
- Government can buy land in favour of SC/ST women.
- Indian social system and legal institution does not accept women as farmers. So **property right to women, joint paata with husband in agriculture land, issue of Kissan credit card to women at household level** are three major area where we need policy intervention immediately.
- **Allocation of resources** for extension services targeting women farmers.
- States should be directed to enact community forestry act in addition to (rights over forests).
- **Ground water should be declared as community property** and science based regulations for ground water extraction and water use based on the principles of equity should be promoted.
- Minimum support prices for ID crops and rain fed crops like millets and pulses and distribution of the same through PDS. That would obviate the need for anyone to commit suicide. **The negative impact of suicides on women is incalculable**.
- **Joint rights in land** should also be given to the women as she will ensure that the land does not change hands quickly or is sold leaving the family starving as may often happen when men alone are in charge. Men tend to spend a lot of money on drinking, gambling etc. while women rarely have such vices. A woman will protect the interests of the family first and may prevent sale or misuse of land.

15. Climate Change

Global warming is projected to have significant impacts on conditions affecting agriculture, including temperature, precipitation and glacial run-off. These conditions determine the carrying capacity of the biosphere to produce enough food for the human population and domesticated animals. Rising carbon dioxide levels would also have effects on crop yields. Land use change such as deforestation and desertification,

together with use of fossil fuels, are the major anthropogenic sources of carbon dioxide; agriculture itself is the major contributor to increasing methane and nitrous oxide concentrations in earth's atmosphere.

Coping with changes induced by global warming will require early detection and careful management of factors like land degradation and aridity, diminishing water bodies and water scarcity, reduced forest cover and biodiversity loss.

Adaptations that will be needed to done:

- Using **system of rice intensification**, direct seeded rice or aerobic rice instead of the traditional method of transplanting rice to reduce methane emissions
- **Judicious use of nitrogenous fertilizers** to protect both land as well as reduce emissions of nitrous oxide
- **Use of biogas technology** to reduce both methane as well as carbon emissions
- **Changing land-use management** to make it compatible with the changing situation
- **Developing climate-ready crops** that are more climate resilient
- **Diversifying crop and livestock** to minimize risks
- **Improving pest management**
- Growing crops like **millets**. Millets can save the country in the changing climate scenario**.** Millets are, unlike rice, dependent on rain water and do not require any irrigation. Millet crops are also carbon sequesters, they push carbon back into the ground, which is another crucial need to tackle climate change.

16. Food Export

India has emerged as the world's largest exporter of rice, possibly the world's largest export of beef (buffalo) products and the fourth largest exporter of wheat, and is also becoming a major exporter of maize. On current projections, **total cereal exports for 2012-13 may cross 24 million tonnes,** with rice exports coming to more than 13 million tonnes, wheat exports at around 6.5 million tonnes and other cereal exports at around 4.6 million tonnes.

However, while on the one hand India is over laden with mounting food stocks, on the other hand, **nearly 320 million people go to bed hungry**. Experts agree that for a large section of the population, buying two square meals a day is now becoming more difficult. Ironically, while the poor live in hunger, India is contemplating exports. The

central government is holding on to its procured stocks of grain rather than releasing them on the domestic market so as to benefit consumers. This has led to the perverse situation whereby **grain traders and livestock traders (and not farmers) benefit from being able to sell on the world market**, while Indian consumers face rising prices.

Recommendations for the XII Plan are:

- Uniform Policy for Export of Agriculture Products
- Development of Multi-Modal Transportation
- Promoting Voluntary Adoption of Quality Systems
- Strengthening of Laboratories for Testing of Raw Materials and Processed Food Products
- Standardize pre and post harvest management system and harmonize them with the international standards

17. Food Loss

More than 30% of the produce from fields is lost to poor **post-harvesting facilities and lack of cold chain infrastructure**. Also 20% of foodgrains that India produces annually is **eaten by rodents**. India, the world's second largest fruit and vegetable producer, encounters a waste of close to 50% of produce. The estimated annual loss of food is at Rs. 58,000 crore in 2008. However, in July, 2010, the reported losses from the agricultural sector were estimated to about Rs. 60,000 crore or 9.13% of the total agricultural GDP, including forestry and logging. India wastes more fruit and vegetables than are consumed in the whole of the United Kingdom.

The main reasons of these losses are:

- **Distance** between production and consumption centre due to changing urban land use
- Other **social costs** in the use of fossil fuels in transportation, use of electricity in cold storage and generation costs and consequent environmental loss
- Food is lost between farm and market in **the absence of processing**, proper transportation, storage and distribution

In 2012, FCI estimated 350 lakh tons of wheat and about 70 million tons of Rabi and Kharif combined foodgrains. As a result, FCI is carrying a stock of over 80 million tons, which is the highest ever.

Now, the government has an ambitious scheme to construct more storage capacity of about 15 million tons in various states. Of this, 90 lakh tons of capacity has been awarded for construction, but there has been an eight to nine month's delay in many states for various reasons. There is also **0.002% crop damage** with FCI stocks and some problem with the state stocks that have been kept for the FCI pool.

18. Restoration of Degraded Land

Out of 328.7 million hectare of geographical area of India, about 141 million hectares is Net Cultivated Area. National Remote Sensing Agency (NRSA) carried out a district-wise mapping of wastelands on 1:50,000 scale using satellite data. The wastelands in the country were placed at 63.85 mh. This area is generally subject to wind and water erosion and is in different stages of degradation for subjecting to intensive agricultural production.

Various schemes for development of degraded lands have been devised:

- **Watershed Programme for Development of Degraded Land:** Various Watershed Development Programmes are being implemented by mainly three ministries, namely, Ministry of Agriculture, Ministry of Rural Development & Ministry of Environment & Forests for development of degraded lands.
- **Schemes/Programmes for Development of Degraded Lands of Ministry of Agriculture, Department of Agriculture & Cooperation**: The Central Sector Scheme of 'Soil & Land Use Survey of India (SLUSI)' facilitates various types of soil surveys of catchments/watersheds; The 'Soil Conservation Training Centre at Damodar Valley Corporation, Hazaribagh' is being finance and implemented as non-plan scheme for imparting training /capacity building of the officials working for soil & water conservation programme in the State Governments; A special Central Assistance to State Plan Scheme on 'Watershed Development Project in Shifting Cultivation Areas (WDPSCA)' is being implemented in North Eastern States with 100% Special Assistance to State Plan; Under 'Soil Conservation in the Catchments of River Valley & Flood Prone River (RVP & FPR)', since inception upto X Plan, an area of 65.27 lakh hectare have been treated; The Programme for Reclamation of Alkali Soil(RAS) now named as' Reclamation and Development of Alkali & Acid Soil (RADAS)' is being implemented in the states where alkalinity exists.

However some immediate solutions that can be adopted by the government are:

- **Planning for land conservation** should be prioritized based on the severity of the degradation problems arising owing to water and wind erosions and anthropogenic activities.

- **Afforestation** activities like agroforestry, silviculture and social forestry should be adopted to protect agricultural lands from further deterioration arising out of degradation processes. Afforestation of degraded and wastelands should be given priority.

- As conservation and land rehabilitation measures are highly expensive, the area for reclamation should be **prioritized based on the severity of the land degradation**, the nature of the extent of the problem and the proposed land use.

- **Reclamation of acidic, saline and sodic soils** should get priority in the districts that are severally affected by them in different states. These are chemical land degradation processes and materials needed for their amelioration and reclamation is easily available. The materials should be made available in a planned manner in accordance with the severity of the problem prevailing in the districts/states.

19. Rainfed Areas

Rainfed areas in India are highly diverse, ranging from resource rich areas with good agricultural potential to resource-constrained areas with much more restricted potential. **Rainfed areas currently constitute 55 per cent of the net sown area of the country** and are home to two-thirds of livestock and 40 per cent of human population. Even after realizing the full irrigation potential, about 50 per cent of the cultivated area will remain rainfed. The business as usual approach of taking major interventions uniformly across all the regions of the country has not paid much dividend. Therefore, regionally differentiated interventions befitting natural resource endowment, social capital, infrastructure and economic conditions are need of the hour to meet the local challenges and enhance livelihoods.

The key to the stability in farm production, therefore, lies largely in stabilizing crop output in the rainfed areas. But, unfortunately, most of the developmental effort in agriculture has remained concentrated in irrigated areas, which offered scope for

quick results. The average crop productivity in the rainfed areas has, consequently, remained low at about 1 ton a hectare, less than half of that in the irrigated areas.

Rainfed areas, moreover, become the worst victims of droughts, which are quite common in the country. Their frequency varies in different parts of the country from once in every 2.5 years in Rajasthan to once in 15 years in Assam.

Factors contributing to instability in rainfed production systems are:

a) **Rainfall variation:** About 58% of the net sown area is rainfed which contributes about 44% to the total foodgrains production. The growth of crops and the food production of the country are strongly influenced by the total rainfall. However, rainfall aberrations during south-west monsoon continue to be major factor contributing to instability in kharif crops production. Increasing intra-seasonal variability of rainfall however has become a major concern now.

b)

c) **Land Degradation and Soil Infertility**

d) **Increasing Input Costs:** The growth in input use would contribute to productivity growth assuming other factors are held constant. However, the relative prices of inputs are a function of technology, weather and environment, the level use of inputs reflects the market and policy environment.

e) **Marketing and Profitability:** Markets in India particularly in rainfed regions are underdeveloped and farmers are exposed to high price risk. Small and marginal farmers have only very small quantities of marketable surplus. Moreover, their staying power is low because of their extreme poverty. As a result, these farmers sell off most of their produce in the local markets at very low prices immediately after the harvest. The low market surplus of the small and marginal farmers denies them any economies of scale and bargaining power. The production risk arising out of the very nature of rainfed agriculture coupled with the price risk results in low profitability of rainfed agriculture, low investment on technology and production instability.

f)

Strategies that need to be adopted or have already been adopted for the rainfed areas are:

- **Rejuvenation of natural resource** base and conservation plus development with focus on sustainability
- **Alternative livelihood options** with focus on rural non-farm sector, horticulture, organizing community based, paced organizations of vulnerable sections, putting millets, etc.

- Several schemes have been implemented by different agencies for the benefit of rainfed areas. **National Watershed Development Project for Rainfed Areas (NWDPRA)** and **Integrated Watershed Management Programme (IWMP)** are two such programmes.
- National Rainfed Area Authority (NRAA) was constituted by the Union Government on 3 November, 2006 to give focused attention to the problems faced by rainfed areas in the country.
- **Technological Interventions** should centre on resources (soil and water), agronomic/management practices and seed/ input supports.
- We also need **infrastructure and community based interventions** for renovation of existing water harvesting tanks and improving related water distribution systems, community wells, development of tanks / natural water bodies, community based seed banks, etc.

20. Research

Some of the weaknesses that have come up and need to be reformed by agricultural research institutions are:

- There is **unnecessary focus and investment in research on new seeds** rather than investments in research on our traditional varieties and on creating viable farming systems. The genetic potential of all our varieties has not been realized yet. A farmer today is not able to extract even a quarter of the potential from the traditional high-yielding varieties of food grains including rice, wheat, oilseeds or pulses.
- There is **inadequate emphasis on the needs of rainfed areas**, which account for over 60% of cultivated area
- **Crop bias** with major focus on rice and wheat
- Proliferation of programmes resulting in **resources being spread thinly** and lack of focus in areas of relevance and opportunity
- **Researched data is rarely applied in the fields**
- **Inadequate priority to emerging challenges**, particularly post-harvest, marketing and environmental conservation
- The **multiplicity of institutes with overlapping mandates** has led to duplication of research work
- Lack of accountability, **less emphasis on multidisciplinary research**, weak interaction among researchers, extension workers and farmers and the private sector and, excessive centralization of planning and monitoring.

- Need to **shift away from individual crop-oriented research** focused essentially on irrigated areas towards research on crops and cropping systems in the dry lands, hills, tribal and other marginal areas.
- **Dry land technology has to be improved**. In view of high variability in agro-climatic conditions in such unfavourable areas, research has to become increasingly location-specific with greater participation or interaction with farmers. Horticulture crops that are land-saving and water-saving should be encouraged in dry land areas. Research has to be improved on horticulture crops.

21. Public sector investment

While looking at the agricultural scenario of the country, the question that arises is how much public expenditure is really going to agriculture and how much more needs to be pumped in to achieve stability in production and our desired rate of growth in agriculture and fall in food inflation? The brief answer is that the government is already spending quite a bit on agriculture, almost 20-25% of agri-GDP, which is one of the highest in south and Southeast Asian economies.

Yet, it does not get the desired results because of the nature and manner in which public expenditure is poured in agriculture. **Almost 80% of the public expenditure going to agriculture is in the form of input subsidies (fertilizers, power and irrigation) and only 20% as investments in agriculture.** From irrigation pump-sets to farm machinery, they are all going up and that growth is accelerating. Total gross capital formation (public plus private) has gone up from about 12% in 2000-01 to about 20% plus in 2010-11. During the last three Five Year Plans, we have failed to achieve our modest targeted rate of growth of 4% in agriculture.

Some of the reforms that can be brought about include:

- Reforming APMC Act, ECA, etc.
- Abolishing levies
- Freeing up landlease markets
- aggregating the produce at farmers' level through farmer producer organisations (FPOs) and linking them to largescale processors, modern retailers
- Building effective and efficient value chains by investing in logistics

The larger chunk of resources for investments in value chains can come from the private sector, if we get our incentive structures right and declare food processing and organised retailing in food, ensuring food safety, as priority sectors. Public funds can come from rationalising and containing input subsidies on fertilisers, power, irrigation and credit.

22. Food Inflation and Food Crisis

Food inflation is now a concern for the Reserve Bank of India (RBI) which has begun to make direct links between per capita availability of foodgrains and **high retail prices**. A connection has been drawn between food prices and the minimum support price (MSP) announced by the Government of India for procurement of various commodities. The **high increase in MSP** since 2007-08 has given an upward bias to agricultural. Other than that, **reduced availability** of foodgrains also tends to keep the food prices high. As per the Economic Survey 2009-10, per capita net availability per day of cereals and pulses has been lower than that observed in the previous four decades. The per capita daily availability of foodgrains was 447 grams in the 1960s and 1970s, which successively increased to 459 grams in the 1980s and 478 grams in the 1990s, but came down to 446 grams during 2000-08 and stood still lower at 436 grams in 2008. **As consumers of food, it should concern every Indian that food prices are going up.**

The Government of India has approved proposals for joint ventures and foreign collaboration (including **100% FDI**) in processed food businesses (including 100% export-oriented units), and "**mega food parks**". According to Indian Credit Rating Agency (ICRA), the processed food market accounts for 32% of the total food market with the sub-sectors listed as soft-drink bottling, confectionery manufacture, fishing, aquaculture, grain-milling and grain-based products, meat and poultry processing, alcoholic beverages, milk processing, tomato paste, fast-food, ready-to-eat breakfast cereals, food processing, food additives and flavours.

From the point of view of the major national industry associations (CII, FICCI, Assocham) the approximately 7,500 regulated mandis lack critical infrastructure, the provision of which will cost at least Rs. 12,000 crores at 2009 prices. The potential of the **public-private partnership model** in the foods business is seen by industry as being embodied in ventures such as Safal market, ITC's e-Chaupal, Haryali Kisan Bazaar, Mahindra Subh Labh, Cargill Farm Gate Business and Tata Kisan Sansar.

The world is facing a severe food crisis. **Bad weather conditions** are leading to projections of major production shortfalls in some the world's leading food suppliers. Substantially **reduced access and sharp price increases are**, therefore, expected to keep food out of the reach of a larger proportion of the world's population. The last two crises, in 2007-08 and 2011, led to food riots in many countries. So it is not just

high food prices, **increased hunger, localized famines, climate change and widespread increase in deprivation** that are possibilities.

Another reason for rising food prices is **growing penetration of big corporates in the food economy**; international trade in food items and speculative futures trading in agricultural commodities has weakened the government's capacity to control food prices.

We are not producing enough to meet the needs of a growing population. The peasantry continues to be in distress, with 2.5 lakh farmers committing suicide over the past 15 years. Also, price **hikes of inputs like diesel and fertilizer** are also contributing to food inflation. The deregulation of petrol prices has led to very steep hikes in the recent weeks.

23. Agro-biodiversity

Population is an important resource for development, yet it is a major source of environmental degradation when it exceeds the threshold limits of the support systems. Unless the relationship between the multiplying population and life support systems can be stabilized, development programmes, however, innovative, are not likely to yield the desired results. It is possible to expand the "carrying capacity' through technological advances and spatial distribution. But neither of these can support unlimited population growth.

- Even today, over 250 million children, women and men suffer from under-nutrition.

- The scenario for the coming years is alarming and we are likely to **face food crisis** unless we are in a position to increase crop and animal productivity on a continuing basis, since the only option open to us for increasing production is productivity improvement. Also, access to food will have to be ensured through opportunities for productive employment.

- A growth in domesticated animal population has been accompanied by a **loss of area under grasslands and pastures**. Hardly, 3.5 per cent of our geographical area is under grasslands, while our domesticated animal population numbers nearly 500 million.

- **Out of total area of India of about 329 million hectares, 175 million hectares of land is wasteland** and requires special treatment to restore such land to productive and profitable use. The degradation is caused by water and wind erosion (150 million ha), salinity and alkalinity (8 million ha) and river action and other factors (7 million ha).

- Our forest wealth is dwindling due to over-grazing, over-exploitation both for commercial and house-hold needs, encroachments, unsustainable practices including certain practices of shifting cultivation and developmental activities such as roads, buildings, irrigation and power projects. **The recorded forest cover in the country is 75.01 million ha i.e. 19.5% of the total geographical area** against the broad national goal of 33% for the plain areas and 66% for hilly regions.

- The loss of habitat is leading to the extinction of plant, animal and microbial species. According to the Botanical and Zoological Surveys of India, **over 1500 plant and animal species are in the, endangered category.**

- Our unique wetlands, rich in aquatic and bird life, providing food and shelter as also the breeding and spawning ground for the marine and fresh water fishes, are facing problems of pollution and over-exploitation. The **major rivers of the country are also facing problems of pollution and siltation**. Our long coastline is under similar stress. Our **coastal areas have been severely damaged** due to indiscriminate construction near the water-line. Coastal vegetation including mangroves and sea grasses is getting denuded.

- Our mountain ecosystems are under threat of serious degradation. **Extensive deforestation leading to the erosion of valuable topsoil** is threatening the livelihood security of millions of hill people. Equally serious is the downstream effects of the damage done upstream.

- Indo-gangetic agriculture, often described as a potential bread basket in the world, is being damaged beyond repair as a result of soil degradation.

- **The water table is receding because of over-exploitation of ground water.** Furthermore, the quality of groundwater is being affected due to chemical pollution and in coastal areas, due to the ingress of sea water. The excessive use of fertilizers and pesticides impose threat to human health, to the genetic stocks and reduces the natural soil fertility in the long run. The absence of an integrated land and water use policy for the country is taking a heavy toll on these basic natural assets.
- **Global atmospheric changes resulting in altered temperature and precipitation and rising ocean levels** are no longer within the realm of mere theoretical possibilities. Combination of local subsidence, greenhouse induced sea-level rise and coastal environmental degradation may lead to periodic floods, incursion of salt water, melting of glaciers and river flooding. Local changes of average rainfall will severely affect agriculture and water supply, especially in semi-arid areas.

- **Pollution** is arising from toxic wastes and non-biodegradable consumer articles is tending to increase.

- **Lack of opportunities for gainful employment in villages** and the ecological stresses is leading to an ever increasing movement of resource-poor families to towns. Mega cities are emerging and urban slums are expanding. **Illiteracy and child labour are persisting**. There has been a substantial urban growth in the last four decades. This has resulted in congestion and squatter settlements with millions of people having no access to the basic needs of civic amenities.

- **A large number of industries and other development projects have been incorrectly sited,** leading, on the one hand, to over-congestion and over-pollution in our urban centres and on the other hand, to diversion of population and economic resources from the rural areas. This has also resulted in the pollution of most of our water bodies which are major constituents of our life support systems.

It is difficult to clearly delineate the causes and consequences of environmental degradation in terms of simple one-to-one relationships. The causes and effects are often interwoven in complex webs of social, technological and environmental factors. Environmental conservation is, in fact, the very basis of all development.

For conservation and development of bio-resources, the following should be promoted:

- **Support** to tribal and rural people for revitalizing their farm conservation traditions.
- **Participatory breeding procedures** involving scientists and local conservers for improving the productivity of land races.
- Genetic engineers working in public institutions to perform the role of **pre-breeding** i.e., development of novel genetic combinations for important biological and economic traits, such as resistance to biotic and abiotic stresses, in participatory breeding programmes with farmers, to integrate genetic efficiency and genetic diversity in an effective manner.
- Launch of **literacy movement on genetic and legal aspects**, in areas rich in agro-biodiversity such as the North East, Western and Eastern Ghats and the arid and semi-arid zones.
- **Conservation of coastal** biodiversity, including coral reefs and sea grass beds and support to traditional methods of conservation.

- Organise and **support herbal biovalleys** in the Western Ghats, Eastern Ghats, Vindhyas and Himalayan region for the conservation and sustainable use of medicinal plants.
- **Participatory management** of national parks, bio-sphere reserves and gene sanctuaries.

24. Livestock and Animal Husbandry

Livestock are omnipresent economic resource in poor communities across the developing world. Livestock husbandry is an important agriculture sub-sector of Indian economy. It significantly contributes to the agricultural GDP in India. Livestock generated outputs worth Rs 2075 billion (at 2004-05 prices) in 2010-11 which comprised 4% of the total GDP and 26% of the agricultural GDP. The total output worth was higher than the value of food grains (12th five year plan, 2012-17). Livestock-derived food items (meat, milk and eggs) are the great contributor in the Indian economy. This sector is an integral component of Indian agriculture supporting livelihood of more than two-thirds of the rural population.

However, livestock animal husbandry practices in india have some hidden concerns, that seem to miss our eye:

- **Infertility in cattle** accounts for major economic losses in dairy farming and dairy industry in our country. An infertile animal is also an economic burden. 10% – 30% of lactation may be affected by infertility and reproductive disorders. Causes could be malnutrition, infections, congenital defects, management errors, and also ovulatory or hormonal imbalances in the female

- Unable to discriminate between pure and cross breeds, many countries are indiscriminately **promoting the cross breeds** to improve productivity. However, we must realize and understand that indigenous breeds prove to be much sturdier as they as well adapted to local climatic and geographic conditions. These breeds can actually continue remaining reproductive even with limited inputs of fodder, feed and health care. Exotic breeds like Jersey though they produce 25 liters of milk a day, they can survive only in controlled agro-climatic environments. Efforts need to be made to **protect and preserve the indigenous cattle and buffalo** in their native tract, which are now facing the threat of extinction.

- **Gender discrimination** is a grave concern in livestock too, the fairer sex are outnumbering the males in livestock. Uttar Pradesh, for example, has 17.7

million female buffaloes as against just 4.9 million males and 16.9 million female cattle to 8.2 million males. In Andhra Pradesh there are 10.6 million female buffaloes but just 1.6 million males and 9.3 million female cattle for 4.7 males.

- **Reproduction is the first system to be affected by malnutrition**. A well balanced diet with protein, mineral, and vitamin supplements is vital for cattle, to increase conception rate, healthy pregnancy, safe parturition, low incidences of infections and healthy calves.

- **Global warming** looms large over livestock too. FAO has reported that 1530 million cattle can contribute more to global warming than 900 million cars and commercial vehicles. The gas emanating from livestock flatulence and manure is estimated to contribute to 27% of the global warming.

- **Certain diseases and climatic conditions** that are common yet important is what the farm is not aware of. For e.g. ticks. Milk production falls considerably when cattle are infested by ticks and the farmers would have to spend a hefty amount as treatment costs. Protection of dairy animals from thermal stress is very essential and so is the housing facility of these cattle. The necessity to vaccinate cattle against the two most dreaded diseases – foot and mouth and hemorrhagic septicemia.

- **Sufficient facility / setup for disease diagnosis, reporting, epidemiology, surveillance and forecasting are not on board**. Several diagnostic kits required for disease surveillance and monitoring are imported at a huge cost. The limited diagnostics available in the country are produced by few laboratories and are not of desired quality.

- Livestock sector receives only about **12% of the total public expenditure** on agriculture and allied sectors and about 4-5% of the total institutional credit flowing to agriculture and allied sectors. Only 6% of the animal heads (excluding poultry) are provided insurance cover. Livestock extension remains grossly neglected. Only about 5% of the farm households in India do access information on livestock. Organized slaughtering facilities are too inadequate.

- **Shrinking and degrading pastures** coupled with limitations of fodder, lack of sufficient veterinary care and apathy to assisted reproductive technologies have been the major constraints. The potential of raising Pashmina goats' viz. Changthangi in Ladakh and Chegu in Himachal Pradesh remains under exploited.

- **Rural poultry sector** needs financial, infrastructure and technological support to raise the present 2% growth rate to 3%.

- Testing of milk for safety and quality parameters at the collection centers is almost non-existent. Lack of proper anaerobic waste treatment and dairy byproduct utilization are the other concerns. Due to quality **concerns of milk**, value addition and export potential has not been fully exploited.

- Livestock production activities are largely in the hands of women. The rapidly increasing demand for livestock products creates opportunities for their empowerment. Harnessing these, however, would require **addressing constraints that women face.** Appropriate policy and institutional arrangements such as establishment of "Women Livestock Producer Associations" would facilitate availing credit, insurance and other inputs and marketing services.

The major recommendations suggested by the working group on Animal Husbandry & Dairying of the 12th five year plan are:

- For achieving targeted growth rate of 5 -6 % in milk production, provision should be made for production of required good quality semen from high genetic sources.
  Larger focus should be on **progeny testing for quality bull production**.

- Profitability in sheep and goat would largely come from increased meat and to some extent wool/ hair production. The focus should be to **adopt semi-intensive/ commercial production systems**, application of assisted reproductive technologies and provision of improved quality feed and fodder and health care specially control of PPR. A community/ institutional approach, establishing meat processing plant and developing adequate market linkages are suggested.

- **Conservation of indigenous and threatened breeds** should be a national responsibility and conservation activities must be implemented with 100% central assistance. Threatened breeds with unique characteristics should receive priority. There must be at least one farm for each breed in its native tract.

- Initiate a major **'Feed and Fodder Mission'** for addressing the problem of shortages of quality fodder seed production, and nutritional enhancement of crop by-products. A comprehensive strategy for rejuvenation of natural

grasslands/ pastures/ common property resources for enhancing their productivity are also required.

- A comprehensive national network of **diagnostic laboratories** should be established. The vaccine and diagnostic production should be privatized with suitable incentives. Existing State Biological Vaccine production units should be phased out in a given time frame. **Mobile veterinary services** should be introduced and treatment provided at cost. A Veterinary Drug Control Authority should be put in place.

- The **share of animal husbandry in agricultural credit should be increased at least to 10%** and interest rate on animal husbandry credit should be at par with crop loan. The facility of the **Kisan credit cards should be extended to all livestock farmers**.

25. Biomass

Biomass today provides some 10 percent of global primary energy. Biomass contributes over a third of primary energy in India. Biomass fuels are **predominantly used in rural households for cooking and water heating**, as well as by traditional and artisan industries. Biomass delivers most energy for the domestic use **(rural - 90% and urban - 40%)** in India. Wood fuels contribute 56 percent of total biomass energy. Estimated demand in India for fuelwood was 201 million tons in mid 1990s. The total availability of offal/bones in the country generated from large slaughter houses is estimated to be more than 21-lakh tonnes/annum. Besides other uses, it can also be used for the preparation of animal feeds.

Major biomass resources in India are:

- Wheat/rice/maize/cotton/soya/Horti based products like Rice Straw, Rice Husk, Rice bran, Corn Stover, Soya pulp, Soy lecithin, etc.
- Plantation crop based biomass like Cocoa-pod husk and bean waste, Coconut, Rubber, etc.
- Meat industry byproducts like Offal/bones, Hides, Poultry and fish feed, etc.

Positive aspects of biomass promotion

- Since biomass production is labour intensive, feedstock production could be an important source of both primary employment and supplemental income in rural areas.
- Many farmers could sell farm residues or even purpose-grown wood. Biomass production can be a new source of revenue.
- Indirectly, other rural enterprises can benefit from biomass feedstock production activity especially providers of agricultural inputs such as fertilizer, suppliers of farm equipment, transporters and marketers of goods.
- Employment is also generated in processing biomass and working at the bioenergy conversion facility.
- The wood-fuel trade is the largest source of employment (3–4 million) in the energy sector
- Wastelands and degraded forests, which could be utilized for growing biomass
- Increased employment in farm-activities of bio-energy development such as cultivation of biofuel crops, seed collection, briquetting and transportation of biomass, etc.
- Introduction of biopower, biogas and other clean fuels will drastically reduce health problems resulting in increased life expectancy and decreased infant mortality
- compressing the biomass to form briquettes which not only occupy lesser space but also are more efficient conversion of organic matter into biogas through anaerobic digestion which apart from meeting fuel needs also gives digested manure for farms
- conversion of organic matter into biogas through anaerobic digestion which apart from meeting fuel needs also gives digested manure for farms

Negative aspects of biomass promotion

- Involvement in ethanol requires accessibility to irrigated land, which small farmers may not be able to spare due to their needs of other crops. Further, initial investments in both biodiesel and ethanol programmes are large, which such farmers may not be able to afford.
- The potential distribution of waste, marginal and pasture lands to corporate and bigger farmers will have adverse effect on the rural poor community as it could lead to highly mechanized production process and less job opportunities.
- Comparing Jatropha cultivation with Sugarcane cultivation, farmers may not find the former remunerative enough. For instance, in India, sugarcane plantations yield 70 ton per hectare and fetch the farmer Rs.70, 000 per hectare at a sugarcane price of Rs.1, 000 per ton. In comparison, with Jatropha

plantation farmer gets Rs.5, 000 per ton of oilseeds and if the yield is 3.75 ton per hectare, his income is only Rs.18, 750 per hectare.

- For production of ethanol, Sugar beet has advantages over sugarcane as it provides higher yield (12.5 to 17.5 ton per hectare of sugar against 7.5 to 12 ton of sugar per hectare from sugarcane). In addition, it requires lesser water and power for crushing and shorter maturity time.

26. Peri-urban Agriculture

Peri-urban agriculture (UPA) is defined as food production from cropping and animal husbandry in and around the urban area. More than thirty percent population of India lives in urban areas and this percentage is expected to grow further. This will result in increasing demand for food items for people living in the urban areas. Traditionally, fruits, vegetables, milk, etc. for the urbanites come from the adjoining rural areas; however, a part of the demand has been catered by urban and peri-urban agriculture (UPA) in many urban centres in India.

Benefits of Peri-Urban Agriculture:

- **Contribution to food security**: It aims at local food production in cities (urban) and surrounding (periurban) areas to cater primarily to the city dwellers. UPA increases the availability and accessibility of food.

- UPA is important for the **health and nutrition** of city dwellers, particularly the poor. The low wage earners find it difficult to buy nutritious food from the market but can find that nutrition in the food they grow themselves.

- UPA also provides the low-income urban dwellers an opportunity for **employment and additional income** generation. The involvement of less middlemen and low cost for transportation and storage reduces the price of locally produced fruits and vegetables. The wasteland, if any, in the periurban areas can be used for cash crops.

- UPA contributes to **social and gender equity** by enhancing the capacity of the poor in income generation and positively impacts their health and productivity. Women empowerment is another important benefit of UPA, as women are involved in most cases. Another benefit of UPA is the way it connects people with their food by creating awareness about the food production system.

- **Environmental benefits**: It provides habitat for urban wildlife and conserves biodiversity. It reduces the heat island effect of cities, reduces average temperature and contributes to climate change mitigation by minimizing the use of fossil fuels by avoiding the transportation of food. UPA produces less waste due to no or less packaging, and absorbs a substantial portion of rain water, thus putting less pressure on the use of municipal resources for storm water management. It also uses wastewater as well as bio-solids and other organic waste, thereby helping in waste management. UPA also improves the air quality and stabilizes soil reducing the susceptibility to flood and other natural disasters.
-

Integrating UPA in to the Development Plans:

- UPA is an important aspect of **'sustainable development' of cities**. Active cooperation from the governments is essential for its growth and the contribution of UPA to ‘sustainable development’.

- Irregularities in land-use planning, unavailability of land for agriculture in urban area, rapid urbanization of peri-urban areas, lack of proper 'waste management' policies and/or implementation, lack of co-ordination between different stakeholders including governments at different levels on 'natural resources management' and insufficient knowledge about safe and scientific technologies lead to unsustainability. There is a **need for conductive government policies**.

- There is no clear responsibility for the agricultural activities on any government or non-government agency; and the **city planning does not address UPA** and the role of UPA in reducing urban poverty. However, the Government of India is, at present, considering promotion of UPA on a national scale to fight food and nutrition insecurity and increasing prices of vegetables.

- It is high time **to frame appropriate policies by the governments at all levels** to adequately address the different challenges of urban farmers and UPA as a whole for tackling urban poverty and food insecurity as well as environmental management and sustainable urban development.

- **Research institutes and government departments need to intensify education and training programs** for farmers on sustainable agriculture methods including improved irrigation practices, rainwater harvesting, organic farming, integrated pest management (IPM), integrated plant nutrient management (IPNM) and post-harvest management.

- **Recently, the Govt. of India has launched a number of schemes for peri-urban vegetable production:**

  - **Working groups on horticulture constituted by Planning Commission** deliberated the issues in sub-group on urban and peri-urban horticulture and have advocated for focused attention to the production of fruits and vegetables, environmental services, and also for health care.

  - **A National Dialogue organized jointly by National Horticulture Board (NHB) and Indian Institute of Horticultural Research (IIHR)** also discussed urban and peri-urban horticulture and advocated for maximizing land utilization, interior and exterior landscaping, and vertical garden, terrace cultivation of fruits and vegetables and mushroom culture.
  - **The National Academy of Agricultural Sciences (NAAS)** organized a brainstorming session on "Urban and Peri-urban Agriculture for Policy Framework".

All these concerted efforts by the premier organizations responsible for policy planning are expected to bring forth conducing policies for the promotion of UPA in near future

27. The need to make the farmer an entrepreneur

For farmers, the causes of poverty are many: The price of farm products is low, they have insufficient access to credit, they face high costs of agricultural inputs, they lack access to basic infrastructure, they lack institutional support, the transfer of agricultural research, extension and access to markets.

Getting the farmers around the negotiating table with buyers would be a rewarding challenge. **Production needs to be linked to the market**. Farmers need to be market oriented in their production or crop planning, quality production and be able to effectively sell such produce. This kind of encouragement would **need training and educating** the farmers on how they can increase the value of their produce by **engaging them in the value chain**.

There is a need for a program that will provide support to farmers through marketing and **production specialists and supervisors who will provide continuous technical assistance**. Also a **marketing committee should be set up by the farmers** themselves which will be responsible for coordinating production and marketing activities. The members of the marketing committee can then communicate with the buyers and meet with them to determine their needs, negotiate prices and deliver products on behalf of all the farmers of a particular village.