

## **‘Indian Agriculture: A Fresh Approach Towards Green Revolution 2.0’**

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**Abstract:** *The agriculture sector which employs more than 55% of the country workforce whereas share of agriculture and allied sector to total GDP is 14.1% (2011-12). The farm sector achieved 3.6% growth during the 11<sup>th</sup> Five Year Plan (2007-12), falling short of the 4% growth target, although it was much higher than growth of 2.5 and 2.4% during 9<sup>th</sup> and 10<sup>th</sup> plan respectively. Thus, the sector needs urgent reforms to boost crop yields and private investment in infrastructure so as to motivate farmers and feed the growing population. At the latest Economic Survey (2012-13) points out that “India is at a juncture where further reforms are urgently required to achieve greater efficiency and productivity in agriculture for sustaining growth. There is a need to have stable and consistent policies where markets play a deserving role and private investment in infrastructure is stepped up. An efficient supply chain that firmly establishes the linkage between retail demand and the farmer will be important”*

**Keywords:** *Green Revolution, efficiency, productivity, sustainable growth*

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### **I. Introduction :**

Indian agriculture is presently facing an unprecedented crisis. Today’s crisis is reminiscent of those inglorious days of 1960s, when persistent drought had compelled India to go out with a begging bowl and seek food from rich countries to prevent poor Indians and farmers from starving to death. The generation next of 21<sup>st</sup> century, India is largely ignorant of the fact that the drought and famine of 1965-67 had resulted about 1,00,000 starvation death.

Every unprecedented crisis begins also an unprecedented opportunity. Back in 1960s, the specter of famine, begging and starvation and prompted policy maker in India to embark upon a journey that later become immortal as India’s Green Revolution. Aided by modern seeds, techniques, fertilizers and equipments, many states in India saw such massive rise in productivity that India has never again had to seek food aid from the world. Green Revolution was simultaneously accompanied by the White Revolution and even the Chicken Revolution.

But looking at the changing food habits, what we have is not enough to satisfy this ever changing need. We have to double our food grain output and agricultural output resource to be able to do that, but we are not geared for that right now and agricultural needs structural change.

But just like in the 1960s, the latest crisis confronting Indian agriculture is also an opportunity. It is time for policy makers to take steps that will lead to green revolution, part-2 in the country.

### **Why Green Revolution 2.0 ?**

There is hard evidence to indicate that the initial gains of the Green Revolution are now petering out. Food grain production is slackening. Its rate of growth is much slower than that of population. Pulses and edible oils have been regularly imported, while wheat and sugar too are at times sourced from abroad. So, even the self-sufficiency in food production seems to be in jeopardy. Natural resources base of agriculture is crumbling. Use of land urbanization and industrialization is constricting the availability of cultivable land, which was 0.36 hectare per capita at the time of independence, but has come down to around 0.12 currently and is likely to shrink to 0.09 by 2025. Soils are experiencing serious fatigue. Yields have started showing decline trends in terms of input output response, as several soil nutrients and organic matter have depleted drastically. Area under irrigation, instead of expanding is contracting.

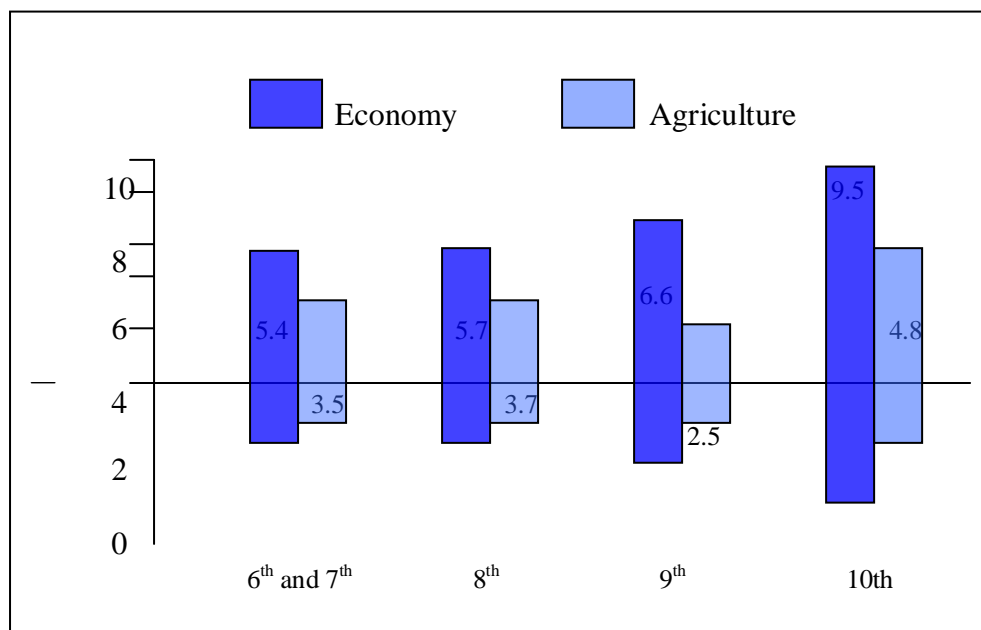
Approximately, 60% of our agriculture still remains rain dependent. Ground water is depleting at an alarming rate. The frequency and severity of natural disaster is increasing on account of climatic changes. Costs of cultivation have been rising at a faster pace than the prices of agricultural produce. The law of diminishing returns has already set in squeezing farmer’s profits progressively. Fragmentation of land holding has rendered about 80% of them as economically unviable. Mono cropping patterns are causing severe imbalances in the soils and endangering bio-diversity.

India although became the world’s largest milk producer, but the live stock economy is in distress. The process of economic liberalization and globalization, instead of benefiting the farmer, is compounding their apprehensions and insecurity. Rural unemployment is increasing making the rural youth desperate.

**Agricultural Growth and Productivity :**

Indian agriculture sector supports more than half a billion people by providing employment to 52% of the country's work force. Still its share in GDP is just 18.5% (in 2006-07), down from 36.4% in 1982-83, owing a lot to the sluggish growth. However, a glimpse of hope was seen during the 10<sup>th</sup> 5-year plan when the sector posted a stronger growth of 4.8% as compared to 2.5% during the 9<sup>th</sup> plan.

**Figure-1**  
**Growth in GDP and agriculture during various 5-year plans**



Source: Original data from CSO's National Accounts Statistics Based on 1999-2000 prices.

Agricultural Statistics 2010 of Ministry of Agriculture indicates that out of 328.73 million hectares of the country's total geographical area, the gross cropped area and the net sown areas have been 195.83 and 140.86 million hectares respectively. The net area under irrigation is 62.29 million hectares with a cropping intensity of 139 per cent. Between 1950-51 and 2007-08, even though the gross cropped area increased by 48.5 per cent, the net shown area rose by only 18.6 per cent (Table-1).

**Table-1**  
**Indian Agriculture by Category of Land Use**

(Area: Million Hectares; Growth: per cent)

Year	Gross Cropped Area		Net Area Sown		Cropping Intensity		Gross Irrigated Area		Net Irrigated Area	
	Area	Growth	Area	Growth	Area	Growth	Area	Growth	Area	Growth
1950-51	131.9	--	118.7	--	111.1	--	22.6	--	20.9	--
1960-61	152.8	15.8	133.2	12.2	114.7	3.2	28.0	23.9	24.7	18.2
1970-71	165.8	8.5	140.9	5.8	117.7	2.6	38.2	36.4	31.1	25.9
1980-81	172.6	4.1	140.3	-0.4	123.1	4.6	49.8	30.4	38.7	24.4
1990-91	185.7	7.6	143.0	1.9	129.9	5.5	63.2	26.9	48.0	24.0
2000-01	185.3	-0.2	141.4	-1.1	131.1	0.9	76.2	20.6	55.1	14.8
2007-08	195.8	5.7	140.9	-0.4	139.0	6.0	87.3	14.6	62.3	13.1

Source : Ministry of Agriculture, 2010.

Table-1 indicates that the growth rate of net sown area has declined from 12.2 per cent during 1950-51 to 1960-61 to -0.4 per cent during 2000-01 to 2007-08. The growth rates of gross and net irrigated areas between 1960-61 and 1990-91 witnessed increase of 3 and 5.8 percentage points, respectively where as between 1990-91 and 2007-08, the growth rates reduced by 12.3 and 10.9 percentage points.

There has been no specific correlation observed between the overall GDP growth rate and growth rate in the Agriculture and Allied Sector (Table-2) during 7<sup>th</sup> Five Year Plan (1985-90) to 11<sup>th</sup> Five Year Plan (2007-12). The maximum growth in agriculture and allied sector was experienced during the 8<sup>th</sup> Five Year Plan (1992-

97). As against the target of annual growth rate of 4 per cent during the 10<sup>th</sup> Plan (2002-07), average annual agricultural growth rate was 2.5 per cent.

Table-2 indicates that during the first three years of the 11<sup>th</sup> Five Year Plan (2007-2012), the agriculture and allied sector recorded an average growth of 2.03 per cent against the Plan target of 4 per cent per annum. In the first year of the plan (2007-08), the growth of agriculture and allied sector was 5.8 per cent which became negative (-0.1 per cent) in 2008-09 even though this year witnessed a record 234.4 million tonnes food production. The decline in the growth was due to reduced production of crops viz. oilseeds, cotton, jute, mesta and sugarcane. The deficient south-west monsoon in 2009-10 restricted the agricultural growth rate to only 0.4 per cent. Relatively good monsoonal rainfall during 2010-11 has prompted the Government to project the agricultural growth rate at 5.4 per cent.

**Table-2**  
**Annual Average Growth Rate from 7<sup>th</sup> Five Year Plan to 11<sup>th</sup> Five Year Plan (in per cent)**

Five Year Plans	Overall GDP Growth Rate	Agriculture and Allied Sectors	Share of agriculture and allied sector in total GDP
7 <sup>th</sup> Plan (1985-90)	6.0	3.2	
Annual Plan (1990-92)	3.4	1.3	
8 <sup>th</sup> Plan (1992-97)	6.7	4.7	
9 <sup>th</sup> Plan (1997-2002)	5.5	2.1	
10 <sup>th</sup> Plan (2002-07)	7.78	2.56	
11 <sup>th</sup> Plan (2007-12) [GDP factor costs 2004-05 prices]			
2007-08	9.3	5.8	16.8%
2008-09	6.7	0.1	15.8%
2009-10	8.6	0.8	14.6%
2010-11	9.3	7.9	14.5%
2011-12	6.2	3.6	14.1%

Note : Growth rates up to 2004-05 are at 1999-2000 prices and thereafter at 2004-05 prices.

- Advance Estimate of CSO.

Source: Compiled from Economic Survey, 2011-12, Ministry of Agriculture, 2011.

The analysis of growth in food-grains production during 1960-61, 1990-91 and 2009-10 indicated that the food-grain production grew at a higher rate during 1990-91 as against 2009-10 for almost all crops under reference. (Table-3).

The food grain production in 2009-10 was 218.1 million tonnes. This indicates that on an average 1.11 tonnes of food grains are produced in one hectare of gross cropped area.

**Table-3**  
**Food grains Production**

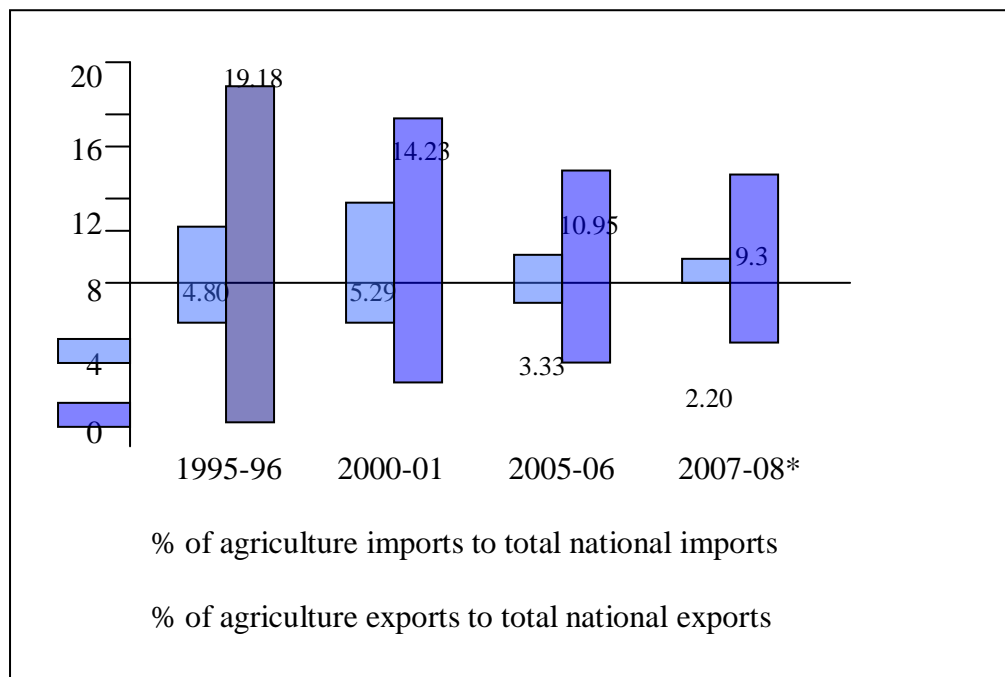
Sl.No.	Crop	1960-61	1990-91	2009-10	Per cent growth	
					1990-91 over 1960-61	2009-10 over 1990-91
1.	Rice	35.0	75.0	89.0	114.3	18.7
2.	Wheat	11.0	55.0	80.8	398.2	46.9
3.	Coarse Cereals	23.0	32.0	33.6	39.13	5.0
4.	Total Cereals (1+2+3)	69.0	162.0	203.4	134.8	25.5
5.	Pulses	13.0	14.0	14.7	7.7	5.0
6.	Total Food grains (4+5)	82.0	176.0	218.1	114.6	23.9

Source: Ministry of Agriculture, 2010 and Economic Survey, 2010-11.

While the situation of agriculture as a sector goes from bad to worse in the country, its contribution to trade also shows a similar trend. From 19.18% of total exports in 1995-96, it has declined to 9.3% in 2007-08.

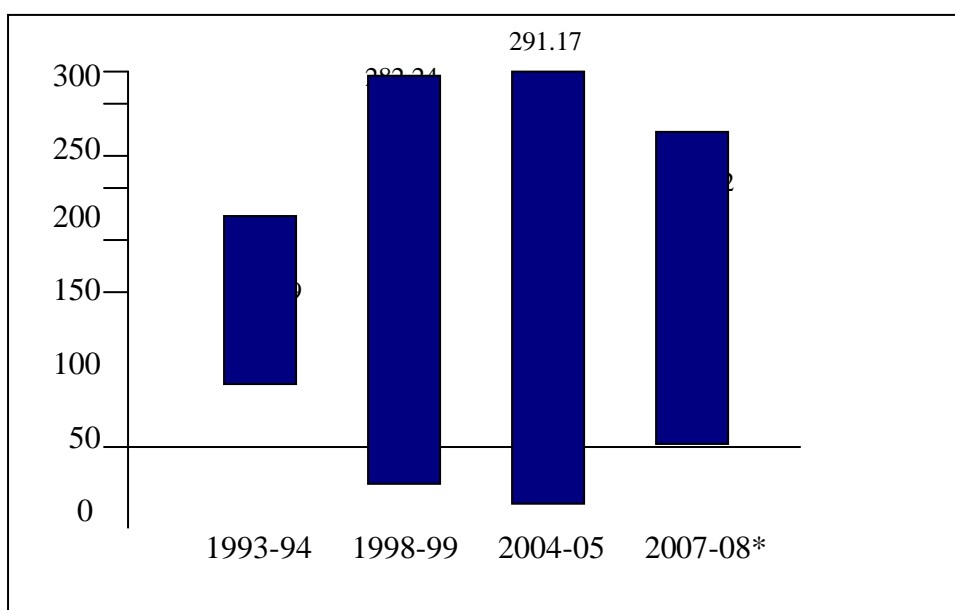
Interesting, however, is the fact that agricultural imports too have gone down as a share of total imports. Well, to make you happy it may indicate our self-dependency, but try to think is it really so?

**Figure-2**  
**Contribution of agriculture to exports and imports**



To give the necessary impetus huge agricultural subsidies have been given. And with every successive five-year plan the corpus just gets bigger. From Rs.140.69 billion subsidy in 1993-94, it increased to Rs.291.17 billion in 2004-05. The balloon keeps getting bigger. Sadly, the needy farmers don't get what is rightly theirs and the suicide cases keep coming every now and then.

**Figure-3**  
**Agriculture subsidies in India (in Rs. billion)**



Source: CSO. \* Figures for fertilizer subsidies only.

India, with nearly two thirds of its population dependent on agriculture, stands out as the only country among the world's twenty largest economies where nearly 45% of farm families still knock the doors of local moneylenders. Out of the remaining 55% going for institutional credit, nearly 80% live at subsistence levels owing to a crumbling irrigation infrastructure, corrupt middlemen system of markets and a stagnant public investment in agriculture as a percentage of GDP for the last 15 years. Ever since the development of co-operatives in the 1950s to help the farmers get access to credit for short and long term needs, there have been vast improvement in terms of the number of districts and total number of farmers covered through institutional credit and the adverse effects of informal credit through moneylenders has been mitigated. The development of institutions like NABARD, innovative models like Kisan Credit Cards and microfinance accompanied by RBI policy of stipulating a fixed percentage (currently at 18%) of net bank credit to be directed towards agriculture under priority sector lending has increased the institutional credit flow. At a glance, it appears Indian farming is moving towards realizing a utopian dream.

But the more we delve into farm numbers, the most gruesome of the score card becomes. Due to a massive number of marginal farmers holding extremely small farm holding of the order of 1-2 acres, they have absolutely no collateral to offer for attaining institutional credit from commercial banks or co-operatives. The debt relief scheme declared early this year by the UPA government covered farmers owning farms of 4-6 acres while a majority of farmers in the drought hit regions of Orissa, Andhra Pradesh and Vidarbha have average farm areas of 1-2 acres. Another variable largely missed in the equation is the mode of water availability on a particular farmland. Since most of the farmers are currently borrowing from financial institutions are located in irrigated areas, the challenge before the institutional credit is to increase its outreach in the rain fed and dry regions.

**Table-4**  
**Report card of investment status in agriculture**

Year	Gross Capital Formation (GCF) in Agriculture & Allied Sector	Gross Capital Formation in the economy	% share of agriculture to total GCF
2003-04	614.67	7129.00	8.6
2004-05	716.93	9548.89	7.5
2005-06	839.55	11,954.08	7
2006-07	966.08	14,426.04	6.7

Year	Investment in Agriculture*	GDP at 1999-2000 prices*	% share of agriculture
2003-04	535.41	24,027.27	2.1
2004-05	577.59	26,016.30	2.2
2005-06	645.11	28,419.67	2.3
2006-07	712.08	31,173.71	2.3
Tenth Plan ('02-03 to '06-07)	3026.87	131,808.29	2.3

Source : C.S.O.

\* Rs. Billion.

#### **Agriculture Marketing :**

Agriculture marketing is very near to what can be called homogeneous. Whether it is production of cash crops or food grains, average Indian farmers invariably face trouble in marketing their products. Most of the times they even fail to sell crops at the market price. But the real vices are more deeply rooted.

From the very beginning of a crop's journey towards the market, a farmer starts struggling because of the loopholes in the existing system. Storage as such costs the most. Even if the farmer is ready to pay, there is lack of sufficient storage facilities. And if the farmer needs a customized storage facility like a cold storage, then the situation turns out to be even worse. Not that there is no government service. There are FCI godowns, but their maintenance and availability can put the most complacent person in the world to shame. Although, private companies have now started to come up with their services, they are still going through their own troubles.

Besides lack of proper means to reach the market, the farmers are also looted by the middlemen who buy crops at a price much lesser than the price at which they sell it in the markets. The Minimum Selling Price mechanism is not of much help since the farmers are either unaware of it or it has a very low control over market forces that determine the prices in Indian market. This kind of corrupt and inefficient mechanism makes agriculture marketing nothing more than a nightmare. The situation is aptly described by The Rural Credit

Survey Committee. As per it, “While standards of marketing have improved in most of the relatively few regulated markets which have been established, a number of malpractices still exist even in them since personnel and enforcement are two great problems, not always sufficiently attended to, much less solved.”

These malpractices get new life when private parties are involved and the producers i.e. the farmers are in no case in the position to get any kind of protection from these practitioners. The report also says, “there is a great lacuna that no control at all is exercised over village sales, in which the primary producer is literally, legally and in practice at the mercy of the village trader.”

#### **Agricultural Credit :**

Currently, farm credit is being delivered, besides informal moneylenders, by institutional agencies viz., commercial banks, Regional Rural Banks and Co-operatives. The moneylenders supply a little less than half of the total borrowings of farmers mostly for consumption purposes including conspicuous consumption. The share of private local area banks is yet to assume significant proportion in farm credit. There are also recently entered micro-finance institutions (MFIs) and their numbers have been proliferating. The high rate of interest ranging from 15-50% charged by the MFIs generally make them unsuitable for farm credit as the average rate of return on investment in agriculture may be around 15-20%. More recently, the emergence of corporate finance, primarily in financing agri-machinery has been observed. Of all sources, institutional credit is still the predominant source of credit.

By virtue of a central government mandate, the credit flow to agriculture more than doubled from Rs.869.8 thousand crore in 2003-04 to Rs.2.29 lakh crore in 2006-07. This reflected the view that farm credit is indeed productive. But in 2008, the same government announced a Debt Waiver and Debt Relief Scheme writing off loans worth Rs. 73 thousand crore. This implied ex-post sterility of farm credit.

The biggest challenge before farm credit from institutional sources has always been the increase in outreach, i.e. timely availability of farm credit in adequate amount to a large section of disadvantaged farmers. Right from the time of independence, institutionalization of farm credit has been the prime objective and yet in practice there is a tardy process lingering on the exclusion of a large number of small, marginal and sub-marginal farmers. Credit also has a strong tendency to perch on where it is relatively safe and shy away from the risky rain fed regions that constitute around 60% of the total cultivated area. Since most of the farmers currently borrowing from financial institutions are located in irrigated areas, the challenge before institutional credit is to increase its outreach in the rain fed and dry regions in keeping with the technological leverage in these areas.

The flow of agricultural and rural credit witnessed rapid increase after the first round of bank nationalization in 1969. Between 1971-72 and 2007-08, agricultural credit witnessed a jump of around 220 times from merely Rs. 883 crore to Rs.1,94,953 crore. (Table-5)

**Table-5**  
**Direct Institutional Credit to Agriculture and Allied Activities**

(Short and Long Term: 1971-72 to 2007-08)

Year	Share in Total Credit (Per cent)				Total (Rs. Crore)
	Cooperatives	State Governments	SCBs	RRBs	
1971-72	87.1	11.2	1.7	--	883
1981-82	57.7	3.6	34.8	3.9	4296
1991-92	50.2	2.9	41.7	5.2	11,538
2001-02	56.4	0.8	34.4	8.4	54,195
2002-03	52.2	--	38.8	9.0	65,175
2003-04	48.0	--	43.4	8.6	83,427
2004-05	42.7	--	45.9	11.3	105,303
2005-06	33.4	--	56.0	10.6	144,021
2006-07	28.5	--	60.8	10.7	189,513
2007-08	29.6	--	58.2	12.2	194,953

Notes : SCBs: Scheduled Commercial Banks, RRBs: Regional Rural Banks.

Source: Reserve Bank of India, 2010.

The overall higher-order credit growth in the banking system has not supported the desired expansion of agricultural credit and credit to small-scale industries. The sectoral orientation of bank credit under priority sector lending ensures guaranteed flow of credit to the priority areas, namely agriculture and allied sectors, small-scale and cottage industries, and socially and economically weaker sections of society. Table-6 indicates that the share of priority sector advances in total credit of Scheduled Commercial Banks (SCBs) went up from 14 per cent in 1969 to 42.9 per cent in 1987 and thereafter fell below the prescribed 40 per cent limit. In the

post-bank reform period (post 1992), the share of priority sector lending in total credit of SCBs has ranged between 32.8 percent in 1996 and 36.7 per cent in 2005.

**Table-6**  
**Share of Priority Sector Advances in Total Credit of SCBs 1969-2010**

Year	Share (in per cent)
1969	14.0
1972	21.0
1975	25.0
1978	28.6
1981	35.6
1984	38.1
1987	42.9
1990	40.7
1993	34.4
1996	32.8
1999	35.3
2002	34.8
2005	36.7
2008	34.9
2010	35.1*

\* Provisional Source: Shah et al., 2007; RBI, 2011.

Transformation in banking policies and practices and the resultant improvement in the outreach of and access to total bank credit during the post-bank nationalization period have not satisfactorily addressed equitable and efficient delivery of agricultural and rural credit. Due to declining public capital formation in the rural and agricultural sector and the persistent lukewarm attitude of rural bankers towards formal financing, the planners and policymakers are relying on microfinance to suitably supplement formal banking in rural India.

#### **Suggestions for Green Revolution :**

There is hard evidence to indicate that the initial gains of the Green Revolution are now petering out. Food grain production is slackening. Its rate of growth is much slower than that of population. Pulses and edible oils have been regularly imported, while wheat and sugar too are at times sourced from abroad. So, even the self sufficiency in food production seems to be in jeopardy. Natural resource base of agriculture is crumbling. Use of land for urbanization and industrialization is constricting the availability of cultivable land, which was 0.36 hectare per capita at the time of independence, but has come down to around 0.12 currently, and is likely to shrink to 0.09 by 2025. Soils are experiencing serious fatigue. Yields have started showing declining trends in terms of input output response, as several soil nutrients and organic matter have depleted drastically. Area under irrigation, instead of expanding, is contracting.

Approximately, 60% of our agriculture still remains rain dependent. Ground water is depleting at an alarming rate. The frequency and severity of natural disasters is increasing on account of climatic changes. Costs of cultivation have been rising at a faster pace than the prices of agricultural produce. The law of diminishing returns has already set in squeezing farmers' profits progressively. Fragmentation of land holdings has rendered about 80% of them as economically unviable. Mono cropping patterns are causing severe imbalances in the soils and endangering biodiversity.

India although has become the world's largest milk producer, but the live stock economy is in distress. The process of economic liberalization and globalization, instead of benefiting the farmers, is compounding their apprehensions and insecurity. Rural unemployment is increasing making the rural youth desperate.

The situation obviously calls for inventing a new approach and strategy. The broad contours of such a strategy could be the following:

First of all, investment in agriculture, which sustains 62% of India's population, has remained stuck up at around 1.3% of GDP since the Fifth Five Year Plan. Irrigation though the most critical input for agriculture is the most neglected sector. Different Agricultural Scientists have repeatedly suggested that we should immediately formulate a Ten Year Water Plan to harness the total irrigational potential through major, medium and minor modes which includes rain water harvesting and water shed management, The investment required for this is estimated to be around Rs.400,000 crores. States alone, however, are not in a position to mobilize such resources. The central government should share it equally with them. Secondly, there has to be a land use policy strictly prohibiting conversion of fertile land for non-agricultural purposes, except in rare cases.

Thirdly, thoroughly researched models of integrated nutrient and pest management based on use of organic matter and biological controls have to be promoted through out the country.

Fourthly, a comprehensive livestock and biodiversity policy aiming at conservation and improvement of native breeds and varieties through selective breeding must be put in place and form part of the integrated farming systems.

Fifthly, the price policy, which has so far been favouring only a few crops such as wheat, rice, sugarcane and cotton, and neglected the coarse grains, that are more nutritious and can be grown with lesser water, needs to be redesigned to make their cultivation equally profitable, if not more. Terms of trade for agriculture too warrant a correction.

Sixthly, all restrictions on trading, stocking, financing, movement and processing of agricultural products must be removed forth with to make India as one integrated market. Seventhly, the numbers dependent on agriculture have to be reduced by creating alternative job opportunities in rural areas and establishing facilities for technical and vocational education for enhancing skills and employability of rural youth.

And lastly, the multiplicity of Indian agriculture must be protected at all costs. We must be self sufficient in almost every item. Food security has to be an integral component of national security. Use of food as a weapon in international politics is not an unknown phenomenon. Our own experience tells that whenever we have deficit, prices in international markets go up.

#### **Suggestions Other than Agricultural :**

1. The Indian government has to provide the access to education to children living in rural India and also create enough job opportunities in urban India so that a large percentage of rural India effectively becomes urban. All India has to do is follow the example set by China where massive investments in primary education have been accompanied by massive investments in infrastructure and industrialization. Most children living today in villages will not get a job at Infosys; but they will surely earn a decent livelihood if Reebok, Nike, Wal Mart and others make India a supply hub. This will once and for all remove the Indian curse whereby more than 60% of the nation depends on agriculture for a livelihood even though it contributes just about 20% to GDP.

2. The other steps that need to be taken are already visible through numerous successful experiments that have been implemented by activists, NGOs, private sector companies and even many state agencies. The Indian farmer badly needs access to the market; and it is critical for the state to harness the power of internet and telecom technology to provide that access.

3. Similarly, dozens of micro credit organizations have managed to reach rural India in a cost effective manner that public sector banks with their baggage of manpower and overheads have not been able to. All the state needs to do is to duplicate these entrepreneurial efforts by proving credit and guarantees.

But really, the most important step that needs to be taken to implement Green Revolution 2.0 is also the simplest and the most challenging. Just like India unshackled the animal spirits of entrepreneurial India in 1991 by lifting the heavy weight of the state, the Indian farmer too needs to be liberated from the heavy hand of a corrupt and patronage doling state.

Green Revolution 2.0 will come when the Indian farmer has the freedom to grow what he wants and sell wherever he wants at the best price that he can get.

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