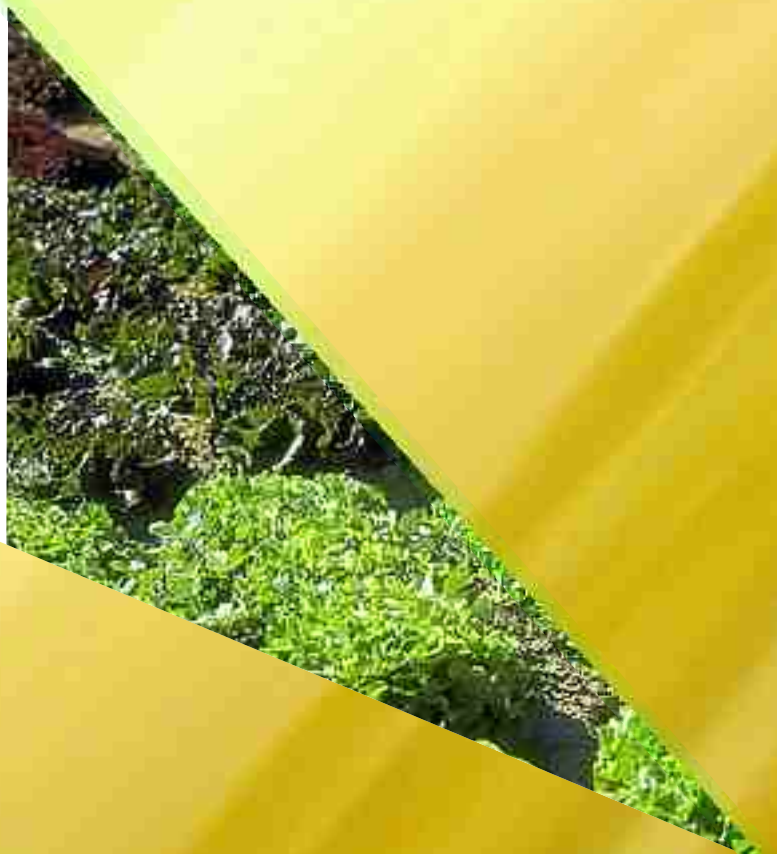
1st Prof. Dayanatha Jha Memorial Lecture

Challenges for Revival of Indian Agriculture



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Prof. Mahendra Dev has been an well wisher of NCAP and guided us as member of a prestigious committee on Performance Evaluation of NCAP constituted by the Ministry of Finance, Govt. of India.

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Challenges for Revival of Indian Agriculture

I am grateful to the National Centre for Agricultural Policy (NCAP), particularly Dr P.K. Joshi for inviting me to deliver the first Dr Dayanatha Jha memorial lecture. I met Dr Jha several times and discussed several issues relating to agricultural sector. I learnt a lot from his writings on agricultural research and technology. His contributions to make NCAP a Centre of Excellence on research in agricultural policy are well known. It is a privilege to give this lecture in memory of Dr Dayanatha Jha.

In this lecture, I would like to speak on challenges for revival of Indian agriculture. In India, economic growth improved significantly during the past two and half decades, particularly in the post-reform period, India is considered as one of the fastest growing economies in the world. However, the exclusion problems have not been seriously addressed by the government programmes and strategies. The experience of the economic reforms during the past 15 years indicates that while there have been improvements in economic growth, foreign exchange, IT revolution, export growth, etc., the income distribution has been unequal and only some sections of the population have benefited more from higher growth and prosperity. In other words, real development in terms of growth shared by all sections of the population has not taken place. We have problems of poverty, unemployment, inequalities in access to health and education and poor performance of agriculture sector.

One of the excluded sectors during the reform period was agriculture which showed low growth and experienced more farmers' suicides. There are serious concerns on the performance of agriculture sector in the country. The post-reform period growth was led by services. The commodity sector growth (agriculture + industry) has not been higher in the post-reform period as compared to that of 1980s. Particular worry is the agriculture sector which showed lower than 2% per annum growth during the previous decade. Also, there is a disconnect between employment growth and GDP growth. In other words, employment is not generated in industry and services where growth is high. On the other hand, GDP growth is low in agriculture where majority of people are employed.

Thus, there has been a lop-sided approach to development in India during the past few decades. Growth may be higher during the previous two decades, but inclusive growth in terms of focus on agriculture has been missing[1]. It is like running a train with engine only without connecting majority of the bogies and people to the engine. The role of agriculture in economic development is well known. Agriculture not only contributes to overall growth of the economy but also provides employment and food security to majority population which in turn reduces

[1]More on inclusive growth, see Dev (2008)

poverty in a developing country. Thus, if we want pro-poor growth and real development, high agricultural growth and rising incomes for farmers are essential.

In recent decades, the context within which agriculture policy has to be developed and implemented has undergone fundamental changes. The relationships operated for much of the 1960s and 1970s have changed. Globalization policies in the 1980s and particularly during 1990s and beyond have created many challenges for agriculture in developing countries. Some of the consequences and impacts of globalization are: exposure of domestic agriculture to international competition, growth of non-agricultural sector and its impact on demand for agricultural products, urban middle class life-style changes including diets, rising food imports in developing countries, competitiveness and diversification of domestic production systems, vertical integration of the food supply chain, etc. (Pinglai, 2006).

Because of demographic pressures, there has been significant increase in small and marginal farm holdings. These farmers have to face the challenges of globalization. Risk and uncertainty have also increased as cultivation has spread to marginal lands. The diversification of agriculture has also raised concerns on food security.

In recent years, there has been a concern regarding increase in global food prices. Rise in crude oil prices has increased agricultural costs also. Increased use of food crops in bio-fuels also has pushed up their demand. The USA used 20% of its maize production for bio-fuels; Brazil used 50% of sugarcane for bio-fuels; and the European Union used 68% of its vegetable oil production for bio-fuels. Such large usages, by reducing the availability of these products for food and feed, exerted pressure on prices. Food prices also increased due to low output stocks. International prices of wheat, rice and maize increased significantly during the past two years. This is another challenge for India in maintaining its food security.

This lecture is divided into three sections. Section 1 deals with performance and problems of agriculture, while Section 2 discusses policy challenges for the revival of Indian agriculture. The last Section provides concluding observations.

1. Performance and Problems of Indian Agriculture

One of the paradoxes of the Indian economy is that the decline in the share of agricultural workers in total workers has been slower as compared to the decline in the share of agriculture in GDP. The share of agriculture and allied activities in GDP declined from 57.7% in 1950-51 to 25% in 1999-00 and further to 20% in 2004-05. The share of agriculture in total workers, however, declined slowly, from 75.9% in 1961 to 59.9% in 1999-00 and further to 56.7% in 2004-05. Between 1961 and 2004-05, there was a 34 percentage point decline in the share of agriculture in GDP, while the decline in share of agriculture in employment was of 19 percentage points only. As a result, the labour productivity in agriculture has increased only marginally, while that of non-agricultural workers has increased rapidly. There were about 259 million agricultural workers in the year 2004-05. About 42% of these agricultural workers were females.

A structural transformation has happened in four states, viz. Kerala, Tamil Nadu, West Bengal and Punjab – the share of agriculture in employment being less than 50% in these

states (Table 1)[2]. On the other hand, the share of agriculture in employment in eight states was more than 60%. It may take some more years for these states to achieve structural transformation.

Table 1: Structural Transformation across States: Share of Agriculture in Employment and GSDP: 2004-05

States	Share of Agriculture in Total (Rural+Urban) Employment (%)	Ranks based on Employment Share	Share of Agriculture in GSDP (%)	Ranks based on Share in GSDP
Kerala	35.5	1	16.5	3
Tamil Nadu	41.3	2	12.5	2
West Bengal	45.7	3	23.5	7
Punjab	47.6	4	38.6	16
Haryana	50.3	5	29.3	12
Maharashtra	53.2	6	9.6	1
Gujarat	54.9	7	20.1	5
Andhra Pradesh	58.5	8	24.7	8
Karnataka	60.7	9	19.2	4
Uttar Pradesh	60.9	10	33.3	15
Rajasthan	61.7	11	27.6	9
Orissa	62.4	12	28.2	10
Himachal Pradesh	64.1	13	20.5	6
Assam	66.0	14	32.0	13
Bihar	68.8	15	32.7	14
Madhya Pradesh	69.2	16	28.3	11
All-India	**56.7**	**--**	**21.7**	

Source: 61st Round of NSS Employment and Unemployment Survey and CSO data for GSDP.

In terms of growth, the performance of agriculture during the post-independence era has been impressive as compared to that during the pre-independence period. The all crop output growth of around 2.7% per annum in the post-independence period (during 1949-50 to 1999-00) was much higher than the negligible growth rate of around 0.4% per annum during the first half of the previous Century. As a result, India achieved self-sufficiency in food grains at the national level by mid-1970s. The growth in GDP in agriculture was around 2.2% to 2.5% per annum during 1950-51 to 1980-81. It recorded the highest growth rate of more than 3% per annum in the 1980s. During the post-reform period, the growth rate declined to 2.76% per annum. Growth in agriculture GDP, which was 4.7% per annum during Eighth Plan (1992-97),

[2]Also see Kannan (2007)

declined to 2.1% during Ninth plan (1997-2002) and to 1.8% per annum during Tenth Plan (2002-07). Thus, there has been a significant deterioration in the growth rate of agriculture since mid-1990s. However, there are signs of revival of agricultural growth to more than 3% per annum during the past few years.

If we look at the value of output of various sub-sectors, the crop sector which showed a growth rate of 3.22% during 1990-91 to 1996-97, decelerated to 0.8% during 1996-97 to 2004-05 (Table 2). In the case of livestock and fruits and vegetables, there has been deceleration since the mid-1990s but still their growth rates are above 3% per annum.

Table 2: Growth Rate of Output of Various Sub-sectors in Agriculture: 1980-81 to 2004-05

Period	Crop Sector	Livestock	Fruits and Vegetables	Non-Horticulture Crops	Cereals
1980-81 to 1989-90	2.71	4.84	2.42	2.77	3.15
1990-91 to 1996-97	3.22	4.12	5.92	2.59	2.23
1996-97 to 2004-05	0.79	3.67	3.28	0.05	0.02

Source: Chand *et al.* (2007); Computed from National Accounts Statistics

However, the concern is regarding food crops. There was no growth in the output of cereal crops like rice, wheat, and coarse cereals. Similarly, there has been stagnancy in pulses and oilseed crops. The foodgrains output was 174.8 million tones (Mt) in 2002-03, 213.2 Mt in 2003-04, 198.4 in 2004-05 and 208.6 Mt in 2005-06. It is expected to be around 216 Mt in 2006-07. It is a matter of concern and it may threaten our food security. As shown in Table 3, per capita production of cereals, pulses and foodgrains declined significantly since the early-1990s. However, foodgrains production is expected to be 230 Mt in the year 2007-08. This is a record with paddy and wheat production touching 96 Mt and 78 Mt, respectively.

Table 3: Per Capita Production of Foodgrains per Year (in kg)

Year	Cereals	Pulses	Foodgrains
1971-75	164	19	183
1976-80	172	18	190
1981-85	179	17	196
1986-90	182	16	198
1991-95	192	15	207
1996-00	191	14	205
2001-05	177	12	189
2004-07	174	12	186

Source: Planning Commission (2007)

The major concern during the post-reform period is the decline in yield growth for both foodgrain and non-foodgrain crops (Bhalla, 2006). During the period 2000-01 to 2003-04, all-crop output growth declined further to less than 1% per annum. Reduction was much higher for foodgrains than non-foodgrains.

Recent data given in Table 4 also indicate the story of yield slackness in a fairly telling manner. For the past five years, yield levels for most crops or crop-groups stood almost frozen, as shown by the 0.5% growth (lowest ever in recent times) per annum for foodgrains. Yield growth for rice showed fluctuations. The growth was 1.63% during 2001-02 to 2005-06, but declined to 0.24% during 2003-04 to 2005-06. Wheat recoded a negative growth in the past five years. Only the yield growth of oilseeds recovered during 2001-02 to 2005-06.

Table 4: Growth Rate of Yields for Foodgrains and Oilseeds: 1980-81 to 2005-06

Years	Rice	Wheat	Coarse Cereals	Total Cereals	Total Pulses	Total Foodgrains	Oil-seeds
1980-81 to 1985-86	1.67	2.10	0.27	1.69	1.49	1.63	1.08
1985-86 to 1990-91	1.75	1.38	3.75	2.52	0.96	2.12	3.13
1990-91 to 1995-96	0.73	0.92	0.90	1.11	0.29	1.08	1.57
1995-96 to 2000-01	0.65	0.85	0.59	0.86	0.08	0.95	-0.53
2001-02 to 2005-06	1.63 (0.24*)	-0.71	1.71**	1.03	0.22	0.52	4.53

**Growth rate for the period 2003-04 to 2005-06*
***Covers the period 2001-02 to 2004-05*
Source: Economic Outlook for 2006-07, A Report prepared by the Economic Advisory Council to the Prime Minister (August, 2006)

Input Growth in Agriculture

One of the reasons for the decline in output growth and farm business income was low yield growth during post-reform period. The reduction in yield growth, in turn, was largely a result of reduction in input growth in agriculture. Sen and Bhatia (2004) have shown that the growth of per hectare input-use at constant prices decelerated from 3.66% per annum in the 1980s to 0.94% per annum in the 1990s. The same study reveals that combination of input price increase and inadequate expansion of public infrastructure could be responsible for the deceleration in growth of input-use. Real input prices (deflated by CPIAL) declined at the rate of (-)1.94% per annum during the 1980s but had risen at 0.33% per annum during the 1990s. Also, growth in the wages of hired labour was also responsible for the cost increases in non-cereal crops and this depressed the farm business incomes. It was also mentioned that reduction in subsidies could be compensated by higher output prices, but to compensate for the decline in yields and farm income, much higher output prices are needed. Mid-term Appraisal of the Tenth Plan also attributes part of the decline in agriculture growth to lower input-use which in turn, was due to lower profitability during the post-reform period

Terms of Trade in Agriculture

The reform strategy for agriculture relied on making terms of trade (TOT) favourable to the sector by reducing the protection to industry and trade liberalization. These favourable relative prices are expected to attract investible resources into agriculture and lead to higher growth of agricultural production.

As shown in Table 5, TOT for agriculture during the 1980s increased significantly, from 88.7 in 1981-82 to 99.4 in 1989-90. Inspite of this increase, however, the terms of trade for agriculture were unfavourable. With liberalisation and reduction in protection to industry, terms of trade were favourable to agriculture since 1990-91. In the years 1999-00 and 2000-01, there was a reduction in the index before recovering in the subsequent two years. The index based on implicit prices of GDP also shows that during 1998 to 2004, there was four point decline in the agricultural TOT, although it is still favourable to agriculture as compared to non-agriculture (Sen, 2007). However, the private investment in agriculture improved due to increase in terms of trade. Although private investment increased at a faster rate during the 1990s, it has started declining in recent years. It may be noted that terms of trade are one of the factors responsible for enhancing agricultural growth. There are many non-price factors which are important for higher growth in agricultural production.

Table 5: Index of Terms of Trade between Agricultural and Non-agricultural Sectors (Base 1988-91=100)

Year	Index	Year	Index	Year	Index	Year	Index
1981-82	88.7	1989-90	99.4	1997-98	105.6	2005-06	101.9
1982-83	91.4	1990-91	101.9	1998-99	105.2	2006-07*	102.0
1983-84	91.6	1991-92	105.6	1999-00	102.7		
1984-85	93.9	1992-93	103.9	2000-01	100.7		
1985-86	93.6	1993-94	103.6	2001-02	102.8		
1986-87	95.7	1994-95	106.6	2002-03	103.6		
1987-88	97.4	1995-96	105.3	2003-04	101.0		
1988-89	98.3	1996-97	103.1	2004-05	100.3		

*provisional
Source: Directorate of Economics and Statistics, Ministry of Agriculture, Government of India

Total Factor Productivity in Agriculture

In development literature, the assumption is that productivity is lower in agriculture than non-agriculture sector. Here, we look at the Indian evidence on total factor productivity growth (TFP) in agriculture and non-agriculture sectors. The evidence shows that TFP growth has been almost identical (1.13% per annum) in both the sectors during the 50-year period 1950-2000 (Krishna, 2006). The sub-period data indicate that TFP growth in agriculture was the highest during the 1980s at 1.89% per annum, but it declined to 1.68% during the post-reform period (Table 6). On the other hand, non-agriculture sector's TFP growth was higher than that of agriculture in the 1980s and increased marginally during the post-reform period.

One interesting finding is that inspite of lower growth in GDP, the TFP contributed more than 50% to GDP in agriculture, whereas in non-agriculture, its contribution to GDP was less than 30% during 1980s and 1990s. It shows the importance of TFP for agriculture during the past two decades.

Table 6: Total Factor Productivity (TFP) in Agriculture and Non-Agriculture Sectors

	1950-51 to 1960-61	1960-61 to 1970-71	1970-71 to 1980-81	1980-81 to 1990-91	1990-91 to 1999-2000
	Agriculture Sector				
Growth Rate in GDP (%)	3.03	2.31	1.50	3.43	2.97
Growth Rate in TFP(%)	1.65	0.88	-0.35	1.89	1.68
% of TFP Share in GDP Growth	54.5	38.1	-23.3	55.1	56.6
	Non-Agriculture Sector				
Growth rate in GDP (%)	5.34	5.30	4.38	6.77	7.14
Growth Rate in TFP (%)	0.88	0.89	0.01	1.98	2.04
% of TFP Share in GDP Growth	16.5	16.8	0.22	29.3	28.6

Source: Sivasubramonian (2004)

Regional Disparities: There are large regional disparities in output across regions. Certain regions such as Punjab, Haryana, Western Uttar Pradesh, parts of Andhra Pradesh and Tamil Nadu had benefited more during the initial phase of the green revolution than others. This had accentuated regional disparities in the immediate post-green revolution period. An important feature of the 1980s and the early-1990s, however, is that there has been much more equitable spread of agricultural growth. After performing poorly during the early years of the green revolution, many of the states where poverty is widespread — Assam, Bihar, Orissa, Madhya Pradesh and West Bengal — have shown significant growth during the 1980s. Oilseeds have also gained in the dry belts of Rajasthan, Madhya Pradesh, Karnataka and Maharashtra.

Table 7 shows high growth rate in agriculture SDP for many states during the period 1984-85 to 1995-96. However, growth rates decelerated in all the states except Bihar during the period 1995-96 to 2004-05. The deceleration is the highest in the states with greater proportion of rain-fed areas (Gujarat, Rajasthan, M.P., Karnataka and Maharashtra). Agricultural growth in these states was less than one per cent per annum during the previous decade.

Table 7: Growth Rates of Agriculture SDP: States Ranked by Percentage of Rainfed Area

State	Growth Rate in NSDP Agriculture		Rainfed (%)	State	Growth Rate in NSDP Agriculture		Rainfed (%)
	1984-85 to 1995-96	1995-96 to 2004-05			1984-85 to 1995-96	1995-96 to 2004-05	
Punjab	4.00	2.16	3	Gujarat	5.09	0.48	64
Haryana	4.60	1.98	17	Rajasthan	5.52	0.30	70
Uttar Pradesh	2.82	1.87	32	Orissa	-1.18	0.11	73
Tamil Nadu	4.95	-1.36	49	Madhya Pradesh	3.63	-0.23	74
West Bengal	4.63	2.67	49	Karnataka	3.92	0.03	75
Bihar	-1.71	3.51	52	Maharashtra	6.66	0.10	83
Andhra Pradesh	3.18	2.69	59	Kerala	3.60	-3.54	85
All India	**3.62**	**1.85**	**60**	Assam	1.65	0.95	86

Source: Planning Commission (2007)

NSS Data on Status of Farmers: The National Sample Survey Organisation (NSSO) undertook a comprehensive survey to assess the situation of farmers in the country during 2003 at the request of the Union Ministry of Agriculture. According to the NSS Report (497) on Income and Expenditure of Farmer Households, the average total monthly income of a farmer's household was Rs 2115 (annual income of Rs 25,380). Average monthly income per farmer household from cultivation being Rs 969. Income per farmer household from wages was Rs 819, while income generated from non-farm business was Rs.236 and income from farming of animals was only Rs 91. However, there are large differences in the total income across farm-size classes.

The question is whether the income from cultivation is sufficient to meet all the basic necessities of a family. From cultivation, an average household gets a net income of Rs 969 (annual income of Rs 11,628). One household needs more than Rs 20,000 in order to cross poverty line. Here, even an average farmer household is not able to earn half of the income needed to cross the poverty line from cultivation. Incomes of small and marginal farmers will be much lower than that of an average farmer household. Many of the households depend on wages and non-farm businesses to augment their incomes. Even these incomes may not be sufficient to meet the basic necessities including health and education.

A study by Sen and Bhatia (2004) based on cost of cultivation data indicates a decline in the growth of farm business income (FBI) over time. This study shows that the all-India rate of growth of real (deflated by Consumer Price Index Number for Agricultural Labourers) FBI per hectare declined sharply from 3.21% per annum during the 1980s to only 1.02% per annum during the 1990s. However, a farmer is interested in farm income per cultivator rather than price-cost ratio or FBI per hectare. Estimates of FBI per cultivator using growth of cultivators and cropped area revealed that the growth rate was 1.78% per annum during the 1980s but it decelerated to 0.03% per annum during the 1990s- indicating almost stagnant FBI per cultivator in the later period.

Farmers' Suicides: In recent years, farmers' suicides have increased in some states. There were 167,000 farmers' suicides in the previous decade. This is one of the darker sides of Indian agriculture. Indebtedness of farmers and increasing risk in agriculture are the main factors responsible for the suicides[3]. Sharper decline in absolute productivity, price uncertainty due to trade liberalization and rise in costs due to domestic liberalization, decline in credit and non-farm work intensified the crisis. Most of these studies have, rightly, identified household indebtedness as the main reason for the suicides. However, indebtedness is due to increase in input intensity of agriculture. Long-term factors like decline in farm size, groundwater depletion, deterioration in soil quality, etc. have also been responsible for the agrarian crisis and farmers' suicides.

Many farmers are shifting to commercial crops. In commercial crops, input intensity is higher than subsistence crops. There is no breakthrough in dryland technology. Cultivation is also being done in marginal lands. Risk is high in commercial crops and marginal lands. The government has identified 32 districts in the four states of Andhra Pradesh, Karnataka, Maharashtra and Kerala and announced a package in September, 2006. Half (16) of these districts are from Andhra Pradesh. Due to this package, these four states would benefit in terms of irrigation projects, bank debt reschedule, writing-off interest, moratorium on loans, support to co-operative banks, increase in new agricultural credit, support to dairy, poultry, fisheries, horticulture, insurance for crops and sheep, etc. The government package on farmer's suicides and agrarian crisis is a welcome step. However, the government has to take both short- and long-term measures to reduce the crisis. Prime Minister's package for Vidarbha is comprehensive in coverage. However, it has to be improved from some deficiencies as pointed by the Committee chaired by Radhakrishna (GOI, 2007). First, the design of some of the schemes is not based on the felt needs of households. Second, there is a lack of region- and household-specific flexibility built into these measures. Third, there are implementation and monitoring problems due to lack of proper institutional arrangements.

Problems and Reasons for Deceleration in Agriculture

To recapitulate, agriculture sector has many problems. Its growth rate has been less than 2% since the mid-1990s, although there are signs of improvement in recent years. Yield growth has also declined. Farmers' suicides have continued/increased in some states. Farming is becoming a non-viable activity. There are also other problems. Further scope for increase in net sown area is limited. Land degradation in the form of depletion of soil fertility, erosion and waterlogging has increased. There has been a decline in the surface irrigation expansion rate and reduction in groundwater table. Risk and vulnerability have increased. Disparities in productivity across regions and crops have persisted. Long-term factors like steeper decline in per capita land availability and shrinking of farm size are also responsible for the agrarian crisis.

The Steering Committee report on agriculture for 11th Plan (GOI, 2007a) has identified the possible reasons for deceleration in agriculture since mid-1990s. According to the report, the major sources of agricultural growth are: public and private investments in agriculture and

[3] More on agrarian crisis, see Vyas (2004) and Reddy (2006)

rural infrastructure including irrigation, technological change, diversification of agriculture and fertilizers. It looks like that the progress on all these sources slowed down in the 1990s particularly since mid-1990s (Table 8).

Table 8: Trend Growth Rate (percent/year) in Area, Input-use, Credit and Capital Stock in Agriculture during 1980-81 to 2003-04

Particulars	1980-81 to 1990-91	1990-91 to 1996-97	1996-97 to 2005-06
Technology[a]	3.3	2.8	0.0
Public sector net fixed capital stock	3.9	1.9	1.4[b]
Gross irrigated area	2.3	2.6	0.5[b]
Electricity consumption in agriculture	14.1	9.4	-0.5[c]
Area under fruit and vegetables	5.6	5.6	2.7[c]
Private sector net fixed capital stock	0.6	2.2	1.2[b]
Terms of trade	0.2	1.0	-1.7[b]
Total net fixed capital stock	2.0	2.1	1.3[b]
NPK use	8.2	2.5	2.3
Credit supply	3.7	7.5	14.4[b]
Total cropped area	0.4	0.4	-0.1
Net sown area	-0.1	0.0	-0.2
Cropping intensity	0.5	0.4	0.1

Notes: a - Yield potential of new varieties of paddy, rapeseed/mustard, groundnut, wheat and maize; b - Up to 2003-04; c - Up to 2004-05.
Source: GOI (2008)

According to the report, the causes of slow down are: increase in subsidies crowding out investment in infrastructure, degradation of natural resources, failure in conservation and improvement of rain-fed land, knowledge gap with existing technology, low market infrastructure and too much regulation, institutions not geared to help women farmers, imperfections in land market and plight of small farmers.

3. Policies Needed for Revival of Indian Agriculture

Agricultural growth declined during the post-reform period, particularly since the mid-1990s as noted in the previous section. Appropriate policies are needed for achieving growth rate of 4 per cent in agriculture and increase in incomes of farmers. In order to frame these policies, it is important to identify policy issues and the needed reforms in agriculture. In this section, we discuss the policies needed for revival of Indian agriculture.

The supply and demand side constraints have to be removed to raise overall growth in agriculture. It may be noted that more than 80% of India's farmers belong to the categories of small and marginal farmers with an area share of more than 40%. The support systems and policy changes have to be tuned in such a way that they improve the productivity and incomes of the small and marginal farmers. However, the Approach Paper for 11th Five-Year Plan indicates that the entire agriculture sector is in crisis and it is not limited to small and marginal farmers. *Also*

second 'green revolution' should focus more on dryland areas. Simultaneously, the domestic reforms have to be undertaken in certain areas to improve growth and compete in globalized world.

The policies needed for revival of Indian agriculture are discussed below.

Price Policy

The major underlying objective of the Indian government's price policy is to protect both producers and consumers. Currently, food-security system and price policy basically consist of three instruments: procurement prices/minimum support prices, buffer stocks and public distribution system (PDS). Government of India (GOI) follows a Minimum Support Price (MSP) Policy for 24 major crops including paddy, wheat, jowar, bajra, maize, ragi, pulses, oilseeds, copra, cotton, jute, sugarcane and tobacco. The Commission for Agricultural Costs and Prices (CACP) recommends levels at which MSP should be fixed, based on several considerations : (i) Cost of production; (ii) Changes in input prices; (iii) Input-output price parity; (iv) Trends in market prices; (v) Demand and supply; (vi) Inter-crop price parity; (vii) Effect on industrial cost structure; (viii) Effect on cost of living; (ix) Effect on general price level, etc. Among these factors, cost of production is the important factor in determining minimum support prices.

There is a need to provide remunerative prices to farmers in order to maintain food security and increase incomes of farmers. There has been a debate on price vs. non-price factors in the literature. In our view, both price and non-price factors are important in raising agricultural production. It is true that studies have shown that aggregate supply response is higher for non-price factors as compared to price factors. However, prices play important role in cropping pattern shifts and also increase in private investments in agriculture. There are some concerns that inflation would increase if minimum support prices are raised. It may be noted that consumers' interests can be protected with open market operations and public distribution system.

During the post-reform period, terms of trade increased initially, declined in the late-1990s and increased again recently (growth also fluctuated similarly). Another problem is the volatile international agricultural prices.

In the context of globalization, tariff policy becomes important for agricultural commodities. In other words, it is important to monitor exports, imports, global supply and demand and fix tariffs accordingly. There is a need to strike a balance between producer prices and consumer prices by careful calibration of minimum support prices and tariff policy (import duties).

Macro Policies and Agriculture

There is a need to have pro-agriculture macro policies. The experience in several countries during the reform period shows that public expenditure as percentage of GDP is low and declining. As a result, public investment in rural development has declined sharply in most of the Asian countries. Consequently, agricultural growth slowed down in most countries in the 1990s. Average annual rate of growth of gross capital formation also slowed down in many countries. Trade liberalization has been associated with increased ratio of trade to GDP, improved export

performance, and diversification towards manufactured exports. However, linkages to employment are not so well established. Financial sector has historically had an urban bias. On balance, the macro policies have not been pro-employment and pro-poor in the post-reform period in many developing countries, including India. Therefore, there is a need to have pro-poor macro policies.

In terms of fiscal policy, pro-poor approach involves increasing tax/GDP ratio, improving expenditures on agriculture and rural development, infrastructure and other capital expenditures. Pro-poor monetary and financial liberalization policies should improve agricultural credit to small and marginal farmers and also to informal sector. Monetary policy should contain inflation particularly food prices and also reduce spread between lending and deposit interest rates. Pro-poor trade liberalization and exchange rate policies are needed to promote employment through labour-intensive exports and also measures to reduce volatility in prices due to globalization.

Thus, priority should be given to the policies that improve quality and quantity of employment growth. Priority to public investment in physical (irrigation, roads, communications, transport, electricity, etc.) and human infrastructure (health, education, etc.) is considered one of the important factors responsible for inclusive growth. Also, priority to rapid growth in agriculture and rural non-farm sector are important for poverty reduction.

Land Issues

Land relations are extremely complicated and this complexity has contributed significantly to the problems facing actual cultivators. Unregistered cultivators, tenants, and tribal cultivators all face difficulties in accessing institutional credit and other facilities available to farmers with land titles. One priority is to record and register actual cultivators including tenants and women cultivators, and provide passbooks to them, to ensure that they gain access to institutional credit and other inputs. As part of the reforms, lease market should be freed and some sort of security for tenants has to be guaranteed. This will ensure availability of land for cultivation on marginal and small farmers. The land rights of tribals in the agency areas must be protected. There is considerable scope for further land redistribution, particularly when waste and cultivable lands are taken into account. Complementary inputs for cultivation (initial land development, input minikits, credit, etc.) should be provided to all assignees, and the future assignments of land should be in the name of women.

On land market, the Report of the Steering Committee recommended the following: "Small farmers should be assisted to buy land through the provision of institutional credit, on a long-term basis, at a low rate of interest and by reducing stamp duty. At the same time, they should be enabled to enlarge their operational holdings by liberalizing the land lease market. The two major elements of such a reform are: security of tenure for tenants during the period of contract; and the right of the land owner to resume land after the period of contract is over,, (Planning Commission, 2007a). Basically, we have to ensure land leasing, create conditions including credit, whereby the poor can access land from those who wish to leave agriculture.

Small and uneconomic holdings are at the root of many difficulties in the way of agricultural development and farmers' incomes. In order to improve the incomes of marginal and small farmers, there is a talk that we should promote cooperative farming, Andhra Pradesh has some experiences in cooperative farming particularly in the case of women. One of the most interesting

examples of this is the Deccan Devlopment Society (DDS), an NGO working with poor women's collectives in some 75 villages in Medak district – a drought-prone tract of A.P. The DDS has helped women from landless families in establishing claims on land, through purchase and lease, using various government schemes. One such scheme of the Scheduled Caste Development Corporation in A.P. provides subsidized loans to landless scheduled caste women for buying agricultural land. Catalyzed by DDS, women form a group, apply for the loan after identifying the land they want to buy, and divide the purchased land among themselves, each women being registered as the owner of about an acre. Cultivation, however, is done jointly by each group.

On a large scale, cooperative farming may not be possible. It is true that farming has become uneconomical in India because of proliferation of marginal and small farms. However, cooperative faming in terms of pooling of individual lands and cultivating as one unit may not be practicable now. To start with, there can be cooperation in input purchases and marketing the commodities. Similar to the DDS experiment, poor women's cooperative farming can be encouraged in some parts of the state. Because of the increased pressure from small and marginal farmers on the limited land for their livelihood, there is no justification, at this stage, for encouraging corporate farming by relaxing the existing ceiling on land ownership. Basically, marginal and small farmers need assistance in input purchases, technology adoption, crop insurance, credit, output marketing, and improving rural infrastructure in a big way.

The share of women is increasing in agriculture. However, the public services are not supporting women in agriculture. We have to ensure women's rights to land (Agarwal, 1994), infrastructural support to women farmers, and their access to technical knowledge, credit, inputs and marketing.

Special Economic Zones (SEZs)

In the year 2000, the Government of India replaced the old Export Processing Zones (EPZ) policy by a new a scheme called,- Special Economic Zones' (SEZs) with some more incentives. In 2005, a bill was passed by the Parliament in the form of SEZ Act and SEZ rules were notified in February, 2006. The SEZ policy is expected to give a big push to employment, exports and investment. Since the SEZ Act was notified, 133 SEZs were notified (Table 9). Out of these, 75 Zones have been in operation. It generated 35,000 jobs. By March 2008, SEZs are expected to increase investment to Rs 1,00,000 crore and create 1 lakh jobs.

Table 9: Status Report of SEZs: Progress Since Notification of SEZ Act

Granted Formal Approval	362
Notified	133
Yet to be Notified	229
Operational SEZs	75
Investment in SEZs	Rs43,125 crore
Employment Generation	35,053
Estimated Investment by March 2008	Rs.1,00,000 crore
Estimated Direct Employment by March 2008	1,00,000

Source: Businessline, July 24, 2007

However, there are several apprehensions against the SEZs. Some of these are: "(a) generation of little new activity as there may be relocation of industries to take advantage of tax concessions, (b) revenue loss, (c) large-scale land acquisition by the developers which may lead to displacement of farmers with meager compensation, (d) acquisition of prime agricultural land having serious implications for food security, (e) misuse of land by the developers for real state, and (f) uneven growth aggravating regional inequities,, (GOI, 2007a). These are valid apprehensions. The social costs of creating large zones and the revenue loss (Rs 1,75,000 crores according to one estimate) have to be weighed against alternatives of employment generation. The government made some changes in the SEZ policy recently. According to the new policy, the government can not compel any land owner to sell land for SEZs. On the other hand, the Central Government can not take away the right of the state governments to acquire land. If a state government acquires land by force, the Central Government will not notify it under SEZ. But, in practice it is difficult to say whether state government acquired the land voluntarily or by force. In the original policy, corporate responsibility will be confined to utilizing only 30% of the land allotted, leaving the rest for development and real estate business. Now the new policy mandates that at least 50% of the land should be for processing (of goods and services).

Often, Chinese experience is given regarding SEZs. It may be noted that China has only six SEZs. Also, there are many problems in the Zones of China. One other criticism relating to India is that it would create distortions. In other words, for example, the IT units in SEZs would have tax advantage beyond 2009. On the other hand, the IT units outside SEZs will not have this tax advantage beyond 2009.

One question is whether SEZs is the policy for long run industrial development in the country. SEZs can only be a transitory phenomenon. Factors like technological, institutional and infrastructural improvements are necessary than cost minimization approach of SEZs.

Subsidies and Investments

The question of subsidies in agriculture has emerged as an important issue in recent policy debates. Undoubtedly, subsidies are effective in pushing agricultural growth to a certain extent, but it is important to make sure that they do not become a permanent feature of the Indian economy.

Input subsidies in agriculture are having adverse effect on environment. These policies are leading to degradation of land and water. These subsidies have caused severe deterioration of the systems due to the neglect of their maintenance, in addition to becoming fiscally unsustainable. Further, they have led to the highly wasteful use of canal water, ecological degradation from waterlogging, salinity, pollution, excessive consumption of electricity, and over drawl of groundwater, resulting in the shortage of drinking water in several parts of the country. Similarly, the prevailing heavy subsidy on nitrogenous fertilizers perpetuates inefficiencies in the domestic fertilizer industry. Irrigation and use of power seems to be higher under small farms as compared to large farms. Moreover, these are cornered by the farmers in irrigated areas and those in unirrigated areas do not get these subsidies. Most of the fertilizer subsidy also goes to the farmers under irrigated areas. The benefit flowing to the farmers and consumers of food is illusory, as it

is leading to the degradation of soil on account of excessive chemicalization and adverse NPK ratio. A fixed quantity of fertilizers sufficient for one or two hectares may be subsidized for all the farmers, if necessary through a system of input coupons, requiring them to purchase the remaining quantities in the market at the on-going rates.

Who gets these subsidies? During the initial stages of the adoption of new technology in agriculture some of these subsidies may be justified as ' front-up costs'. Over time it was found, that the richer states and well-irrigated areas, certain crops, and sometimes rich farmers captured a disproportionately high share of the major input subsidy programmes of fertilizer, power, irrigation and credit.

Another issue regarding subsidies is that whether these should be withdrawn without improving the efficiency in supplying inputs. While withdrawing subsidies, care should be taken to remove inefficiencies in production and distribution of inputs and services. For example, a farmer may not pay the full cost of power if reliable and continuous electricity is not supplied. The distribution system is characterized by inefficient transmission and widespread pilferage. Irrigation system is charactetrized by inflated costs on account of bad design, inferior quality of services, inefficiencies in management, delays and leakages in construction. Due to these inefficiencies, the actual subsidy going to the farmers using these inputs is far less than what is projected. A case for reducing subsidies will be strengthened if the input-use efficiency improves.

There has been a secular decline in public investment and it has been a concern as it is important for improving infrastructure. As compared to the target of 3.4 million hectares per annum, the irrigation potential harnessed during the Ninth Plan was only 1.8 million hectares per annum. It is true that private investment has increased during the 1990s. However, public and private investments cannot be treated as substitutes as their compositions are different. Public investment is mainly in medium and major irrigation works, while private investment is mainly in minor irrigation, mechanization and land levelling (Sawant et al., 2002). More public investment is needed in the rain-fed and backward areas. Many of the ills of the agriculture sector, namely, low productivity, low employment opportunities and inadequate infrastructure are attributed to inadequate and progressive decline in the public investment in agriculture.

The public investment in real terms in the agriculture sector has actually declined during the past two decades. It may be noted that inadequacy of investments has slowed the pace of technological change in agriculture with adverse effects on productivity. Investment in agriculture has declined from 2.2% of GDP in 1999-00 to 1.7% in 2004-05 (Table 10). This declining share was mainly due to stagnation or fall in public investment in irrigation, particularly since the mid-1990s. However, there is an indication of a reversal of the declining trend with public sector investment reaching its highest level of Rs 12,591 crores since the early-1990s (Table 10). As a result, the share of public sector in total investment increased from 18% in the early years of this decade to 29% in 2004-05. Private investment in agriculture, on the other hand, has continued to decline. It is a concern that overall investment which was Rs 38,215 crores in 2001-02 declined to Rs 30,532 crores in 2004-05. It is true that overall investment in agriculture during the past few years has increased from 10% to 12% of agricultural GDP. Given the low base, a dramatic

improvement is needed to enhance income generating capacities. It is estimated that 16% of investment is needed to attain 4% growth in agriculture.

There seems to be some trade-offs between input subsidies and public investment in agriculture. The problem of mounting subsidies and its effect in terms of crowding out public agricultural investment has been highlighted in the 10th Plan document[4].

The estimates of CSO's public sector investment comprise mainly of investment in irrigation projects. Some researchers feel that this is an underestimate and there is a need for widening the definition of public investment by including investment in infrastructure, like rural roads and electrification. The government allocates large funds to anti-poverty programmes. Some of these programmes also may be contributing to capital formation in agriculture.

Table 10. Gross Capital Formation in Agriculture

Year	Investment in Agriculture (Rs crore)			Share in Agricultural Gross Investment (%)		Investment in Agriculture as % of GDP
	Total	Public	Private	Public	Private	
In 1993-94 prices						
1990-91	14836	4395	10441	29.60	70.40	1.92
1995-96	15690	4849	10841	30.90	69.10	1.57
1996-97	16176	4668	11508	28.90	71.10	1.51
1997-98	15942	3979	11963	25.00	75.00	1.43
1998-99	14895	3870	11025	26.00	74.00	1.26
1999-00	17304	4221	13083	24.40	75.60	1.37
In 1999-00 prices						
1999-00	43473	7716	35757	17.7	82.3	2.2
2000-01	38735	7155	31580	18.5	81.5	1.9
2001-02	47043	8746	38297	18.6	81.4	2.2
2002-03	46823	7962	38861	17.0	83.0	2.1
2003-04	45132	9376	35756	20.8	79.2	1.9
2004-05	48576	10267	38309	21.1	78.9	1.9
2005-06	54539	13219	41320	24.2	75.8	1.9

Source: Economic Survey 2006-07, GOI (2007)

Rural Infrastructure and *Bharat Nirman Programme*

Investment in rural infrastructure is more important for agricultural growth than trade liberalization per se. The role of public and private investments in infrastructure becomes crucial in this context. The rural infrastructure plays an important role in both input and output sides. It helps to ensure timely and adequate delivery of inputs to the farmers and on the output front, integrating local markets with national and international markets. In this context, the announcement of *Bharat Nirman programme* in 2005 by the Government of India in order to

[4] More on subsidies vs. investments, see Gulati and Narain (2003)

improve agricultural and rural infrastructure is in the right direction. It covers six components of infrastructural development: accelerated irrigation benefit programme, accelerated rural water supply project, construction of rural roads, rural housing, providing rural electrification and telephone connectivity in the villages (see Box 1). The Union Budget 2007-08 provided an enhanced outlay of Rs 24,603 crores as against Rs 18,696 crores for *Bharat Nirman Programme*. The programme for repair, renovation and restoration of water bodies is being implemented through pilot projects in 23 districts of 13 states. The design of the programme has been finalized in consultation with the states. Restoration of water bodies is expected to give an element of stability to agricultural production and thereby to give a boost to yields.

Irrigation and Water Management

Water is the leading input in agriculture. Development of irrigation and water management are crucial for raising levels of living in rural areas. Around 40% of country's cultivated area is irrigated. The ultimate irrigation potential of the country has been assessed at around 140 million hectares– 58.46 million hectares from major and medium irrigation and 81.42 million hectares from minor irrigation, of which 64.09 million hectares is from groundwater sources. Nearly 37% of the available irrigation potential from major and medium irrigation projects in the country still remains to be exploited. Over 400 such projects were in the pipeline at various stages during the Ninth Plan period. When these on-going projects are completed, bulk of the remaining irrigation potential would have been exploited. Decline in public investment and the thin spread of resources over a large number of projects are responsible for the delay in completion of these projects.

Around 70% of the available potential from minor irrigation sources (81.4 million hectares) consisting predominantly groundwater sources has been utilized. Further progress towards the exploitation of the remaining potential depends on availability of electric power for pumping water in the Eastern and North-Eastern states where as much as 75% of groundwater potential still remains to be exploited. Apart from electricity, there is also a need for devising affordable schemes for financing groundwater in these states, since most of the farmers in the region are resource-poor. Tapping groundwater in the Gangetic Plains and Assam are important for raising productivity in these regions.

The *Bharat Nirman Programme* inter-alia indicates creation of 10 million hectares additional assured irrigation during the four-year period (2005-09). To achieve this, the pace of potential creation will have to be increased. Investment under Accelerated Irrigation Benefits Programme (AIBP) has to be raised significantly.

Conservation of surface and ground water has become imperative. This is best achieved when water and power are priced according to the volume of consumption. Some state governments are providing free power to farmers. This is not sustainable. Involvement of rural communities is essential in setting the user charges as well as for assessing the individual consumption.

Rain-fed areas constitute about 60% of the 142 million hectares net sown area in the country. Rain-fed agriculture is characterized by low levels of productivity and low input usage.

The bulk of rural poor lives in the rain-fed regions. Therefore, it is important to accord high priority to sustainable development of these areas through watershed development approach. In fact, watershed development has been given high priority, at least on paper, for several years, but it does not appear to be making much headway, except in isolated cases, primarily under the initiatives and close supervision of a few NGOs. Watershed development can be sustained in the long-run only through social mobilization and capacity building. Land use should be made more remunerative through the new dryland technologies and the development of infrastructure. Watershed programme addresses two different concerns in the matter of land management. One is to conserve water in drought-prone areas. However, the programme is equally effective in areas with a surplus of water where drainage and waterlogging might be a problem. Another area of concern is fodder, fuel and secondary timber availability. Because wastelands are treated under this programme, the availability of such forest produce has shown a significant increase. The proposed National Rainfed Area Authority is supposed to provide a vehicle for developing concerted action plans for rainfed areas in close consultation with state governments.

Traditional water harvesting structures like tanks have become virtually defunct. The Finance Minister in his 2004-05 budget speech had announced a scheme to repair, renovate and restore all the water bodies that are directly linked to agriculture. Their restoration involves not only the physical aspects of the task but a clear demarcation of water rights. As many as 20,000 water bodies and a command area of 1.47 million hectares have been identified in the first phase under the programme for repair, renovation and restoration of water bodies. This is important as many small and marginal farmers benefit from the programme. It is important to assign water rights to the community at large as a part of watershed approach that may be adopted for the afore-mentioned special programme for dryland farming in the arid and semi-arid regions in the country.

Agricultural Credit

The nationalization of banks in 1969 and subsequent developments led to expansion of the geographical and functional reach by commercial banks, regional rural banks (RRBs) and cooperative credit institutions. Public policy is aimed at- social' and- development banking' in the form of meeting rural credit needs and reducing the role of informal sector credit. A large number of small and marginal farmers and other vulnerable groups remain excluded from the opportunities and services provided by the financial sector.

Supply and Demand Side Issues

It is being increasingly recognized that addressing credit expansion requires a holistic approach, addressing both supply and demand side aspects. Although there has been significant expansion in banking during the past few decades, there are many supply-side problems for commercial banks, RRBs and Co-operative Banks. Some of the criticisms on the trends in rural credit in the 1990s are: (a) narrowing of the branch network in rural areas; (b) fall in credit-deposit ratios in rural areas; (c) disproportionate decline in agricultural credit to small and marginal farmers; (d) worsening of regional inequalities in rural banking – steepest decline in credit-deposit ratio in

eastern and north-eastern states; and (e) crippling RRBs[5]. Political interference including loan waivers and write-offs also resulted in unviability and sickness in some of the formal rural credit institutions.

The credit-deposit ratios increased from 55.1% in 1980 to 97.1% in 1990, but declined significantly to 49.3% by 2000. The incremental CD-deposit ratios also declined from 106.1% in the 1980s to 36% in the 1990s. Against the target of 18% for ' priority sector', the direct agricultural advances by the commercial banks are only around 11%. The position is much worse in the eastern and northern states. The Rural Infrastructure Development Fund (RIDF), started a decade ago as a measure to provide infrastructural support to agriculture in lieu of its falling share in commercial bank credit, has remained grossly underutilized, basically for want of matching contributions from the state governments. In the process, individual needs of the farmers for investment and production credit are not being adequately met.

The Kisan Credit Card Scheme, aimed at providing adequate and timely support to the farmers from the banking system in a flexible and cost-effective manner, does not seem to be working well because of various stipulations and restrictions. A more farmer-friendly credit card system needs to be operated so as to realize the objectives of the scheme.

There has been some improvement in institutional credit to agriculture during the past few years. With rising income, there will be diversification of crops. Investment needs for the production of high income-elastic agricultural products, such as dairying and livestock, horticulture, agro-forests, etc. would rise much faster now. But, the main problem is that the focus is on meeting the quantitative targets and the government has to be more sensitive to the distributional aspects of farm credit. The government has been silent on these distributional issues such as regional disparities and access to credit by small and marginal farmers. There is a suggestion that government should have sub-targeting to improve the credit flow to small and marginal farmers[6].

One issue is whether we need separate institutions for promoting credit expansion. Existing formal institutions may be sufficient for this purpose. It is true that commercial banks have their own problems, like manpower shortage, unfavourable attitude towards rural services, infrastructure and technology-related problems in rural areas, etc. Rural banking has to be friendly to small and marginal farmers and other vulnerable groups. It requires a specific type of organizational ethos, culture and attitude (Rangarajan, 2005). There is a need to remove the supply-side problems of commercial banks, RRBs and co-operative banks. As the Union Budget 2005-06 admits, ' the cooperative banks, with few exceptions, are in shambles'. This institution has to be revived as many farmers are dependent on the credit from these banks. Vaidyanathan Committee's recommendations may be helpful to revive the cooperative sector.

On demand side, some of the constraining factors for credit in rural and urban areas are: low productivity and risk and vulnerability of small and marginal farmers, low skill and poor market

[5]For more on this, see Shetty (2003) and articles in Ramachandran and Swaminathan (2005).

[6]See Reddy (2007)

linkages for rural non-farm and urban workers, vulnerability to risk for rural landless and urban poor, inadequate awareness and low financial literacy.

NABARD has also taken several initiatives that have significantly contributed to credit expansion. Self-Help group (SHG)-bank linkage programme of NABARD is an innovative programme. It was started as a pilot program in 1992. We have 22 lakh SHGs under this programme comprising more than 3 crore poor households who are accessing credit through commercial and cooperative banks. Every year 6 lakh SHGs are added. The programme is no longer confined to southern states. The non-southern states have 46% of these groups. Thus, the SHG movement is now a national movement. MFIs have been playing an important role in substituting money lenders and reducing the burden on formal financial institutions[7].

One can also learn lessons from the successful experiences in and outside India. Within India, we have good and successful practices for credit like *Kudumbasree* programme in Kerala, *Velugu (Indira Kranti Padhakam)* SHG programme in Andhra Pradesh. We have good practices in SEWA (health), BASIX (livelihoods) for insurance, while Pondicherry pilot project offers lessons for bank accounts. We can also learn from the successful practices in countries like Bangladesh, Thailand, Indonesia, Mexico and Brazil.

Ultimately, the credit expansion programme will be successful only if the productivity of small and marginal farmers improves. We have to recognize that credit expansion for farmers can not be sustained by the banking system alone, as there is a need for other measures like public investment in irrigation, research and extension, infrastructure in rural areas, proper seeds and fertilizers, good marketing system for better price, etc. Small and marginal farmers face many risks in cultivation. Credit expansion should take into account the risk element of farmers while framing policies. The agricultural officers must provide 'farm advisory' services that will help in making agriculture an integrated activity with appropriate backward and forward linkages (Rangarajan, 2005).

Risk in Agriculture

One of the differences between 'green revolution' benefits during the 1960s and 1970s and the present 'second green revolution' plan is that the risk is higher in the latter approach as it has to concentrate more on dryland areas apart from the problems in irrigated areas. Crop failures and distress sales are increasing.

Agriculture has two types of risks: Yield risk and Price risk. Crop insurance is important for taking care of yield risk. Since major cultivated area is dependent on rainfall, crop insurance is important for farmers. In place of the Comprehensive Crop Insurance Scheme (CCIS), The government introduced a new scheme entitled 'National Agricultural Insurance Scheme' (NAIS) from Rabi 1999-2000 season. The premium paid during 1999 to 2006 was around Rs 2,566 crores while total claims during that period were of Rs 7,506 crores. In the implementation of

[7]On the approach of RBI on micro finance, see Reddy (2005); on the initiatives of RBI on financial inclusion, see Thorat, Usha (2006).

NAIS, certain limitations/shortcomings relating to unit area of insurance, calculation of generated income, low indemnity level, and delay in settlement of insurance claims were observed. The government is thinking of an alternative mechanism for crop insurance.

Field surveys also show that the insurance schemes are largely ineffective, although some farmers got the benefits (Vyas and Singh, 2005). Many farmers have criticized compulsory insurance for loans taken from banks and they never got compensation inspite of low yields. Another problem is that we do not have data on yields at village level.

There are some proposals that insurance based on rainfall should be considered instead of yields. Area-based rainfall index insurance has some attractive features such as less adverse selection, less administrative costs, potential for a secondary market, can be sold to non-farmers, can be linked to microfinance and can clear the way for innovation in mutual insurance (Hazell and Skees, 2006). Some developments have emerged in India in recent years to offer rainfall insurance contracts. ICICI Lombard General Insurance Company began a pilot insurance programme that will pay farmers when there are rain shortfalls in one area, and pay others in case of excess rain. BASIX used ICICI Lombard and technical assistance from the Commodity Risk Management Group of the World Bank to develop and launch the new rainfall insurance products. BASIX began operations in March 2001, in the districts of Mahbubnagar in Andhra Pradesh and Raichur and Gulbarga in Karnataka. In 2003, the new rainfall insurance was targeted at individual farmers for three categories of groundnut and castor farmers: small, medium, and large. Given the apparent attractiveness of area-based index insurance, private sector should have entered this field quickly. But, this has not happened on any widespread scale because of several set up problems. Government may have to help in setting up basic infrastructure. In 2007-08 budget, the Finance Minister had announced that he would ask Agricultural Insurance Corporation (AIC) to start a weather-based crop insurance scheme on a pilot basis in two or three states as an alternative to NIAS.

It may be noted that crop insurance is not the long-term solution for yield variability. Risk prevention or de-risking agriculture is important. In order to de-risk agriculture, we have to focus more on land and water management including irrigation development, soil conservation, watershed development, water conservation and improvement in public delivery systems.

For taking care of price risks, futures markets are advocated. It is not, however, clear whether farmers are benefiting from futures markets. It looks like that there is a disconnect between futures markets and the farmers. The argument in favour of futures markets is that farmers in all other countries are benefiting from these markets. Indian farmers should not be denied this facility of futures markets.

Research and Extension

The yield growth for many crops has declined in the 1990s. Technology plays an important role in improving the yields. The National Commission on Farmers also indicates that there

is a large knowledge gap between the yields in research stations and actual yields in farmers' fields. There seems to be a technology fatigue in Indian agriculture. The yield gaps given by the Planning Commission (2007) are the following.

The 2003-05 data show very large yield gaps:

- Wheat: 6% (Punjab) to 84% (M.P.)
- Rice: Over 100% in Assam, Bihar, Chattisgarh and UP
- Maize: 7% (Gujarat) to 300% (Assam)
- Jowar: 13% (M.P.) to 200% (Karnataka)
- Mustard: 5% (Haryana) to 150% (Chattisgarh)
- Soybean: 7% (Rajasthan) to 185% (Karnataka)
- Sugarcane: 16% (A.P.) to 167% (M.P.)

A fresh look at the priorities of Indian agricultural research system is necessary in light of emerging prospects. There is only marginal increase in the funds for research in the recent budgets. Of course, states have to take a lead in research and extension. It is known that India spends only 0.5% of GDP on agricultural research as compared to more than 1% by other developing countries. There is considerable potential for raising the effectiveness of these outlays by reordering the priorities in agricultural research and redefining the relative roles of public and private sectors in research and extension.

A review of the research and development activities of the Indian Council of Agricultural Resarch (ICAR) system during the first two years of the 10th Plan revealed several weaknesses. Some of these are: (a) there is inadequate emphasis on the needs of rainfed areas, which account for over 60% of cultivated area; (b) crop bias with major focus on rice and wheat; (c) proliferation of programmes resulting in resources being spread thinly and lack of focus in areas of relevance and opportunity; (d) inadequate priority to emerging challenges, particularly post-harvest, marketing and environmental conservation; (e) the multiplicity of institutes with overlapping mandates leading to duplication of research work; and (f) 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. A thorough reform of ICAR system is needed to address these weaknesses.

There is a need to shift away from individual crop-oriented research focused essentially on irrigated areas towards research on crops and cropping systems in the drylands, hills, tribal and other marginal areas[8]. Dryland 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. Horticultural crops that are land-saving and water-saving should be encouraged in dryland areas. Research has to be improved on horticulture crops.

Progress in post-harvest technology is essential to promote value addition through the growth of agro-processing industry. Private sector participation in agricultural research, extension and marketing is becoming increasingly important, especially with the advent of biotechnology and

protection being given to intellectual property. However, private sector participation tends to be limited to profitable crops and enterprises undertaken by resource-rich farmers in well-endowed regions. Moreover, private sector is not interested in research for better techniques of soil and water management, rainfed agriculture, cropping systems, environmental impact and long-term sustainability. Therefore, the public sector research has to increasingly address the problems facing the resource-poor farmers in the less-endowed regions. The new agricultural technologies in the horizon are largely biotechnologies. Effective research is needed to have biotechnologies suitable to different locations in India.

Regarding extension, the existing Training and Visit (T and V) system of extension is top-down in its approach and there is little participation by the farmers. There is a need to take corrective steps to deal with the near collapse of the extension system in most states. In the absence of public provision of such services, the resource-poor and gullible farmers are becoming the victims of exploitation by the unscrupulous traders and moneylenders interested in selling inputs such as seeds, fertilizers and pesticides. There is, therefore, an immediate need for reforming and revitalizing the existing agricultural extension system in the country. The main ingredients of reforms should be: (a) active involvement of farmers through user groups/ associations; (b) participation by the private sector and the NGOs; (c) increasing use of media and information technology including cyber kiosks to disseminate the knowledge on new agricultural practices and the information on output and input prices; and (d) building gender concerns into the system, for example, by manning the extension services predominantly by women[9].

The returns to investment on research and extension will be much higher on agricultural growth as compared to other investments.

Diversification by Maintaining Food Security

There has been diversification of Indian diets away from foodgrains to high-value products like milk and meat products and vegetables and fruits. The increasing middle-class due to rapid urbanization, increasing per-capita income, increased participation of women in urban jobs and impact of globalization has been largely responsible for the diet diversification in India. Hi-value products have caught the fancy of the expanding middle-class and the result is visible in the growing demand for hi-value processed products. There is a growing demand for non-foodgrain items in India. The expenditure elasticity for non-cereal food items is still quite high in India. It is thrice as high when compared to cereals in the rural areas and over ten-times as high in urban areas. Per capita consumption of fruits and vegetables showed the highest, growth followed by edible oils. Diversification to high-value crops and allied activities is one of the important sources for raising agricultural growth. Since risk is high for diversification, necessary support in infrastructure and marketing is needed. Price policy should also encourage diversification.

However, diversification should not be at the cost of food grains and other food crops. Efforts should be continued to improve the yields of food crops.

The government wants to have second- green revolution' by diversifying agriculture in crop sector and allied activities. Diversification is unlikely to be a feasible strategy all over the country, if it is restricted only to agriculture-related activities like shift from cereals to horticultural crops. The true benefit of diversification will come if more emphasis is given on allied activities like animal husbandry and fisheries. The livestock sector contributes 5.4% to GDP and 22.7% to total output from agriculture sector. Value of milk group (Rs 103804 crore) is more compared to paddy (Rs 73965 crore) and wheat (Rs 43816 crore). Rural women play a significant role in animal husbandry and are directly involved in major operations like feeding, breeding, management and health care. As the ownership of livestock is more evenly distributed with landless labourers, and marginal farmers, the progress in this sector will result in a more balanced development of the rural economy, particularly in the reduction of poverty ratio.

Marketing

For small and marginal farmers, marketing of their products is the main problem apart from credit and extension. The contract farming arrangements are particularly useful in developing countries where small-scale agriculture is widespread. The small and marginal farmers have problems in getting inputs, credit, extension and marketing. The services provided by the contract farming companies would thus be useful for small-scale agriculture. In recent years, there has been some form of contract arrangements in several agricultural crops such as tomatoes, potatoes, chillies, gherkin, baby corn, rose, onions, cotton, wheat, basmati rice, groundnut, flowers, and medicinal plants. The contract farming arrangements have to be strengthened in order to help the small farmers. There is a silent revolution in institutions regarding non-cereal foods. New production –market linkages in the food supply chain are: spot or open market transactions, agricultural co-operatives and contract farming (Joshi and Gulati, 2003).

The contract farming is spreading throughout India for several crops in states like Andhra Pradesh (Dev and Rao, 2005), Tamil Nadu, Karnataka, Punjab and Maharashtra. From the farmers' perspective, there are risks of market failure and production problems while growing new crops. The sponsoring companies may be unreliable, may exploit a monopoly position, and/or have inefficient management and marketing problems that could result in manipulation of quota and non-fulfillment of commitments. Contract farming in India is backed up by neither law nor an efficient legal system. This is the single most constraint to widespread use of contract farming in India. The legal system can be improved with legislative measures like the model contract and code of practice, registration of contracts with marketing committees and tribunals for dispute resolutions.

Both the 11th Plan and NDC Working Groups on Marketing have supported the on-going marketing reforms. They want to take APMC amendments to their logical conclusion. However, many states are yet to frame the necessary rules. Both Working Groups have endorsed - Contract Farming'. Since several models are coming up, there is a need for mechanisms for dispute resolution and contract registration (Planning Commission, 2007).

The most important problem for the farmers is output price fluctuations. There is a big gap between producer prices and consumer prices. For example, sometimes farmers get 50

Box 1.

Bharat Nirman Programme

Bharat Nirman is a time-bound business plan for action in rural infrastructure over the four-year period (2005-2009). Under Bharat Nirman, action is proposed in the areas of irrigation, rural roads, rural housing, rural water supply, rural electrification and rural telecommunication connectivity. Specific targets have been set under each of these goals as under:

Irrigation	-	To create 10 million hectares of additional irrigation capacity
Rural roads	-	To connect all habitations (66802) with population above 1000 (500 in hilly/tribal areas) with all-weather roads
Rural housing	-	To construct 60 lakh houses for rural poor
Rural water supply	-	To provide potable water to all uncovered habitations (55067) and also address slipped back and water quality affected habitations
Rural electrification	-	To provide electricity to all un-electrified villages (1,25,000) and to connect 23 million households below the poverty line
Rural telephony	-	To connect all remaining villages (66822) with a public telephone

While the agenda is not new, the effort is to impart a sense of urgency to these goals, make the programme time bound, transparent and accountable. The funding for the programme will be met through an appropriate mix of budgetary support by the Centre and states, external aid, market borrowing and a separate window under RIDF for rural roads.

To ensure accountability, the names of villages electrified, villages connected by all-weather roads, villages provided drinking water and villages provided telephones will be put on the internet.

paise per kg. of tomatoes, while the consumers pay Rs 15/kg in urban areas. In order to protect farmers from national and international price volatilities, price stabilization fund is needed. There are different models for marketing collectively by the small and marginal farmers. These are: self-help group model, co-operative model, small producer co-operatives and contract farming. Apni Mandi in Punjab, Rytu Bazars in Andhra Pradesh, and dairy co-operatives are some of the successful cases in marketing. The real challenge lies in organising the small and marginal farmers for marketing and linking them to high-value agriculture.

Globalization and Agriculture

There has been adverse impact of trade liberalization on the agricultural economy of the regions growing crops such as plantation, cotton and oilseeds in which foreign trade is important. With liberalization, the issue of efficiency has become highly relevant as domestic production has to compete with products of other countries. In the recent years, domestic prices of several agricultural commodities have turned higher than international prices. India is not able to check import of a large number of commodities even at high tariffs. This is true not only in the case of import from developed countries where agriculture is highly subsidized but also in the case of products from developing countries. India is facing severe import competition in the case

of items like palm oil from Malaysia and Indonesia, spices from Vietnam, China and Indonesia, tea from Sri Lanka and rice from Thailand and Vietnam (Planning Commission, 2007). Cost reduction is, therefore, important for increasing producers' profit margins. The policies have to induce larger investments in yield-augmenting technological improvements and contain the adverse environmental impact of misuse of water and agro-chemicals for sustainability of growth. To compete in the global market, the country needs to reduce various post-harvest costs and undertake suitable reforms to improve efficiency of domestic markets and delivery systems. To be able to successfully compete in a liberalized trade regime, therefore, there is need for a paradigm shift from merely maximizing growth to achieving efficient growth. The effect of volatility in international prices on domestic agriculture should be checked by aligning tariffs with the changing price situation.

Implementation of the WTO Agreement on Agriculture (AOA) since 1995 has brought out the inadequacies inherent in the agreement. The ongoing negotiations in the WTO on the AOA provide an opportunity for India to rectify these inadequacies and inequalities. India should stress on the implementation of Uruguay round agreements to reduce subsidies and other distortions caused by policies pursued by developed countries.

What is the impact on India due to recent Hongkong Ministerial conference? India is likely to benefit if developed countries reduce agricultural subsidies. The phasing out of export subsidies is clearly a long overdue small step in removing distortions in the area of agriculture. But, since the total magnitude of export subsidies are only of the order of US $5 billion, it would not make much difference to markets for agricultural products until domestic support (more than US $300 billion) is reduced substantially. Unless domestic subsidies are cut, export subsidization will continue even after the- elimination of export subsidies' in 2013 or their phasing out before that. The Hong Kong conference would have been more meaningful if there had been a decision leading to substantial cuts in total-trade distorting domestic subsidies to levels below the current or planned applied levels, and serious disciplines on the Green Box subsidies and their reductions, so that overall domestic support is really decreased.

Institutional Reforms and Sustainable Agriculture

Institutional reforms are important, particularly in the domain of public systems for sustained technical progress and output growth in agriculture. "There is a limited scope for privatizing irrigation, research and extension and other infrastructural facilities. All of these will continue to be mainly the responsibility of public sector. Unless the public sector's efficiency in mobilizing resources and managing these facilities is vastly improved, *trade and price policy reforms will not make a significant difference to the pace of agricultural growth"* (Vaidyanathan, 1996, emphasis added).

Institutions for Sustainable Land and Water Management

Environmental concerns are among the policy priorities in India. Particularly degradation of land and water is alarming. Watershed development under the new guidelines, in general, has

an overall positive impact on environment. However, groundwater tables are depleting at an alarming rate. The *defacto* privatization of groundwater and subsidized power supply are the main culprits. There has been a neglect of minor irrigation sources like tanks. Shortage of drinking water has accentuated and quality of water has declined over time.

An integrated approach is needed for water resources management in the country. An appropriate strategy should integrate institutional approaches with market principles. Since institutional innovation (Water user associations) is already in place for canal irrigation, it is time now to implement volumetric pricing. There is a need to de-link water rights from land rights in order to ensure equity and sustainability.

Institutions like the water user associations (WUAs) and watershed committees are important for water management. The experience of Andhra Pradesh shows that the impact of WUAs has been encouraging in these areas, especially in terms of providing irrigation to tail-end farmers. This has been made possible by cleaning of canals and water courses and monitoring of water losses by the WUAs. Area under paddy is reported to have increased significantly following reforms. However, much of the reported increase could be statistical because of underreporting of irrigated area before reform, as this meant lesser payment of water tax to revenue department. Paddy yields are reported to have increased by 40%. Long-term solution for effective functioning of WUAs is awareness building and promoting participatory monitoring and evaluation. Unlike in the case of canal irrigation, WUAs are not found to be effective in respect of tank irrigation due to insufficient allocations.

In the case of land and forestry, watershed approach and Joint Forest Management are crucial for protecting the environment. The critical issue is sustainability of these programmes. Although watersheds have shown positive economic impact, the social issues are missing. More participatory approach and involvement of women would lead to sustainability of watershed development approach. In the case of JFM, the focus is more on high income areas like timber. Low-value products constituting sources of livelihoods for the poor have low priority. Customary rights of the tribals on podu (shifting cultivation) have to be recognised. Awareness and involvement of the civil society is a precondition for checking environmental degradation. Environmental movements would have a discerning impact in this regard.

Another concern is the land degradation due to excessive use of fertilizers and pesticides. Government has programmes such as Integrated Pest Management (IPM) and Integrated Nutrient Management (INM). Keeping in view the ill effects of pesticides and also National Policy on Agriculture, Integrated Pest Management (IPM) approach has been adopted as a cardinal principle and main plank of plant protection in the country in the overall crop production programme. Besides ongoing activities, the thrust area will be pertaining to Pest Risk Analysis (PRA) and post entry quarantine surveillance. This has become essential in the light of WTO agreement, which will facilitate more and speedier movement of plants, and planting materials globally.

Integrated Nutrient Management (INM) advocates the integrated use of all sources of plant nutrients like chemical fertilizer, bio-fertilizer and locally organic manures like farmyard manure, compost, vermi-compost, green manures, edible and non-edible oil cakes to maintain soil health and its productivity. Focusing on improving soil quality should be one of the priority areas in raising agricultural growth. Organic farming is also being encouraged in the country due to demand for these products all over the world.

District Planning

Agriculture is a state subject and most of the strategies are done at the state level. The agricultural planning at state level has become weaker as often State Plan consists of only Centrally Sponsored Schemes. The NDC resolution and 11th Plan strategy of the Planning Commission advocate state-specific planning for improvement in agricultural performance. In fact, 'District Planning' is advocated for fully utilizing the resources available from all the existing schemes. The district agricultural plan will include crop sector, livestock and fishing and be integrated with minor irrigation projects, rural development and with other schemes for water harvesting and conservation. The state governments are supposed to set up appropriate units at district level for this purpose. They have to prepare a state agricultural plan based on district plans, subject to reasonable resources from its own plan and add those available from the Centre. The plans should aim at achieving the state's agricultural growth objective, keeping in view the sustainable management of natural resources and technological possibilities in each agro-climatic region (Planning Commission, 2007). They also should include seed production, extension, credit, and natural resource management. They should fix the annual targets and funds at the start of the fiscal year and review the implementation every quarter at both district and state level.

Rural Non-farm Sector

The ultimate solution for reduction on land is to improve rural non-farm sector and planned urbanization. Rural diversification is important for several reasons. At the economy level, the demographic pressures on land have been increasing significantly in India. Urban areas have their own problems of demographic pressures. As a result, rural non-farm sector becomes an escape route for agricultural workers. In order to increase wages in agriculture and to shift the workers to more productive areas, rural diversification is required.

Chinese experience on rural transformation offers several lessons for India. Chinese government has recognised that agricultural growth is a necessary but not a sufficient condition for alleviating poverty. It has followed several approaches including migration from rural to urban areas, employment generation in rural areas to deal with surplus agricultural labour. Chinese rural industrialization strategy is the most successful example for other countries to emulate. The rural township and village enterprises (TVEs) grew rapidly following the rural reforms of 1979 and now play a significant role in Chinese rural income growth.

Chinese experience shows that globalization with better initial conditions has increased employment and incomes for workers, which in turn has been due to rural diversification. Developing countries should learn from China on agricultural growth, rural non-farm employment, public investment and human development. The impact of growth on poverty reduction is quite significant. Elements of Chinese experience such as high and labour-releasing agricultural growth, favourable income distribution through broad-based agricultural growth, availability of infrastructure, higher levels of literacy and skills, inducements for the location of enterprises in rural areas, and easy access to credit and inputs are extremely relevant for developing countries. Those who support liberalization say that China's high economic growth and impact on poverty is due to economic reforms since 1978. However, initial conditions before introduction of reforms are important. China's success is due to these better initial conditions. China introduced land reforms and invested in infrastructure, health and education before reforms. This led to high agricultural growth, and better human development. In other words, reforms work better in a more egalitarian (equality) society. Infrastructural investment was 19% of GDP in China as compared to 2% in India in the 1990s. The foreign direct investment also played an important role in improving investment in China. One important debate in India relates to the impact of FDI, particularly on retail chains on employment.

Although there has been reduction in the growth of TVEs, they are likely to remain important in Chinese rural economy. The effective functioning of a well-knit decentralized mechanism of resources and control system along with massive investment in local infrastructure and newer ventures helped the Chinese TVEs enormously.

Turning to India, it is recognized that this sector is important in both generating productive employment and alleviating poverty in rural areas as agriculture and urban areas can not absorb the increasing workforce. Within agriculture and allied activities, there seems to be some diversification towards non-cereal crops. However, risk and uncertainty is associated with diversification. Technology, infrastructure and market have to be improved in order to shift the farmers to non-foodgrain crops. By any standards, the unutilised potential of food processing in India is enormous. An expansion of this sector is an ideal way of bringing industry to rural areas, expanding the value chain of agricultural production, providing assured markets for farmers, enabling them to diversify into higher value horticultural crops and expanding employment by creating high quality non-agricultural work opportunities in the rural areas. There can not be one policy package for the entire rural non-farm sector. Sub-sectoral policies in different regions are needed.

In general, development of manufacturing sector is important for absorbing labour force productively. Right now many workers are absorbed in low-productive services sector. Encouragement to women and training and improvement in skills would enhance employment

opportunities. Leading factor for diversification is improvement in education and skills of workers. Migration is considered another form of diversification. But, it has to be based on pull factors rather than distress migration.

Two-pronged strategy is needed for enhancement in the livelihoods of the poor. On the one hand, the government should have policies to improve education and skills of the workers. On the other hand, they should have several policies to increase employment for the unskilled workers. For these two strategies, pro-poor growth engines have to be identified. Simultaneously, backward areas and social groups have to be helped for development. Livestock and forest sectors are more pro-poor in rural areas as compared to other areas. Poor suffer from inadequate access to important capitals. These are physical (roads, buildings, plant and machinery, infrastructure), natural (land, water, forests, livestock, weather), human (nutrition, health, education, skills, competencies), social and financial. There is a need to improve these capitals for the poor in order to reduce demand-side problems.

4. Concluding Observations

There are many policy challenges for Indian agriculture. Both price and non-price factors are important for higher agricultural growth. The challenges for `second green revolution' as compared to green revolution of 1960s and 1970s are: (a) globalization challenges, volitility in prices, (b) shrinking farm size than before, (c) dryland farming challenges, and (d) environmental stress. Small farmers are certainly going to remain in India the next decade or more. The main challenges are improving productivity and moving towards high-value agriculture and promote rural non-farm sector by maintaining food security for reducing poverty and hunger.

There are six deficits in Indian agriculture. These are: (a) investment, credit and infrastructural deficit; (b) research and extension (technology) deficit; (c) market deficit; (d) diversification deficit; (e) institutions deficit; and (f) education/skill deficit.

De-risking or risk prevention in agriculture through land and water management is better than insurance, etc. There are many domestic and external trade liberalization challenges and small farmers can respond and benefit from the challenges. Apart from high growth, efficiency (cost reduction) is also needed in globalized world.

Ultimately, it depends on political will at both central and state levels. Deficiency in agriculture and rural infrastructure is the biggest problem for agricultural development. There is a need for massive increase in outlays for agriculture and rural infrastructure by simultaneously improving the delivery systems. Trilemma of keeping input prices low, farm level prices high and consumer prices low has always been a challenge for policy-makers. `Business as usual approach' may not help in revival of agriculture. Declining profitability in Indian agriculture has to be reversed. The government is thinking of big push to education in 11th Five Year Plan. Such a big push is needed for agriculture. Given the short-run and

structural long-term problems in agriculture, the government should give large push to core issues like public investment in infrastructure, land and water management, including rain water conservation and watershed development, research and extension, price stabilization, etc. to make cultivation viable and profitable. There is a need to concentrate on delivery systems also. India's large number of farmers and poor can benefit if there are right policies and their effective implementation.

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Prof. Jha was a man of great vision and professional wisdom. His contributions in the area of agricultural research policy and technological change are recognized internationally. His work on research investment and its impact on agricultural productivity and growth, and resource allocation is a seminal contribution. His-in-depth understanding of micro-dimension of technological change is widely acclaimed. It was due to Prof. Jha's vision and leadership that NCAP became a centre of excellence and an institution of international repute. Indian agricultural economics profession rose to a new height and gained unprecedented visibility. Prof. Jha bestowed with several awards and recognitions.

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