AJSS, Vol. 6, No. 2, July - December 2007, pp. 60-72

AGRARIAN CRISIS: CHALLENGES AND THE WAY AHEAD

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Abstract

Indian agriculture has undergone a slump in the post-reform era. The deceleration in the agricultural sector vis-à-vis the rapid growth experienced by the manufacturing and the services has widened the gap between the agriculture and the non-agriculture sector. This paper examines the crisis that Indian agriculture is currently going through and attempts to suggest a policy-approach that can help it in its revival.

I. Introduction

Agriculture has been the mainstay of the Indian economy since 1947. This sector was considered so important for the growth of the economy that the first five-year plans launched were dedicated entirely to the development of Indian agriculture. But slowly and steadily, as other sectors grew in importance in terms of their share in GDP, agriculture was neglected in the government's policy initiatives and strategies. After the reforms of 1991 were initiated, the economy experienced a rise in overall GDP from below 6 per cent per annum in the 1990s to over 8 per cent in the recent

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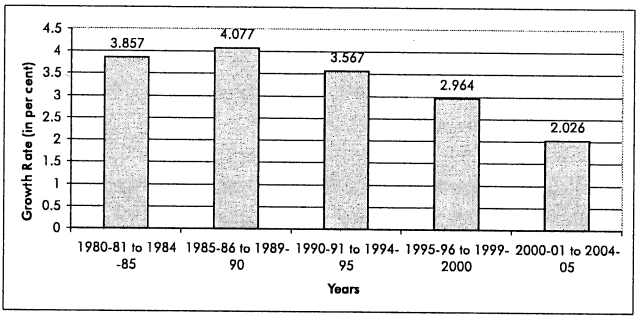
years, but agriculture did not see any corresponding growth. Thus, what is more challenging now is not the growth in overall GDP, rather the sectoral composition. Indian agriculture since the 1990s has experienced a continuous deceleration, which needs to be trapped as soon as possible.

After the mid-1990s the economy has failed to achieve the growth targets set for agriculture. The widening gap between agricultural and non-agricultural sector which can be seen in the form of rate of growth after 2000-01, i.e., 7.6 per cent per annum for non-agriculture and only 2 per cent per annum for agriculture, has been a cause for much distress among the farmer community leading them to something as extreme as committing suicides as well at times [Chand, Raju and Pandey; 2007]. This paper attempts to analyse the agrarian crisis that Indian economy is facing and focuses on the kind of solutions that can be taken up. Next section of this paper looks at the kinds of trends that have prevailed in the Indian agricultural sector. Section III analyses the causes for deceleration in agriculture. In section IV, we look at the relationship between agricultural output and the input variables and establish a link between the problems and the solution for it. Section V focuses on the measures to be taken up at various levels that will help the agriculture sector to fight the crisis it is facing. Finally, section VI presents concluding remarks of the study.

II. Agricultural Trends

A decline in the growth of agricultural sector has been observed, mainly on account of high growth rate seen in services. After the mid 1980s, which saw an annual rate of growth of 4 per cent for agriculture and allied sector (figure 1), the growth rate fell to 3.5 per cent and then below 3 in the later half of 1990s. The beginning of the new century saw agriculture growing about at just over 2 per cent per annum. Also, the share of agriculture in the overall GDP has seen a decline from 29.76 per cent during 1993-94 to 1995-96 and this fell to 23.15 per cent during the period 2000-01 to 2002-03. This is a sign of falling incomes in agriculture. What has been of major concern is that even though the share of agriculture in GDP has experienced downfall, the proportion of the population dependent on agriculture has remained more or less constant over the years; the proportion of India's rural population which is dependent on agriculture for its livelihood either directly or indirectly has not fallen much— from 76.7 per cent in 1981 census to 74.3 per cent in 1991 and according to the recent census of 2001 it has fallen marginally to 72.2 per cent.



Source: Central Statistical Organization (CSO)

Figure 1: Compounded Average Rate of Growth Rate for Agriculture & Allied Activities

After the reforms, especially since 2000-01, India has been able to accelerate its overall growth from 5 to 8 per cent per annum successfully mainly due to growth in services and also manufacturing (figure 2). But the agriculture sector has not been to prosper much. In fact, it has seen wide fluctuations in its growth rate over the years, in the year 2002-03 going down to as low as –7.3 per cent.

Output of major food grains, viz., rice, wheat, coarse cereals and pulses has seen fluctuations since the advent of the 20th century. Till 1999-2000, there was a marginal increase in the production of these crops, but an increase nevertheless. But since 2000-01 the total production of food grains has been varied, increasing in one year and decreasing in the other (table 1).

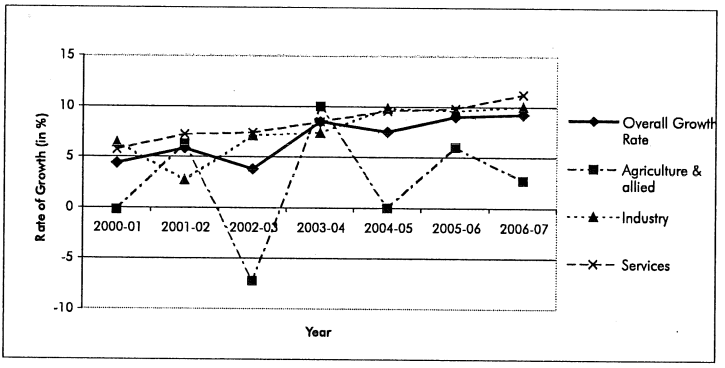


Figure 2: Sectoral real growth rates in GDP at factor cost (at 1999-2000 prices)

Table 1: Food Grains Production

(Million Tonnes)

Year→ Crop	1997 -98	1998 -99	1999 2000	2000 -01	2001 -02	2002 -03	2003 -04	2004 -05	2005 -06	2006 -07*
Rice	82.5	86.1	89.7	85.0	93.3	72.7	88.5	83.1	91.8	90.0
Wheat	66.4	71.3	76.4	69.7	72.8	65.1	72.2	68.6	69.4	72.5
Coarse Cereals	30.4	31.3	30.3	31.1	33.4	25.3	37.6	33.5	34.1	32.0
Pulses	13.0	14.9	13.4	11.1	13.4	11.1	14.9	13.1	13.4	14.5
Total	192.3	203.6	209.8	196.8	212.9	174.2	213.2	198.4	208.6	209.2

**- Advance Estimates*
Source: Economic Survey, 2003-04 and 2006-07

The per hectare productivity of major crops for the year 2004-05, namely, rice, wheat, maize, cotton and major oilseeds is way below when compared with the productivity of other countries and also significantly lower than the world average (Table 2).

It is also important to consider the real value of food grains when we look at the overall growth in agriculture. Mathur (2006) calculated this value using the WPI-based inflation in food grains and taking 1993-94 as base year and observed that the value of food grain came down consistently from Rs.88,081 crore in 1990-91 to Rs.51,565 crore in 2002-03. However, provisional estimates show some recovery in 2003-04.

Table 2: International comparisons of yield elected commodities – 2004-05

(In Metric tones/Hectare)

Rice		Wheat		Maize	
Egypt	9.8	China	4.25	U.S.A.	9.15
India	**2.9**	France	7.58	France	7.56
Japan	6.4	**India**	**2.51**	**India**	**1.18**
Myanmar	2.43	Iran	2.06	Germany	6.69
Korea	6.73	Pakistan	2.37	Philippines	2.1
Thailand	2.63	UK	7.77	China	4.9
USA	7.83	Australia	1.64		
World	**3.96**	**World**	**2.87**	**World**	**3.38**

Cotton		Major Oilseeds	
China	11.10	Argentina	2.51
U.S.A.	9.58	Brazil	2.48
Uzbekistan	7.98	China	2.05
India	**4.64**	**India**	**0.86**
Brazil	10.96	Germany	4.07
Pakistan	7.60	U.S.A.	2.61
		Nigeria	1.04
World	**7.33**	**World**	**1.86**

Source: Economic Survey, 2006-07

Thus, we see that the Indian agriculture since the 1990s has been undergoing a deceleration which needs to be checked. In the next section we look at what are the factors that have led Indian agriculture into the kind of state it is at present.

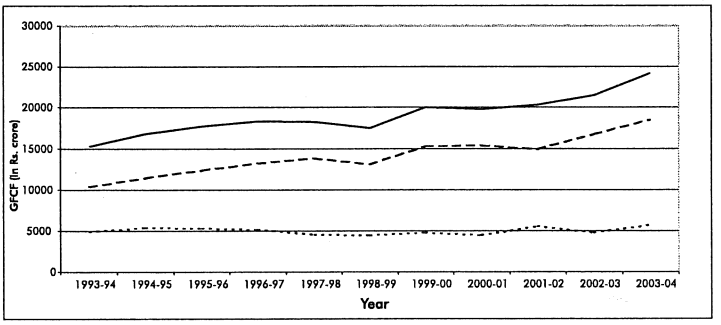
C H H Rao (2005) analyzed agricultural growth from the first decade of the planning era and suggested the continued need for provision of irrigation facilities, strengthening of extension services, developing high yield variety seeds along with adequate supply of institutional credit to increase the sector's productivity.

III. Problems Associated with Indian Agriculture

There have been many studies that have evaluated the problems that agriculture is currently facing. Mathur (2006) has empirically established that declining public investment in agriculture and fall in provision of input subsidies are major factors responsible for the lack of growth in this sector. Reddy and Galab (2006) hold the absence of any breakthrough technology in agriculture responsible for deceleration in agricultural sector. No significant advancements have been made in dry-land technology. What needs to be understood is that the potential for increasing land productivity is limited, hence development of irrigation and moisture conservation facilities becomes very critical, but in the past two decades the progress achieved in this area has been limited.

Suri (2006) looks into the political side of this and emphasises the lack of political will shown by various parties in power which has caused the downfall of this sector. According to him the political leadership is not interested in safeguarding and promoting the interests of the farmer community because they do not see any incentive attached to such kind of an activity.

One of the major causes that have been attributed to the decline in growth of agriculture sector in India has been the fall in proportion of Public Gross Fixed Capital Formation (GFCF) as against Private GFCF (Figure 3). The proportion of public investment to total investment in agriculture at constant prices was 32.3 per cent during 1993-94, which has come down to 23.6 per cent during 2003-04. During 1999-2000 to 2002-03 both total and private investments in agriculture were stagnant. Public investment in agriculture at constant prices has come down since 1994-95, a trend that continued till 2000-01 although this improved somewhat in subsequent years.



____ GFCF -------- Private GFCF ..... Government GFCF

Source: Agricultural Statistics at a Glance 2005, Ministry of Agriculture

Figure 3: Gross Fixed Capital Formation for Agriculture at Constant Prices (1993-94)

The comparison of proportion of GFCF in agriculture to overall GFCF shows the pitiable condition of Indian agriculture vis-à-vis other sectors (Table 3). Average annual overall GFCF from 2000-01 to 2003-04 has been 24.35 per cent of the GDP, whereas annual GFCF for the same period in agriculture sector has been 7.27 per cent per annum of the total GDP. Public sector contribution in GFCF in the agricultural sector has been abysmally low—only 1.92 per cent as against 5.35 percent for the private sector.

Clearly, low fixed capital formation in agriculture sector is one of the major factors that has caused the deceleration in the rate of growth of the agricultural sector. Low rate of capital formation means lack of infrastructure which can be seen in the form of inadequate irrigation facilities; still a large proportion of the cultivated area is rain dependent and a few seasons of bad monsoon can have a major adverse impact on the productivity and the incomes of farmers.

Table 3: GFCF in Agriculture as Compared to Overall GFCF

(In Per Cent)

Year	Overall GFCF/GDP			GFCF/GDP in Agriculture		
	Public	Private	Total	Public	Private	Total
1993-94	8	13.4	21.4	2.03	4.27	6.30
1998-99	6.5	15.1	21.6	1.71	4.32	6.04
2000-01	6.9	16.7	23.6	1.74	5.26	7.00
2001-02	6.9	16.8	23.7	2.03	4.92	6.95
2002-03	6.2	18.5	24.7	1.87	5.61	7.48
2003-04	6.5	18.9	25.4	2.04	5.59	7.63

Source: Economic Survey 2004-05
Agricultural Statistics at a Glance 2005, Ministry of Agriculture.

Table 4 provides the data on net cultivated area and the area under irrigation. Net Cultivated Area (NCA) has become stagnant at 142 million hectares. If the pace of irrigation development that was maintained in the decade of 1990s, it would help in attaining only 0.78 per cent rate of growth in output.

Table 4: Net Cultivated Area and Area under Irrigation

(Million Hectares)

Particulars	1979-80	1989-90	1999-00
Net Cultivated Area	140.6	142.4	142.0
Cropping Intensity	122.6	128.8	134.6
Net Irrigated Area	38.4	46.9	56.0
Irrigated Crop Intensity	127.8	131.9	136.3
Irrigation Ratio: NIA/NCA	27.3	32.9	39.5

Source: National Accounts Statistics

Inefficient use of land and water resources has also added to many already existing inadequacies in the agricultural sector. Decline in soil fertility has been compensated for with increased use of fertilizers. The use of fertilizers was significant in increasing the productivity through the 1970s and 1980s but now their increased use has lowered soil quality and thus pushed up the costs. The land use pattern in India reveals out of the 304.9 million hectare area, 40.9 million hectare area is under either non agricultural use or barren and unproductive land. Water resources are

becoming extremely scarce, as India has only 4 per cent of the world's water resources and 16 per cent population. The advent of bore well technologies has facilitated the over exploitation of groundwater resources in many regions. The capital intensive and lumpy nature of these investments coupled with well failure (depletion of water table), is one of the main reasons for indebtedness in the farm community. The problem of groundwater depletion is due to the neglect of the linkages between replenishing mechanisms like tanks. According to some studies the availability of ground water for irrigation would emerge as a major bottleneck for attaining self-sufficiency in food grains by 2020, as demand for irrigation would exceed its availability by nearly 30 per cent.

Rural credit policies also need to undergo a change, which currently encourage private moneylenders. There is an absence of seed and other input policies. The role of extension services has declined over time, leaving farmers in the dark regarding, quality of inputs, soil quality, availability of groundwater, etc. The spread of high input intensive and remunerative crops like cotton into the marginal lands and fragile resource regions has caused further degradation of resources, especially groundwater, and cost escalation. Due to the absence of a stable policy support, shifting of farmers towards high remunerative crops and horticulture hasn't yielded any favourable results.

Thus a change in the attitude of the government towards agriculture in form of some drastic policy-changes is required. The government should try to provide a conducive policy environment in the form of markets, stable prices, storage and processing facilities to the marginal farmers.

IV. Agriculture Output and Input Variables

In order to establish a relationship between agricultural output and various input variables, Co-efficient of Correlation, r was used. The input variables used are Investment— total, public and private, fertilizers (NPK) and input subsidies.

The data for Output in agriculture (at market price) was used for the years 2000-01 to 2005-06 at 1999-2000 prices. The correlation coefficient between Public Investment and Agricultural GDP is found to be as high as 0.9687, which shows a very strong positive relationship between Public Investment and Agricultural Output. This co-efficient when calculated between Private Investment and Agriculture GDP goes down slightly to 0.8347. This signifies that public investment proves to be far more effective in providing an impetus to agricultural growth than the private investment. So even though private investment in agriculture has gone up, it is public expenditure that will help it more to face the current crisis.

The use of fertilizers and grant of input subsidies also yields a high correlation of 0.8428 and 0.4856 respectively, though lower than public expenditure; this only goes to show that input subsidies can only be a short term solution and sustainable growth can be achieved only through constant increases in public expenditure which would lead to capital formation. Therefore, when we think of policy measures to revive agriculture the above mentioned relationships should be kept in mind, as they state what kind of a policy will be more effective than the other.

V. Policy Approach

Government needs to take some urgent and strong measures to reverse this trend of deceleration in agriculture. Firstly, it needs to increase its investment outlay which has been on a decline during the past decade. Not only the outlay is important, but where and how this expenditure is channelized is also of much significance. More stress needs to be laid on long term measures like development of physical infrastructure, like dams, irrigation facilities, investment in research and development (R&D) and human capital; rather than on just short term measures like credit facilities.

The problem of disguised unemployment, which is rampant in this sector, can be solved by developing agro-based industries and thus creating strong backward and forward linkages. This would lead to shifting of some of the labour from the agricultural sector to the industries, which would also help in increasing the per capita income of this sector.

Favourable pricing and procurement policies need to be formulated, which would help to increase income of farmers. Currently, the kind of policies followed by the government is biased in the favour of wheat and paddy only and ignores other cereal and dry land crops.

Efficient use of land and water resources needs to be promoted. Earlier we saw that the net cultivated area has stagnated over the past decade. This can be increased by raising a greater number of crops on the same piece of land, a technique that has been termed *Crop Intensity*. This expansion heavily depends on the provision of irrigation facilities. It has been revealed that if the irrigation potential is fully exploited it would raise the present level of output by 50 per cent (Chand 2006). This implies that if the entire irrigation potential is exploited, by the year 2020 it would enable the country to realise a growth rate of around 2 per cent per annum for two decades. Such kind of a target would need an increment in the irrigated area by 31.8 million hectares by 31.8 million hectares and this is more than double the irrigation potential created during the 1990s decade.

The wasteland of 79.5 million hectares needs an effective and efficient strategy to be developed as agricultural land. Heavy capital investments, especially from the government are required. Mechanisms like leasing out these wastelands to local households need to be developed to make a productive use of wastelands.

Educating farmers about the judicious use of these fertilizers can solve the problem of degradation of soil due to excessive use of chemical fertilizers. Also using these fertilizers with the organic ones will help to maintain the soil salinity. Thus, methods of quick decomposition of biomass that is available in abundance in India need to be developed.

As far as water resources are concerned, first there is an urgent need of making farmers aware about the value of efficient use of water and its sustainable use. Saleth (1996) found out that a 10 per cent improvement in water use efficiency is equivalent to increase in gross irrigated area by 14 million hectares. Measures like rainwater harvesting and groundwater recharging also need to expand simultaneously.

The government policies also need to pay attention to income and work security of small and marginal farmers. Development of SAZs (Special Agricultural Zones) has been suggested by many experts in this context. These special zones would be -integrated packages of technology, techno-infrastructure and producer oriented trade, which would aim at bringing about Small Farm Management Revolution.

The failure of development of any new technology has been a cause for declining trend in Indian Agriculture. Thus, a strong R&D culture needs to be created for the development of innovations and breakthroughs in agriculture. Measures need to be taken to work towards generating technologies and practices for sustained increases in productivity especially for rain-fed areas and for methods by which costs of irrigated agriculture can be reduced, and adverse environmental consequences contained. The need of public sector becomes very critical and needs to be redefined. Public research and extension services need to be integrated and focus on domestic markets and small producers. Decentralization of powers to the ground level is required to maximize local benefits. The Indian Council of Agricultural Research (ICAR) must focus on developing and strengthening R&D institutions at zone and state level. Agriculture education must be on the high priority to match the international standards. Though, what is the most important is developing a well-informed political constituency for public agricultural R&D. Thus, the entire R&D sector needs a reorientation towards performance.

The urgent need for taking agriculture to a higher trajectory of 4 per cent annual growth can be met only with improvement in the level and quality of agricultural

reforms undertaken by the various States and agencies at the various levels. The need of the hour is to push for a second Green Revolution that would be, unlike the first revolution, more widely spread in terms of both, crops covered and the geographical area.

VI. Conclusion

Indian agriculture since the reforms of 1990 has undergone a slump period, which needs to be trapped immediately. A declining growth trend, which has seen wide fluctuations, has been observed. Fall in proportion of public expenditure and gross fixed capital formation have been the most disturbing trends that need to be reversed. Inefficient use of land and water resources is also the reason for low productivity. Many policy factors like biased price and procurement policies, unfair credit policy system and input policies have also contributed the deceleration of output growth.

A strong relationship is seen between agriculture output and public investment and subsidy, which establishes the importance of increasing public expenditure to increase the productivity. Efficient use of scarce resources needs to be promoted through education and developing effective technologies. Development of agro-based industries and creation of strong forward and backward linkages, which would solve the problem of disguised unemployment in agriculture.

Creation of a strong R&D network that would work towards developing new technologies to raise agricultural productivity and thus help the sector to usher into a more widespread second Green revolution that would help India to move up to a higher growth trajectory of the aimed 4 per cent.

Annexure

Statistical Parameter, Co-efficient of Correlation, r_{xy}, was used to establish a relationship between Agriculture GDP and input variables.

$$r_{xy} = \frac{n\sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n\sum x_i^2 - (\sum x_i)^2}\,\sqrt{n\sum y_i^2 - (\sum y_i)^2}}.$$

where $\bar{x}$ and $\bar{y}$ are the sample means of X and Y, s_x and s_y are the sample standard deviations of X and Y and the sum is from $i = 1$ to n

GDP and Public and Private Investment in Agriculture and Allied Activities

Year	GDP at Mkt Price (Rs. Crore)	Public Investment (Rs.Crore)	Private Investment (Rs.Crore)	Total (Rs.Crore)
2000-01	4685	7155	31580	38735
2001-02	5219	8746	38297	47043
2002-03	5099	7962	38861	46823
2003-04	5336	9376	35756	45132
2004-05	5366	10267	38309	48576
2005-06	5951	13219	41320	54539

Note: 1999-00 prices used.
Source: Agricultural Statistics at a Glance 2006

GDP of Agriculture and All-India Consumption of Fertilizers

Year	GDP at Market Price	Use of N, P & K Fertilizers (in 0000 tonnes)
2000-01	4685	167.02
2001-02	5219	173.6
2002-03	5099	160.94
2003-04	5336	167.99
2004-05	5366	183.98
2005-06	5951	203.4

N: Nitrogen P: Phosphate K: Potash
Source: Same as above

GDP of Agriculture and Subsidies Granted

Year	GDP at Market Price	Total Subsidies
2000-01	4685	36007
2001-02	5219	38142

2002-03	5099	36514
2003-04	5336	35458
2004-05	5366	41372
2005-06	5951	NA

Total includes Fertilizer, Irrigation, Electricity and other subsidies.
Source: Same as above.

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