

INDIA'S NATIONAL AGRICULTURAL POLICY: A CRITIQUE

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Agriculture is described as the backbone of Indian economy, mainly because of three reasons. One, agriculture constitutes largest share of country's national income though the share has declined from 55 percent in early 1950s to about 25 percent by the turn of the Century. Two, more than half of India's workforce is employed in its agriculture sector. Three, growth of other sectors and overall economy depends on performance of agriculture to a considerable extent. Besides, agriculture is a source of livelihood and food security for large majority of vast population of India. Agriculture has special significance for low income, poor and vulnerable sections of rural society. Because of these reasons agriculture is at the core of socio economic development and progress of Indian society, and proper policy for agriculture sector is crucial to improve living standards and to improve welfare of masses.

1 BROAD CHARACTERISTICS OF AGRICULTURE

Agriculture in India is in the hands of millions of peasant households, a bulk of which comprise tiny land holdings with preponderance of owner cultivation. There is hardly any direct government intervention in the production and investment decisions of the farmers but the government does influence the legal, material and economic environment in which farmers operate (Vaidyanathan 1996).

Though tremendous progress has been made to exploit irrigation potential in the country still two third of area under cultivation is unirrigated and there is thus heavy dependence of production on vagaries of nature i.e. rainfall. Irrigated areas have experienced sharp increase in productivity level and large part of output at such farms is for market. On the other hand, productivity in unirrigated areas has remained

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either stagnant or experienced very small growth and most of the farmers in such areas produce for subsistence purpose.

At overall level, agricultural growth remained slow (below 3 percent) in the country. Apart from that, agricultural growth remained confined to a few well endowed pockets which has created regional disparities.

2 PHASES IN AGRICULTURAL POLICY

There is a close association between agricultural policy followed in the country and the magnitude and sources of output growth. Based on these, agricultural policy followed during the last five decades can be broadly distinguished in 3 phases. A detailed description of policy followed in each phase is given in Rao (1996) and in this section we have drawn mainly from this paper.

The period from 1950/51 to mid 1960s which is also called pre green revolution period witnessed tremendous agrarian reforms, institutional changes and development of major irrigation projects. The intermediary landlordism was abolished, tenant operations were given security of farming and ownership of land. Land ceiling acts were imposed by all the states to eliminate large sized holdings and cooperative credit institutions were strengthened to minimise exploitation of cultivators by private money lenders and traders (Radhakrishna 1993). Land consolidation was also affected to reduce the number of land fragments.

Expansion of area was the main source of growth in the pre green revolution period. The scope for area expansion diminished considerably in the green revolution period in which growth rate in area was less than half the growth rate in the first period. Increase in productivity became the main source of growth in crop output and there was significant acceleration in yield growth in green revolution period. The main source of productivity increase was technological breakthrough in wheat and rice. The country faced severe food shortage and crisis in early 1960s which forced the policy makers to realise that continuous reliance on food imports and aid imposes heavy costs in terms of political pressure and economic instability (Rao 1996) and there was a desperate search for a quick breakthrough in agricultural production.

One choice before the country was to go for spread of new seeds of high yielding varieties (HYV) of wheat and rice which were available with CGIAR

institutes like CIMMYT and IRRI. Amidst a serious debate the then Government took bold decision to go for the import and spread of HYV of wheat and rice which involved use of fertilisers and irrigation. This marked second phase of agriculture policy in the country. The strategy produced quick results as there was quantum jump in yield. Consequently, wheat and rice production in a short span of 6 years between 1965/66 and 1971/72 witnessed an increase of 30 million tonnes which is 168 percent higher than the achievement of 15 years following 1950/51.

The biggest achievement of new agricultural strategy, also known as green revolution technology, has been attainment of self sufficiency in foodgrains. Since the green revolution technology involved use of modern farm inputs, its spread led to fast growth in agro input industry. Agrarian reforms during this period took back seat while research, extension, input supply, credit, marketing, price support and spread of technology were the prime concern of policy makers (Rao 1996).

Two very important institutions, namely Food Corporation of India and Agricultural Prices Commission, were created in this period in the beginning of green revolution period, to ensure remunerative prices to producers, maintain reasonable prices for consumers, and to maintain buffer stock to guard against adverse impact of year to year fluctuations in output on price stability. These two institutions have mainly benefited rice and wheat crops which are the major cereals and staple food for the country.

The next phase in Indian agriculture began in early 1980s. While there was clear change in economic policy towards delicensing and deregulation in Industry sector, agriculture policy lacked direction and was marked by confusion. Agricultural growth accompanied by increase in real farm incomes led to emergence of interest groups and lobbies which started influencing farm policy in the country. There has been a considerable increase in subsidies and support to agriculture sector during this period while public sector spending in agriculture for infrastructure development started showing decline in real term but investments by farmers kept on moving on a rising trend (Mishra and Chand 1995, Chand 2001). The output growth, which was concentrated in very narrow pockets, became broad-based and got momentum. The rural economy started witnessing process of diversification which resulted into fast growth in non foodgrain output like milk, fishery, poultry,

vegetables, fruits etc which accelerated growth in agricultural GDP during the 1980s. This growth seems largely market driven.

3 RECENT TRENDS

Though green revolution has been widely diffused in irrigated areas throughout the country, the dryland areas have not seen benefit of technological breakthrough as witnessed through green revolution technology. Of late, improved varieties of oilseeds and coarse cereals have provided some opportunities for productivity growth in dryland areas. A new phase was started in India's economic policy in 1991 that marked significant departure from the past. Government initiated process of economic reforms in 1991, which involved deregulation, reduced government participation in economic activities, and liberalization. Though much of the reforms were not initiated to directly affect agriculture sector, the sector was affected indirectly by devaluation of exchange rate, liberalisation of external trade and disprotection to industry. Then came new international trade accord and WTO, requiring opening up of domestic market. Initially there were strong apprehensions about the impact of trade liberalisation on Indian agriculture which later on turned out to be real threat for several commodities produced in the country.

All these changes raised new challenges and provided new opportunities that required appropriate policy response. Besides, last two decades had witnessed mainly price intervention that had a very limited coverage, and there was a sort of policy vacuum. Because of this, there was a strong pressure on the government to come out with a formal statement of agriculture policy to provide new direction to agriculture in the new and emerging scenario. In response to this, government of India announced New Agricultural Policy in July 2000.

4. NEW AGRICULTURAL POLICY AND CHALLENGES IN INDIAN AGRICULTURE

The challenges facing Indian agriculture can be grouped in four categories relating to (1) growth (2) sustainability (3) efficiency and (4) equity. There are also other important concerns like food security, livelihood, employment, improvement in standard of living of agricultural population. Addressing these challenges requires

efforts on several fronts like incentive structure, infrastructure, technology, market development, extension, regulations, input supply, tenancy etc. New agriculture policy should address above challenges through efforts in abovementioned areas and also provide direction to the future of agriculture in the country.

The National Agricultural Policy (NAP) document aims to attain output growth rate in excess of 4 percent per annum in agriculture sector based on efficient use of resources. It seeks to achieve this growth in a sustainable manner and with equity. The Policy resolution than describe in detail the strategy and policy alternatives which are grouped under the following heads:

1. Sustainable agriculture
2. Food and nutrition security
3. Generation and transfer of technology
4. Inputs management
5. Incentive for agriculture
6. Investment in agriculture
7. Institutional structure
8. Risk management

4.1 Growth prospects

Agricultural growth is essential for the sector's progress and for overall growth of Indian economy. This growth rate is also a sort of essential condition for improving living standard of those who are dependent on agriculture. Past growth experience of Indian agriculture can be seen from Table 1.

The main goal of National Agricultural Policy to achieve growth rate higher than four percent seems to be formidable task particularly when we look at historical rate of growth in Indian agriculture. As can be seen from Table 1 long run growth rate in Indian agriculture in the post Independence period is found to be 2.55 percent per annum. This growth rate includes contribution of technological breakthrough of green revolution and major expansion in irrigation and in area under cultivation. Out of these three sources of output growth the scope for expansion of cultivated area is much more limited in future compared to that experienced in the past. Net cultivated area (NCA) has become stagnant at 142 million hectares (Table 2) and unless serious efforts are launched to bring wastelands under cultivation there would be no scope to expand

NCA. However cultivated area as such can be expanded by raising more number of crops on the same piece of land i.e. by raising crop intensity. This expansion depends heavily on provision of irrigation.

Table 1: Growth rates in GDP and value of output of agriculture and its sub sectors at 1993-94 prices

Period	GDP			Value of Output			
	Agri. & allied	Agri-culture	Fishing	Crop sector	Live-stock	Fruit & vegetable	Non horti. crops
Decade - wise growth rates							
1950-51 to 1959-60	2.71	2.93	5.79	3.06	1.42	0.56	3.44
1960-61 to 1969-70	1.51	1.27	4.00	1.70	0.41	5.82	1.09
1970-71 to 1979-80	1.74	1.94	2.90	1.79	3.92	2.88	1.55
1980/81 to 1989-90	2.95	3.13	5.82	2.47	4.99	2.36	2.48
1990/91 to 1999/2000	3.23	3.28	5.46	2.99	3.82	5.97	2.26
Historic growth rate							
1950-51 to 2001-02	2.55	2.66	4.31	2.65	3.12	4.00	2.39
Reforms: growth rate							
1990/91 to 1995/96	3.15	3.16	7.49	2.65	4.25	4.93	2.13
1996/97 to 2001/02	1.82	1.75	2.72	1.28	3.47	4.55	0.34
Post WTO growth rate							
1990/91 to 1995/96	3.15	3.16	7.49	2.65	4.25	4.93	2.13
1990/91 to 1996/97	3.64	3.69	7.41	3.22	4.12	5.92	2.59
1990/91 to 1997/98	3.33	3.35	6.90	2.92	3.95	5.91	2.21
1990/91 to 1998/99	3.37	3.43	5.90	3.10	3.89	6.14	2.36
1990/91 to 1999/00	3.23	3.28	5.46	2.99	3.82	5.97	2.26
1990/91 to 2000/01	2.98	3.01	5.07	2.66	3.76	5.88	1.84
1990/91 to 2001/02	2.94	2.95	4.96	2.58	3.73	5.78	1.76

Source of data: National accounts Statistics, various issues.

According to official estimates, available water resources can provide irrigation to 140 million hectares area (Tenth Five Year Plan Vol. 2 Ch. 8) which can provide irrigation to 72 percent of gross cropped area, assuming irrigated crop intensity to be 1.36, as compared to 40 percent area under irrigation at present. Further, productivity of one hectare of gross irrigated area is reported to be 2.75 times the productivity of unirrigated area (Dhawan 1994 p. 83). A simple exercise based on this information reveals that if irrigation potential is fully exploited it would raise present level of output by 50 percent. This further implies that if the entire irrigation potential is exploited by the year 2020 it would enable the country to realize annual growth rate of the order of 2.00 percent per annum for two decades. This would require decadal increment in gross

irrigated area by 31.8 million hectare, which is more than double the irrigation potential created during the decade of 1990s. In case the pace of irrigation development is maintained at the level of decade of 1990s, it would help in attaining only 0.78 percent growth rate in output.

Table 2: Changes in net and gross cultivated area and area under irrigation: 1950/51 to 1999-00 (Million hectare)

Particular	TE	TE	TE	TE	TE	
	1950-51	1959-60	1969-70	1979-80	1989-90	1999-00
Actual area:						
Net sown area	118.8	131.3	138.7	140.6	142.4	142.0
Gross sown area	131.9	150.1	161.8	172.3	183.4	191.1
Cropping Intensity	111.1	114.3	116.7	122.6	128.8	134.6
Net Irrigated area	20.9	23.5	28.8	38.4	46.9	56.0
Gross irrigated area	22.6	27.0	35.2	49.1	61.8	76.4
Irrigated crop intensity	108.2	114.8	122.3	127.8	131.9	136.3
Irrigation ratio: NIA/NCA	17.6	17.9	20.8	27.3	32.9	39.5
Incremental area during the previous decade:						
Net sown area		12.5	7.4	2.0	1.8	-0.4
Gross sown area		18.2	11.8	10.5	11.1	7.7
Net Irrigated area		2.7	5.3	9.6	8.4	9.2
Gross irrigated area		4.5	8.2	13.9	12.7	14.5
Ultimate Irrigation potential						140

This shows that tremendous efforts are needed in development of irrigation in the country to help attain growth rate stipulated in National agricultural Policy. This would require very sharp increase in public investments in agriculture, which has remained either stagnant or followed decline during the last two decades. It would not be an exaggeration to say that for creating such a magnitude of irrigation potential would require trebling of public investments in real terms. Second, expansion of irrigation through conventional means like major irrigation projects is likely to face resistance from various environmental groups.

Growth rate results presented in Table 1 indicate that among all the five decades in post independence India, highest growth rate is realized during the decade of 1990s. This is the result of three factors. Main factor underlying high growth during the last decade is diversification towards horticultural crops. Horticultural crops showed trend growth rate close to 6 percent, which helped agriculture sector to attain growth rate of 3.28 percent. Second, the decade of 1990s has witnessed highest expansion in gross

irrigated area. Third, favourable terms of trade for agriculture are considered as another factor for favourable growth during 1990s.

It would also be seen from Table 1, that, after area expansion effect of 1950s, non horticultural crops never showed growth rate exceeding 2.5 percent. In contrast to this, horticultural crops, livestock and fishery have shown the potential to grow at the rate of 4-5 percent for a long time. A simple exercise done by us reveal that due to large difference in productivity per unit of land a one percent shift in area from non-horticultural crops to horticultural crops raises overall output of crop sector by 4 percent.

These results and growth rate information presented in Table 1 makes it evident that to achieve growth rate of four percent in agriculture India needs to follow diversification of its agriculture extensively alongwith exploitation of its irrigation potential at a faster rate compared to the past. A slight acceleration in growth rate for the whole decade of 1990s should not be taken as a sustainable achievement as there are worrying signs of slowdown in growth rate of almost all the sub sectors of agriculture during the second half of decade of 1990s.

4.2 Sustainable agriculture

The policy aims to promote technically sound, economically viable, environmentally non – degrading and socially acceptable use of country's natural resources – land, water and genetic endowments. This indeed is a tall order.

Land Resources

Status of land resources of India is presented in Table 3. Out of 304.9 million hectare area for which land use information is available item 1 and 2 cannot be considered for biotic production. This leaves 264 million hectare area that can be considered for some sort of biotic production. Out of this 142.2 million hectare area is under cultivation. The challenge relating to this land area is to maintain its fertility status and protect against degradation due to soil erosion, chemicalisation, waterlogging and salinisation and alike problems. In the remaining area, sum of items 6 to 10 can be taken to represent maximum wasteland area, assuming forest with poor cover and permanent pasture and grazing grounds are more or less bereft of vegetative cover. This comes to 79.5 million hectare which is more than half of the

size of area under cultivation. NAP proposes to put this so called wasteland to use for agriculture and afforestation, but it does not elaborate any strategy to do so. Most of this land requires heavy capital investments to make it productive. Such investments can either come from corporate sector or from government but serious apprehensions have been expressed to allow corporate sector to control these lands. Enough care is also needed to ensure that some proportion of common property waste lands remains around all habitation to serve the community needs and needs of resource poor rural populace. Some innovative mechanisms like leasing such lands to local households needs to be evolved to make productive use of wastelands.

Table 3: Land Use pattern in India

Category	Area
1. Area under non agricultural uses	21.2
2. Barren and uncultivable land	19.7
3. Net sown area	142.2
4. Forest land under good tree cover	38.6
5. Misc. tree crops and groves	3.7
6. Forest lands under poor tree cover	29.3
7. Cultivable wastelands	15
8. Current fallows	13.8
9. Old fallows	9.6
10. Permanent pastures and grazing lands	11.8
11. Total of above	304.9

It needs to be noted that wastelands in India are not confined only to items 6 to 10 in Table 3. According to the information provided by the Department of Land Resources in the Ministry of Agriculture, GOI, 175 mha area suffers from degradation. This exceeds the wasteland area by 95.5 mha (175 minus 79.5 items 6 to 10). According to Department of Land Resources this area of 95.5 mha must be a part of the 142.2 mha of land under agriculture. On that reckoning 2/3rd of our agricultural lands are degraded or sick to some extent and only one third are in good health.

In the case of degradation of cultivable land the problem seems to be less complex compared to the wastelands. In some cases use of chemical fertiliser is held responsible for soil degradation. This is somewhat surprising because level of use of inorganic fertilizer in the country is quite low. The reason for adverse impact of

chemical fertilizer in the country does not seem to be because of excessive use but because of indiscriminate and non-judicious use. The problem can be tackled by creating awareness among farmers about proper use of fertiliser, and appropriate price structure for various formulations of fertiliser.

Another healthy way to take advantage of chemical fertilizer is by using them alongwith organic fertilizer. There is lot of wastage and diversion of valuable animal dung. Similarly, lots of agricultural bio mass go waste that can be decomposed to produce organic fertilizer. In some parts of the country like North West India lakhs of tonnes of rice and wheat straw is disposed off by burning. This not only causes wastage of biomass but also causes lot of air pollution. Efficient and quick methods for decomposing such biomass would increase availability of organic matter for application in agricultural land.

NAP emphasises use of watershed approach to manage land resources. Watershed approach is also proposed for rainfed agriculture. There are several success stories related to success of watershed approach which includes some outstanding and impressive experiences like those seen in Sukhomajri, Ralegaon Sidhi, Adgaon. There are two aspects of this strategy. One, to protect the inhabitants of fragile eco systems from acute distress caused by recurring drought. In such cases it is basically a survival strategy (Hanumantha Rao 2000). It is important to distinguish this strategy from wider strategy for development of agriculture in dryland or raifed area (Hanumantha Rao op. cit.) as proposed in the National Agricultural Policy. The success of watershed approach as a wider strategy for development of rainfed agriculture would require other ingredients like technology, credit, market and roads, remunerative price environment. Further, participation of local community is critical for success of watershed approach. This requires change in capability and incentives of government bureaucracy in organising communities to take advantage of watershed approach (Kolavalli and Kerr 2002).

Water Resources

Water resources are becoming extremely scarce as demand for water for agricultural, industrial and household uses is increasing rapidly. It is often quoted that future wars would be fought over water and water would be the source of maximum local conflicts. As India has only 4 percent of world water resources and 16 percent

share in population (Iyer 2001) water scarcity is more acute in the country compared to world average. The pressure on water resources is increasing with population growth, urbanisation and improvement in living standard.

According to some scholars availability of ground water for irrigation would emerge as a critical bottleneck for self sufficiency in foodgrain by the year 2020 as demand for irrigation would exceed its availability by nearly 30 percent (Chopra and Golder 2000). Similarly, National Commission for Integrated Water Resource Development Plan has projected that requirement for irrigation water in India would grow by more than 50 percent by 2050. Evidence is accumulating that water table in several states is getting depleted at a fast rate. Based on various assessments it is concluded that even after fully exploiting available water resources water supply can match the demand only if there is a big improvement in efficiency of irrigation.

In the light of this scenario, National Agricultural Policy announces that “rational utilization and conservation of the country’s abundant water resources will be promoted”. It is somewhat surprising that against all evidence of scarcity the NAP feels water resources are abundant. It seems the importance and implications of growing stress on water resources are not adequately recognised by the policy. This requires efforts on several fronts. One, there is a need for creating awareness about the value of water and its sustainable use. The policy should lead to concrete measures for conservation of water resources through measures like rainwater harvesting and groundwater recharging and ensure judicious use of water. This would require first of all placing value on water that reflects its opportunity cost. Second, improvement in water use efficiency is crucial. According to one estimate a 10 percent improvement in the efficiency of water use would be equivalent to 14 million hectare of gross irrigated area (Saleth 1996) which is as large as the total irrigation potential created during whole decade of 1990s. Achieving them would involve addressing property rights in water, institutions and public policy (pricing etc.).

Plant and Animal Genetic Resources

NAP expresses concern about the narrowing and erosion of India’s plant and genetic resources in the last few decades. Here two important concerns are missing. One, NAP does not stress quality improvement in livestock through use of better quality indigenous germplasm. There is strong fascination in the country for exotic germplasm, particularly of cattle, at the cost of ignoring rich germplasm of domestic breeds for improving productivity and quality of livestock. Experience of cross

breeding with exotic stocks of cattle is showing its own hazards in some areas where infertility among cross bred is leading to hordes of stray cattle in the countryside. Two, there is not enough awareness about breeding aspects in the country. Often same bull continues to be used in one locality for lifetime which results in inbreeding and genetic decline. There needs to be some guidelines with Panchayati Raj institutions for taking care of healthy breeding practices.

4.3 Food and nutrition security

Food and nutritional security has remained central to India's agricultural and development policy since Independence. However, importance being accorded to food and nutrition security has receded during 1990s because of two reasons. One, there was accumulation of very large stock of grains in government stock after April 1998 which had posed very serious problem of disposal in domestic and international market. This has also caused serious burden on state exchequer. If India had not experienced very severe drought during the year 2002, which caused 14 percent (30 million tonne) decline in foodgrain production, then country was going to have tough time to clear excessive stock of grains. Two, all kind of reduction in cereal consumption is being wrongly attributed to phenomenon of dietary diversification which involves structural shifts in demand from cereal to horticultural and livestock feed, without distinguishing between diversification by choice or diversification under distress.

A closer look at the household consumption data and macro data on availability of cereals for consumption reveals very disturbing trend in food and nutrition security during 1990s. It is found that per capita energy and protein intake declined very sharply during 1990s and percent of population getting energy and protein below the minimum threshold level has increased. This can be seen for rural cultivators and labour households from the data presented in Table 4 taken from Chand et.al. 2003. Similar evidence for total rural population is reported by Meenakshi and Vishawanathan (2003).

Average per capita calorie intake at cultivator households in India during the year 1983 was 2289 kcal, which increased to 2423 during 1987-88. By the year 1999-00 calorie intake declined to 2277. Protein intake increased between 1983 and 1987-88 and declined thereafter. Calorie intake at labour households also dropped sharply during 1990s. There was a sharp reduction in percent of population consuming less

than minimum level of calorie suggested for a healthy person between 1983 and 1987-88. The process got reversed during the economic reforms. Incidence of malnourishment (protein deficiency) showed a sharp decline before reforms. With the intensification of reforms with trade liberalization there was sharp increase in malnourishment of farm population. According to the estimate for the year 1999-2000 more than 26 percent farm population and more than 45 percent of rural labour are suffering from energy and protein deficiency.

It would be seen from the results presented in Table 4 that reduction in poverty before reforms was associated with sharp reduction in under nourishment and malnourishment. However, after 1987-88, reduction in poverty did not reduce undernourishment.

Table 4: Nutrition and poverty among agricultural labour and farm households, 1983, 1987-88 and 1999-00

Aspect/Year	Agricultural labour	Farm households
Population under poverty %		
1983	64.6	42.6
1987-88	55.3	31.6
1999-00	39.7	21.0
Undernourished population %		
1983	48.6	29.0
1987-88	41.2	21.9
1999-00	45.5	26.2
Malnourished population		
1983	44.1	27.7
1987-88	38.0	21.1
1999-00	48.7	28.2
Calorie intake/person/day		
1983	1908	2289
1987-88	2010	2423
1999-00	1948	2278
Protein intake/person/day: gram		
1983	54.0	64.7
1987-88	56.9	69.2
1999-00	51.9	62.7
Cereal intake: Kg/person/year		
1983	166.1	187.5
1987-88	162.2	186.2
1999-00	148.4	161.1

Source: Chand et.al. 2003.

The patterns in poverty, nutrition and cereal intake show that poverty and cereal intake plays important role in nutritional security of rural households in India. These changes also show that high growth rate in output of fruits and vegetables and livestock products in India during 1990s did not help Indian masses to improve nutrition. As cereals constitute the major share in the food and the decade of 1990s witnessed their reduced consumption the net result has been increase in proportion of population deficit in calorie. Similarly, pulses are the main source of protein in India, stagnation in their production is the cause of protein deficiency.

There is a strong feeling among some researchers that decline in cereal consumption in India is the result of structural shifts in demand or dietary diversification away from cereals caused by changes in life style, tastes and preferences and it should not be seen as causing adverse effect on nutrition. However, the decline in cereal consumption during 1990s was much higher than what was accounted for by dietary diversification (Chand et.al. 2003). The rate of decline in cereal consumption was small during 1970s and 1980s - the period during which real prices of cereals were also falling. During 1990s rate of decline in cereal consumption accelerated by about 70 percent. The reason for this acceleration in the rate of decline in cereal consumption was sharp increase in real prices of cereals in the same period. This price increase also led to accumulation of foodgrain in government. These stocks did not result from growth in foodgrain production but because of diversion of foodgrain from market and consumption as increase in their real prices forced consumers to consume less foodgrains (Chand 2003a and Chand et. al. 2003).

Cereals are the predominant source of calorie and protein for rural masses. They are also the cheapest source of energy and protein in the country. Due to low level of per capita income, rural masses are not in a capacity to compensate for nutritional decline due to decline in cereals by increasing consumption of fruits and vegetable, milk, meat etc to get adequate nutrition. Thus, prices of cereals play an extremely important role in determining food and nutrition security of India's population. Any increase in real prices of cereals result in their reduced consumption, which might help in building up grain surplus but is detrimental to household food security. Main implication of these findings is that growth in food production should

not be accompanied by increase in per unit costs. Thus, sustaining nutrition and food security require reduction in average cost of foodgrain production in real terms. This necessitates raising food grain production by tapping unexploited potential rather than offering higher and higher price incentives to already developed regions where productivity levels are approaching plateau.

4.4 Generation and transfer of technology and input management

NAP calls for according very high priority to evolving location specific and economically viable improved varieties of agricultural and horticultural crops, livestock species and aquaculture. There is added emphasis on regionalisation of agricultural research based on identified agro climatic zones. These priorities and emphasis are important in a country like India, which has continental diversity and where technology is the main driver for output growth. But this itself may not be enough. This is evident from experience of technology generated during last three decades and its adoption at farmers fields. National Agricultural Research System (NARS) has a very wide network of research and technology network and there is hardly any agro ecological pocket which does not have NARS institute or research station. Similarly, annual reports of ICAR and State Agricultural Universities are replete with achievements in terms of new varieties in almost all regions. But this has not helped in bridging huge gap between what is attainable through these technologies and what is actually attained at farmers field in most of the crops and states. This is evident from the information presented in Table 5 on yield gap.

The yield gap was measured by taking the percent by which gap between attainable yield and actual yield exceeds actual yield as under:

$$[(\text{Attainable yield} - \text{Actual yield})/\text{Actual yield}] * 100$$

Attainable yield refers to the yield in national demonstration plot at farmers' field when improved technology and management were used alongwith optimum level of inputs. These yields at various sites were then compared with actual yield in the region. In all the states there is large yield gap in all the crops for which yield gap information was available. Even in agriculturally advance state like Punjab actual yield of paddy can be raised by 87 percent using already existing improved technology. In most of the crops technologies are available to double the actual yield. The purpose of presenting yield gap (Table 5) is to demonstrate that improved technologies are already

available for raising existing yield substantially. Thus, it is more important to ensure that these technologies are used at farmers field than to spend resources to develop more technologies.

Table 5: Yield gap as revealed by ratio of difference between attainable and actual yield and actual yield in percent in various states

State	Irrigated			Rainfed			
	Paddy	Wheat	Mustard	Maize	Bajra	Jowar	Groundnut
Andhra Pradesh	123	23			191	231	83
Assam	175	46	114				
Bihar	162	74	174	195			25
Gujarat	60	43	124	99	191	541	1
Haryana	55	25	1	3	86		
HP	49	163	420	11			
Karnataka	132	28			258	292	45
Kerala	116						
MP	135	73	89	105	165	231	55
Maharashtra	140	102					
Orissa	115	66	63	153			60
Punjab	87	40	25	6			
Rajasthan	27	82	130	114	309		106
Tamil Nadu	61				163	479	62
Uttar Pradesh	101	93	164	106	92		106
West Bengal	90	15	131	11			

Source: Computed using data reported in Joshi 1996.

This discussion shows that either the technologies having higher yield potential are not actually suitable at farmers field or enough effort is not made to take the technologies from labs and experimental station to farmers field. Technology policy needs to address the issue whether technologies being generated are less appropriate or there is weakness in technology transferring extension system.

Strategy for technology generation and transfer should be of two types. A lot can be achieved by effective dissemination of already existing improved technologies. Generating more technologies of same potential as existing ones have would not be of any help. There should be accurate assessment of existing technologies. Then, reasons for these technologies not reaching intended users need to be identified. New technologies need to be developed in frontier areas. Similarly, because of growing competition due to globalisation, technological upgradation assumes greater significance. This should be done through application of modern science taking advantage of advances in molecular biology and other sciences. Over the years, interactions of NARS scientists with science institutions in the western world has

weakened. This needs to be reversed to enable our scientists to benefit from advance knowledge originating in western institutes.

Harnessing benefit of technology generation requires well developed system for sales and distribution of seeds and plant propagation material. Till now public sector dominates multiplication and supply of seed and plant propagation material but it is highly inadequate to meet the emerging and growing needs and demand. There are also reports of some decay in public system distribution of seeds etc. on account of several reasons. The advantage of this is being taken by unscrupulous private trade. There is a need to promote competition in seed sector by encouraging large scale private sector participation in seeds business.

4.5 Incentive for agriculture

Agricultural policy repeats the policy concerns echoed in the beginning of green revolution to provide favourable economic environment for promoting farm investments through (1) removal of distortions in the incentives (2) improvement in terms of trade with manufacturing (3) external and domestic market reforms. This is most important area for policy actions. The document states only the intention but does not elaborate how it would be achieved. Some reforms which government has initiated in this area are (a) liberalisation of land lease market (b) proposal to change regulation to promote contract farming and private markets.

Liberalisation of land lease market has been quite misunderstood in India. It is taken to imply that it would lead to transfer of land from small and marginal farmers to big farmers and also adversely affect interest of tenants. Reality is just opposite of this. It is the small and marginal farmers who lease in and lease out much more than large farmers. Also, the need for leasing in land is much greater at small and marginal farmers to make their holdings viable. Land lease laws in the country are such that if there is legal or documentary evidence of leased in land, the lessor can face problem in evicting the lessee. Because of this, the landowners, who have land to lease out, either do not lease out his/her land for fear of losing control over it or tenancy is totally concealed. Because of this, most of the small and marginal farmers are deprived of raising the size of their operational holdings when they can't lease in. When they lease in in a concealed manner they can't get advantage of credit etc. Similarly, large number of small and marginal farmers who do not find farming viable and find some other attractive vocation, but do not want to sold their land, avoid renting out land. This way,

because of adverse legal implications of leased land market, small and farmers are sufferers in several ways. The fears related to security of already existing tenants due to liberalisation of land lease market are also misplaced as their interest can be safeguarded by exempting them from the new regulation.

Government has already initiated measures to amend Agricultural Produce Market Committee Acts. This is a step in the right direction. Government needs to move fast on this. As it is very difficult to reach consensus on such reforms, the states coming forward to undertake such reforms should be encouraged. Essential commodities act has already been amended. Though restrictions on inter state movement of farm produce have been removed much remains to be done to improve efficiency of road transport.

Liberalisation of external trade requires policies to deal with volatile nature of international prices. Impact of volatility on imports can be regulated through appropriate tariffs but maintaining export poses serious problem. Price stabilisation funds for exports can help to maintain export at the times of low international prices. SPS issues would assume greater importance in future. India needs to formulate SPS guidelines for all the products. It is better to segregate produce for domestic market and export purposes as early as possible.

Incentive to agriculture should be provided by promoting competitive trade. These incentives should be consistent with demand side factors. Due to lot of regional variations, national level terms of trade often conceals regional story. There is a need to monitor TOT at regional level and to ensure that agricultural incentives promote regional equity.

4.6 Investments in agriculture

The purpose of investments in agriculture is to generate capital in the form of infrastructure, improvement in quality of natural resources and assets, and creation of productive assets for promoting long run growth and improving efficiency in production and marketing. This investment in any sector comes from two sources viz. public and private. While public investment is meant mainly to create infrastructure, private investment is used mainly for assets formation and for improvement in quality of existing assets. Traditional agriculture and agriculture in underdeveloped countries is generally starved of investment resources because private capital is deterred by the risk involved in agriculture (Schultz, 1964) and institutional investment has also been

meagre (Shonfield, 1960). Therefore, special efforts and attention are required to direct and induce public and private investments in agriculture in underdeveloped countries.

In the recent years there has been renewed interest in public and private investments in Indian agriculture. This has been induced by serious concern for secular decline in public investments in Indian agriculture, which began in the early 1980s. This adverse trend did not reverse even during 1990s (Table 6 and Fig. 1 and 2). GFCF in the public sector showed some improvement during mid 1990s but again declined during late 1990s. GFCF public sector as percent of GDP agriculture has declined to 1.56 percent compared to more than two percent during early 1990s. This shows that infrastructure development for agriculture sector failed not only to keep pace with growth of the sector but lagged far behind the growth in the sector. There is some comfort that like the decade of 1980s decline in public investments did not cause decline in private investment even during 1990s.

Table 6: Capital formation in agriculture sector including allied activities and GDP agriculture at 1993-94 prices, Rs. Crores

Year	Gross fixed capital formation			GDP Agriculture	GFCF/GDP Agri %		
	Total agriculture	Public sector	Private sector		Total agriculture	Public sector	Private sector
1990-91	15805	4871	10934	223114	7.08	2.18	4.90
1991-92	14546	4400	10146	219660	6.62	2.00	4.62
1992-93	15610	4549	11061	232386	6.72	1.96	4.76
1993-94	14749	4996	9753	241967	6.10	2.06	4.03
1994-95	15978	5410	10568	254090	6.29	2.13	4.16
1995-96	16824	5398	11426	251892	6.68	2.14	4.54
1996-97	17009	4942	12067	276091	6.16	1.79	4.37
1997-98	17035	4467	12568	269383	6.32	1.66	4.67
1998-99	16516	4459	12057	286094	5.77	1.56	4.21
1999-2000	18082	4764	13318	286983	6.30	1.66	4.64
2000-01	18364	4468	13896	285877	6.42	1.56	4.86
2001-02	19880			302054	6.58		

It is contended in some quarters that CSO series on public investment in agriculture is very restrictive, as about 90 percent of the CSO series is reported to consist of investments in major and medium irrigation. The CSO series does not include investment in several items of infrastructure, like rural roads, rural electrification, agricultural markets etc. which plays crucial role in development of agriculture sector. Thus, the trend revealed by CSO series cannot be used as an adequate indicator of allocation of public sector resources for agriculture infrastructure.

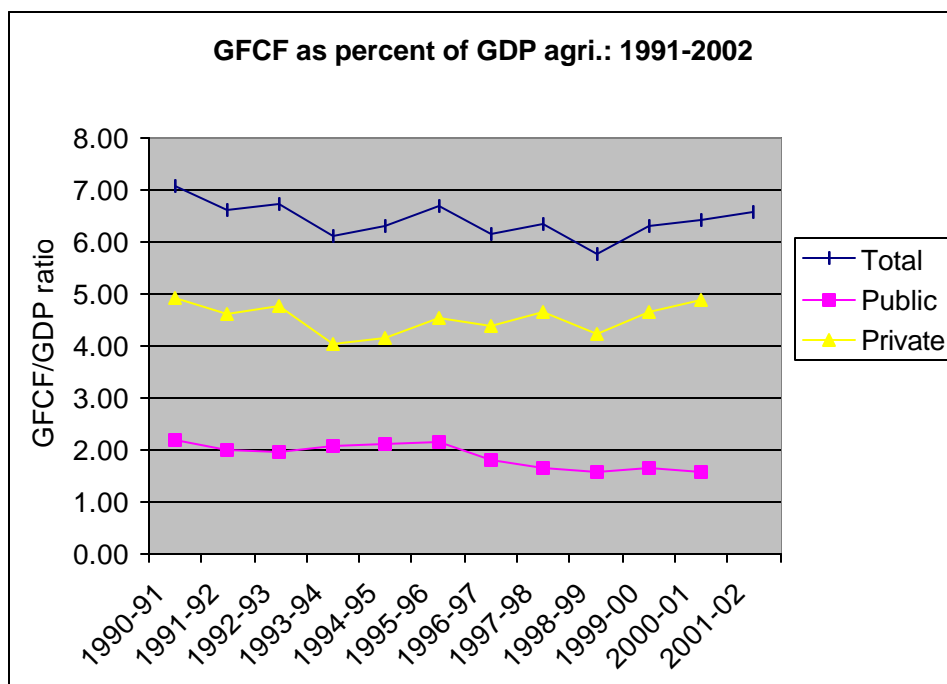
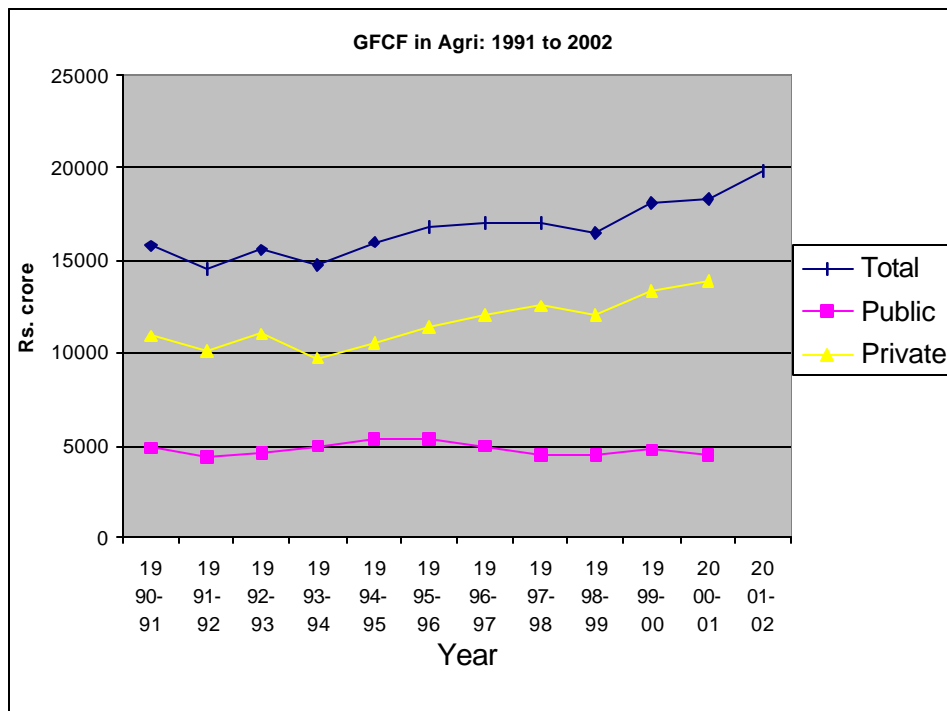
However studies by individual researchers (Chand 2001) and by Committee set up Government of India (GOI 2003) to examine this issue show that even when public investments in various heads meant for agriculture like rural roads, electrification, markets etc is taken into account there is a decline in importance accorded to infrastructure development for agriculture sector.

National Agriculture Policy acknowledges this problem and proposes to rechannelise available resources from support measures towards asset formation. However, first three years since the announcement of NAP show that support measures have reached higher proportion and public investment continues to decline or remain stagnant.

4.7 Institutional structure

NAP advocates land reforms by focusing on consolidation of holdings, redistribution of surplus/waste land among landless, tenancy reforms, development of lease market and recognition of women's rights in land. Other areas listed for policy attention are private sector participation through contract farming, assured markets for crops especially for oilseeds, cotton and horticultural crops, increased flow of institutional credit, strengthening and revamping of cooperative credit system.

Out of these, some policy concerns like land lease market have already been discussed at length in section 4.5 above. Land consolidation has assumed greater importance due to large scale fragmentation of land holdings due to division of inherited property and certain other factors. Division of land parcels into smaller pieces scattered over space has become so complex that their consolidation by revenue authority, as witnessed during first two decades of planned development in some states, would not help much but would leave it free to revenue officials to use their authority to show favours and disfavours. The best way to encourage land consolidation would be to encourage mutual transfers of land by providing incentives like complete waiving or nominal stamp duty in land transactions that lead to land consolidations.



In the case of cooperatives, it has been emphasised time and again to reduce or rationalise government control over these institutions. However, no concrete measures have been taken so far. NAP focus mainly on credit delivery role of cooperatives, whereas, these institutions have much bigger role to play in Indian agriculture in terms of organising small and marginal farmers in activities relating to production, marketing and processing.

There is lot of debate and pressure to consider institutional reforms for sustainable agricultural development and poverty alleviation. It is being proposed to involve people in management of infrastructure like irrigation and to go far participatory management of common pool resources like water, forest and common-lands. Strangely, NAP is silent on these important institutional issues.

A large number of agricultural holdings are managed by women farmers. Empowering these women through right in land has been a very difficult proposition as it involves changes in legislation and in most cases consent of other family members particularly male members. A much easier way out to improve women's access to technology is to ensure that land records show cultivation under women's name where they actually manage the farm. This would avoid complications involved in transferring property rights but give recognition to women in terms of title to cultivation. As the information about crop cultivated on each field and name of the cultivator is recorded each season it is very easy to recognise women's status as farmer. This can be achieved by instructing revenue officials to follow factual position regarding cultivation title. Subsequently, this should be supported by recognition of women as a farmer for availing all facilities like credit etc. Similarly, while undertaking distribution of surplus land/wasteland the title should recognise rights of male as well as female.

4.7 Risk management and management reforms

Price fluctuation and natural calamities are recognised as main factor for imparting instability to condition of farmers. NAP suggests Agriculture Insurance Scheme covering all farmers and all crops throughout the country with built in provision for insulating farmers from financial distress. Other measures suggested under this are (1) enhancing flood proofing and drought proofing through (2) ensuring remunerative prices through announcement of MSP and (3) future trading in agriculture products.

Risk proofing in agriculture through insurance is a very complicated process. Covering all crops and all farmers through this seems to be gigantic, rather ambitious task. Technological and infrastructural solutions are more appropriate in the Indian circumstances.

Announcement of MSP in itself does not ensure that farmers get remunerative price or price above the ceiling level. Obviously, ensuring that farmers do not receive price below MSP requires some mechanism to buy produce if market price happens to be lower than MSP. This mechanism exists only in a few states and for a few crops. Because of this, some regions have benefited too much where government procure produce and some got nothing for same crops, from system of MSP (Chand 2003b). It is also not feasible to guarantee MSP by making procurement of produce by official agencies in the event of fall in market prices below MSP everywhere and for all the crops. Therefore, alternatives like deficiency price payment, as suggested by some studies (Chand 2003a) needs to be used to make MSP effective over large number of crops and over large region.

Future trading is being allowed in more and more agricultural products in India with a view to minimize price fluctuations and for hedging price risk. It is difficult to conjecture about the impact of future trading in reducing price risk for farmers because basis of future trading itself is price fluctuation. Second, success of future trading would require that government intervention does not influence normal course of price. Thus, future trading and government intervention in influencing behaviour of prices through MSP and issue prices would not go together. Therefore some clear policy is needed on price intervention and future trading.

Under the management reforms, proposals like moving away from schematic approach to macro management approach and working out effective partnership between the Centre and States are worth implementing.

5. FURTHER SUGGESTIONS

The document on National Agricultural Policy released by Government of India in July 2003 contains set of policy intentions of government. In order to implement those intentions a concrete and time bound action plan was needed but that is missing. The document is quite comprehensive in expressing what ought to be done in agriculture, This is a first step in giving policy direction. The subsequent step is, how and when policy goals and objectives would be achieved. In most of the cases the NAP

is silent on this, nor, there is any follow up document on this. This is the reason that in more than three and half years after release of NAP no serious action is initiated on most of the aspects. It is highly desirable to prepare action plans at the Centre and at the State level in quantitative terms to implement the new policy agenda in a time bound framework. For instance, to achieve 4 percent annual growth rate in agriculture certain planning and strategy has to be there on how much growth in each crop/enterprise in various states is visualised. How much growth this would require in inputs, irrigation, credit etc. There is no such follow up action plan and it is assumed that setting goals with change in overall policy environment would automatically help in achieving the goals enshrined in new policy. Besides action plan on quantifiable goals, a time schedule for change in qualitative policy aspects like changes in regulations is also needed.

Achieving the goal of high growth (more than 4 percent) through efficient use of resources and promoting sustainability and equity would require area specific strategies. Past experience shows that this can be achieved by promoting area specific specialisation taking into account the groundwater status, soil health and other micro characteristics. This often results in diversification at country level. The advantages of specialisation pockets are (i) it is useful in harvesting advantages of scale economy and (ii) it is easy and less costly to develop infrastructure to boost one or few commodities, rather than many commodities.

Raising productivity in already agriculturally advanced regions would involve more cost in terms of inputs compared to underdeveloped regions as the developed regions are at a higher level on the production frontier. Since the domestic supply would be facing competition from imports, the emphasis should be on increase in productivity in a cost effective manner. This, in turn, require paradigm shift from output growth or maximising production to efficient growth. The twin goal of increase in productivity and efficiency can be achieved by harnessing potential of underdeveloped regions and through development of specialisation pockets. The focus must shift to area specific enterprises as has been the case of dairying in Gujarat, rice-wheat in Punjab, apple in sub-temperate West Himalayan region, grapes in Nasik region of Maharashtra, mangoes in Rayalseema region of Andhra Pradesh.

Large scope exists for raising productivity of most of the crops by ensuring that improved technologies already developed in various states are adopted by farmers.

Efforts in technology generation go waste if it is not disseminated to end users. This requires rigorous efforts on extension front. NAP should evolve ways and means to strengthen existing extension mechanism and involve NGOs, panchayats and private sector in extension activities. Beside technology, shift in crop pattern from low value to high value offers vast scope for output growth.

Irrigation is vital resource for raising agricultural output but strain on water resources is growing. This requires adoption of improved irrigation technologies that improves efficiency of water use. New policy should provide effective incentive for adoption of drip, sprinklers and other water efficient technologies.

NAP should give due importance to people's participation in management of natural resources and in organization of production and marketing activities.

Competitive global liberalisation has thrown new and formidable challenge to compete with international technologies. Facing this challenge would require vigorous efforts in domestic R&D. Some countries have very effectively applied tools of biotechnology to raise yield, reduce cost of production, and improve quality. India needs to learn from the experience of such countries and should encourage new yield enhancing and cost reducing technologies without getting bogged down in the debates on transgenics and genetically modified products.

There is no mention of Organic farming in NAP. Organic farming offers an alternative method of production that can be suitably exploited to benefit some segment of farmers.

There are frequent reports of pesticides and chemical residues beyond safe limits in various foods. The main reason for this is indiscriminate use of agricultural chemicals. Farmers need to be educated about proper use of various agro-chemicals.

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