

CHAPTER 3

AGRICULTURE AND ALLIED SECTOR

Overview

Agriculture continues to be the most crucial sector of the Indian economy. With 26.8 percent contribution to the Gross Domestic Product (GDP) at current prices and providing employment to nearly 2/3rd of the work force, agriculture is so much at the center stage in the Indian economy that any situational change in this sector, positive or negative, has a multiplier effect on the entire economy. The largest industries of the country like sugar, jute, textiles, food processing, milk, etc. are dependent on agriculture for their raw materials. Besides, the agriculture sector and rural areas are the biggest markets for low priced and middle priced consumer goods, including durable use items.

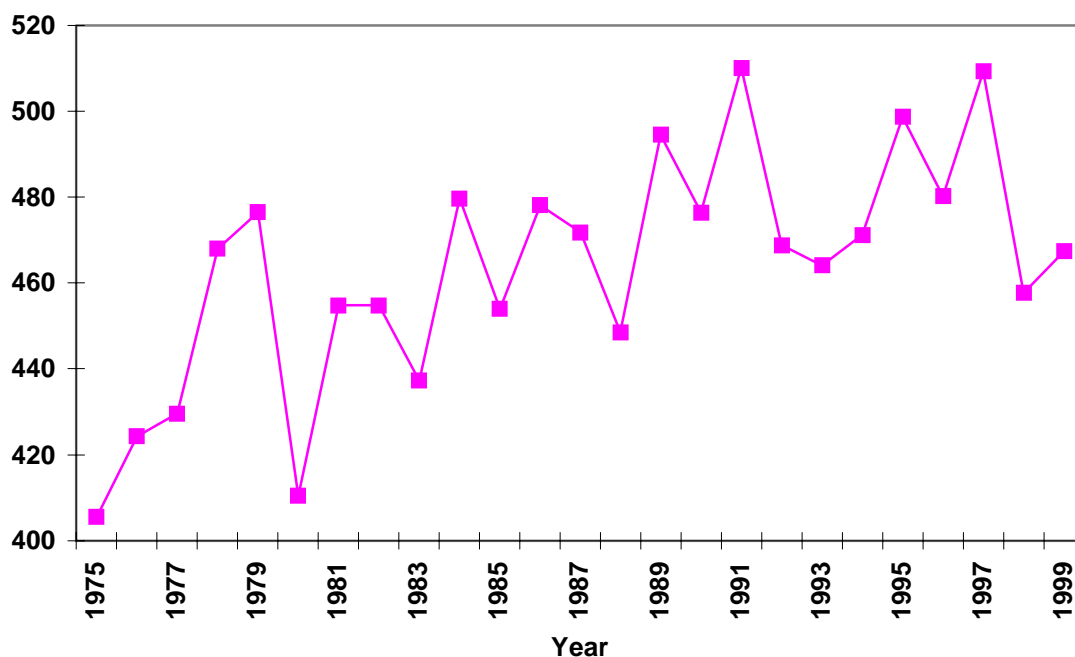
2. Foodgrains production recorded a growth rate of 2.5 percent per annum during 1949-50 to 1998-99 and reached 203.04 million tonnes (Table1). Per capita availability of foodgrains went up from 395 grams in 1951 to 484 grams per day in 1998 (see graph). During 1949-50 to 1998-99, the oilseeds production increased at the rate of 2.85 percent per annum and went up from 5.23 million tonnes to 25.21 million tonnes. Cotton production increased from 2.75 million bales to 12.18 million bales yielding a growth rate of 2.56 percent per annum and for sugarcane, growth rate of 3.08 percent per annum was achieved resulting in increase in production from 50.17 million tonnes to 295.73 million tonnes.

Commodity	Production (Million Tonnes)				Growth Rates(% per annum)					
	1949-50	1979-80	1989-90	1998-99	1979-80 to 1989-90			1989-90 to 1998-99		
					Area	Prod.	Yield	Area	Prod.	Yield
Rice	23.54	42.33	73.57	85.99	0.45	4.29	3.82	0.49	1.70	1.21
Wheat	6.39	31.83	49.85	70.78	0.57	4.24	3.65	1.64	3.64	1.96
Coarse Cereals	16.83	26.97	34.76	31.46	(-)1.19	0.74	1.84	(-) 2.36	(-) 0.48	1.63
Pulses	8.16	8.57	12.86	14.81	0.15	2.78	2.63	(-) 0.22	0.75	0.65
Foodgrains	54.92	109.70	171.04	203.04	(-)0.11	3.54	3.33	(-) 0.18	1.80	1.42
Oilseeds	5.23	8.74	16.92	25.21	2.45	5.75	2.93	1.27	3.06	1.93
Cotton	2.75	7.65	11.42	12.18	(-)1.32	2.19	3.56	2.71	2.22	(-) 0.47
Sugarcane	50.17	128.83	225.57	295.73	1.89	3.73	1.81	1.81	2.90	1.08
Milk	17.00*	30.40	51.40	74.70	----	5.39	----	----	4.78	----
Egg (Million nos.)	1832*	9523	20204	30150	----	7.81	----	----	5.13	----
Fish	0.75*	2.34	3.68	5.26	----	4.78	----	----	4.70	----

* Relates to 1950-51, Source: - Ministry of Agriculture

3. The livestock sector also registered notable growth. Milk production increased from 17 million tonnes in 1950-51 to 74.70 million tonnes in 1998-99. Egg production increased from 1832 million nos. to 30150 million nos. The production of fish has increased by 4.2 percent per annum since 1950-51 having gone up from 7.52 lakh tonnes to 52.60 lakh tonnes in 1998-99.

Per capita daily availability of cereals and pulses in grams



Growth Trends during Eighties and Nineties

4. During the nineties, (1989-90 to 1998-99) growth rate of production for both foodgrains and non-foodgrain crops taken together has declined to 2.35 percent per annum from 3.72 percent per annum achieved during the eighties (1979-80 to 1989-90). The decline in the rate of growth for foodgrains was sharper from 3.54 to 1.80 per cent per annum. Even for the milk and eggs sector, which had led the growth pattern in the 1980's, there was decline in the 90's, although not as severe as for foodgrains.

Table-2. Growth rates of foodgrains production in different States during Nineties (1990-98)

>2.5%	1.5-2.5%	<1.5%
Mizoram	Meghalaya	Goa
Rajasthan	Madhya Pradesh	Assam
Manipur	Uttar Pradesh	J & K
Nagaland	Punjab	Tripura
Haryana		Tamil Nadu
Karnataka		A. P.
Bihar		H.P.
West Bengal		Maharashtra
Gujrat		Arunachal Pr
		Sikkim
		Orissa
		Kerala

Based on production estimates

5. Among the states, the Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Bihar and Orissa registered a decline in growth rate of foodgrains production during nineties. However, Gujarat, Rajasthan, Karnataka, and Goa have performed better. In the case of Tamil Nadu (0.78 percent), and Maharashtra (0.05 percent) the production growth remained very low whereas in Kerala and Orissa, it was negative. Slower growth in production in the poorer states

of Uttar Pradesh, Madhya Pradesh, Orissa and Assam is a matter of concern, especially because these are ground water rich states, hence with a great deal of untapped potential.

How West Bengal did it

The rate of growth in crop productivity in West Bengal during 1977-95 was nearly 5%, due to land reforms and spurt in private shallow tube well irrigation. Security of tenure has altered the credit relations that had earlier trapped the peasants in debt cycles. With increasing access to institutional credit, farmer was able to put more land under HYV cultivation. He also invested in shallow tube wells, thanks to easy availability of groundwater. With assured irrigation, the cropping pattern during *rabi* also changed in favour of high value non-food crops, such as potato, oilseeds, etc.

6. Production growth rate of rice and wheat have declined because of lower growth in productivity, though there has been some expansion in area. The plateauing of yield of rice and wheat in high productivity areas under rice-wheat system and low yield levels in Central, Eastern and North Eastern parts of the country have affected the growth of production. Coarse cereals production recorded a negative growth rate mainly due to diversion of about 8 million ha to other more remunerative crops. Besides the decline in area, coarse cereals productivity has remained nearly stagnant. In case of pulses the growth in production has declined substantially because of sharp decline in the growth of productivity from 2.63 percent per annum to 0.65 percent per annum and also a negative growth (-0.22 percent) in area (Table-1).

7. Introduction of cross breeding programme and implementation of Operation Flood Scheme boosted milk production during eighties. During nineties, however, there was decline in the growth of production (Table-1). The rise in egg production has been mainly due to spurt in setting up modern poultry farms in the southern India, though the growth rate declined during nineties. However, the annual growth rate of fish production during nineties remained more or less, at the level achieved during eighties mainly because of increased growth in inland fish production.

Why the slow down in the 90's?

8. The policy approach to agriculture, particularly in the 1990s, has been more to secure increased production through subsidies in inputs such as power, water and fertilizer, rather than through building new capital assets in irrigation and power. This has reduced the pace and pattern of technological change in agriculture and effected TFP (total factor productivity) adversely. The equity, efficiency, and sustainability of the current approach thus becomes debatable. The subsidies also do not improve income distribution and the demand for labour. The boost in output from subsidy-stimulated use of fertilizers, pesticides and water may partly be coming at the expense of deterioration in the aquifers and soil – an environmentally unsustainable approach that may partly explain the rising costs and slowing growth and productivity in agriculture, notably in Punjab and Haryana. Moreover, the deteriorating state finances have meant that subsidies have, in effect :-

- a) crowded-out public agricultural investment in irrigation and roads and expenditure on technological upgrading,
- b) limited maintenance of canals and roads, and
- c) contributed to the low quality of rural power.

These problems are particularly severe in the poorer states. Although private investment in agriculture has grown, this is hardly a substitute for lower public investment and deteriorating quality of public services, in some cases involving macroeconomic inefficiencies (such as private investment in diesel generating sets). At the same time, power capacity is underutilized because of poor distribution and maintenance, and excessive use of capital on the farms encouraged by subsidies (see para 55). The fiscal problems of the central and state governments suggest that the subsidies cannot continue to grow, and the stock of rural productive assets and technological basis for growth will be limited by the past pattern of spending, unless low cost options are pursued, which have a higher capital-output ratio.

9. In addition, agriculture has seen much less reform than other sectors. Agriculture is still constrained by central and state regulations that limit movement and intra-state trade, public procurement, and canalization of trade. For example, simply allowing greater private trade in products would help reduce price fluctuations and improve the productivity of labour and land-use and stimulate agricultural exports. Similarly, removal of small-scale reservation would help the growth of domestic agro-industry, which in some cases is now facing increased competition from larger size offshore producers as a result of lower tariff. According to a recent World Bank study cotton and textile policies effectively tax domestic cotton producers and oilseed producers by 15% and 30% respectively.

10. To sum up, though there are region-specific causes to explain the decline in the growth rate in the nineties, but some of the possible reasons seem to be:

- Low public investment in irrigation and poor maintenance of rural infrastructure, specially canals and roads.
- Decline in investments in rural electrification, and in its availability. This has vastly affected production in eastern India, where huge groundwater potential remains untapped.
- Rising level of subsidies for power, water, fertilisers and food are eating into public sector investments in agriculture, besides inducing inefficient use of scarce resources, such as water. This further aggravates environmental problems leading to loss of soil fertility and groundwater, which intern reduces returns on capital. Farmers then demand further subsidies to maintain the same level of production.
- Inadequate credit support.
- Continuing imbalanced use of N, P, K fertilisers, (which was 8.5:3.1:1 in 1998-99 as against the desirable norm of 4:2:1) and increasing deficiency of micro nutrients.
- Stringent market controls on foodgrains that suppress their profitability. In the face of pressure from WTO, it is feared that if domestic market reforms are not carried out soon, it would create a situation that an opportunity to capture world markets would be converted into a threat to the future growth of Indian agriculture. The classic case is that of sugar where imports were opened at zero duty when controls on domestic markets remained.
- Growth in total factor productivity (TFP), which is a measure of technical change, seems to be decelerating, suggesting a decline in the force of technology.
- Demand constraints: slow growth of urban economy, restriction on exports, lack of land reforms, failure of poverty alleviation schemes, slow growth in rural wages.
- Controls on agro-processing industry

NINTH FIVE YEAR PLAN

Strategy

11. The Ninth Five Year Plan envisages a growth of 4.5 percent per annum in agriculture sector. For achieving the objective of 4.5 percent growth in agriculture sector, a Regionally Differentiated Strategy, based on Agro-Climatic Regional Planning, has been proposed to be implemented. Keeping in view the significance of agriculture sector in achieving a broad based growth of income levels and employment, especially in rural areas, a target of doubling food production and making India hunger-free in 10 years has been envisaged. Besides adequate availability of basic food products, the concept of food security has been broadened to include accessibility and availability of basic nutritional requirements. The strategy for food security aims at increasing overall employment and incomes by raising farm productivity, providing gainful supplementary employment through poverty alleviation schemes and distribution of foodgrains through public distribution system at subsidised rates to those living below the poverty line.

12. The objective of giving priority to the issue of access of the poor to foodgrains is important for two reasons. Firstly, despite the fact that the growth of foodgrains production in the period 1989-99 was lower than the increase in population during the same period, procurement has been going up, which is suggestive of a decline in people's consumption or the purchasing power of the poor. This may have happened because of the structural imbalances (rising capital intensity, lack of land reforms, failure of poverty alleviation programmes, growing disparity between towns and villages, etc.) created in the economy, as well as due to production problems in less endowed regions, which has led to a dangerous situation of huge surplus in FCI godowns coupled with widespread hunger. Therefore it is as important to correct these policy imbalances as to increase food production. Secondly, if consumption of the poor does not increase there would be serious demand constraints on agriculture, making the growth target of 4.5 percent per annum unachievable.

Thrust Areas

13. Keeping in view the above strategy, thrust areas for the Ninth Plan include;

- *Conservation of land, water and biological resources.*
- *Development of Rainfed agriculture.*
- *Development of minor irrigation.*
- *Timely and adequate availability of inputs.*
- *Increasing flow of credit*
- *Enhancing Public sector investment*
- *Effective transfer of technology*
- *Support for marketing infrastructure & Export promotion and Enhanced support for research.*

Financial Allocations

14. Department-wise allocations for the Ninth Plan and expenditure incurred during first three years of the Plan are given in Table-3. Besides, Ministry of Commerce has been allocated Rs. 705.03 crore for the developmental activities of plantation

Period		DAC	DAH&D	DARE
Eighth Plan	Allocation	7000.00	1300.00*	1300.00
	Expenditure	5494.46	1125.00*	1257.71
Ninth Plan-	Allocation	9153.82	2345.64	3376.95
	Expenditure			
1997-98	Allocation	1416.00	319.15	331.17
	Expenditure	1196.85	201.07	323.30
1998-99	Allocation	1941.00	381.90	531.17
	Expenditure	1342.66	166.07	427.73
1999-2000	Allocation	1941.00	381.90	573.50
	Expenditure	1440.63	207.29	503.78

*Excluding fisheries sector- Rs.400 crore allocation and Rs.373.74 crore expenditure.
Source: Ministry of Agriculture/ Planning Commission

crops (tea, coffee, rubber & cashew) and promotion of export of spices.

Developmental Programmes

15. Besides the ongoing programmes, some new initiatives have been taken for achieving the Ninth Plan objectives which include;

- introduction of crop insurance scheme “Rashtrya Krishi Bima Yojana (RKBY)”,
- establishment of Watershed Development Fund (WDF),
- launching of Technology Mission on Cotton (TMC),
- launching of Kisan Credit Cards,
- introduction of new Credit Linked Capital Subsidy Scheme for the development of cold storage and onion storage facilities
- implementation of World Bank aided National Agriculture Technology Project (NATP).
- formulation of On-farm Water Management Scheme for Eastern India.
- formulation of Project for Technology Mission on Horticulture Development for North Eastern States.

16. The RKVY has already been launched from Rabi 1999. The WDF have been established with the support of Rs.100 crore from NABARD and the DAC is to provide their share of Rs.100 crore during 2000-01. The TMC have also been approved. The launching of Kissan Credit Cards have met with a good measure of success and needs to be replicated / expanded all over the country. The implementation of NATP has also commenced for the research and human resource development. However, the credit linked capital subsidy schemes is yet to become operational and the schemes on On-farm Water Management for Eastern India and Technology Mission on Horticulture for North Eastern States are yet to be finalized.

Performance Review

Foodgrains

17. As against the Eighth Plan (1996-97) achievement of 199.44 million tonnes, food grains production target for the terminal year of the Ninth Plan (2001-02) has been fixed at 234 million tonnes. Production targets and achievements for foodgrains and other commercial crops for first three years of the Ninth Plan are given in Table-4. To achieve the targets, production will have to be increased by 14 percent in the remaining two years, which seems to be an impossibility.

Name of the crop	9 th Plan Target (2001-2002)	1997-98		1998-99		1999-2000	
		Tar.	Achi.	Tar.	Achi.	Target	Likely Ach.
Rice	99.00	83.00	82.54	86.00	86.00	86.00	88.25
Wheat	83.00	70.00	66.35	74.00	70.78	74.00	74.25
Coarse Cereals	35.50	34.00	30.40	34.50	31.46	34.50	30.35
Pulses	16.50	15.00	12.97	15.50	14.80	15.50	13.06
Total Foodgrain	234.00	202.00	192.26	210.00	203.04	210.00	205.91
Oilseeds	30.00	25.50	21.32	27.00	25.21	28.00	21.18
Sugarcane	336.00	280.00	279.54	300.00	295.73	305.00	309.31
Cotton *	15.70	14.80	10.85	14.80	12.18	15.00	11.99

* Million bales
Source: Ministry of Agriculture / Planning Commission

18. Pulses have been brought under Technology Mission since early nineties. However, there has not been any appreciable improvement either in area expansion or in productivity levels. Lack of HYV seeds and cultivation on marginal lands, mostly in unirrigated areas, have mainly been responsible for low production of pulses. There appears no possibility of

achieving a quantum jump in production unless a major breakthrough is made in development of high potential input-responsive and insect-pest and disease resistant varieties.

Oilseeds

19. Oilseeds production suffered a set back during 1997-98 but during 1998-99, record production of 25.21 million tonnes was achieved (Table-1). Oilseeds were brought under “Technology Mission on Oilseeds (TMO) ” in 1986 and efforts made through the Mission have helped in area expansion and increasing productivity. Increased production of oilseeds helped to reduce the imports of edible oils drastically by early nineties. However, reduction in import duty to 16.5 percent on edible oils in 1998 from the earlier peak level of 60 percent has resulted in heavy imports of more than 4 million tonnes of edible oils in 1998-99. Recent hike in import duty to 27.5 percent may have some favourable impact on production of oilseeds. As oilseeds and edible oils belong to the sensitive consumer basket, striking a balance between the interest of consumers and producers remains a delicate exercise.

Cotton

20. During 1997-98, cotton production declined substantially to 10.85 million bales from 14.23 million bales in 1996-97. However, during 1998-99, it increased to 12.18 million bales. Lack of pest resistant high yielding varieties is the main obstacle in raising productivity/production of cotton. Emphasis is required to be given on enhancing the Seed Replacement Rate (SRR). To achieve this, the concept of Seed Village Programme (SVP) exclusively for cotton seed production in collaboration with Cotton Corporation of India (CCI) and other Institutions with buy back arrangement and distribution of certified seeds should be considered. The cotton crop alone consumes about 1/2 of total pesticides used in agriculture in the country. Development of Integrated Pest Management (IPM) technology and its wider adoption should be a thrust area for minimizing the use of pesticides, lowering the cost of production and minimizing environmental hazard. Cotton trade is besieged with a plethora of restrictions which continue to hamper healthy/competitive growth in its trade and in turn adversely affects the efforts for raising production and productivity. Therefore, all restrictions on movement, stocking, credit by financial institutions, monopoly buying, processing and exports have to be removed to allow the farmers to take advantage of free market. Besides, in view of removal of Quantitative Restrictions under WTO, suitable tariff protection will have to be provided to Indian farmers. With the setting up of Cotton Technology Mission, the production may look up during the remaining years of the Plan.

Sugarcane

21. The Ninth Plan target of sugarcane production is 336 million tonnes. During 1998-99, production has increased to 295.73 million tonnes. The productivity levels of sugarcane in Northern States like Bihar, Madhya Pradesh, Haryana, Punjab, Assam and Uttar Pradesh are lower as compared to all-India average yield (72.58 tonnes/ha). Disease resistant short duration improved varieties need to be propagated in this region. Sugar industry, though delicensed, still continues with lot of regulations and controls, including the levy on sugar, release of free sale sugar quotas, distribution and pricing of molasses, etc. All these controls should be done away with as they have been hampering the process of modernization, diversification and waste and by-product utilization by the industry. The era of chronic shortages of sugar being over and the emergence of free trade regime under WTO make it more imperative than ever before that the industry is allowed to develop its own strength in terms of efficient production having competitive costs, quality and value addition, if it has to survive.

22. Sugar yield has gone up only by 1.3 percent in the last three decades, as area increase has brought 60 percent increase in sugar production. Not only are Indian yields 1/3rd to 1/2 of those achieved in similar agro climatic conditions (Australia, Brazil, South Africa), sugarcane quality is also lower, with sucrose content of 11 percent, compared to an international standard of 13 percent. About 22 percent of sugar is lost in processing compared to an international benchmark of 17 percent and the best practice of 10.5 percent in Australia. These inefficiencies are due to government policies that encourage wasteful use of land and water, and regulatory obstacles in pricing, distribution, marketing and manufacturing.

23. India produces 20 percent more sugar than Brazil, but has four times as many mills on account of historical bias against setting up of large size sugar mills. However, this bias has since been rectified. Biases against the healthy growth of *Khandsari* units also need to be removed. They will help in stabilizing the sugarcane - sugar equilibrium and generate employment in rural areas with relatively less capital. Major cause of instability in sugar production from year to year is the fixation of state Advised Prices which has no legal base and is fixed arbitrarily by the states, sometimes on whimsical grounds. This bad practice also needs to be stopped.

Excessive use of water in sugarcane

Sugarcane, occupying around 3% total cropped area in Maharashtra, gets about 60% of irrigation water. Subsidy on water discourages farmers to shift to drip irrigation, which will also prevent water logging and salinity.

Horticulture

24. India is the second largest fruit and vegetable producing country in the world after China. Horticulture sector suffers from various technological and infrastructural constraints, preponderance of old and senile trees, poor management, acute shortage of seeds and planting material of improved quality and lack of post harvest handling, sorting, grading, packaging, storage and transportation etc. Besides, inadequate processing

Table-5. Targets and production of horticulture products (in million tonnes)

Product	1996-97	9th Plan Target	1997-98	1998-99
Fruits	38.03		40.05	42.00
Vegetables	75.07	179.00	72.83	80.00
Sub-total	113.10*		112.88	122.00
Spices	2.50	3.36	NA	3.00
Cashew	0.43	0.70	0.36	0.35

***141.00 Million Tonnes indicated in the 9th Plan Document**
Source: - Ministry of Agriculture.

infrastructure and poor marketing network are other constraints for growth and expansion of horticulture. The North-East region, which has tremendous potential for horticulture development, has severe constraints of connectivity. Organically produced, chemical free horticulture products are labour intensive. There is scope for organic farming, but potential remains under-utilized.

25. The Ninth Plan strategy for growth and expansion of horticulture sector is to improve productivity, reduce post-harvest losses and improve marketability and promote export. A number of schemes for development of fruits, vegetables, floriculture, root and tuber crops, spices, medicinal and aromatic plants etc. are under implementation. There is vast scope for horticulture produce like mangoes of North, litchi and *makhana* of Bihar, fibreless ginger and mandarins of North-East and large cardamom of Sikkim etc. Considering the tremendous potential for development of horticulture in North-East region a mission mode approach has

been envisaged to provide boost to the production of fruits and vegetables, medicinal and aromatic plants, floriculture, etc.

26. For the Ninth Plan, combined production target of fruits and vegetables is 179 million tonnes. Production during 1997-98 was 112.88 million tonnes, while in 1998-99 it was 122 million tonnes. Achieving Ninth Plan production targets for fruits and vegetables and cashew (Table-5) seems to be difficult. The financial outlays and expenditure during Ninth Plan for development of horticulture and plantation crops are given in Table-6.

Sub-sector	9 th Plan outlay	1997-98 (Exp.)	1998-99 (Exp.)	1999-2000 (Anti. xp.)
Horticulture (incl. Spices & cashew)	1200.00	182.42	221.01	130.68
Tea	130.00	27.52	15.05	17.27
Coffee	125.00	23.00	25.50	27.00
Rubber	373.19	44.46	63.20	81.72

* IEBR Source: Ministry of Commerce.

Plantations

27. The Ninth Plan (2001-02) production targets and achievements during the first two years of the Plan of tea, coffee and rubber are given in Table-7. To meet the requirements of rapidly rising domestic consumption and export of tea, coffee and rubber, the focus is on enhancing productivity and bringing more area under cultivation especially in North-East region and focus on block/group plantation. To overcome the situation of glut in production of natural rubber on account of recession in industrial sector concerted efforts would be required to promote the use of rubber wood in furniture and rubberisation of roads.

Product	1996-97	9 th Plan target	1997-98	1998-99
Tea (in million kgs)	775	1000	838	850
Coffee	2.05	3.00	2.28	2.65
Rubber	5.49	7.17	5.84	6.05

Development of Degraded Land and Rainfed Areas

28. It is estimated that out of the total geographical area of about 328.73 million ha, 107.4 million ha are degraded land (DAC 1994). Out of this about 67.6 million ha are subjected to wind and water erosion. Water logged area is estimated to be about 3.20 million ha and 2.38 million ha are affected due to shifting cultivation in hilly regions of the country. Indiscriminate use of water in high productivity rice-wheat cropping system areas has resulted in depletion and up-surging ground water tables, water logging and salinity. Out of 142.82 million ha of net shown area, 89.82 million ha (63percent) is rainfed, where crop production suffers from low yields and year to year fluctuations. For the development of rainfed areas and degraded lands, Watershed Development and Soil and Water Conservation Programmes have been taken up by different Departments at the Centre and also by the State Governments. Besides, several externally aided projects are also under implementation. A Watershed Development Fund (WDF) has been created by NABARD with central assistance to cover 100 priority districts in a period of three years. It is projected that during the Ninth Plan about 16 million ha degraded /rainfed area will be treated/developed under the various Watershed Development Projects.

29. It is estimated that upto the end of Eighth Plan about 16.5 million ha rainfed /degraded land has been treated/developed. However, these achievements do not get reflected in Net Sown Area, which has almost remained stagnant at around 142 million ha. This indicates that either the treated lands were already under cultivation or an equal area is getting degraded or

diverted for non-agriculture purposes. The possibility of bogus reporting can also not be ruled out. This requires deeper investigation and analysis.

30. Several evaluation studies conducted on various projects implemented under NWDPR, FPR and RVP indicate beneficial impacts such as increase in cropping intensity, change in cropping pattern, increase in crop productivity and increase in underground recharge as a result of conservation measures, reduction in soil and run-off losses with lesser siltation effect and reduction in sedimentation at watershed level. These projects have also generated employment and increased family incomes through diversified farming system such as livestock development, dryland horticulture and household production activities.

Impact Evaluation Studies

The impact evaluation studies conducted by 10 Agro-Economic Research Centres on NWDPR during the terminal year of the 8th Plan indicated,

- increase in cropping intensity and change in existing cropping pattern.
- Increase in underground water recharge as a result of conservation measures.
- Reduction in soil and water run off losses with lesser siltation effect and
- Increase in family income through diversified farming and household production activities.

31. However, there is other side of the picture too. A survey of 70 villages of Maharashtra and A.P., covering several watershed programmes, revealed that increase in agricultural production did not last for more than two years. Structures were abandoned because of lack of maintenance and there was no mechanism for looking after common lands. Projects have failed to generate sustainability because of failure of Government agencies to involve the people. For watershed projects to be sustainable, community managed systems are needed and they can succeed only with farmers contribution and their commitment of time and resources. This has been amply demonstrated in watershed programmes implemented by some voluntary organizations, in 25 villages of Pune. Equitable distribution of water amongst the families has also been one of the main factors in the success of Sukho - Majari (Haryana) and Relegan Sidhi (Maharashtra) Projects. The adoption of common guidelines prepared for implementation of six major watershed development programmes of Ministry of Agriculture and Ministry of Rural Development, which also envisage greater participation of people and creation of corpus fund for the maintenance of assets is likely to ensure active participation of beneficiaries and take care of the management of common property resources even after the project has been withdrawn.

32. About 63 per cent of the Net Sown Area of 142.82 million ha is still dependant on rainfall. In Eastern India, only 1/5th of ground water resource is being utilized. Stimulating ground water development is crucial to kickstart the Green Revolution in this region and also address the problem of extensive water logging. Studies have revealed that pump subsidy schemes operated by the State Governments have fared poorly due to lengthy, irksome and complex procedures and heavy transaction costs which leave little real subsidy for the farmers. For example, in West Bengal, the pump subsidy scheme has been co-opted by the State's minor irrigation administration and panchayat bodies and the process of accessing the scheme is so lengthy and cumbersome that small farmers without political support do not hope to benefit from it. Similarly, in Orissa a 50 percent subsidy is provided on the cost of diesel as well as electrified tubewells, but the process of accessing the subsidy is both cumbersome and full of corruption. The entire process of subsidy approval and supply of equipment, especially for the manual treadle pump, is controlled by a government Corporation, but farmers complained that the cost estimates made by the Corporation were more than twice they would incur if they went direct to the market. The result is that there is effectively very little real subsidy to claim.

33. However, Uttar Pradesh transformed the diesel pump subsidy scheme by assigning the diesel pump dealer the role of central coordinating mechanism for the scheme. The

absolute monopoly power itself is diffused through the competitive dealer dynamism resulting in a win-win situation for all. This experiment has many lessons for stimulating Eastern India's ground water economy. Essentially, East Indian States need to reform their pump subsidy scheme on similar lines to ameliorate the pump capital scarcity, which lies at the heart of the problem. It is also equally important to promote cost effective improved manual irrigation technologies for the sub-marginal farmers. Expansion of irrigation facilities through the development of minor irrigation would be more effective and economical as it ensures all time availability of water at low costs. Besides, the gestation period for the minor irrigation is just 1-2 years compared to 4-5 years for medium irrigation and 7-10 years for major irrigation projects. Capital required to create one hectare potential through major and medium mode is Rs.1,00,000 while through minor it is about Rs.20,000. Top priority needs to be accorded to massive development of minor irrigation in Eastern India to achieve quick increase in productivity and production in the region known for low productivity.

Agricultural Inputs

Seeds

34. Although the availability of certified/quality seeds has increased from 90.76 lakh quintals in 1996-97 to 104.38 lakh quintals in 1998-99, the Seed Replacement Rate (SRR) has still remained much below the desired level and varies widely from crop to crop and state to state. Against the desired level of 20 percent SRR for self-pollinated crops, for paddy it is only about 8.8 percent and for wheat 9.2 percent. In other crops, especially pulses and oilseeds, where Seed Multiplication Ratio (SMR) is low, replacement rate is much below the desired level. The target fixed for the terminal year of Ninth Plan (2001-02) is 109.66 lakh quintals.

35. New Seed Development Policy (NSDP) adopted in 1988 has liberalized import of seeds and germplasm. Further, in 1991, 100 percent foreign ownership for seed sector units was also allowed. As a result, the number of private firms conducting R&D in the seed sector is on the increase. Private sector has contributed immensely in the development of hybrids. In some States like Andhra Pradesh and Karnataka, private bred hybrids cover sizeable area, despite higher prices compared to the public hybrids. The public sector seed producing agencies have added responsibility to produce high volume low value seeds to fulfill the National objective as private sector agencies generally concentrate on low volume high value seeds. There is need for setting up a National Seed Grid and Seed Bank by amalgamating, National Seed Corporation (NSC) and States Farms Corporation of India (SFCI), involving State Government farms, establishing seed villages and undertaking production of seeds upto foundation seed stage and facilitate development of certified / quality seeds production in private sector.

36. In pursuance of agreement on Trade Related Intellectual Property Rights (TRIPs), a bill to enact legislation to adopt *sui generis* system for granting plant variety protection has been introduced. The proposed legislation is expected to provide an effective system of protection to plant breeders' right, which will also facilitate growth of seed industry and safeguard farmers' and researchers' rights. Emergence of bio-technology as a means of evolving new varieties of seeds and the associated bio-safety concerns necessitate a careful review of policy framework for the seed-sector.

Fertilizers

37. The rate of growth of fertilizer application has considerably slowed down in the 1990s, as compared to the previous decade.

<u>Year</u>	<u>'000' tonnes</u>	<u>NP&K Use Ratio</u>
1980-81	5516	5.9 : 1.9 : 1.0
1990-91	12546	6.0 : 2.4 : 1.0
1996-97	14308	10.0 : 2.9 : 1.0
1997-98	16188	7.9 : 2.9 : 1.0
1998-99	16798	8.5 : 3.1 : 1.0

Source : Ministrv of Aariculture.

However, it is an encouraging development that during 1996-97 to 1998-99, while nitrogen(N) consumption has increased only by 10.7 percent, phosphorus (P) consumption has increased by 39.1 percent and that of potash (K) by 29.2 percent. This has slightly improved the NP&K use ratio (table-8). Fertilizer consumption per hectare has also increased from 77 kg/ha in 1996-97 to about 90 kg/ha in 1998-99.

38. There are, however, wide variations in fertilizer use in different regions, depending on irrigation facilities, adoption of crop production technologies and economic viability. In Punjab, Tamil Nadu, Haryana, Andhra Pradesh, which have high level of adoption of crop production technology, fertilizers consumption is comparatively high (142-179 kg/ha). In the North-Eastern States, where irrigation facilities are inadequate and agriculture is highly risky because of its proneness to floods and water stagnation, fertilizer consumption is very low. Besides, the marketing network is poor in the region. In states like Madhya Pradesh, Rajasthan and Himachal Pradesh also the fertilizers consumption has remained low because of larger dependence on monsoon and risk due to proneness to droughts.

39. Besides low per unit area consumption and imbalances in the NP&K use, deficiency of micro nutrients like zinc, iron, sulphur, etc. is increasing, especially in areas where intensive cultivation and multiple cropping are adopted. Over the last few decades, the carbon content in soil has also gone down, which is affecting soil health and productivity. In addition to increased use of organic manures and biofertilizers, it is necessary to promote need based use of fertilizers on the basis of soil tests by adopting Integrated Nutrient Management (INM) approach. The use of organic manures needs to be promoted by recycling urban and rural waste in a scientific manner. Some success stories like Idar Composting, the Chakriya Vikash Pranali and the Bio-dynamic farming etc. need to be evaluated and replicated.

40. So far, 519 soil testing laboratories including 105 mobile laboratories have been set up in the country. It is proposed to establish 70 new soil testing laboratories and strengthen 200 existing laboratories for NPK, fertilizer and biofertilizer testing during Ninth Plan. It would, however, be desirable to establish composite facilities for testing soil, water, biofertilizers, pesticides, biopesticides to meet the needs of farmers on payment basis. These testing laboratories could also be encouraged in the private sector so as to have at least one such laboratory in each block.

Plant Protection

41. To minimize the losses/damage caused to various crops by pests and diseases, the thrust is on the adoption of Integrated Pest Management (IPM) approach with emphasis on bio-controls. Besides, being effective, the IPM approach poses no environmental health hazard and is economical in terms of cost as compared to chemical control. As a result of promotion of IPM concept, consumption of pesticides has declined. (Table-9). The programme can, however, achieve greater success if forecast about likely outbreak of pests and diseases is made regularly for the benefits of farmers and adequate availability of bio-control agents and other environment friendly devices is assured.

Table-9- Consumption of Pesticides (000' tonnes)	
1990-91	75.03
1996-97	56.11
1997-98	52.24
1998-99	49.16
Source : Ministry of Agriculture.	

42. Toxic residues of chemicals used in agriculture are affecting the environment, creating health problems and affecting adversely the export of agriculture commodities. Besides creating awareness and minimizing the use of chemicals, chemical residue testing facilities have to be strengthened and made available. Plant Quarantine and Fumigation Centres have been set up at international airports, seaports, and land frontiers to check entry of exotic pests and

diseases. In the wake of liberalization of trade, it has become necessary to strengthen the quarantine facilities for testing and detection of pests and diseases in grains and plants and also for genetically modified materials, which may affect the bio-diversity if it gets introduced.

IPM in Cotton: A Success Story of Ashta (Maharashtra)

The IPM module for cotton crop developed by the NCIPM, which had been earlier tested on farmers' field, was validated on 200 hectares involving 124 cotton growers in village Ashta of Nanded district in Maharashtra. It comprised planting a row of maize with cowpea as interplants all around the field to enhance population of friendly insects (predators and parasites), planting of *Setaria* in between 9-10 cotton rows to attract insect predatory birds, seed treatment with Imidacloprid at 7 g a.i/kg of cotton-seed, and release of parasitoids *Trichogramma chilonis* at 1,50,000 at egg-laying of *Helicoverpa*, and application of HaNPV at 250 LE/ha and 2-3 applications of home made NSKE (neem-seed, kernel extract) on the basis of ETL.

The combined package of integrated crop production and IPM resulted in satisfactory control of different cotton pests to all the farmers in this village. This has reduced the use of chemical pesticides and the farmers could harvest an average yield of 1,000 kg/ha seed cotton during 1998 season. This was possible because of effective transmission of technology. The project was taken up jointly with the Marathwada Agricultural University, Parbhani.

Agricultural Implements and Machinery

43. Assistance is provided to farmers for popularising improved farm implements for various field operations. Training programmes for machine operators, farmers and officers of State Governments are organised at Farm Machinery Training and Testing Institutes in MP, Haryana, Andhra Pradesh and Assam. Another training and testing institute would be set up in Tamil Nadu to strengthen training and testing facilities in the region. Studies by the Central Institute of Agricultural Engineering (CIAE) Bhopal have revealed that there has been substantial increase in productivity in Punjab and Haryana due to mechanization of farm operations. Changing profile of livestock sector also highlights the need for mechanization of dairy and milk processing operations. There is likely to be a shortage of animal power, which needs to be bridged by mechanization. There is urgent need for preparing a list of tools, implements and machinery used in agricultural operations throughout the world and modify these to suit India's needs and conditions. There is potential market for tools, implements and machinery developed in India for small farmers in the developing countries. Setting up of a "National Institute of Agriculture Engineering and Appropriate Technology" to take up these tasks should be considered by the Department of Agriculture and Cooperation. Research in animal drawn tools, implements and carriages has been lacking and needs to be stepped up.

Agricultural Extension

44. The main thrust of the Ministry has been on achieving the set target of production by relying on the effectiveness of extension services. The main components of Agriculture extension system presently are (i) agriculture extension service with the State Governments, (ii) extension, education system of ICAR and SAUs and (iii) extension programmes of input industry in public and private sectors and NGOs. It has been noticed that in high technology adoption areas like Punjab and Haryana, farmer to farmer spread of technology is much faster. Thus, extension network has to take into consideration variations in degree of sophistication and attitude of farmers and other administrative and institutional structures of the region. The traditional Village Level Worker (VLW) based extension system will still be important in tribal and very backward areas, or in such places where irrigation is being introduced for the first time. Even in backward areas, where the potential of achieving higher production through extension exists, experience shows that VLWs and the extension staff are hardly devoting any time for this purpose and have not been found upto the mark. The reasons could be large area of operation, too much of office/file work, involvement in non-agricultural works and even non-residence in the area of work. Of late, the administrative environment, in which VLWs have functioned, has been undergoing change for worse.

45. The VLWs have responded to this environment in three ways. Firstly, they started falsifying and distorting reports. They soon discovered that they were encouraged to inflate the figures because each officer, be the BDO or the Collector, was being evaluated by his superior on the basis of these figures. Secondly, they started neglecting targets which they found were of a low priority. Thus, even if the Fisheries had a good potential for development in a village, the VLWs paid no attention to this programme because it was not considered to be important by their officers. Thirdly, they started using resources under their own control to stimulate the farmers' participation in unpopular programmes. Besides, the philosophy of extension is hardly consistent with the rigidity of superior-subordinate relations so characteristic of Indian administration as a result of which extension services have not been fully effective.

46. The original assumption behind the importance given to extension services that the Indian farmer is tradition bound, conservative and needs constant goading so as to effect a change in his behaviour needs to be challenged now. Although peasant societies till the nineteenth century all over the world have been cautious and somewhat hostile to outside interference, yet a number of studies on the responses of Indian farmer have shown that he is, on the whole, innovative, price conscious and receptive to modern ideas. If any generalization regarding peasant behaviour is to be made, it should be on the side of rationality and not otherwise.

47. In many schemes of the Ministry, there is an element of Transfer of Technology (TOT), which consists of crop demonstrations, farmer training, information support, trainers' training, etc. States currently employ over one lakh extension functionaries. In these schemes of about Rs.1000 crores annually, the share of TOT comes to about 15 to 20%. This does not provide for much flexibility to the states, and because of rigidity of the schemes, funds are fragmented and cannot be effectively utilized. As a result of lack of coordination between departments, absence of region-specific orientation, lack of role clarity for extension staff and inadequate investment in infrastructure for the development of agriculture and allied sectors, the overall growth rate in agriculture has slowed down.

48. However, the present Village Level worker (VLW) and Community Development Block based manual extension system, which has become outmoded, has got to be replaced with a more vibrant system using modern modes like print and electronic media. Research, education and extension agencies should interact with the farmers to know their needs and problems and come out with demand driven solutions. Printing and publishing of material on various crop production oriented activities and crop production technologies need to be taken up regularly for the benefit of the farmers. Task of listing success stories in extension, education and transfer of technology in public, private and NGO sectors and propagating their adoption at field level needs to be taken up. The Danish model of extension through Folks' Schools, where workers educate farmers by making use of school and other public buildings during evenings and holidays, is worth studying and emulating. In today's administrative environment it is neither possible for a government servant to live in the villages nor is it realistic to expect him to provide knowledge to the farmers. If any service is needed at the village level, it must be entirely controlled by the user groups themselves, or transmitted to them through modern IT systems. The role of non-government sector should also increase and an innovative approach in the field of TV broadcast including specific channel with an interactive mode will be useful. With far reaching changes in the communication technology and breakthrough in space technology, remote sensing, satellite broadcasting and the media spread revolution, extension workers will have to be totally re-oriented and re-trained to adapt themselves to these developments and make full use of emerging opportunities. In future, extension services have to be responsive to changing agricultural scenario resulting from economic liberalization. Research and extension

would need to focus on environmentally sustainable diversification and intensification of agriculture, location specific technologies tailored to suit local needs and greater efficiency in use of inputs. Besides, risk prone areas, such as dryland rainfed farming, would require much greater attention from extension workers.

Agricultural Credit and Co-operation

49. Disbursement of agricultural credit in the terminal year of the Eighth Plan and during the first three years of the Ninth Plan is given in Table-10. According to RBI report on Trends & Progress in Banking (1998-99), the relative share of agriculture credit in net bank credit stood at 12.8 percent in March, 1997 and 11.7 percent in March, 1998 as well as in March, 1999. As against the target of 40 percent for priority sector lending by banks, the sub target for agriculture has been fixed at 18 percent. The declining share of agriculture in the net bank credit against 18 percent target under priority lending is a matter of concern. More credit needs to flow to agriculture for providing timely and adequate credit under simplified procedures to farmers for increasing agriculture production and productivity.

Year	Short Term		Long term		Total
	Amount	Percent	Amount	Percent	
1996-97	16998	64.4	9413	35.6	26411
1997-98	20640	64.59	11316	35.41	31956
1998-99	23633	64.05	13264	35.95	36897
1999-2000	27239	65.38	14526	34.70	41765

50. A major bottleneck in the smooth flow of credit is the worsening recovery position of the cooperative credit institutions, which has gone down from an average of 90 percent to demand in 1995-96 to 80 percent to demand in 1998-99 (provisional). Persistence of chronic over-dues has caused poor re-cycling of funds from the borrowers to the financing agencies. The broad analysis of sectoral flows indicates that credit flows for minor irrigation and fishery sub-sectors have declined since 1996-97. There is potential for augmenting credit flow to agriculture through micro irrigation system in the form of sprinklers and drip irrigation networks in the irrigated areas especially in the low rainfall zones, hi-tech projects in floriculture, horticulture, mushrooms, dairy, poultry and cold storages. A Kisan Credit Card Scheme, aimed at providing adequate and timely support from the banking system to the farmers for the purchase of inputs in a flexible and cost effective manner, has been launched.

51. The need to suitably amend the Multi-State Cooperative Societies Act, 1984 to inject professionalism and autonomy in the functioning of these societies and free them from government control has long been felt. Choudhary Brahma Prakash Committee set up by the Planning Commission (1991) made recommendations for a Model Act, which were further examined by Ramniwas Mirdha Committee (1996). Amendment to Multi-State Cooperative Law by the Centre needs to be taken up urgently. A Model Cooperative Act was circulated to State Governments suggesting appropriate changes in their respective cooperative laws. So far only Andhra Pradesh, Bihar, Orissa, Kerala, Madhya Pradesh and J&K have amended State Cooperative Acts to make the functioning of cooperatives autonomous and transparent. All the states need to enact a Model Cooperative Law. In this context, it may be worthwhile to consider preferential assistance for development of cooperatives to compliant States.

Rising capital intensity in agriculture

52. The much debated size-productivity relationship has so far looked at productivity from the viewpoint of land. Another scarce resource is capital, and it is equally important to keep in mind which class of farmers use capital more efficiently. Small farmers have better access to labour, as they use their own family labour, whereas large farmers have better access to capital and have to hire labour from the market. These differences result in small farmers using more

labour to production than large farmers, and large farmers substituting machines and capital for labour. Thus a small farmer may get an extra unit of output by using home produced mulch and organic manure and the large farmer may depend on chemical fertilizer bought from the markets. In fact, capital intensity per unit land is increasing for all category of farmers, but at a faster pace in green revolution areas and for large farmers. Thus, the weight of fertilizers, pesticides and diesel, which accounted for a mere 14.9 per cent of the total inputs in 1970-71 in the country, increased to 55.1 per cent in 1994-95. For a large farmer in commercialized regions, it could be as high as 70 per cent. But the proportion of output sold has increased at a much slower rate than the proportion of industrial inputs or of monetised inputs. The implication of this is a resource squeeze in agriculture. Whereas the need for resources to purchase these inputs has been increasing faster, the marketable surplus has been increasing at a slower rate to absorb this, as growth in industrial employment has become very sluggish. It is not surprising that the repayment of loans is such a problem in Indian agriculture and has emerged as a major issue in farmers movements. Pressed by the increasing costs, big farmers demand higher output prices, thus setting the cycle of inflation. This is a serious problem, which has escaped the attention of both policy planners and academics. They both tend to view subsidies as a political problem. However, if 70% people continue to live in villages and dependent on home production, the cost of homegrown inputs to purchased inputs cannot be very different from 70:30, unless one considers exports as a major option in agriculture. A better option would be to concentrate on eastern region and rainfed areas in respect of public investments, where returns to both capital and labour are high. The need is also better factor productivity in agriculture or of a new technology,

Agrarian distress in Bidar: Market forces, the state and suicides

Farmers' suicides in Bidar are symptomatic of the larger and more pervasive ecological, economic and social crises in the region. The promotion of commercial agriculture based on hybrid seeds, fertilizers and pesticides in a semi-arid region results in loss of land-race seeds as local crops are displaced. There is loss of soil fertility and the crop becomes more susceptible to pests and diseases. Then, institutional credit is available only to large farmers forcing the small farmers to borrow at a high rate of interest. In times of outbreak of pest or diseases such a borrowing increases beyond their payment capacity. Some farmers had to pay for high-risk agriculture through taking their own lives.

Why is credit not available to small farmers through the official channels? Firstly, Bank credit to agriculture has been declining over the years. Between 1987 to 1992 credit to agriculture from the Banks as a percentage of total credit fell from 19.1 to 11.7%. Secondly, many farmers are defaulters and are thus not entitled to further credit. A NABARD report (1997-98) for Bidar shows that recovery of cooperative credit was 24% and for commercial banks between 27 to 30%. Low recovery rates render most farmers as credit-unworthy. High-risk technology and subordination of farmers to market forces without any safety net has high social costs resulting in suicides.

A R Vasavi :Economic and Political Weekly, Aug 7, 1999

which would be more labour intensive and would cut cash costs. The present high capital use is also sustained because of free power and water and other subsidies (unpaid loans, cheap fertilizers etc). One cannot simultaneously talk of reduction in subsidies and at the same time increase input use, especially in areas where they have reached a point of saturation. Investments are higher than warranted on tractors, fertilizer use, and tubewells; while others are under capitalized. Small holdings do not need as much capital in substitution of labour. Numerous farmers committed suicides in Andhra Pradesh, Maharashtra, Karnataka and also in some parts of Punjab because of indebtedness owing to inappropriately large quantum of capital.

Crop Insurance

53. Introduction of "National Agricultural Insurance Scheme" (Rashtriya Krishi Bima Yojana) from the Rabi season of 1999-2000 by replacing earlier Comprehensive Crop Insurance Scheme (CCIS) is a new experiment introduced in the Ninth Plan. India is the third country in the world and first ever amongst developing countries to have such a scheme. Under

the scheme, coverage has been enlarged to loanee and non-loanee farmers and to all foodgrain crops (cereals and pulses), oilseeds and horticulture/commercial crops, in respect of which past yield data are available for adequate number of years. The premium rates vary from 1.5 percent to 3.5 percent of the sum insured for foodgrain crops. Small and Marginal farmers will be entitled to a subsidy of 50 percent of the charges to be shared equally between Central Government and State Government. However, the premium subsidy is to be phased out over a period of five years. Out of Ninth Plan provision of Rs.730 crore, the expenditure in the last two years under CCIS had been Rs. 428.32 crore.

Investment in Agriculture

54. Public sector investment has played a crucial role in the development of infrastructure like irrigation, electricity, agricultural research, roads, markets and communications. However, the share of Gross Capital Formation in Agriculture (GCFA) in the total Gross Domestic Capital Formation (GDCF) has declined sharply to 9.4 per cent in 1996-97 from 19.1 per cent in 1979-80 (at 1980-81 prices). It has further come down to 5.5 per cent in 1998-99 (at 1993 prices) from 6.3 per cent in 1996-97 (Table-11) and 6.8 per cent in 1993-94.

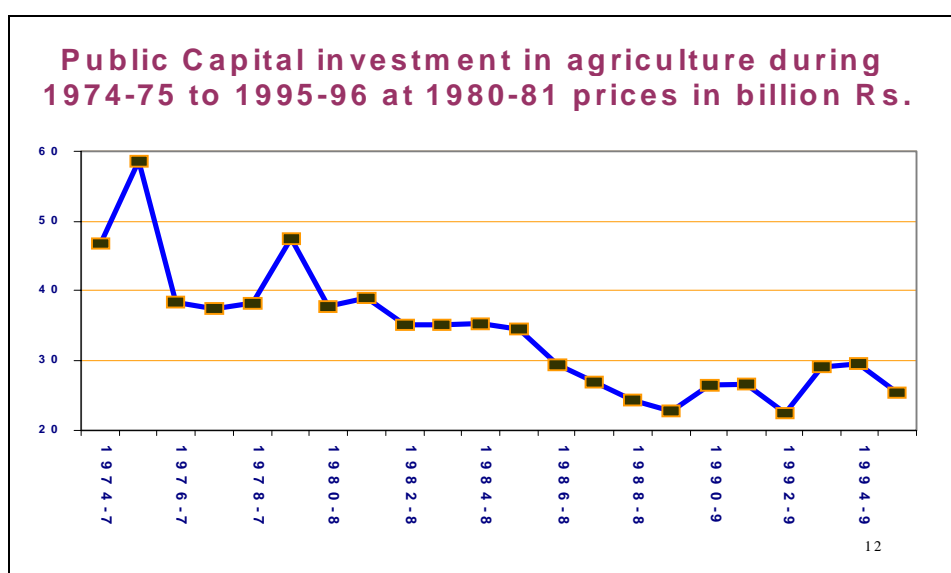
Table 11: Gross Capital Formation in Agriculture

Year	Gross Domestic Capital Formation			Gross Capital Formation in Agriculture			Percentage		
	Total (Unadjusted)	Public Sector	Private Sector	Total	Public Sector	Private Sector	Col.5 as % of Col.2	Col.6 as % of Col.3	Col.7 as % of Col.4
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<u>At 1980-81 prices</u>									
1970-71	16550	6984	9566	2758	789	1969	16.7	11.3	20.6
1971-72	17941	7650	10291	2924	851	2073	16.3	11.1	20.1
1972-73	17636	9053	8583	3180	1049	2131	18.0	11.6	24.8
1973-74	20007	8969	11038	3208	993	2215	16.0	11.1	20.1
1974-75	20729	8757	11972	2975	919	2056	14.4	10.5	17.2
1975-76	22908	11030	11878	3388	1041	2347	14.8	9.4	19.8
1976-77	22498	12326	10172	4258	1378	2880	18.9	11.2	28.3
1977-78	22415	10445	11970	4073	1534	2539	18.2	14.7	21.2
1978-79	28144	12512	15625	5246	1697	3549	18.6	13.6	22.7
1979-80	27334	13029	14305	5215	1772	3443	19.1	13.6	24.1
1980-81	25794	11767	14027	4636	1796	2840	18.0	15.3	20.2
1981-82	32437	15009	17428	4503	1781	2722	13.9	11.9	15.6
1982-83	32496	16261	16235	4590	1742	2848	14.1	10.7	17.5
1983-84	31920	15846	16074	4101	1711	2390	12.8	10.8	14.9
1984-85	33187	17718	15469	4549	1674	2875	13.7	9.4	18.6
1985-86	38654	18504	20150	4325	1520	2805	11.2	8.2	13.9
1986-87	38405	19911	18494	4011	1425	2586	10.4	7.2	14.0
1987-88	37679	17734	19945	4414	1458	2956	11.7	8.2	14.8
1988-89	44761	19296	25465	4346	1362	2984	9.7	7.1	11.7
1989-90	44263	20641	23622	4353	1156	3197	9.8	5.6	13.5
1990-91	49886	21592	28294	4594	1154	3440	9.2	5.3	12.2
1991-92	46718	20047	26671	4729	1002	3727	10.1	5.0	14.0
1992-93	52131	20583	31548	5372	1061	4311	10.3	5.2	13.7
1993-94	51330	21546	29784	5031	1153	3878	9.8	5.4	13.0
1994-95	71422	24945	46477	6256	1316	4940	8.8	5.3	10.6
1995-96	76820	22937	53883	6961	1268	5693	9.1	5.5	10.6
1996-97	74216	22992	51224	6999	1132	5867	9.4	4.9	11.5
<u>At 1993-94 prices</u>									
1993-94	198412	68853	129559	13523	4467	9056	6.8	6.5	7.0
1994-95	242113	81498	160615	15021	4971	10050	6.2	6.1	6.3
1995-96	269219	76755	192464	15876	4928	10948	5.9	6.4	5.7
1996-97	263883	72956	190927	16610	4689	11921	6.3	6.4	6.2
1997-98	298568	70743	227825	16344	4240	12104	5.5	5.6	8.9
1998-99 [@]	297518	78640	218878	16457	3876	12581	5.5	4.9	5.7

Source: Central Statistics Organisation , @ - Quick Estimates.

A more marked decline in capital formation has been in public sector which has come down from 15.3 per cent in 1980-81 to 4.9 per cent in 1996-97 at 1980-81 prices. Even at 1993-94 prices, the percentage of capital formation in public sector has come down from 6.5 per cent in 1993-94 to 4.9 per cent in 1998-99.

55. The share of public investment in agriculture has also declined to 23.6 percent in 1998-99 from 33 percent in 1993-94, whereas the share of private investment has risen from 67 percent to 76.4 percent during the same period (Table-11). The decline in public investment is mainly due to diversion of resources in the form of subsidies for fertilizers, rural electricity, irrigation, credit and other agricultural inputs rather than on creation of assets.. Declining trend in public sector agricultural investment needs to be reversed by augmenting agricultural credit and also by increasing allocation to all the major States for agricultural growth. There is good potential for mobilizing private sector investment particularly for augmenting storage capacity. But, this is contingent upon removal of restrictions on trading, storage and movement as are in force in many states.

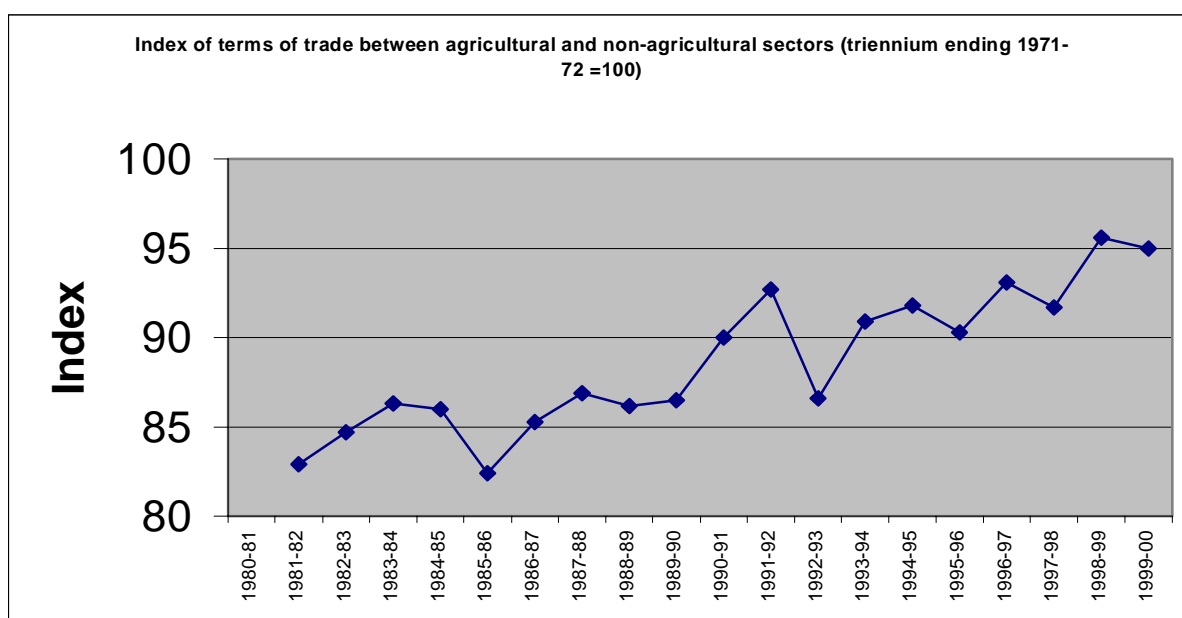


Agriculture Marketing

(I) Terms Of Trade:

56. The indices of terms of trade (base TE 1970-71) between agriculture and non-agricultural sectors showed an improvement in favour of agriculture during the period 1980-81 to 1990-91 as the index of prices received increased at the rate of 8.2 percent per annum while that of prices paid increased at 7.2 percent per annum. During this period the index of terms of trade improved from 82.9 to 90.0. Moreover, the index of prices paid by the Agriculture Sector for intermediate consumption (farm inputs) increased at the rate of 4.7 percent per annum indicating that the profitability of crop production increased even faster. During 1990-91 to 1994-95, the terms of trade improved further in favour of agriculture and the index increased to 91.7. However, the prices paid during this period by the farmers for agricultural inputs increased

at the higher rate of 14 percent per annum, thus showing a fall in profitability in crop production, although overall terms of trade improved. During 1994-95 to 1997-98, the terms of trade appear to have moved somewhat against agriculture with the index prices paid growing at higher rate (6.2%) as compared to the index prices received (5.9%). During this period, the index of terms of trade moved down from 91.7 to 88.5. As per the new series (revised base of TE 1990-91) which has much larger coverage of items both for prices paid and prices received for the farm sector, the overall terms of trade have improved somewhat more than that reflected in the old series because while the index of prices received is similar in the two series, that of prices paid shows a slower increase in new series. If we have a look at the historical movement of relative prices, ever since 1960-61 the terms of trade for Agriculture has been hovering between 82% to 94%. This implies that agriculture sector has been losing at the rate of about 12% p.a. and thus, large resources have got transferred from the farm sector to non-farm sector through the subtlety of price mechanism. The obvious consequence is a continuously widening gap between per capita income of farmers and other professionals, which used to be around 1:2 upto 1960-61 by now has become 1:6.



(II) Market Distortions:

57. Farmers will produce more when there are sufficient incentives for them to do so. The experiment of Rayot Bazar of Andhra Pradesh and similar markets in Tamil Nadu where farmers directly sell their produce to consumers should be encouraged by setting up markets on the peripheries of all big cities at the trunk route connections in all States of India. In addition, we need to change several laws regarding the disposal of crop output, which are based on the mindset of the era of food shortages. The situation has changed now, but the effect of these laws, which have remained almost unchanged is that today, we procure more than we should, and then its disposal requires heavy subsidy to the consumers. If market distortions on food and other crops are eased, both farmers and consumers would benefit, and at the same time the burden of input and output subsidy would also be reduced. We have discussed this in detail in the Chapter on PDS.

Storage and Post-harvest Infrastructure.

58. By the end of eighth Plan, the storage capacity in the public sector aggregated to 7.69 million tonnes of which 2.14 million tonnes was with Food Corporation of India (FCI), 1.08 million tonnes with State Warehousing Corporations (SWCs) and 0.72 million tonnes with Central Warehousing Corporation (CWC) and rest with other government agencies. FCI proposed to add storage capacity of 4.55 lakh tones during Ninth Plan, out of which 0.71 lakh tonnes is to be created in remote, hilly and other inaccessible areas. CWC had proposed an addition of 8.20 lakh tonnes of storage capacity. FCI has since added storage capacity of 1.54 lakh tonnes, while CWC created additional capacity of 3.18 lakh tonnes. SWCs added 2.65 lakh tonnes of storage capacity.

59. To bring in additional investment for strengthening storage, handling and transportation infrastructure, there is need to involve private sector. Present restrictions on movement and storage under the Essential Commodities Act and other regulations of State Governments have hampered the entry of private sector. For the expansion of storage facilities, it would be necessary to set up a chain of licensed godowns involving private investment in rural areas and credit facilities on the basis of receipts against stocks through banking sector. The ambit of future trading for agriculture commodities needs to be widened and the existing limitations such as those applicable for future trading in cotton and other commodities could be dispensed with. A National Policy on Handling, Storage and Transportation of Food is under consideration which will focus on greater involvement of private sector in strengthening storage and handling infrastructure.

60. The Cold Storage capacity, which in 1980 was 39.65 lakh tonnes, had almost doubled by 1990 at 76.77 lakh tonnes. During nineties, however, the pace of capacity creation slowed down and it was 103.53 lakh tonnes in December, 1998. Various measures such as licensing, rent control and requisitioning of cold storage space in some States have constrained capacity expansion in the past. Most of the States, except Bihar and West Bengal, have now done away with these regulations. The State Governments of Bihar and West Bengal should rescind the rent control orders on cold storage for promotion and expansion of the capacity in these states. Considering agro-climatic diversity and production pattern of horticulture throughout the country, the present cold storage capacity is inadequate. The post-harvest losses of horticulture produce have been very high (37%) as the post-harvest technologies and infrastructure have not kept pace with production technology. A Credit Linked Capital Subsidy Scheme has been approved in 1999-2000, which aims at creation of additional 12 lakh tonnes of cold storage capacity and rehabilitation/modernization of 8 lakh tonnes of cold storage capacity particularly in U.P., Bihar and Orissa. It is also planned to create 4.5 lakh tonnes of onion storage capacity. The Scheme involves an investment of Rs.652 crore, of which Rs.175 crores is the subsidy component for entrepreneurs. A large number of cold storages are lying closed because of power and other problems. These need to be addressed so that the already created capacity is fully utilized.

Agriculture Exports

61. At the end of Eighth Plan (1996-97), share of agricultural exports in total exports was 20.4 percent. It declined to 18.5 per cent in 1998-99 (Table-12). Under the Exim Policy, agricultural exports continue to be subjected to selective restrictions

Table-12. Value Of Exports (in US\$ millions)

Year	Value of Agricultural Exports	Value of Country's Total Exports	% Share of Agricultural Exports
1990-91	3521	18143	19.4
1996-97	6828	33470	20.4
1997-98	6375	33980	18.8
1998-99	6219	33659	18.5

Source: Economic Survey 1999-2000.

(Table-13). The export policy towards agricultural products is significantly influenced by considerations of domestic demand-supply balance. However, undue delay in release of quantitative ceilings for various agricultural products is certainly not conducive for sustained presence of India in world market for agricultural products. Similarly, untimely release of the ceiling does not help to enhance the unit value

Product	Type of restrictions
Wheat	Quantitative Ceilings
Pulses	Licence (except in consumer packs upto 5 kg allowed freely)
Paddy	License
Onion	Canalysed through NAFED and/or State Government agencies. Often time frame prescribed for export and also realization of minimum export price (MEP)
Coarse Cereals	Quantitative ceiling/registration cum allocation certificate by APEDA
Sugar	Quantitative ceilings and registration with APEDA
Raw cotton	Quantitative ceilings, registration, Canalization and often subject to realization of minimum export price (MEP)
Niger seeds	Canalised through NAFED and TRIFED
Beef	Prohibited

Source: Ministry of Commerce.

realization. The World Trade Organization commitments negotiated under the Agreement on Agriculture in GATT 1994, require developed countries to open up their markets faster than developing countries for agricultural exports by undertaking reductions in export subsidies, production subsidies and tariffs. However, the pace of implementation of these commitments has been very tardy and protracted negotiations have not yielded positive results in terms of market access for India and other developing countries. Moreover, developed countries have imposed non-tariff barriers which inhibit exports from India. This has resulted in poor demand for products like groundnut, oil meals, cashew, fresh fruits and vegetables etc.

62. The world trade in medicinal aromatic plants is currently valued at US\$60 billion and India accounts for a negligible share valued at about US\$100 million only, whereas China accounts for about 40 percent of world trade. This area needs to be fully exploited. The potential for export of organically produced natural agriculture products is yet to be fully realized. On the supply side, infrastructure support in areas such as inland transport and port facilities is far from satisfactory. As a result, a large volume of international trade is not being handled efficiently leading to trade disadvantages and loss of exports.

63. In an increasingly globalised market arising out of trade liberalisation, *inter-alia*, through WTO Agreements impact on Indian agriculture needs to be analyzed in the context of both exports from India and imports into India. Apart from the agreement on Agriculture, another measure taken as part of India's commitments in WTO is the removal of Quantitative Restrictions, maintained for balance of payment purposes, including an agricultural products.

64. However, there is sufficient flexibility for India to protect its domestic producers as tariff bindings undertaken in the Uruguay round range between 100% to 300% as against much lower applied rates. Certain low tariff bindings undertaken before Uruguay Round have also been renegotiated upwards. In the wake of Quantitative Restriction Removal and in order to provide a level playing field to domestic producers, the recent Exim Policy has stipulated that all imported goods shall be also subject to domestic laws, rules, orders, regulations, technical specifications as well as environmental and safety norms applicable to domestically produced goods (Para 4.12 of Exim Policy). However, an appropriate and suitably strengthened mechanism for enforcing the same needs to be put in place urgently.

Nature of Interventions by the Department of Agriculture & Cooperation

65. Introduction of High Yielding Varieties during mid-sixties and launching of crop-specific programmes during Seventh and Eighth Five Year Plans resulted in increase in production of foodgrains and achieving of self-sufficiency in foodgrains. However, the impact of these initiatives remained mainly confined to North and North Western regions of the country. There was limited impact of these programmes in many high potential areas, particularly in Eastern India. Second, in the initial phase there was thrust on development of infrastructure, but subsequently it petered out in favour of some populist subsidy oriented programmes. Third, some of the programmes implemented by more than one Department lacked direction and common guidelines. Each line department has its own hierarchy, with little interaction with each other. Their services are supply driven with no effective feedback or mechanism for farmers to articulate their demands. As such, their impact was much below expectations. Fourth, the emphasis for too long remained confined to foodgrains production. Horticulture, dairy, fishery etc. and marketing and post-harvest infrastructure were not given due attention. In many schemes of the Ministry there is an element of Transfer of Technology (TOT), which consists of crop demonstrations, farmer training, information support, trainers' training, etc. States currently employ over one lakh extension functionaries. In these schemes of about Rs.1000 crores annually the share of TOT comes to about 15 to 20%. This does not provide for much flexibility to the states, and because of rigidity of the schemes, funds are fragmented and cannot be effectively utilized. As a result of lack of coordination between departments, absence of region-specific orientation, lack of role clarity for extension staff and inadequate investment in infrastructure for the development of agriculture and allied sectors, the overall growth rate in agriculture has slowed down.

Animal Husbandry, Dairying & Fisheries

Animal Husbandry & Dairying

66. The livestock sector helps in providing essential proteins for human diet, besides providing self-employment opportunities to the rural people. Its contribution to the total agricultural output is 28 per cent. The Ninth Plan lays emphasis on improving the productivity of livestock through upgradation of the genetic potential of the livestock, developing adequate animal health care including control of diseases and creation of disease free zones, production of quality feed and fodder, revamping extension services, modernization of abattoirs, strengthening of dairy cooperative activities and rehabilitation of sick dairy cooperatives.

67. A Centrally Sponsored Scheme of Assistance to State Poultry/Duck Farms to encourage backyard poultry among small and marginal farmers has been taken up on pilot project basis. Another scheme on Cattle Insurance has been formulated with subsidized premium rate for the non-scheme animals of poor farmers. Two new schemes viz. 'New Primary Dairy Cooperatives' to establish 15000 new dairy cooperatives societies in Operation Flood districts and 'Assistance to Cooperatives' aimed at reorganizing of economically weak dairy milk unions/federations have also been formulated.

68. The Ninth Plan target for milk and egg production and achievements during the first two years of the Plan are given in Table-14. With concerted efforts in improving genetic stock through crossbreeding, effective control of diseases and implementation of Operation Flood Programme, milk production has increased substantially. Similarly, poultry sub-sector has shown steady progress over the years.

Period	Milk (million tonnes)		Eggs (billion nos.)	
	Target	Ach.	Target	Ach.
Eighth Plan*	70.80	69.10	30.00	27.50
Ninth Plan (target)*	96.49	----	35.00	-----
1997-98	71.00	70.80	29.30	28.57
1998-99	74.80	74.70	30.12	30.14

*Terminal Year of Eighth Plan (1996-97)

69. Eradication of rinderpest (a dreadful disease) has been a significant achievement. Attempts are being made to control other important diseases like tuberculosis, brucellosis, etc. Creation of disease free zones in the states of Andhra Pradesh, Maharashtra (Zone I), Gujarat (Zone II), Haryana, Punjab, Delhi and Western U.P. are contemplated. Animal quarantine stations have been set up at New Delhi, Chennai, Mumbai and Calcutta to prevent the entry of exotic disease in the country. Import and export of livestock products are regulated through certification as per international standards. Attention needs to be given to conservation, augmentation and improvement of native breeds of cattle the bufflow and all other domestic animals through selective breeding in view of their heat tolerance, disease resistance and production under nutritional scarcity. Implementation of schemes relating to improvement of meat processing facilities and modernization of abattoirs has not been satisfactory; projects sanctioned during the 7th and 8th Plans in Karnataka, Kerala, Tripura and Assam are still to be completed. Establishment of carcass utilization centers to make use of hides, bones and other body parts of dead animals and value addition thereon also needs to be considered.

70. Ninth Plan year-wise allocations and expenditure for the first three years are given in Table-15.

Item	9 th Plan		1997-98		1998-99		1999-
	Outlay	BE	Exp.	BE	Exp.	2000 BE	
Animal Husbandry	1076.12	160.02	94.84	170.40	51.48	160.08	
Dairying	469.52	39.00	29.24	50.60	23.17	73.90	
Total	1545.64	199.02	124.08	221.00	74.65	233.98	
Source:	Deptt. of AH & D						

71. Attention is needed for cultivation of fodder crops and fodder trees to improve animal nutrition. The area under permanent pasture and grazing land has been estimated at 11.06 million ha. However, actual availability appears to be much less. An integrated approach for regeneration of the grazing lands needs to be evolved. A back up of technological innovations to evolve new varieties of grass/fodder would help to give a fillip to overcome fodder shortage. The fodder available in the country includes normally agricultural crop residues, grass and grazing, green fodder raised on agricultural land, weeds from agricultural fields and field bunds and leaf-fodder from trees. The types of areas producing fodder are broadly the cultivated lands, the forests and the grazing areas (both under Government and private ownership). Green fodder is mostly obtained from cultivated areas; about 4.4% of the total cultivated area is devoted to fodder production. Forests too contribute about 10-25% to the green fodder supply, besides providing dry grasses. The Committee on Fodder and Grasses estimated that in 1985 only about 57 per cent of dry fodder and 27 per cent of green fodder requirements were being met. Because

of lack of fodder resources, cattle population has only marginally increased from 155 million in 1951 to 200 million in 1987. However the number of goats and sheep that can survive in harsher environment has increased by 100% and 26% respectively in the same period. This could be both - a consequence of land degradation as well as its cause. Including these two categories the total livestock population during 1951-87 has increased from 292 to 445 million, giving a growth rate of less than 1.2% annually. Had the productivity of grass lands and forests increased by more than 1.2%, the imbalance between the carrying capacity of present public and forest lands and livestock pressure would have been further narrowed.

Major achievements in Livestock Sector

- Country gained the position of single largest milk producer (74.7 million tonnes) & fifth largest egg producer (30.14 billion nos.) in the world.
- Dairy Cooperative network covering 376 districts of Operation Flood and Non-Operation Flood (hilly & backward) areas reached about 106.18 lakh people.
- Facilities for processing of 211 lakh litres of milk per day developed.
- Country achieved provisional freedom from rinderpest w.e.f. 31.3.1998.

Policy issues

72. In the past, government owned public lands outside forest areas constituted an important source of grazing. In the absence of any policy for proper management, these areas decreased in extent and deteriorated. Decrease in their area and productivity resulted in under-nourishment of the livestock and also in the degradation of forests as a result of overgrazing. While the national forest policy deals with forest areas and the agriculture policy deals with agriculture areas under private ownership, Government owned wastelands are left uncared for. A clear policy for the conservation and development of these areas for grazing and fodder production is called for. Conflicting claims on these lands for expansion of agriculture or forestry will have to be resolved.

73. Under the present arrangement, fodder production is nobody's specific responsibility. The Agriculture Department is concerned with food production, while Animal Husbandry Department's interest mainly appears to be animal health and breeding. The mandate of the Forest Department is forest conservation and wood production (including fuel wood) although grazing and grass cutting is permitted. In the absence of clear responsibility for fodder production, the livestock has to survive mainly on the residues of agricultural crops and on grass and grazing available from forests and uncultivated wastelands. The agriculture policy should clearly provide that the responsibility of fodder for livestock should be of the owner if he owns land; Government wastelands should be used to produce fodder for livestock owned by the landless. Any fodder development programme should deal with all the land resources available such as cultivated lands, Government wastelands and forests. Fodder development on cultivated lands should deserve priority to make every farmer self-sufficient in fodder. A policy direction to use the Government wastelands according to land capability is necessary to stop encroachments of such lands for agriculture or for growing trees not otherwise suitable for such sites.

Fisheries

74. The fisheries sector provides employment to about 3.84 million full or part time fishermen, with an equally impressive segment of the population engaged in ancillary activities associated with fisheries and aquaculture. Potential of marine and inland resources has been estimated at 3.9 million tonnes and 4.5 million tonnes respectively. At present, total fish production is 5.26 million tonnes. Having almost reached a plateau in production from the

coastal waters, the scope for increasing fish production from marine sources now lies in the deep sea. In the inland sector, however, there is considerable scope for increasing production and productivity by sustainable exploitation of the existing resources. The potential for fishery development in East and North Eastern states is immense and fish is an important constituent of diet of majority populace of the states in this region. Development of fisheries can go a long way in solving the problems of providing food as well as employment to region's predominant rural populace and water recharging.

75. Ninth Plan has focused on an integrated approach to sustainable development of fisheries and aquaculture and aims to optimize production and productivity, augment export of marine products, generate employment, improve socio-economic conditions of the fishermen and fish farmers, conserve aquatic resources and genetic diversity and increase per capita availability and consumption of fish. The major thrust is on expansion of aquaculture in freshwater and brackish water, development of reservoir fisheries, strengthening of infrastructure like fishery harbours and fish landing centres.

76. For the Ninth Plan period, Rs.800 crore have been earmarked for the fisheries sector. Against the outlays of Rs.119.15 crore for 1997-98 and Rs.159.90 crores for 1998-99, expenditures was only Rs.85.06 crore (71.4 %) and Rs.91.42 crore (57.2%) respectively. Allocation for 1999-2000 is Rs. 145.92 crore.

77. The Ninth Plan fish production target of 7.04 million tonnes envisages a growth rate of 5.70 percent per annum. During the first two years of the Plan, fish production was 5.39 million tonnes (1997-98) and 5.26 million tonnes (1998-99) against the target of 5.65 million tonnes and 5.97 million tonnes respectively. Production target for 1999-2000 is 6.3 million tonnes. The riverine fisheries have been affected due to abstraction in various farms, sedimentation, effluxion and increasing pollution. The slow performance of brackish water aquaculture activities is due to the Supreme Court judgement prohibiting these activities within the Coastal Regulation Zone (CRZ). Legislation to regulate the brackish water aquaculture is yet to be enacted. Formulation of Deep Sea Fishing Policy is essential to exploit the fishery resources in the Exclusive Economic Zones (EEZ).

78. The giant, global fish and seafood market worth \$ 8,000 million has encouraged mushroom growth of intensive and semi-intensive prawn farms along the elongated coastline as well as intensive and mechanized fish farming in the coastal waters. Boosted by the liberal Exim policy, shrimp farming developed feverishly and unpoliced in India. Of the 1.2 million ha of brackish water areas in India inclusive of ponds, lakes and lagoons spread along the coastline, about 80000 ha is under shrimp culture (80% under extensive methods and the rest under modified extensive and semi-intensive modes).

79. As aqua farming requires capital investment, the ownership of lands steadily gravitates to the cash-rich urban businessmen. Though there has been some investigation into the environmental impact of large shrimp farms, there is little, in terms of sound aquaculture policy taking care of above concerns in place to comprehensively deal with the loss of productive assets and threats to livelihood generated by aquaculture.

80. Some of the major constraints being faced in the development of the fishery sector are inadequate infrastructure for fish seed production and rearing space, lack of feed support to freshwater and brackish water aquaculture, lack of trained manpower and infrastructure for the same, inadequate infrastructures for fish gene banks, marketing linkages, lack of research input to control fish disease etc. Further, technologies for raising seed of minor carps, catfish and cold-water fish species area also required to fill the gaps.

81. Greater emphasis needs to be given by the research institutions for developing technology for breeding and seed production of commercially viable fresh water fish and package of practices for pen culture and cage fish farming. Advanced technologies for augmenting inland fish production through integrated fish farming, running water or flow-through systems are required to be promoted. Measures should also be taken to conserve coastal fishery resources and exploiting deep sea fishery resources in the EEZ of the country.

Agriculture Research & Education

82. Indian Council of Agriculture Research (ICAR) is the nodal agency at the national level for promotion of science and technology in the areas of agricultural research and education and demonstration of new technologies as frontline extension activities. ICAR has developed a National Grid comprising 46 Institutes including 4 Deemed Universities, 4 National Bureau, 9 Project Directorates, 31 national Research Centres, 158 Regional Stations and 80 All India Coordinated Research Project (AICRPs) in different parts of the country. The educational programmes are carried out by 30 State Agriculture Universities (SAUs) and one Central Agriculture University (CAU). National Bureau of Animal Genetic Resources (NBAGR - Karnal), National Bureau of Fish Genetic Resources (NBFGR - Lucknow) have been further strengthened to enhance their work capacity in respect of collection, acquisition, quarantine, characterization, evaluation, maintenance, documentation, conservation and awareness generation.

83. The Ninth Plan outlay for ICAR has been stepped up to Rs.3377 crore, against Rs. 1300 crore for the Eighth Plan. Besides, a World Bank aided (US \$ 239.7 million) National Agriculture Technology Project (NATP) in agro-eco system research, innovation in technology dissemination and organisation and management systems is under implementation since 1998.

84. All activities relating to transfer of technology (ToT) programmes of the Council have been integrated with Krishi Vigyan Kendras (KVKs) and their mandate enlarged to perform the function of on-farm testing/ research, long-term vocational training, in-service training of grass-root level functionaries and frontline demonstrations. During first two years of Ninth Plan 53 districts have been identified to strengthen the existing Zonal Research Stations (ZRS), to take up the additional functions of KVK raising the number of KVKs to 314.

85. Agricultural Research Institutes are multiplying at a fast rate and also growing in size. Research activity is initially taken up as All India Coordinated Research Project (AICRP), which later gets split into specialities, which after sometime gets converted into National Research Centre and thereafter as Project Directorate before its elevation to an Institute and if possible, to Deemed University. Separate National Centres and Directorates are opened for different crops/different aspects of crop/activity.

86. The above approach makes it difficult to take an integrated view of R&D work being carried under various projects viz. All India Coordinated Research Project, Centres, Directorates and Institutes of Excellence & their linkages with Agriculture and productivity improvement schemes of the Department of Agriculture and Cooperation and Department of Animal Husbandry.

87. Proliferation of institutes is pushing up the establishment cost significantly leaving very little for R&D work. This also places scientists in watertight compartments leading to sub-optimal utilization of manpower and equipment.

88. The results of research activities undertaken by ICAR are not commensurate with the huge infrastructure set up. While examining the ICAR proposal on Technology Mission on Horticulture in NE Region, the State Governments have adversely commented on the ability of ICAR to provide the desired inputs. Similarly, while discussing Technology Mission on Cotton,

ICAR wanted additional funds for undertaking work for the Technology Mission. It indicates that the research activities being undertaken by ICAR are not what are required by the end users and we have to make specific additional provisions for research activities that are relevant for the nation.

Summing up - Agricultural Reforms and Structural Issues

89. There are many structural and institutional issues which need to be addressed for stepping up agricultural growth. This is vital for promoting the welfare of masses, arresting the widening inequality and achieving the growth of the economy at a higher and sustainable level. A multi-dimensional reform agenda for agriculture should be drawn up for improving incentives to produce, rationalizing subsidies and promoting investments, besides, extending protective cover to the poor. A review of myriad controls in domestic market of agricultural produce is an urgent necessity. Control on trading and processing of agricultural commodities block free movement of goods and impose stocking limits on private traders and processors. For example, rice and sugar processors are liable to levies and processing of major oilseeds is reserved for small-scale sector. Similar controls have been imposed under the Essential Commodity Act, which run counter to market and processing efficiency. Unless these are dispensed with, private sector investment would not be attracted. Canal systems are in poor shape for lack of operations and maintenance outlay. These should be improved by involving users' groups in management and appropriate pricing of water to cover full operation and maintenance costs. Most of the States will have to rationalise power subsidy for improving the quality of power. Other institutional reforms relate to land laws and rural credit. The lease market in land needs to be opened up to promote economically viable size of holdings. Rural credit structure needs revamping because of large number of unviable primary cooperatives. Most of the States have yet not amended State Cooperatives laws on the lines of Model Cooperative Act. These measures can put agriculture on higher growth trajectory as well as trigger growth in other sectors.

90. Capital intensity is increasing for all categories of farmers, but at a faster pace in Green Revolution areas and for large farmers. This is causing a resource squeeze in agriculture, as marketable surplus has been increasing at a slower rate to absorb incremental costs. As a result, though buffer stocks are increasing, there is co-existence of hunger because of poor purchasing power. The phenomenon of self-sufficiency is somewhat illusory as the demand is depressed. There is imperative need to adopt, labour intensive production technologies, particularly in rainfed areas to cut cash costs. Some of major reforms and structural issues are summed up below:-

- (i) Removal of domestic market control on agricultural produce.
- (ii) Rationalization of subsidies on inputs which adversely affect sustainable development and use of land and water resources.
- (iii) Institutional reforms relating to rural credit.
- (iv) Opening of lease market in land to promote economically viable size of farm holdings.
- (v) To check tribal land alienation and protect the rights of women in land.
- (vi) Intensification of development of rainfed areas and exploitation of ground water potential especially in Eastern Region.
- (vii) Promotion of balanced use of fertilizers and strengthening of soil testing facilities

- (viii) Augmenting the Seed Replacement Rate (SRR) through enhanced supply of certified / quality seeds.
- (ix) Minimizing the use of pesticides, through popularization of IPM approach.
- (x) Strengthening of post harvest handling processing, storage /cold storage and marketing facilities.
- (xi) Strengthening of Dairy Cooperatives
- (xii) Review of policy on deep sea fishing policy.

91. Future agricultural growth could be speeded by policy and institutional reform in the sector, namely a) changed pattern of spending to building up of capital assets and a reduction in distortionary subsidies; b) deregulation of the processing sector and termination of the use of credit subsidy as a transfer mechanism; and c) empowerment of the poor by improving their access to land and common resources, increasing their control over services and infrastructure in rural areas, and improved safety nets.

92. The above-mentioned policy reforms would also help reduce poverty. For example, increased public spending on rural roads, agricultural technology improvement, and irrigation would all help reduce poverty. Growth in the rural non-farm sector would also benefit from improved infrastructure (roads, power, communications) and social services. More efficient and competitive markets can deliver better prices and greater market opportunities to farmers, without raising consumer prices, which would help farmers offset the impact of cuts in subsidies. Better markets together with futures markets and eased restrictions on commodity movements and private participation in international trade can help reduce price fluctuations.