

CHAPTER 6

AGRICULTURE, WATER RESOURCES, FOOD NUTRITION SECURITY

6.1 Agriculture

Agriculture in India continues to be dependent on rains with 62 per cent of the Net Sown Area being rainfed. During the first four years of the Ninth Plan the foodgrains production moved-up from 192.26 million tonnes in 1997-98 to 208.87 million tonnes, a record, during 1999-2000. In this period, rice production increased from 82.53 million tonnes to 89.48 million tonnes. Similarly, wheat production increased from 66.35 million tonnes to 75.57 million tonnes. In case of pulses, oilseeds and cotton, their production during 1999-2000 was lower than the production level achieved in 1998-99. Sugarcane production moved to 299.23 million tonnes, which was 10.51 million tonnes more than the production achieved in 1998-99.

2. During 2000-01, only 70 per cent of the area and 66 per cent districts of the country received normal to excess rainfall. 135 districts in the country experienced deficient rainfall during the monsoon (June to September, 2000), largely falling in the States of Gujarat, Rajasthan and Madhya Pradesh. The deficiency in rainfall adversely affected crop prospects:

Saurashtra and Kutch received 44 per cent less than normal rainfall, East Rajasthan, Gujarat Region, West Madhya Pradesh received 30 to 35 per cent less than normal rainfall. Similarly, West Rajasthan and East Madhya Pradesh received rains 22 per cent and 28 per cent, respectively, below normal. The winter rainfall too, during the year had not been satisfactory. As a result, production during 2000-01 is likely to be less. Foodgrains production is estimated around 196.07 million tonnes against a

Macro Management of Agriculture

- 27 ongoing Schemes integrated under the Macro Management.
- This will enhance the productivity of support programmes and accord greater flexibility to States to act as per their requirements.
- This will assist in achieving decentralization in pursuance of restoring primacy of States in agricultural development planning.

target of 212 million tonnes. The production and target of crops are given **Annexure 6.1.1**. A major earthquake of the magnitude of 6.9 at Richter Scale occurred on 26th January 2001 with epicenter 20 KM northeast of Bhuj in Gujarat causing heavy loss of human lives and property.

3. During 2000-01, 27 ongoing Schemes have been integrated under one Comprehensive Programme entitled "Macro-Management of Agriculture". Through this approach assistance is extended to the States to meet Work Plan objectives and targets. States are required to prepare Work Plans identifying specific areas/programmes for focused attention and concerted efforts according to their regional priorities.

Crop Production

Foodgrains

4. Foodgrains production during 1997-98 was only 192.26 million tonnes which was much below the target achieved during the last year of the Eighth Plan (1996-97) at 199.43 million tonnes. While the position of production improved during 1998-99 and 1999-2000, as per the estimates of the Department of Agriculture and Cooperation, the foodgrains production during 2000-01 has been estimated to be only 196.07 million tonnes. During 1999-2000 the country could achieve record production of 87.50 million tonnes of rice and 75.60 million tonnes of wheat which may likely to come down in 2000-01 to 86.30 million tonnes and 68.46 million tonnes, respectively. The record production of 34.10 million tonnes of coarse cereals achieved during 1996-97 could not be sustained during the first four years of the Ninth Plan. The performance of pulses production also remained much below the targeted level. The performance of the foodgrain production during the first four years of the Ninth Plan was not up to the mark. Considering this fact, the foodgrains production target of 234 million tonnes, as fixed for the terminal year of the Ninth Plan earlier had been revised and the target for 2001-02 fixed at 218 million tonnes. It comprises of 203 million tonnes of cereals and 15 million tonnes of pulses. The production of 14.24 million tonnes achieved during 1996-97 and 14.81 million tonnes during 1998-99 could not be attained during the other years of the Ninth Plan.

Oilseeds

5. Similarly, oil seeds production target for 2001-02 has been revised downward to 28 million tonnes from that of 30 million tonnes envisaged earlier. The performance of oil seeds production during the first four years of the Plan has not been satisfactory. For increasing production of oilseeds, the Oilseeds Production Programme and Oil Palm Development Programme are being implemented as Centrally Sponsored Schemes under Technology Mission on Oilseeds. In addition, National Oilseeds and Vegetable Oil Development (NOVOD) Board is supplementing the efforts of TMOP by opening new areas for non-traditional oilseeds and non-traditional areas for promotion of additional oilseed cultivation. It is also promoting tree-borne oilseeds.

Cotton

6. The revised Centrally Sponsored Scheme on Intensive Cotton Development Programme under the Technology Mission on Cotton, is being implemented in 15 major cotton growing states, namely, Andhra Pradesh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Assam, West Bengal, Tripura and Jammu & Kashmir. The production performance of 14.23 million bales achieved during 1996-97 could not be repeated in the subsequent years. The likely production of cotton during 2000-01 would be 9.39 million bales which shows consecutive decline since 1998-99. The Ninth Plan target of 15.7 million bales does not seem achievable and the target for 2001-02 has been fixed at 14.50 million bales.

Jute and Mesta

7. The likely production of Jute & Mesta during 2000-01 would be 10.37 million bales which is lower than the achievement of the preceding year. The target of production of Jute and Mesta for 2001-02 has been fixed at 11 million bales. The jute development programme in the major jute growing states is being supported through Special Jute Development Programme which has since been subsumed under the Macro Management.

Sugarcane

8. From 2000-01, the Centrally Sponsored Scheme on Sustainable Development of Sugarcane based Cropping System (SUBACS) has been brought under Macro-Management approach. This scheme is being implemented in 21 States and one Union Territory. The sugarcane production has shown steady increase during the four years of the Ninth Plan. The increase during 2000-01 is only marginal. The production increased from 299.23 million tonnes in 1999-2000 to a likely level of 300.32 million tonnes during 2000-01. With the growth in the production observed so far, the Ninth Plan target of 336 million tonnes does not seem achievable. For 2001-02, the target of production of sugarcane has been fixed at 325 million tonnes.

Horticulture

9. India is endowed with diverse agro-climatic conditions and rich bio-diversity. Therefore, there are varieties of horticulture crops, medicinal and aromatic plants, spices and plantation crops. Horticulture sector has significance for increasing gainful employment opportunities, both in rural and urban areas, besides improving the nutritional status of the masses. Horticulture sector also provides a sound base for agro industries. There are however, constraints in the form of inadequacy of technologies and infrastructure, small and marginal size of land holdings, preponderance of old and senile orchards, shortage of good quality seeds and elite planting materials, prevalence of diseases and pests and poor post harvest management practices such as handling, sorting, grading, packaging, transportation and storage facilities. Processing network is also unsatisfactory. Efforts are made to provide boost to the development of the horticulture sector in

Technology Mission for Integrated Development of Horticulture In North Eastern Region including Sikkim.

The goals of the Mission are:

- To establish convergence and synergy among numerous ongoing government programme in the field of horticulture development to achieve their horizontal and vertical integration to ensure adequate, appropriate, timely and concurrent attention to all the links in the production, post harvest and consumption chain .
- To maximize economic, ecological and social benefits from the existing investment and infrastructure created for horticulture development.
- To promote ecologically sustainable intensification, economically desirable diversification and skilled employment to generate value addition.
- To promote the development and dissemination of eco-technologies based on blending of the traditional wisdom and technology with frontier knowledge, such as bio-technology, information technology and space technology.
- To provide the missing links in ongoing horticulture development projects.

terms of increased availability of good quality seeds and healthy/elite planting materials, incentives for area expansion with improved cultivars and varieties, integrated management of nutrients, water, pests and diseases, development of infrastructure etc. The emerging areas in the horticulture are medicinal and aromatic plants, floriculture, mushrooms etc. Beekeeping enhances crop productivity. Therefore, a thrust has been given for expanding the scope of beekeeping. Cashew and spices are traditional crops grown in the country and productivity and quality improvement has been focus of activity.

10. A credit linked subsidy programme of action was launched during last year to create additional 12 lakh tonnes of cold storage capacity, rehabilitation/modernization of eight lakh tonnes of existing cold storage capacity and creation of 4.5 lakh tonnes of onion storage capacity. A large number of entrepreneurs and organizations have come forward to avail benefit under this scheme. Thus, under this project it is envisaged that sizeable additional capacity of cold storage would be created during the Ninth Five Year Plan.

11. Technology Mission for integrated development of horticulture in North East including Sikkim has since been launched toward the end of 2000-01 with an outlay of Rs.229.38 crore for the remaining period of the Ninth Plan. The programme is aimed at providing all relevant services to boost productivity and quality of horticulture in North-East region. Ninth Plan target of production of fruits and vegetables is kept at 179 million tonnes. The estimated production of fruits and vegetables during 1999-2000 is 137 million tonnes. Achievement of Ninth Plan target therefore seems to be a difficult task.

Plantation Crops:

12. Coastal areas and hills in the southern part of the country and Himachal Pradesh and North East region are endowed with agro-climatic conditions suitable for large scale tea plantation. The states of Karnataka, Kerala and Tamil Nadu and some parts of North-East region are suitable for growing coffee. Rubber plantation has been popular in Kerala, Tripura and other few pockets of North-East states. The commodity Boards have been implementing various developmental programmes for area expansion under tea, coffee rubber etc. and increasing the productivity and improvement of quality of the produce at various stages of processing. The achievement of production of each of the commodities during Ninth Plan is very close to the target.

Soil and Water Conservation and Watershed Development

13. Scheme for soil conservation and reclamation of problem soils namely; Soil Conservation for enhancing the productivity of degraded land in the catchments of River Valley Projects (RVP) and Flood Prone Rivers (FPR) and Reclamation of Alkali soils, have been subsumed under Macro Management allocation to States for these activities will depend upon their work plans/physical targets.

14. The National Watershed Development Projects for Rainfed Areas (NWDPA) programme aimed at to improve production and productivity in the vast rainfed areas and to restore ecological balances have also been subsumed under the Macro Management. For the Ninth Plan period an outlay of Rs. 1020 crore was provided to treat 22.5 lakh ha. During first four years of the plan 21.19 lakh ha has been treated with an expenditure of Rs.792.15 crore. Physical target and allocation under the programme will depend on the work plans of different States.

The National Watershed Development Projects for Rainfed Areas (NWDPA)

Salient Features:

- Revision of cost norms and introduction of flexibility and revision of component-wise allocation of resources.
- Development of Sustainable Watershed with different Project Implementing Agencies (PIA).
- Broadbasing of Watershed Development Team (WDT) for better community mobilization.
- Provision of Farm Pond Technology.
- Cluster Plantation under Horticulture/Agro-forestry.
- Enlarging role of NGOs and Panchayats.
- Management of Common Property Resources.
- Project Benefit and cost sharing.
- Improvement in Monitoring and Evaluation (M&E) through concurrent evaluation.
- Impact assessment through development of realistic quantifiable indicators.
- Capacity building through training and orientation.

Agricultural Inputs and Services:

Seeds

15. Seed is a critical and basic input for attaining sustained growth in agricultural production and productivity in different agro-climatic regions and different geographic locations. During the Ninth Plan, much emphasis is being laid on increasing the production and distribution of certified/ quality seeds to the farmers. The target of certified/ quality seed production for the terminal year of the Ninth Plan has been fixed at 109.6 lakh quintals. During 2000-01, 112.89 lakh quintals of certified/ quality seeds were made available to farmers. . During 2001-02, Govt. of India would continue to provide incentive/ assistance for production, storage, quality control, transport and distribution of improved seeds under various crop production oriented schemes are proposed to be continued.

16. During 2000-01, the DAC proposed for enacting Legislation on Plant Varieties and Farmer's Rights Protection. The Department has also proposed to modify the existing Seed Act and enact the Seeds Act, 2000.

Fertiliser

17. Fertilizer is another important agricultural input in achieving the higher production and productivity of agricultural crops. The consumption of chemical fertilizer during 1999-2000 was 180.70 lakh tonnes of nutrients (NPK) as against 167.72 lakh tonnes achieved during 1998-99, showing an increase of almost 13 lakh tonnes. The schemes of concession on sale of decontrolled phosphatic and potassic fertilizer to the farmers continued during 2000-01. The Centrally Sponsored Scheme on Balanced and Integrated use of Fertilizers was implemented during 2000-01 to achieve the twin objective of strengthening soil testing

facilities and ensuring promotion of balanced fertilizer use. During the Ninth Plan period, the existing 519 Testing Laboratories would be modernized and new laboratories would be established in areas where these facilities are weak. 36 new compost plants are intended to be established during the Ninth Plan for balanced and integrated use of fertilizers with organic manure/ compost.

Plant Protection

18. In order to minimize the losses/ damages to the various crops and to save them from number of diseases, pests and insects, a number of Central Sector Schemes are in operation. Under the Integrated Pest Management (IPM) Programme, the main thrust during the year lays emphasis on conservation of existing biocontrol and fauna and use of bio-pesticides, bio-control agents and products of plants origin. The existing 26 Central Integrated Pest Management Centres located in 21 States and one Union Territory have conducted demonstrations and training on integrated pest management technology to educate farmers and State education functionaries. Demonstrations of IPM approach are also being organised through various crop production oriented schemes. This has helped in reducing the use of pesticides which has declined to 46195 tonnes in 1999-2000 against 56114 tonnes used in 1996-97.

19. Plant Quarantine and Fumigation Centres are in existence at International Airports, seaports, land frontiers to check the entry of exotic pests and diseases. These Centres also issue Phytosanitary Certificates for export and import of planting materials. These Centres are being strengthened to keep a strict vigil on the export and import of different plants and enforce the quarantine regulations. The Locust Warning Organisations (LWO) undertakes regular surveillance on locust situation and control of its population in scheduled desert area in the northwest region of the country.

Agricultural Implements & Machinery

20. Centrally Sponsored Scheme on Promotion of Agricultural Mechanisation is in operation since 1992-93 to popularise the agricultural equipments amongst the small farmers. Subsidy to the extent of 30 per cent limited to Rs.30,000/- is being provided to individual farmers for purchase of tractors. Under the scheme, during the first two years of the Ninth Plan, a total no. of 11,020 tractors were distributed. The scheme has also been implemented in the North Eastern States and during the year 2000-01, funds amounting to Rs.150 lakhs have been allocated to these states for subsidizing the supply of 500 tractors to eligible beneficiaries under the scheme. During 2000-01, till October, 2000, 2083 persons have been trained against the target of 3500 in different courses. These Institutes have tested 47 machines (till Oct., 2000) of various categories, including tractors, power tillers, combine harvesters and other implements as against a target of 70 machines.

Agricultural Extension

21. Transfer of technology in agriculture sector is being taken care of by the Agriculture Extension Programmes. Training infrastructure in the country has already been developed

at the existing National Institute of Agricultural Extension Management at Hyderabad with World Bank Assistance under national Extension Projects. Regional Extension Education Institutes and Advanced Training Centre have also been established in critical subject matter areas. Special Sub-projects for North-Eastern States and for the States of Goa, Sikkim and all the U.Ts. are being continued during the year. Extension services specially for women farmers are being strengthened through Externally Aided Projects.

Agriculture Credit and Cooperatives

22. Agricultural credit and its timely availability plays an crucial role in enhancing the efforts of farmers in increasing production and productivity.. Agriculture credit is disbursed through a multi-agency network, consisting of Cooperatives, Commercial Banks and Regional Rural Banks (RRBs). The disbursement to the agriculture sector was Rs. 26411 crore in the terminal year of the Eighth Plan (1996-97). Although the actual disbursements of credit has been increasing in the first four years of the Ninth Plan, there has been shortfall against the projected requirement of credit recommended by the Ninth Plan Working Group on agricultural credit and cooperation. The credit flow from all agencies is targeted to reach a level of Rs. 60,842 crore in 2001-2002 (the terminal year of the Ninth Plan) as per the Working Group.

TABLE 6.1.1
Flow of Credit to Agriculture & Allied Activities

(Rs. in crore)

Year	Recommended by Ninth plan Working Group	Disbursements	Percentage shortfall
1997-98	33375	31956	(-) 4.3
1998-99	38645	36860	(-) 4.6
1999-2000	44780	44612 *	(-) 0.4
2000-2001	52108	51460 **	(-) 1.2
2001-2002	60842	NA	-

Source_: Economic Survey : 2000-2001.

* Estimated

** Projected

According to RBI Report on Trends and Progress in Banking (1999-2000), the relative share of agriculture credit in net bank credit stood at 11.7 per cent in March, 1998 and in March, 1999. It has declined to 11.1 per cent in March, 2000. As against the target of 40 per cent for priority sector lending by banks, the sub target for agriculture has been fixed at 18 per cent. The declining share of agriculture in the net bank credit against 18 per cent target is a matter of concern.

23. Due to various reasons, the Cooperative Credit Structure (CCS) is almost defunct in most of the states. Limited ability to mobilize resources, low levels of recovery of the loans advanced, high transaction costs, frequent suspensions of recovery, administered interest rates and externally imposed controls, have all seriously affected the health of the system. A number of measures have been taken to ensure their growth and thereby improve credit flow to agriculture sector. They include, measures for procedural simplification for credit delivery, delegation of more powers to bank managers, introduction of composite cash credit limit to farmers, introduction of one specialized agricultural bank in each state to cater to the needs of high-tech agriculture, introduction of cash credit facility, issue of Kisan Credit Cards to farmers to draw cash for their production

Kisan Credit Card Scheme

While presenting the Union Budget for 2001-02, Finance Minister announced the following measures with regard to Kisan Credit Cards:

- Banks have to accelerate the programme and cover all eligible farmers within the next three years.
- The banks have to provide a personal insurance package to the Kisan Credit Card holders, as is often done with other credit cards, to cover them against accidental death or permanent disability, upto maximum amount of Rs. 50,000 and Rs. 25,000 respectively. The premium burden will be shared by the card issuing institutions.

Other measures concerning agricultural credit are:

- To reduce interest rate charged by NABARD under RIDF from 11.5 per cent to 10.5 per cent. The corpus of RIDF-VII to be increased from Rs. 4500 crore to Rs. 5000 crore.
- NABARD to link one lakh additional Self-Help Groups, which would assist in providing credit to an additional 20 lakh families. Share croppers and tenant farmers will also become eligible for this scheme and special attention will be given to SC/ST groups. A micro finance development fund has also been set up in NABARD with contribution of Rs. 40 crore each by NABARD and RBI.
- To continue with the issue of capital gains tax exemption bonds by NABARD.
- The resources from the Watershed Development Fund set up in NABARD would be used to promote people's participation and also enable water users' associations to implement, operate and maintain irrigation schemes.
- To extend the coverage of the credit linked subsidy scheme for construction of cold storage for perishable commodities to also cover rural godowns. The loans would carry an adequate long-term repayment period and would enable individuals, cooperative banks, commercial banks and RRBs. This scheme will enable small farmers to enhance their holding capacity in order to sell their produce at remunerative prices. NABARD to reduce its rate of interest for funding the storage of crops, from 10 per cent to 8.5 per cent.
- To launch a scheme for setting up Agriclincs and Agribusiness Centres by agricultural graduates with the support of NABARD.

needs, augmenting Rural Infrastructure Development Fund (RIDF), etc. The Kisan Credit Card (KCC) scheme aims at providing adequate and timely support from the banking system to the farmers for their cultivation needs including purchase of inputs in a flexible and cost effective manner. Details of progress under the KCC scheme is given below:

TABLE 6.1.2
KCC Scheme- Progress upto 31-3-2001

(Rs. in Crore)

Year	Coop. Banks		RRBs		Comm. Banks		Total	
	No.of Cards Issued	Amount sanctioned	No.of Cards Issued	Amount sanctioned	No.of Cards Issued	Amount sanctioned	No.of Cards Issued	Amount sanctioned
1998-99	155353	826.10	6421	10.68	445451	1246.63	607225	2083.41
1999-2000	3594869	3605.64	173301	405.41	1365911	3537.08	5134081	7548.13
Upto 31-3-2001	5614445	9411.71	648324	1400.42	1814719	4730.14	8077488	15542.27
Cumulative Progress Upto 31-3-2001	9364667	13843.45	828046	1816.51	362608	9513.85	13818794	25173.81

Source: NABARD

24. The Introduction of National Insurance Scheme (Rashtriya Krishi Bima Yojana) by replacing earlier Comprehensive Crop Insurance Scheme from Rabi 1999-2000 has been a significant development in the Ninth Plan. 17 States and 2 UTs have implemented the scheme of Rashtriya Krishi Bima Yojana during 2000-2001. While during 1999-2000 rabi season, 5.74 lakh farmers were covered and a sum of Rs. 339.13 crore was insured, in the kharif 2000 season 7.5 million farmers were covered for a sum of Rs. 6040 crore.

Outlays and Expenditure:

25. During 2000-01, Department of Agriculture and Cooperation incurred an expenditure of Rs.1644 crore (Provisional) on various schemes for the development of agriculture against an outlay (BE) of Rs.1965 crore . For 2001-02, being the terminal year of the Ninth Plan, an amount of Rs. 1985 crore has been provided to the Department. The details of outlays and expenditure are given in **Annexure 6.1.2**.

Animal Husbandry and Dairying:

Livestock Development

26. The major thrust in the Ninth Plan is concentrated on the improvement of livestock productivity through scientific management and upgradation of genetic resources, control of animal diseases, production of quality feed and fodders, establishment of dairy processing and marketing infrastructure in hilly and back-

Major Achievements in Livestock Sector:

- The contribution of livestock sector to the GDP is about 6 per cent.
- Animal Husbandry sector provide employment opportunities to about 15 million persons.
- India ranks first in milk production and fifth in egg production, in the world.
- The country is at present provisionally free from rinderpest w.e.f. 31-3-1998.

ward areas, revamping the sick district cooperative milk unions and modernization of abattoirs. In pursuance of the strategy of doubling food production, the Department of Animal Husbandry and Dairying has identified ten schemes as action plan schemes for accelerated growth of livestock products. Besides the action plan schemes, the Department is also implementing 16 schemes related to creation of infrastructure facilities, eradication of rinderpest and modernization of abattoirs.

Milk and Milk Products

27. With concerted efforts, the milk production has increased significantly in the last decade and is anticipated to reach the level of 78.1 million tonnes during 1999-2000. The target of milk production during 2000-01 has been kept at 81.0 million tones. The per capita availability of milk is also expected to increase to 214 gm. per day during 2000-01 against minimum nutritional requirement of 201 gm. per day. However, it seems that with the present growth rate of milk production (about 4.8 percent during nineties), it will be difficult to achieve the Ninth Plan target of milk production set at 96.49 million tones. A new centrally sponsored scheme 'National Project for Cattle and Buffalo Breeding' was approved in October 2000 with a focus on delivery of breeding inputs at farmer's doorstep, quality control of inputs and improvement of indigenous breeds.

28. A new scheme 'Assistance to Cooperatives' aims at revitalizing the sick dairy cooperatives at the district level was started in January 2000 with an outlay of Rs. 150 crore. The Department has since approved rehabilitation proposals of four milk unions in Madhya Pradesh and two in Karnataka with a total outlay of Rs.53.51 crore. Another scheme 'Integrated Dairy Development Projects in Non-operation Flood, Hilly and Backward Areas' which was running since Eighth Plan as a Central Sector scheme has been converted into Centrally Sponsored scheme. Since the starting of the scheme, 42 projects with a total outlay of Rs. 215.97 crore have been sanctioned in 20 states.

Poultry including Egg

29. India is the only country in the developing world, which has the necessary technology and capabilities for successful poultry production. India is the 5th largest egg producers in the world, and ranks 19th in respect of broiler production. Both egg and broiler meat production has been accelerated at an annual growth rate of about 5 and 15 percent respectively. Egg production during 2000-01 is anticipated to be 32500 million compared to 800 million two decades ago. Ninth Plan target of egg production (35 billion no. Egg) is likely to be achieved. A new Centrally Sponsored scheme 'Assistance to State Poultry/Duck Farms' has started during the Ninth Plan in Northeastern states including Sikkim as a 100 percent central assistance to strengthen at least two duck/poultry farms in each state. The programme will be extended to other states in the ensuing years.

Other Livestock

30. Sheep and Goat are mostly reared by weaker sections of society, particularly the small and marginal farmers and the landless laborers. About 5 million households in the country

are engaged in the rearing of sheep and goat. The fact that the population of sheep and goat has been increasing continuously despite high annual slaughter rate and bare minimum Government assistance indicates the relevance and importance of these livestock species in the rural economy. Wool production of about 47.4 million kg has been expected to be achieved during 2000-01 as against 41.2 million kg during 1990-91. Under the National Ram/Buck production programme, a small amount of fund (Rs.86.21 lakh) has been released to the State Government of Mizoram, Gujrat, Nagaland, Sikkim and Orissa during 2000-01 upto December 2000.

31. Piggery development is of considerable significance, particularly in the Northeastern region of the country. To strengthen the state pig farms, a scheme 'Assistance to the States for Integrated Piggery Development' is continuing since 1991-92. During 2000-01, an amount of Rs. 60.25 lakh has been released till November, 2000.

Improvement of Slaughter Houses

32. There are 2702 registered slaughter houses in the country; most of them have poor facilities for maintaining proper hygiene and sanitation. A Centrally Sponsored Scheme entitled 'Assistance to States for improvement/modernisation of abattoirs/establishment of carcass utilisation centers and primary hide flaying units' is being implemented to improve the conditions of the slaughter houses but the scheme is running poorly; out of total disbursement of Rs.20.37 crore during the first four years of the Ninth Plan, unspent balance is Rs.12.56 crore as on 1-1-2001.

Animal Diseases

33. The present National Project for Rinderpest Eradication is continuing with financial assistance from European Union since 1992. Government of India declared the country provisionally free from rinderpest w.e.f. 1-3-1998, which was accepted and notified by Office International des Epizooties (OIE). However, due to dismantling of the immune zone from October, 2000 along the Indo-Pak border, as rinderpest is endemic in Pakistan, an early warning and response system has been installed along the border. A new scheme 'Creation of Disease Free Zone' is being formulated by the Department of Animal Husbandry and Dairying with the objective to create rinderpest, foot and mouth disease and contagious bovine pleuropneumonia free status in selected areas of potential growth of livestock products.

Fisheries

34. The fisheries sector occupies an important place in the socio-economic development of India. The sector's contribution in supplementing the family income of households, especially in the rural areas, and assisting in employment generation has been well-recognized. The sector also stimulates growth of a number of subsidiary industries and is a source of cheap and nutritious food. At the same time it is an instrument of livelihood for a large section of economically backward population of the country. The fishery sector has also been one of the major contributors of foreign exchange earning through exports. The

earnings from export of fish and fishery products has reached a level of Rs. 6308 crore in 2000-01.

35. The main objectives of the fisheries development programmes of the government during the Ninth Five Year Plan are: optimising production and productivity, augmenting export of marine products, generating employment, improving the socio-economic conditions of the fisher folk/fish farmers, conservation of aquatic resources and genetic diversity, increasing the per capita availability and consumption of fish etc. The Ninth Plan also focuses on an integrated approach to sustainable development of fisheries and aquaculture.

Major Emphasis in Fisheries :

- Optimising production and productivity.
- Conservation of aquatic resources and genetic diversity.
- Integrated approach to sustainable development of fisheries and aquaculture.

36. Fisheries is a state subject and as such the primary responsibility for development rest with the state government. However, supplementing the efforts of the state governments, the central government has been implementing various central sector and Centrally Sponsored Schemes for the development of fisheries in collaboration with the states/UTs. The Ninth Plan fish production target is set at 70.40 lakh tonnes envisaging a growth rate of 5.64 per cent per annum. An allocation of Rs. 800 crore has been earmarked for the fishery sector during the Ninth Plan period.

37. Development of Freshwater Aquaculture is one of the most important production oriented programmes implemented by the states through a network of 422 Fish Farmers Development Agencies (FFDAs). Under this programme, all the potential districts in the country have been covered. The Agencies provide a package of technical, financial and extension support to fish farmers. Under another programme, 39 Brackishwater Fish Farmers Development Agencies (BFDAs) have been sanctioned in all the coastal states and the UTs of Andaman and Nicobar Islands to develop brackishwater aquaculture in the country. In the marine sector, some of the major programmes are motorisation of traditional craft, reimbursement of central excise duty on HSD oil supplied to mechanised fishing vessels below 20 meters length etc. Since inception of the scheme for strengthening of infrastructure, 6 major fishing harbours, 33 minor fishing harbours and 130 fish landing centres are operational in the country. Besides, another 15 minor fishing harbours and 41 fish landing centres are at the various stages of construction which are likely to be completed by the end of the Ninth Five Year Plan. A number of welfare programmes for fishermen such as construction of houses, insurance coverage to active fishermen and saving-cum-relief during the lean period of fishing are being implemented by the government.

38. During the terminal year of the Plan, the four pilot projects, viz. Development of Coldwater Fisheries and Aquaculture; Development of Reservoir Fisheries ; Utilisation of Inland Saline Soil ; and Development of Waterlogged Areas as Aquaculture Estates are being taken in the identified states by the Government

Agriculture Research and Education

39. Indian Council of Agriculture Research (ICAR) is an apex body responsible for planning, undertaking, aiding, promoting and coordinating agriculture research education and frontline demonstration in the country. It undertakes, aid, promote and coordinate research

and its applications in agriculture, animal sciences, fisheries, agro-forestry and allied sciences. The outlay approved for the year 2001-2002 is Rs.684 crore. The major programmes of the ICAR are as under:

- Inventory of natural resources base, especially in the area of land-use, water-use and agro-forestry and wastelands systems for an identified area/watershed.
- Conservation and planned exploitation of germplasm resources through genetic enhancement centers, technology blending centers of plants, trees, livestock and fisheries.
- Enhancing productivity through evolution of new high-yielding hybrids/varieties/breeds/ strains with tolerance to biotic and abiotic stresses.
- Breeder seed production.
- Development and refinement of dry-farming technology.
- Improving integrated nutrient management system.
- Development of integrated pest-management practices.
- Diversification of agriculture with emphasis on agro-forestry, livestock and fisheries.
- Research on export-oriented commodities.
- Energy management in agriculture.
- Post-harvest technology and engineering with emphasis on on-farm storage.
- Fostering excellence in research and educational programme.
- Transfer of technology and improving information and communication system.
- Human resource development.

40. ICAR undertakes research education programmes through its network of Agriculture Universities, ICAR Institutions, Project Directorates and Extension activities through Krishi Vigyan Kendras (KVKs), State Agriculture Universities (SAUs) and through Voluntary Organizations. There are 47 Institutes, 5 Bureaus, 30 National Research Centres, 11 Project Directorates and 80 All India Coordinated Research Projects including network projects. There are 30 State Agriculture Universities and one Central Agricultural University in the country. 261 Krishi Vigyan Kendras are there.

New Initiatives taken by the ICAR during 2001-02:

- ❖ ICAR Research Complex for Eastern Region, Patna, Bihar.
- ❖ National Bureau of Agriculturally Important Microbes.
- ❖ National Research Centre on Seed Spices.
- ❖ National Research Centre on Lichhi – Bihar.
- ❖ National Research Centre on Pomegranate – Maharashtra.
- ❖ Upgradation of AICRP On Disease Monitoring and Surveillance to Project Directorate.
- ❖ Upgradation of AICRP on Pig to Project Directorate.
- ❖ Establishment of Agricultural University at Jammu.
- ❖ AICRP on Engineering Measures for efficient land and water management.
- ❖ Network on Haemorrhagic Septicaemia.
- ❖ Rural Agricultural Work Experience.
- ❖ Establishment of 66 new Krishi Vigyan Kendras.

41. During 2000-01, the following scientific achievements were made by the ICAR:

- Two varieties of rice, five varieties of wheat, five hybrids for maize, six hybrids for sorghum, four hybrids for pearl-milletts, twelve improved varieties of different pulse crops were released. In regard to oilseeds, several improved varieties were

also released. Nine sugarcane varieties, consisting of six for peninsular zone, one for east-coast and two for North-central zone were released.

- Under germplasm collection, 242 explorations were undertaken in diversity rich under-explored areas. 40,330 samples representing cultivated types in cereals, vegetables, major and minor food crops, ornamental, medicinal and aromatic plants, arid-zone samples, under-utilized crops' samples, were collected from diverse habitats in different parts of the country.
- Under DNA Fingerprinting, inter-microsatellite polymorphism were used to detect variations and develop molecular fingerprints of rice, wheat, barley, moong-bean, brassica, sesame, cotton and mango.
- Soil erosion maps of many states mainly Haryana, Punjab, J&K, Uttar Pradesh, Himachal Pradesh, Karnataka, Andhra Pradesh, Kerala, Tamil Nadu have been finalized.
- In Animal Sciences, DNA fingerprinting of Indian Goat by Mini Satellite and Micro-Satellite Marker have been done. Gene marker study is of great value for identification, characterization of valuable germplasm and planning future breeding experiments.
- In areas of poultry, selected and controlled lines of White Leghorn chicken were evaluated for their genetic biodiversity with the help of DNA methods.
- In catfish seed production, *Ompak pabda*, a freshwater catfish was induced bred for the first time in the country using the reared brooders.

Externally Aided Projects

42. The following are details concerning the progress of the Externally Aided Projects (EAP) in the agriculture and the allied sector.

Agriculture and Cooperation

43.i) Alkali Land Reclamation and Development Project with EEC Assistance: This project which has the objective of improving the income level of disadvantaged small and marginal farmers of Bihar and Uttar Pradesh, by reclaiming the potentially fertile alkaline land, came into existence during 1993-94 with EEC assistance. Out of the estimated cost of Rs.85.80 crore for the project, the Central Government's share works out to be Rs.6.88 crore. It is proposed to reclaim 15,000 hectares of alkali lands (10,000 hectares in UP and 5,000 hectares in Bihar). Life span of the project is 7 years and is likely to be completed by September, 2001. Since inception, an area of 0.27 lakh hectares of alkali soil has been reclaimed in both the States at a cost of Rs. 91.49 crore. For 2000-01, an area of 4500 hectares of alkali soil was proposed for reclamation with an outlay of Rs. 20 crore.

- ii) UNDP Programme for Food Security: The agreement with the UNDP for this programme was signed on 13-2-1998. It involves US\$ 13 millions to be given by UNDP for three years. The Food Security Programme is an umbrella programme under which various sub-programmes have been formulated. Five sub-programmes and one supplementary programme have been finalized under the overall Food Security Programme. They are:
- (1) Development of Hybrid Rice Technology for Large Scale Adoption in India (implemented by ICAR) with an outlay of Rs.101.85 crore (US\$ 2.55 millions):
 - (2) Maize Based Cropping System for Food Security in India (implemented by TMOP&M) with an outlay of Rs.3.43 crore (US\$ 0.814 million);
 - (3) Sustainable Dryland Agriculture by Mahila Sangams, Andhra Pradesh with an outlay of Rs.13.42 crore ;
 - (4) Empowerment of Women Farmers for Food Security (implemented in UP) with an outlay of Rs.7.04 crore;
 - (5) (a)-Strengthening of Natural Resources Management and Sustainable Livelihoods of Women in tribal Orissa with an outlay of Rs.7.04 crore and (b)-Supplementary Programme for selected super cyclone affected districts at a cost of Rs. 1.49 crore; and
 - (6) Management Support for Food Security Programme at a cost of Rs. 0.33 crore.
- iii) World Bank Funded National Agricultural Technology Project (NATP): The extension component “ Innovations in Technology Dissemination” is being implemented in six states namely, Andhra Pradesh, Bihar, Himachal Pradesh, Maharashtra, Orissa and Punjab. The broad objectives of the project is to sustain and strengthen research and extension capabilities, restructure public extension services and test new institutional arrangements for technology transfer involving the Government and Non-Governmental agencies at the district level in the selected NATP states.
- iv) EEC assisted Development of Rural Growth Centre Project in Bihar: This is an ongoing scheme being assisted by the EEC. EEC has allowed to spend the unutilized funds under the project.
- v) EEC assisted Coconut Development Projects in Kerala: The objective of the scheme is to establish three integrated production, processing and extraction units for coconuts.

Agriculture Research and Education:

- 44.i) The National Agriculture Technology Project (NATP): This project was started from 1998 and funds are being used to compliment existing resources and augment productivity in the National Agriculture System. This is being achieved by enhancing the availability of funds for research, upgrading of facilities and scientific skill. The projects which have been released so far are: 26 projects under Teams of Excellence,

32 under Mission Mode, 211 under Production System Research, 70 under Institute Village Linkage Programme and 80 under the Competitive Grant Programme. The total cost of the NATP is US \$ 239.7 million (equivalent to Rs. 861.30 crore in August, 1997). The World Bank contribution is 82 per cent of the total cost (US \$ 196.80 million) and the Government of India share is 18 per cent which comes to US \$ 42.9 million. The total Bank assistance comprises IDA credit of SDR 73.8 million (US \$ 100 million) and US \$ 96.8 million has IBRD loan at the usual rate of interest.

- ii) Human Resource Development Project (HRDP): This project is running in NAARM (National Academy of Agriculture Research Management) and Tamil Nadu Agriculture University. This project is meant for human resource development.
- iii) Indo-French Seabass Breeding and Culture: This project is being implemented through Central Institute of Brackish-water Aquaculture at Chennai at a total cost of 3.90 million FRF as a soft loan.
- iv) Indo-Israel Project: This project is for establishing a ten-hectare Farm Unit in the IARI campus at New Delhi which undertakes programmes of demonstrating peri-urban high technology methods of growing flowers, vegetables and fruits. The total outlay of this project is Rs. 986.36 lakhs out of which Government of India's share is Rs. 301.55 lakhs and Israel Government's share is Rs. 684.81 lakhs.

TABLE: 6.1.3

Allocation and Expenditure under Externally Aided Projects

(Rs. in Crore)

Name of the Scheme	IXth Plan Allocation	Expenditure				2001-02 (BE)
		97-98 (Actuals)	98-99 (Actuals)	99-00 (Actuals)	2000-01 (Provi.)	
Agriculture & Cooperation:						
EEC Assisted Alkali Land Reclamation and Dev. Programme	150.00	17.94	24.90	24.90	19.81	1.50
UNDP Programme for Food Security	24.00	Nil	Nil	4.58	6.42	11.50
WB funded National Agri. Technology Project	78.00	0.40	3.47	11.36	13.78	17.67
EEC assisted Rural Growth Centre Project in Bihar	15.00	Nil	Nil	Nil	5.00	5.00
EEC assisted Coconut Dev. Project in Kerala	10.00	Nil	Nil	Nil	0.00	1.94
Total (Agri. & Coop.)	277.00	18.34	28.37	40.84	45.01	37.61
Agriculture Research & Education (ICAR):	638.97	26.64	42.56	101.79	211.54	154.99

ANNEXURE 6.1.1
Physical Targets and Achievements of Agriculture And Allied Sector

Part-A: Production and Targets of Crops										
(In Million Tonnes/bales for Cotton, Jute and Mesta)										
Crop	1996-97	Ninth Plan Target	1997-98	1998-99	1999-00 (Final Est)	2000-01		2001-02 (Target)	Highest Production ever achieved	
						Target	Likely Achievements		Quantity	Year
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Rice	81.74	99.00	82.53	86.08	89.48	90.00	86.30	92.00	89.48	1999-2000
Wheat	69.35	83.00	66.35	71.29	75.57	74.00	68.46	78.00	75.57	1999-2000
Coarse Cereals	34.10	35.50	30.40	31.33	30.47	33.00	30.25	33.00	36.59	1992-1993
Pulses	14.25	16.50	12.98	14.91	13.35	15.00	11.06	15.00	14.91	1998-99
Food grains	199.44	234.00	192.26	203.61	208.87	212.00	196.07	218.00	208.87	1999-2000
Oilseeds	24.38	30.00	21.32	24.75	20.87	28.00	18.20	28.00	24.75	1998-1999
Sugarcane	277.56	336.00	279.54	288.72	299.23	325.00	300.32	325.00	299.23	1999-2000
Cotton	14.23	15.70	10.85	12.29	11.64	14.50	9.39	14.50	14.23	1996-1997
Jute & Mesta	11.13	11.11	11.02	9.81	10.53	10.00	10.37	11.00	11.13	1996-1997
Part-B: Production of Fruits & Vegetables and Plantation Crops										
Crop	1996-97	Ninth Plan Target	1997-98	1998-99	1999-00	2000-01		2001-02 (Target)	Highest Production ever achieved	
						Target	Provisional		Quantity	Year
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Fruits & Vegetables (Million Tonnes)	141.00	179.00	112.88	131.58	137.00		-	-	131.58	98-99
Tea (Million Kg)	775.00	1000.00	838.00	850.00	816.06		840.00	-	850.00	98-99
Coffee (Lakh Tonnes)	2.05	3.00	2.28	2.65	2.92		2.95	-	2.92	99-00
Rubber (Lakh Tonnes)	5.49	7.17	5.84	6.05	6.22		6.95	-	6.22	99-00
Part-C: Animal Husbandry, Dairying & Fishery										
Crop	1996-97	Ninth Plan Target	1997-98	1998-99	1999-00	2000-01		2001-02 (Target)	Highest Production ever achieved	
						Target	Provisional		Quantity	Year
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Milk (Million Tonnes)	69.10	96.49	70.80	74.70	78.10	90.13	81.00	85.00	81.00	2000-2001
Egg (Billion No)	27.50	35.00	28.57	30.15	31.50	31.32	32.50	33.60	32.50	2000-2001
Wool (Million Kg)		54.00	44.50	45.50	46.50		47.40		47.40	2000-2001
Fish (Lakh Tonnes)	53.48	70.40	53.90	52.62	56.55	66.60	58.00	70.40	56.55	1999-2000

Annexure 6.1.2

Outlays and Expenditure of Agriculture & Allied Sector

(Rs. Crore)

Name of Division/Scheme	IX Plan Outlay	1997-98 Actuals	1998-99 Actuals	1999-2000 Actuals	2000-01			2001-02 B.E.
					B.E.	R.E.	Prov.	
1	2	3	4	5	6	7	8	9
Part A: Agriculture & Cooperation								
Agricultural Census	48.00	2.27	6.89	7.32	13.00	9.00	8.68	12.00
Cooperation	765.00	114.08	136.22	110.18	106.33	75.98	82.47	85.00
Credit	1633.85	250.95	222.67	322.87	401.87	341.37	341.37	360.00
Crop	1279.82	112.12	119.47	111.74	142.75	65.40	64.24	120.00
Extension	180.00	9.78	12.21	28.34	45.00	33.24	32.54	46.00
Fertilizer	167.50	8.10	6.43	13.41	12.83	8.62	7.87	6.00
Agri. Implements & Machinery	96.00	18.66	17.65	18.85	8.30	3.65	3.47	4.00
Horticulture	1298.00	183.05	221.14	240.20	191.25	180.21	185.68	175.00
Plant Protection	122.51	19.20	17.06	21.06	25.00	25.66	12.75	23.00
Rainfed Farming system	1030.00	149.13	225.26	186.97	156.85	215.85	215.38	1.50
Seeds	130.80	7.38	3.79	15.65	27.64	19.55	16.40	32.00
Dte. of Econ. & Stat. & CACP	244.00	28.88	30.10	48.98	55.00	38.08	35.09	50.00
Soil & Water Conservation including SP.	891.62	135.50	164.90	150.27	62.18	60.42	58.52	10.00
TMO&P	906.00	164.01	154.99	160.19	165.00	134.15	141.82	150.00
Natural Disaster Management	40.00	1.85	1.80	2.86	7.00	3.15	3.32	8.00
Trade(SFAC) & Int. Cooperation	40.00	0.50	0.50	2.50	5.00	4.00	4.50	5.00
Information Technology	180.00	0.00	0.50	8.99	13.00	5.50	3.77	15.00
Secretariat Econ. Services	15.00	2.34	2.24	2.37	4.00	2.50	1.93	2.50
Macro Management	3.00	0.00	0.00	0.00	490.00	342.00	381.88	850.00
Agri. Marketing	70.00	0.00	0.00	3.95	10.00	6.67	5.50	10.00
Policy Division	12.72	0.00	0.06	0.20	8.00	2.00	0.96	5.00
NES						100.00	20.85	0.00
Total Plan Outlay	9153.82	1207.80	1343.88	1456.90	1950.00	1677.00	1628.99	1970.00
State Plan Schemes								
Watershed Development in Shifting Cultivation Areas in N-E States	75.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Total	9228.82	1222.80	1358.88	1471.90	1965.00	1692.00	1643.99	1985.00
Part B: Plantation Crops								
Plantation	740.20	123.78	125.81	149.22	186.49	174.51	166.08	185.44
Part C: A.H. D. & Fisheries								
Animal Husbandry Sector	1076.12	94.84	53.03	97.26	156.49	91.72		156.49
Dairy Sector	469.52	29.24	23.97	16.45	37.45	39.45		37.45
Fishery	800.00	85.06	91.93	91.97	120.70	96.63	85.98	103.86
Part D: Agriculture Research And Education								
Agriculture Research & Education	3376.95	323.30	427.73	498.47	629.55	500.00	550.00	684.00

Source: Part A: Department of Agriculture and Cooperation, Part B: Department of Commerce, Part C: Department of Animal Husbandry & Dairying and part D: Department of Agriculture Research & Education

6.2 IRRIGATION, FLOOD CONTROL AND COMMAND AREA DEVELOPMENT

The agricultural development strategy for the Ninth Five Year Plan is based on the policy of food security announced by the Government to double the food production and make India hunger free in ten years. The irrigation development and water management are going to be most crucial factors for increase in agricultural production. Of all the inputs that are required to boost agricultural production, assured irrigation facilities occupy a very important place .

2. The net cultivated land per capita decreased from 0.48 ha. in 1951 to 0.20 ha. in 1980 and is likely to further decrease due to pressure of urbanisation, industrialisation and growth of population. In such circumstances due emphasis have to be placed on expanding the area under irrigation and optimising the agricultural productivity from irrigated area.

3. The Ninth Plan target is to achieve a growth rate of 4.5% per annum in agricultural output in order to make a significant impact on overall growth and poverty alleviation. With the net sown area almost stagnant in the country at 140-141 m.ha., further expansion of irrigation, including additional irrigation becoming available from modernisation/renovation of irrigation capacities, is needed as a critical input in achieving the targeted growth rate of agriculture in the Ninth Plan. In the post-independence era, the Government recognized the importance of irrigation in increasing the agricultural production and accordingly assigned a high priority to it in successive Five-Year Plans.

4. The strategy for irrigation development in the Ninth Five Year Plan has interalia laid emphasis on rational pricing of irrigation water , promotion of participatory irrigation management, encouraging conjunctive use of ground and surface waters, improving water use efficiency and completion of ongoing projects particularly those which were started during pre-Fifth and Fifth Plan period.

Major & Medium Irrigation

5. The ultimate irrigation potential through major & medium irrigation projects has been assessed at 58.46 M Ha . The potential created at the end of Eighth Plan was 32.95 M. Ha. It is targetted to create an additional irrigation potential of 9.81 M Ha. through major & medium irrigation during IX Plan. The yearwise potential created and potential utilised during the Ninth Plan period is given in Annexure V.

6. The following table indicates the outlay and expenditure for major and medium irrigation projects during the Ninth Five Year Plan.

TABLE 6.2.1

Plan Outlays and Expenditure

(Rs. Crores)

Period	Central Sector		State Sector (including UTs)	
	Approved Outlay	Actual/Ant. Expenditure	Approved Outlay	Actual/Ant. Expenditure
9th Plan	330.12	—	42629.22	—
1997-98	39.69	35.95	8362.31	7525.32
1998-99	47.56	47.72	10024.03	8144.31
1999-2000	52.51	48.24	12228.81	11234.79
2000-2001	50.60	36.91	12922.40	10976.08
2001-2002	56.14	49.65		

7. During the year 2000-01, there was shortfall in the total outlays for some of the States due to negative BCR and lower contribution of Public enterprises and consequently there was reduction in outlays for Irrigation Sector.

Programme for 2001-02

8. The Ninth Plan strategy for irrigation development inter alia provides the completion of all the ongoing projects, particularly those which were started during pre-Fifth and Fifth Plan period as a time bound programme to yield the benefits from the investments already made.

9. The Planning Commission has identified 43 nos. of major irrigation projects which are continuing from pre-Fifth Plan period. An exercise has been taken up in the Planning Commission for their time bound completion in the next two years. The matter will be further examined in consultation with the State Governments. A provision of Rs. 2000 Crore has been made during 2001-2002 under AIBP for early completion of irrigation projects. In the Central Sector, there is a provision of Rs. 50.60 Crores during 2000-2001 for major & medium irrigation projects, which is mainly for survey & investigation.

Water Use Efficiency

10. Water use efficiency is presently estimated to be only 38 to 40% for canal irrigation and about 60% for ground water irrigation schemes. On the basis of 1991 census, our country's per capita water availability per year was estimated at 2214 cubic metres against the global average of 9231 cubic metres and 3020 Cubic Meters (m³), 3962 m³ and 4792

m³ per year respectively for countries like Afganistan, Pakistan and Sudan. In 1990, India was ranked at the 42nd position among 100 countries by per capita water availability. In the total water use in 1990, the share of agriculture was 83%, followed by domestic use (4.5%), industrial use (2.7%) and energy (1.8%). The remaining 8 per cent was for other uses including environmental requirements. The projected total water demand by the year 2025 is around 1050 cubic kilometres against the country's utilisable water resources of 1122 cubic kilometres. The share of agriculture in total water demand by the year 2025 would be about 74 per cent. Thus, almost the entire utilisable water resources of the country would be required to be put to use by the year 2025 A.D. Irrigation, being the major water user, its share in the total demand is bound to decrease from the present 83% to 74% due to more pressing and competing demands from other sectors by 2025 A.D. and, as such, the question of improving the present level of water use efficiency in general and for irrigation in particular assumes a great significance in perspective water resource planning. It is estimated that with 10% increase in the present level of water use efficiency in irrigation projects, an additional 14 m.ha area can be brought under irrigation from the existing irrigation capacities which would involve a very moderate investment as compared to the investment that would be required for creating equivalent potential through new schemes.

RENOVATION & MODERNISATION OF IRRIGATION PROJECTS

11. Increasing the effective irrigation area through timely renovation and modernisation of the irrigation and drainage systems, including reclamation of waterlogged and salinised irrigated lands through low-cost techniques, needs to be considered especially in the context of the present resource constraints. It is estimated that about 21 m.ha of irrigated area from major and medium projects from pre-Independence period and those completed 25 years ago, require renovation/upgradation/restoration to a great extent of the areas which have gone out of irrigation, either partly or fully, due to deterioration in the performance of the systems. The total investment involved is estimated at Rs.20,000 - 30,000 crore over a period of 20 years. Water Resource Consolidation Project (WRCP- 6 years duration) in the States of Haryana (estimated cost - Rs.1442.12 crore), Tamilnadu (Rs.807 crore) and Orissa (Rs.1409.90 crore) is taking care of this aspect to some extent. Recently, an externally aided Andhra Pradesh Irrigation Project (Phase-III) has been taken up for modernisation/renovation of selected irrigation projects in Andhra Pradesh. Besides the above, Punjab Irrigation and Drainage Project Phase-II (1990-98), with an estimated cost of US \$ 165 million and including components of all sectors of irrigation (major/medium/minor, CAD and flood control) has been completed which aimed primarily at better water management and improved functioning to achieve optimum utilisation of water in Punjab, as the State has almost exhausted the exploitation of surface water. However, a greater push for modernisation/renovation of existing irrigation projects will be needed during the Ninth Plan period.

12. As a follow up of the Union Finance Minister Budget Speech (1999-2000) that a larger assistance will be given to the States, so that rationalise their water rates to cover O&M costs a proposal for taking up renovation and modernisation of irrigation systems is under active consideration of the Government, as a component of the ongoing AIBP.

Accelerated Irrigation Benefit Programme (AIBP)

13. AIBP was launched by the Government of India in 1996-97 for expeditious completion of approved ongoing major/medium irrigation projects. Central loan assistance under the programme is in the form of loan at the rate of interest prescribed by the Ministry of finance from time to time and is provided to those projects which have investment clearance of the Planning Commission. Projects which are already receiving assistance from domestic agencies i.e. NABARD are not eligible. However, components of such projects which are not covered under such assistance are considered for inclusion under the programme. Minor irrigation schemes are not eligible for assistance under AIBP. However, from 1999-2000 Minor Surface Irrigation Schemes both new as well as ongoing of North Eastern States, Hilly States (Himachal Pradesh, Sikkim and J&K) and KBK districts of Orissa which are approved by State (TAC) are now eligible under the programme. Further, as per the revised guidelines CLA for the projects is provided to the non special category States in the ratio of 2:1 (Centre : State). For the special category states the funding is in the ratio of 3:1.. The projects benefiting KBK districts of Orissa are treated at par with special category states as far as funding pattern is concerned. During 1996-97, a sum of Rs.500 crore was released to 52 projects in various States. During the A.P. 1997-98, 1998-99 and 1999-2000 the total releases were Rs.952.19 crore (for 73 projects) Rs.1119.18 crore (for 77 projects) and Rs. 1463.36 Crore (for 87 projects) respectively under A.I.B.P. During 2000-2001, a budget provision of Rs. 1712 crore exists under AIBP also the releases made was Rs. 1470.25 Crore for 98 major & medium and 853 minor irrigation schemes. Table indicating CLA released under AIBP appears at Annexure-VII.

14. The suggestions of the Planning Commission for the intensive and broad based monitoring needs to be further strengthened. In this regard an analysis was carried out in the Planning Commission on the basis of data made available by the MOWR on AIBP projects and the result is as under:

TABLE 6.2.2

Category	No. of projects	Total CLA released (Rs. Crore) upto 3/2000	Total Potential created under AIBP (000'ha) 3/2000	Balance Cost (Rs. Crore)	Balance Potential (000'ha)
Projects with expdr. More than 75%	49	1334.30	3840.51	3117.48	1383.10
Projects with expdr. 50 to 75%	40	1467.20	1742.43	6312.79	2320.50
Projects with expdr. 30 to 50%	18	629.86	278.09	4607.98	595.32
Projects with expdr. Less than 30%	36	2194.02	397.63	25144.58	3544.80
Grant Total	143	5625.38	6258.66	39182.83	7843.72

15. The above analysis indicates that the maximum funds have been pumped for the projects with expenditure less than 30% and for the projects with expenditure between 30 to 50 %. This has definitely dampen the progress of accelerated irrigation development and against the idea of AIBP which was conceptualised in 1996-97 by the Planning Commission. Also the requirement of funds for the projects with progress less than 30% shall be Rs. 25,144.58 Crore which shall create additional irrigation potential of 3544.80 th. ha. and this is not a wise investment.

External Assistance for Development of Water Resources

16. The task of development of water resources in various regions of the country requires large financial investments. The external assistance from different funding agencies is required to fill up the resource gap for implementation of projects for development of water resources.

17. The World Bank continues to be the primary source of external assistance in this sector. The other donors are EEC, OECF-Japan, Kfw Germany and Government of Netherlands etc. In the financial year (1999-2000) upto December, 1999 an amount of Rs. 664.74 Crore was received from the World Bank, European Economic Community and other bilateral agencies and utilised by the State Governments and Government of India for implementation of various externally aided projects in the water sector. The three projects namely "Dam safety assurance & Rehabilitation, water control system for diversification of crops in Maharashtra and Upper Indravati Irrigation Project, Orissa mainly utilized these funds.

Minor Irrigation

18. All groundwater and surface water schemes having culturable command area upto 2000 ha individually are classified as minor irrigation schemes. Minor surface water flow irrigation projects comprising storage, diversion works and surface lift irrigation schemes occupy a prominent place in the scheme of irrigated agriculture particularly in the undulating areas south of the Vindhyas and the hilly regions. Minor Irrigation Schemes are labour intensive, provide employment to rural population and check their migration to urban areas. They also help in raising the standards of living of rural population and bring them above the poverty line. Such schemes are quick maturing and the benefit from the schemes starts flowing with a very small gestation period. Generally the schemes are installed in a maximum, of two to three years.

19. The ultimate irrigation potential from minor irrigation schemes has been assessed as 81.43 m. ha. comprising of 17.38 m. ha from surface water schemes and 64.05 m. ha from ground water schemes. Upto the end of the Seventh Plan, the potential created through the minor irrigation schemes was 47.20 m. ha. The additional potential created under minor irrigation during the Eighth Plan period is 6.10 m. ha. The total potential created at the end of Eighth Plan is estimated at 53.3 m. ha. Hence, the balance potential available at the beginning of Ninth Plan works out to 28.13 m. ha. The target of potential creation in minor irrigation for the Ninth Plan has been fixed at 7.24 m. ha. The year-wise potential created and potential utilised during the Ninth Plan period is given in Annexure VI.

Plan Outlays and Expenditure

20. The minor irrigation schemes are funded from plan funds , institutional finance and private investments by the farmers. It is generally considered as a people's programme as the plan funds form only a small portion of the total investment for its development. The following table indicates the outlays and expenditure in the Central Sector and State Sector for minor irrigation schemes during the Ninth Plan.

TABLE 6.2.3

(Rs.Crore)

Year	Central Sector		State Sector & UTs	
	Approved Outlay	Actual/Ant. Expenditure	Approved Outlay	Actual/Ant. Expenditure
9th Plan	385.00	8984.84	8977.02	1454.43
1997-98	70.56	42.48	1799.20	1536.11
1998-99	67.40	48.09	2057.20	1566.30
1999-2000	55.81	56.47	2117.79	1840.21
2000-01	85.27	66.28	1907.93	1731.67
2001-02	84.58	122.18	—	—

21. Ground water development forms the major part of the minor irrigation programme and includes construction of dugwells, dug-cum-bore wells, filter points , private shallow tubewells and deep Public tubewells . It is essentially a people's programme implemented primarily through individual and cooperative efforts with finances obtained mainly from institutional sources. However, due care as well as control need to be exercised against overdrawal of ground water, as is now found in some parts of Punjab, Haryana, Maharashtra and North Gujarat.

22. The existing regulation of ground water development is in the form of administrative measures being adopted by the institutional financing agencies for schemes proposed for bank financing. The financial institutions by and large insist on technical clearance of the schemes from authorised ground water development institutions of the concerned states. Keeping in view the national interest and to serve the objective of ground water development a model bill "To control and regulate the development of ground water" was framed by the Government of India and circulated to the States in 1970 for adopting the same in the form of suitable legislation. The bill was revised in 1992 and it was circulated to the States for their comments and adoption in a suitable manner . The options for regulating the extraction of ground water are:

- (a) Regulation by education i.e. by creating awareness among the people of the adverse effects of over exploitation of ground water.
- (b) Regulation by administration and legislation as stated above.

23. Whereas the need to regulate ground water is paramount, simultaneous measures will have to be taken to ensure its availability on a sustainable basis. To achieve this, measures like artificial recharge of ground water to augment ground water storage, conservation through economic water use and protection from pollution will have to be taken without further loss of time. The Government of India has constituted a Central Ground Water Authority in pursuance of the directions of Supreme Court. After its constitution in 1997, the Authority considered the following issues which required immediate regulatory measures;

- a) To conserve the ground water resources and ensure its prudent use.
- b) To control over-drawal of ground water in critical areas.
- c) To augment resource in areas of over-exploitation.
- d) To achieve statutory quality standards for ground water set up by BIS and ICMR.
- e) To control discharges to ground eater systems

24. The following powers have been given to the Authority to perform the functions given below:

- (i) Exercise of powers under section 5 of the Environment (Protection) Act, 1986 for issuing directions and taking such measures in respect of all the matters referred to in sub-section(2) of Section 3 of the said Act.
- (ii) To resort to the penal provision contained in section 15 to 21 of the said Act.
- (iii) To regulate indiscriminate boring and withdrawal of ground water in the country and to issue necessary regulatory directions with a view to preserve and protect the ground water.

25. In the North-Eastern States, generally only one crop is cultivated. The present stage of overall development of Minor Irrigation in North-Eastern States is only 33% as compared to the All India figure of 75% and of about 98% in the North-Western States of Punjab and Haryana. In case of Eastern States, the situation is significantly better. Keeping in view the potential available in the Indo-Gangetic belt and its easier and cheaper exploitation, it is pertinent that minor irrigation which includes the ground water also be exploited fully. A proposal is under consideration for tapping vast unutilised ground water resource potential in the four co terminus States of Bihar, Orissa, Eastern parts of Uttar Pradesh and West Bengal for raising agricultural productivity and for overall upliftment of weaker sections of the farmers.

26. As the Minor Irrigation programme in some States and UTs is implemented through several Departments there is a need for effective coordination among all such Departments. In case of Central Ground Water Board (CGWB), emphasis is being laid on stepping up the work relating to ground water investigation and development in North-Eastern States. The Board has drawn up a programme to complete the survey work in the States and to accelerate

exploratory drilling specially in the States of Arunachal Pradesh, Manipur and Nagaland where the work has been lagging behind. Similarly CGWB has drawn up a programme to take ground water surveys and drilling in tribal areas on a systematic basis.

27. The salient features of Minor Irrigation Programme are:-

- (i) To ensure adequate provision of funds for the externally aided projects according to the schedule of disbursement;
- (ii) To ensure prioritisation for on-going schemes;
- (iii) Stepping up the institutional investment to the extent possible including subsidy to small & marginal farmers and other weaker sections;
- (iv) Stepping up ground water development, especially in the Eastern and North-Eastern states;
- (v) Encouraging minor irrigation programme for tribal, backward, drought-prone areas and areas having pre-dominantly scheduled caste and scheduled tribe farmers by establishing effective coordination as well as by dovetailing if possible all ongoing programmes/schemes like employment generation schemes etc. under various Ministries.
- (vi) Encouraging schemes utilising non-conventional sources of energy like hydrums etc.,
- (vii) In water scarce and drought prone areas, the use of sprinkler/drip irrigation system as a water saving device as well as for efficient use of water for productivity should be encouraged.
- (viii) To improve the utilisation of public tubewells and their rehabilitation along with turning over to beneficiary farmers for O&M.

Rural Infrastructure Development Fund

28. The setting up of RIDF in NABARD was announced in 1995-96 with a corpus of Rs. 2000 Crore and the contributions had to be made by Scheduled Commercial Banks excluding foreign banks operating in India, to the extent of shortfall in agricultural lending in the priority sector targets, subject to a maximum of 1.5% of net bank credit. Presently under RIDF, loan assistance is provided for the purposes of major, medium & minor irrigation, soil conservation, watershed management, rural roads and bridges, integrated cold chain projects, integrated market yard projects and other rural infrastructure. The assistance is currently provided upto 90% of the updated cost of the scheme or the balance cost whichever is less and is repayable in 7 years along with interest at the rate of 12% or so per annum.

29. It was observed that the flow of credit from NABARD in respect of certain States was not taking place in the manner as envisaged. The matter was taken up with NABARD to take a review of the disbursements made and persuade the State Govern-

ments for fully availing the funds available so as to ensure that there is no short-fall. The NABARD has indicated the following reasons for slow progress in implementation of RIDF projects:

- a) In the absence of firm figures relating to sanctions to be issued from NABARD the State Governments are finding it difficult to make adequate budgetary provision for projects to be executed in a particular year. This, in turn, affects the implementation of the projects.
- b) Monitoring studies conducted by the Regional Offices of NABARD as well as the feedback received from the implementing authorities reveal the following major constraints in implementation/execution of the projects. Completion of land acquisition/compensation formalities; Forest/environment clearances; Change of design necessitated during the implementation and consequent cost escalation; Cumbersome and time consuming tendering process and sometimes poor responses to the tenders and dispute with the contractors(tendering procedure has since been simplified in many States).
- c) All the States have set up High Powered Committee(HPC) under the Chairmanship of the Chief Secretary of the State to review the progress in the implementation of RIDF projects on a quarterly basis. However, the meetings of the HPC are not held regularly in some of the States.

30. In view of the above noted issues the State Governments were requested to take necessary corrective measures for completion of the projects within stipulated time frame.

Command Area Development

31. The Command Area Development (CAD) programme was initiated in 1974-75 with a view to bridge the gap between the potential created and its utilisation and optimising agricultural productivity through better management of land and water use in the command areas served by selected major and medium irrigation projects. The programme presently covers 226 projects with a total culturable command area of 21.95 million hectares spread over 23 States and 2 Union Territories and administered through 55 CAD authorities. From the inception of the programme in 1974-75, upto March, 2000 an amount of Rs. 2146.24 Crore has been released to the States as Central assistance under the CAD programme. On the basis of shortcomings as found during the implementation of this programme over last two decades, it is being reoriented based on Evaluation Studies so as to make it more effective instrument for ensuring speedy transit to irrigated agriculture alongwith optimising the water use efficiency.

Plan Outlays and Expenditure

32. The table given below indicates the outlays and expenditure in the Central Sector and State Sector for command area development programme during the Ninth Plan.

TABLE 6.2.3

(Rs.Crore)

Year	Central Sector		State Sector	
	Approved Outlay	Actual/Ant. Expenditure	Approved Outlay	Actual/Ant. Expenditure
9 th Plan	860		2032.10	
1997-98	140.70	129.96	371.35	303.43
1998-99	188.00	173.32	348.48	311.37
1999-2000	178.00	163.92	315.31	306.46
2000-01	160.88	144.95	298.07	268.52
2001-02	187.19	115.53		

33. The physical position of this programme is given in the following table.

TABLE 6.2.4**Achievement on CAD Activities (Mill. Ha.)**

Sl. No.	Items	Achiv. Till March 1992	Achiv. 1992-93 to 1996-97	Achiv. 1997-98	Antcpt. Achiv. 1998-99	Antcpd. Achiv. 1999-00	Cumulative Achiv. upto March 2000
1	Field Channels	12.19	1.76	0.32	0.32	0.15	14.74
2	Warabandi	6.12	2.52	0.42	0.33	0.11	9.50
3	Land Leveling	1.99	0.10	0.01	0.02	0.02	2.14
4	Field Drains	0.58	0.19	0.03	0.06	0.02	0.88

34. Greater stress is being laid on better and efficient management of the water distribution system, more efficient and timely onfarm water delivery, training of field staff and farmers and involvement of farmers under the command area in the management of water distribution system below the outlet level. Reclamation of waterlogged areas is another item now included under the programme.

Programme for 2001-02

35. The programme will be continued during 2001-02 . Greater thrust needs to be given for Land Consolidation as a prerequisite for optimal water use efficiency. Close monitoring and evaluation of the projects is being emphasised both at the Centre and State level by

suitably strengthening the concerned organisations wherever necessary. An amount of Rs.187.19 Crore has been provided in the Central Sector for Annual Plan 2001-02.

36. In order to assess the implementation and impact of ongoing centrally sponsored Command Area Development Programme in terms of the objectives and its quantification, the Planning Commission has emphasised the need for comprehensive evaluation of the CAD programme. Accordingly, evaluation of 18 CAD projects had been awarded by MOWR. Most of the reports have been submitted to the MOWR. The major findings are as under:

- a) Enforcement of Warabandi has helped in equitable distribution of water among farmers and in improving utilisation of irrigation potential as well as agricultural productivity.
- b) The extension service support has been considered very important to help the farmers in their decision making in switching over from dry land crops to irrigated crops.
- c) Suitable cropping pattern and improved variety of crops having better water efficiency have been introduced in many irrigation projects replacing non remunerative crops.
- d) The major constraints for ground water development includes small and fragmented holdings, poor economic status of farmers, cumbersome institutional financial support and poor supply of electricity and diesel to operate pump sets, availability of inadequate subsidy to farmers.
- e) For achieving efficiency in irrigation, emphasis have to be given to the maintenance of the system.

Farmers' Participation

37. Participation of farmers in irrigation management implies a significant role of water users in decision making. It is a role which goes beyond mere consultation. It implies an active role of beneficiaries in all the facets of irrigation water management and its attendant forward and backward linkages with main system management in agricultural/agronomic activities. This role is very different from the traditional passive role of farmers to look to the Department for irrigation water supply and its distribution. In order that farmers play an active part in decision making, there is a need to evolve appropriate forms of local organization. The irrigation agency can clearly facilitate this process by developing a planned interaction/intervention strategy. The timing of farmers involvement is crucial. Farmers' participation is most effective when it takes place from the initial stages of project development, including the stages of project formulation and design. Such involvement forms part of ideal conditions for genuine participation for a true partnership between farmers and government. There are successful examples of farmers associations (which are also known as Water Users' Associations) managing irrigation systems, both traditional as well as contemporary. These are nevertheless, quite isolated, scattered and site specific in the sense that such successful experiments have, curiously enough, not spread further to

other areas or even in the adjoining block(s) of the same command. There are about 26771 WUAs in various forms in the States of Andhra Pradesh , Gujarat, Haryana, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Himachal Pradesh , Karnataka, Uttar Pradesh and Assam in India. But total area as presently managed by all such WUAs is estimated to be about 5759.23 th. Ha.

Flood Control

38. Out of a total geographical area of about 329 m. ha. , roughly about 1/8th has been assessed as flood prone. Out of this about 32 m. ha. has been estimated as protectable. After the disastrous floods experienced in the country in 1954 a National Programme of Flood Management was launched . So far various methods of flood protection both long term and short term have been adopted in different States depending upon the type of problem and local conditions. From March, 1954 to March 1992, barring occasional breaches in embankments, various types of flood control works as executed have provided reasonable protection to an area of about 14.20 million ha. The total area benefited upto the end of VIII Plan is 1.8 m. ha. This excludes the area (about 3 million hectares) protected prior to 1954 by works which already existed in some of the States. Apart from these works , reservoirs with the specific flood cushion have been constructed in the country to provide protection to downstream areas. In addition, such multi-purpose storages have helped greatly in moderating the intensity of floods in the flood plains lower down.

39. The following table indicates the outlay and expenditure for flood management works during the Ninth Five Year Plan.

TABLE 6.2.5

Plan Outlays and Expenditure

(Rs. Crore)

Year	Central Sector		State Sector	
	Approved Outlay	Actual/Ant. Expenditure	Approved Outlay	Actual/Ant. Expenditure
9 th Plan	716.13		2012.12	—
1997-98	72.15	48.47	363.66	351.87
1998-99	71.65	55.87	348.48	465.98
1999-2000	61.79	68.69	662.36	486.72
2000-01	154.87	95.13	654.25	573.77
2001-02	148.85	140.96	—	

40. The above table indicates the outlay and expenditure for flood management works during the Ninth Five Year Plan. Against the approved outlay of Rs. 440.23 Crore for flood

control programme both in Central and State sector during 1998-99 , the anticipated expenditure is Rs. 383.52 Crore. During the year, the states like Assam, Bihar, Uttar Pradesh and West Bengal suffered flood menace due to unusual floods in these states. Relief was provided by the Centre to affected States to mitigate the suffering of the people. Since improper maintenance of flood control works leads to extensive damage, it is necessary to ensure proper maintenance by adequate provision of maintenance funds by the States. It should also be ensured that ongoing protection works with strict prioritisation are completed on a time- bound basis.

Plan for 2001-02

41. In view of heavy relief expenditure incurred year after year on flood affected areas priority needs to be given to complete the works in hand. Research and development activities in respect to flood control works also need to be intensified. It is also necessary to prepare a comprehensive master plan for flood control works so that the projects taken up for flood protection works are completed in a time bound manner.

42. In addition to progress made on structural flood protection measures, the flood forecasting and warning of incoming floods has played a great role in mitigating the loss of life and movable property apart from alerting the organisations in charge of various engineering works. The Central Water Commission is entrusted with this work in respect of all the inter-State rivers. To assist the States in framing the flood plain zoning legislation a model Bill was circulated to States in 1975. The State Governments are being persuaded to enact the legislation on the basis of the Model Bill so that unplanned and unregulated development and encroachment into flood plains could be stopped and increasing trend in flood damage is reversed. Only Manipur State has so far enacted the legislation.

43. The MOWR is formulating Centrally Sponsored Schemes for anti-river erosion works and anti-sea erosion works in the country.

Water Rates

44. According to the National Water Policy (1987), water rate should be such as to convey its scarcity value to the users and motivate them in favour of efficient water uses, besides, at the same time, being adequate to cover annual maintenance and operation charges and recover a part of the fixed cost. Agricultural productivity per unit of water needs to be progressively increased in order to be able to compete with other higher value uses of water.

45. The Planning Commission had set up a Water Pricing Committee popularly known as Vaidyanathan Committee . Subsequently a Group of Officials was constituted by the Planning Commission to consider the recommendations made by the above Committee. This Group unanimously recommended that full O&M cost should be recovered in a phased manner i.e. over a 5 year period starting from 1995-96 taking into account the inflation also

and that subsequently after achieving the O&M level the individual States might review the status to decide on appropriate action to enhance the water rates to cover 1% of the capital cost also. In addition , the setting up of Irrigation and Water Pricing Boards by all the States and mandatory periodic revision of water rates at least every 5 years with an opportunity for users to present their views were also recommended. Further, the Group also recommended the formation of Water Users Associations and the transfer of the maintenance and management of irrigation system to them so that each system may manage its own finances both for O&M and eventually for expansion/improvement of facilities.

46. Most of the States have at present very low irrigation water rates at substantially varying levels and some of them have not revised these for the last 2-3 decades. Most of the North-Eastern States (except Assam and Manipur), do not even charge any irrigation water rate. Maharashtra is the only State where the irrigation water rates are announced for 5 years period at a time with a provision for 10% increase per annum so as to cover the full O&M cost as well as interest payable on the public deposits raised through irrigation bonds. The State Governments of Andhra Pradesh, Madhya Pradesh, Rajasthan , Maharashtra, Haryana and Orissa have revised the water rates recently.

47. During the meetings of the Working Group to discuss the Annual Plan 2001-02, the State governments have been requested to revise the water rates to reach a level that at least O&M expenses were covered. They have also been advised to cut down the establishment cost and to improve the collection efficiency of the Water rates.

ANNEXURE-6.2.1

**Actual Expenditure in respect of Major & Medium Irrigation,
Minor Irrgn., CAD & Flood Control for the year 1998-99.**

(Rs. in crore)

Sl. No.	Name of States & U.Ts.	Major & Medium	Minor Irrigation	CAD	Flood Control	Total
1	2	3	4	5	6	7
1	Andhra Pradesh	709.98	175.54	8.99	36.98	931.49
2	Arunachal Pradesh	0.33	13.37	0.82	4.33	18.85
3	Assam	38.77	67.59	3.19	14.72	124.27
4	Bihar	327.59	40.42	11.94	48.06	428.01
5	Goa	20.22	5.56	1.53	1.16	28.47
6	Gujarat	1212.95	148.16	11.32	4	1376.4
7	Haryana	231.27	39.46	8.99	27.36	307.08
8	Himachal Pradesh	12.03	42.81	0.23	5.54	60.61
9	Jammu & Kashmir	27.54	28.17	3.39	16.27	75.37
10	Karnataka	1431.1	92.53	20.45	14.17	1558.2
11	Kerala	171.09	72.23	12	25.48	280.8
12	Madhya Pradesh	462.85	153.44	3.91	1.2	632.2
13	Maharashtra	1593.68	292.25	62.92	3.23	1952.0
14	Manipur	29.02	7.43	2.05	5.1	43.6
15	Meghalaya	2.49	6.5	0.22	3	12.21
16	Mizoram	0.03	4.88	0.03	0	4.94
17	Nagaland	0	2.04	0.1	0.09	2.23
18	Orissa	526.71	83.98	6.18	16.03	632.9
19	Punjab	69.72	37.43	35.76	111.14	254.05
20	Rajasthan	444.65	48.3	66.3	5.73	564.98
21	Sikkim	0	0.85	0.02	2.84	3.71
22	Tamil Nadu	221.27	35.13	21.88	0	278.28
23	Tripura	7.58	8.94	0.02	3.75	20.29
24	Uttar Pradesh	448.4	108.59	25.15	26.45	608.59
25	West Bengal	153.65	41.44	3.77	68.39	267.25
	<i>Total States</i>	8142.92	1557.04	311.16	445.03	10466.9
	<i>Union Territories</i>					
26	A & N Island	0	2.4	0	0	2.4
27	Chandigarh	0	0.44	0	0	0.44
28	D & N Haveli	1.05	1.24	0.21	0	2.5
29	Daman & Diu	0.34	0.03	0	0.34	0.71
30	Delhi	0	0.66	0	14.88	15.54
31	Lakshadweep	0	0	0	2.55	2.55
32	Pondicherry	0	4.44	0	3.18	7.62
	Total U.Ts.	1.39	9.24	0.21	20.95	31.76
	Total States & Uts.	8144.31	1566.30	311.37	465.98	10487.96
	Central Sector	47.72	48.09	173.32	55.87	325.00
	Grand Total	8192.03	1614.39	484.69	521.85	10812.96

Annexure 6.2.2

**Revised Approved Outlay in respect of Major & Medium Irrigation,
Minor Irrgn., CAD & Flood Control for the year 1999-2000**

(Rs. in crore)

Sl. No.	Name of States & U.Ts.	Major & Medium	Minor Irrigation	CAD	Flood Control	Total
1	2	3	4	5	6	7
1	Andhra Pradesh	1051.14	208.63	12	42	1313.77
2	Arunachal Pradesh	0.34	20.09	0.9	4.25	25.58
3	Assam	38.86	66.42	3.19	22.9	131.37
4	Bihar	401.05	50	12	80.69	543.74
5	Goa	17.36	6.55	2.52	1.75	28.18
6	Gujarat	1580	237.3	10	5	1832.3
7	Haryana	342	57	7	20	426
8	Himachal Pradesh	16.75	52.45	0.35	7.74	77.29
9	Jammu & Kashmir	68.16	45.93	4.19	32.11	150.39
10	Karnataka	1500.17	74.53	19.83	11.03	1605.56
11	Kerala	145.72	41.4	12	24	223.12
12	Madhya Pradesh	382.13	150.22	4.55	1.15	538.05
13	Maharashtra	3449	379.61	52.78	0.99	3882.38
14	Manipur	60	18	1.6	15.3	94.9
15	Meghalaya	2	7	0.3	3	12.3
16	Mizoram	0.05	10.44	0.05	0	10.54
17	Nagaland	9.49	0	0.1	0.02	9.61
18	Orissa	515.24	89.08	4.16	3.33	611.81
19	Punjab	96.39	51.44	62.5	109.76	320.09
20	Rajasthan	349.63	35.07	50.85	2.84	438.39
21	Sikkim	0	20	0.5	0.02	20.52
22	Tamil Nadu	366.63	52.88	21.88	22.14	463.53
23	Tripura	7.03	16.49	0.02	7.38	30.92
24	Uttar Pradesh	523.74	22.63	26.52	16.24	589.13
25	West Bengal	78.5	45	2	96	221.5
	Total States	11001.4	1758.16	311.79	529.64	13601
	Union Territories					
26	A & N Island	0	2.5	0	0	2.5
27	Chandigarh	0	0.25	0	0	0.25
28	D & N Haveli	1	1.26	0.24	0	2.5
29	Daman & Diu	0.04	0.05	0.1	0.18	0.37
30	Delhi	0	1.1	0	19.73	20.83
31	Lakshadweep	0	0	0	3.05	3.05
32	Pondicherry	0	6.48	0	6.43	12.91
	Total U.Ts.	1.04	11.64	0.34	29.39	42.41
	Total States & Uts.	11002.4	1769.8	312.13	559.03	13643
	Central Sector	48.32	56.62	165.92	68.69	339.55
	Grand Total	11050.7	1826.42	478.05	627.72	13983

Annexure 6.2.3

**Revised Approved Outlay in respect of Major & Medium Irrigation,
Minor Irrgn., CAD & Flood Control for the year 2000-01**

(Rs. in crore)

Sl. No.	Name of States & U.Ts.	Major & Medium	Minor Irrigation	CAD	Flood Control	Total
1	2	3	4	5	6	7
1	Andhra Pradesh	915.45	143.04	11.1	62.11	1131.7
2	Arunachal Pradesh	0.34	45.63	0.9	4.05	50.92
3	Assam	50.48	77.57	19.16	3.41	150.62
4	Bihar	253.58	26.62	28.71	84	392.91
5	Goa	112.16	6.61	2.79	1.45	123.01
6	Gujarat	1495	240.35	9	4.9	1749.3
7	Haryana	211.01	68	8	20	307.01
8	Himachal Pradesh	14.89	45.62	1.36	7.9	69.77
9	Jammu & Kashmir	68.85	48.61	5.67	27.43	150.56
10	Karnataka	1898.71	100.07	11.83	5.99	2016.6
11	Kerala	125	39	9.4	16.85	190.25
12	Madhya Pradesh	506.4	163.38	2.81	0.91	673.5
13	Maharashtra	3525.18	269.27	24.61	0.65	3819.7
14	Manipur	43	26	0.95	9	78.95
15	Meghalaya	2.5	7.1	0.3	3	12.9
16	Mizoram	1	3.31	0.05	0	9.31
17	Nagaland	0	8.1	0.1	0.3	8.5
18	Orissa	355	84.83	4.74	2.96	447.53
19	Punjab	57.32	25.78	32	75.34	190.44
20	Rajasthan	274.61	59.37	46.3	2.48	382.76
21	Sikkim	0	3.6	0.02	1.32	4.94
22	Tamil Nadu	213.74	103.8	16.58	22.08	356.2
23	Tripura	6.28	17.45	0.02	6.01	29.76
24	Uttar Pradesh	765.45	54.26	27.82	50.18	897.71
25	West Bengal	80.52	54.63	4.25	130.9	270.3
	Total States	10975.48	1722	268.47	543.22	13515
	Union Territories					
26	A & N Island	0	1.5	0	0	1.5
27	Chandigarh	0	0.2	0	0	0.2
28	D & N Haveli	0.5	0.58	0.05	0	1.13
29	Daman & Diu	0.1	0.05	0	0.22	0.37
30	Delhi	0	1.1	0	21.3	22.4
31	Lakshadweep	0	0	0	3.5	3.5
32	Pondicherry	0	6.24	0	5.53	11.77
	Total U.Ts.	0.6	9.67	0.05	30.55	40.87
	Total States & Uts.	10976.08	1731.67	268.52	573.77	13550.0
	Central Sector	39.91	68.28	144.95	95.13	345.27
	Grand Total	11012.99	1799.95	413.47	668.9	13895.31

Annexure 6.2.4

Approved Outlay in respect of Major & Medium Irrigation, Minor Irrgn., CAD & Flood Control for the year 2001-02

(Rs. Crore)

Sl. No.	Name of States & U.Ts.	Major & Medium	Minor Irrigation	CAD	Flood Control	Total
1	2	3	4	5	6	7
1	Andhra Pradesh					
2	Arunachal Pradesh	0.36	44.25	1.95	3.68	50.24
3	Assam					
4	Bihar					
5	Goa	82.62	10.73	3.05	1.65	98.05
6	Gujarat					
7	Haryana	287.1	50	10	20	367.1
8	Himachal Pradesh					
9	Jammu & Kashmir					
10	Karnataka					
11	Kerala	146	40	14	17	217
12	Madhya Pradesh					
13	Maharashtra					
14	Manipur					
15	Meghalaya	4.5	10	0.3	2	16.8
16	Mizoram	0.01	5.75	0.3	—	6.06
17	Nagaland	—	8.25	0.1	0.2	8.55
18	Orissa	480.37	113.78	4.511	12.86	611.52
19	Punjab					
20	Rajasthan					
21	Sikkim					
22	Tamil Nadu	557.25	76.58	15.61	—	649.44
23	Tripura	6.09	45	0.02	10.16	61.27
24	Uttar Pradesh	950.48	96.26	30	54.49	1131.2
25	West Bengal					
	Total States	2514.78	500.6	79.84	122	3217.3
	Union Territories					
26	A & N Island					
27	Chandigarh		0.2	—	—	0.2
28	D & N Haveli	0.5	0.57	0.18	—	1.25
29	Daman & Diu	0.1	0.05	—	0.22	0.37
30	Delhi					0
31	Lakshadweep					0
32	Pondicherry		10.02	5.88		15.9
	Total U.Ts.	0.6	10.84	6.06	0.22	17.72
	Total States & Uts.					
	Central Sector (RE)	49.65	122.18	115.53	140.96	428.32

Annexure 6.2.5

Major and Medium Irrigation Schemes – Physical achievement upto 8th Plan and Target for 9th Plan

(000'ha)

Sl. No.	Name of States & UTs.	Achievement upto March 1997		Ninth Plan Target Major & Medium		1997-98 Achievement Major & Medium		1998-99 Achievement Major & Medium		Achievement 1999-2000		Ant. Achievement 2000-01		Target 2001-02	
		Pot	Utl.	Pot.	Utl.	Pot	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Andhra Pradesh	3045	2883.8	579.13	506.28	76.52	12.1	116.2	158.8	151.4	151.5				
2	Arunachal Pradesh	0	0	0	0	0	0	0	0	0	0				
3	Assam	196.7	138.17	6.5	4	4.2	2	1.3	1	8.8	4.8	6.95	2.4	26	26
4	Bihar	2803	2324.2	492	518	4.33	4.33	27.1	22.1	53.46	0	17.73	18	119.1	78.5
5	Goa	13.02	12.07	16.22	12	3.5	1	0.02	0.02	0.54	0.89	0.15		3.94	1.2
6	Gujarat	1350	1200	1867	1892	17.14	20.62	16.08	20	15	20				
7	Haryana	2079	1833.62	197.71	211.21	1.66	1.66	3.49	3.49	7	3				
8	Himachal Pradesh	10.55	5.59	3	1.5	0.3	0.15	0.15	0.34	0.15	0.34				
9	Jammu & Kashmir	173.7	147.57	29.9	40.1	2.07	2.62	0.22	2.86	0.7	5.3				
10	Karnataka	1666	1471.7	1109.9	887.9	45.44	36.35	35.17	35.17	100	80				
11	Kerala	513.3	464.31	373.12	373.12	32.23	30.61	14	14	30	30				
12	Madhya Pradesh	2318	1620.95	384.75	195.11	32	23.3	20.7	10.3	14.9	8.51	25.5	15.6	16.4	8.7
13	Maharashtra	2337	1287.7	1755	1700	151	150	187	187	200	187				
14	Manipur	63	52	50.38	42.33	1	1	12	10	4	4				
15	Meghalaya	0	0	3.88	3.88	0	0	0	0.97	0	0				
16	Mizoram	0	0	0	0	0	0	0	0	0	0				
17	Nagaland	0	0	4.5	4.5	0	0	0	0	0	0				
18	Orissa	1558	1442.66	915.39	819.27	34.57	54.14	40.39	191.3	62.51	40.39				
19	Punjab	2513	2451.25	126.25	126.25	12.62	22.85	5.01	5.01	1.77	1.77				
20	Rajasthan	2274	2088.39	469.26	394.92	58.9	46.46	11.5	98.7	5.92	10.57	14.65	0	30.5	5
21	Sikkim	0	0	0	0	0	0	0	0	0	0				
22	Tamil Nadu	1546	1545.49	4.8	3.8	2.18	2.18	0	0	1.62	1.62				

Major and Medium Irrigation Schemes – Physical achievement upto 8th Plan and Target for 9th Plan

(000'ha)

Sl. No.	Name of States & UTs.	Achievement upto March 1997		Ninth Plan Target Major & Medium		1997-98 Achievement Major & Medium		1998-99 Achievement Major & Medium		Achievement 1999-2000		Ant. Achievement 2000-01		Target 2001-02	
		Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
23	Tripura	2.3	2.3	22.92	11.05	0.85	0.85	0.2	0.8	1	0.8				
24	Uttar Pradesh	7043	6114	1000	600	129	33	112	75	125	75	425.1		14.4	150
25	West Bengal	1433	1315.28	395	355	53.41	43.22	50	40	35.1	29.5	62	58		
	Total States	32935	28401.05	9806.6	8702.22	662.9	488.44	652.5	876.9	829.5	663				
26	A & N Island	0	0	0	0	0	0	0	0						
27	Chandigarh	0	0	0	0	0	0	0	0						
28	D & N Haveli	0	0	2.2	-	0.1	0.4	—	0.55	0.08	0.28	0.04	0.42		
29	Daman & Diu	3.22	2	3	3	0	0	0	0	3	0				
30	Delhi	0	0	0	0	NR	NR	NR	NR		NR				
31	Lakshadweep	0	0	0	0	0	0	0	0						
32	Pondicherry	0.29	0.29	0	0	0	0	0	0						
	Total U.Ts.	18.51	9.29	5.2	3	0.1	0.4	0	0.55	3	0			0	
	Total States & Uts.	32954	28410.34	9811.8	8705.22	663	488.84	652.5	877.4	832.5	663			0	0
	Grand Total														

NOTE :- The physical achievements during Eighth Plan as above are anticipated and are likely to change.

Annexure 6.2.6

MINOR IRRIGATION - PHYSICAL DETAILS

(000 ha.)

Sl. No.	Name of States & U.Ts.	Achievement Upto March 1997		Target Ninth Plan Minor Irrigation		Target 1997-98 Minor Irrigation		Achievement 1997-98 Minor Irrigation		Achievement 1998-99 Minor Irrigation		Antcpd. Achiv. 1999-2000	
		Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Andhra Pradesh	2901.87	2687.16	28.90	28.70	5.30	5.30	45.94	45.94	49.73	49.73	48.33	48.33
2	Arunachal Pradesh	83.42	65.54	23.00	23.00	4.35	2.25	4.68	2.68	3.21	1.75	2.18	2.18
3	Assam	592.76	484.45	12.84	12.00	7.98	7.98	6.00	4.80	1.22	1.22	0.20	0.20
4	Bihar	5108.24	4573.70	205.25	190.00	8.71	7.00	42.30	25.50	20.00	20.00	66.22	50.22
5	Goa	20.52	17.77	3.02	1.68	0.24	0.20	0.27	0.20	0.01	0.01	0.40	0.40
6	Gujarat	1935.30	1839.62	70.10	50.80	23.91	9.50	23.91	11.50	7.20	4.00	7.20	4.00
7	Haryana	1576.77	1531.62	80.64	80.64	18.00	18.00	15.07	12.06	8.50	8.50	8.50	8.50
8	Himachal Pradesh	150.38	128.42	6.00	6.00	1.80	1.80	2.00	1.80	2.00	2.00	2.12	2.00
9	Jammu & Kashmir	374.62	361.16	21.00	15.00	3.60	5.00	1.62	1.38	0.91	0.63	1.70	1.20
10	Karnataka	1531.01	1488.71	155.00	155.00	14.00	14.00	4.76	4.76	28.13	28.13	7.00	6.00
11	Kerala	573.12	537.49	50.18	50.18	12.84	12.84	12.84	12.84	20.00	20.00	18.00	18.00
12	Madhya Pradesh	2657.52	2422.02	150.00	67.00	25.00	11.00	11.00	11.00	9.90	10.00	18.50	18.50
13	Maharashtra	2547.40	2341.10	528.00	400.00	20.00	83.30	82.00	19.30	67.00	67.00	90.00	4.00
14	Manipur	60.39	51.19	15.00	12.00	3.00	3.00	3.00	3.00	4.00	2.40	3.00	1.80
15	Meghalaya	46.57	41.25	8.82	6.62	5.75	2.45	3.50	2.68	0.61	0.48	2.13	1.60
16	Mizoram	12.73	11.22	1.85	1.85	0.00	1.36	0.11	0.11	0.35	0.35	1.50	0.80
17	Nagaland	67.24	57.93	14.30	12.00	1.03	1.00	1.03	1.00	1.03	1.00	3.45	3.00
18	Orissa	1357.47	1227.05	89.60	101.07	66.08	29.39	30.76	29.39	16.19	29.39	27.06	18.60
19	Punjab	3354.17	3296.12	241.61	241.61	19.75	19.75	14.72	19.75	13.41	19.75	16.56	12.00

Annexure 6.2.6 Contd.

MINOR IRRIGATION - PHYSICAL DETAILS

(000 ha.)

Sl. No.	Name of States & U.Ts.	Achievement Upto March 1997		Target Ninth Plan Minor Irrigation		Target 1997-98 Minor Irrigation		Achievement 1997-98 Minor Irrigation		Achievement 1998-99 Minor Irrigation		Antcpd. Achiv. 1999-2000	
		Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.	Pot.	Utl.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
20	Rajasthan	2421.24	2336.78	39.44	25.67	8.70	5.21	7.35	5.21	5.00	5.21	5.00	9.20
21	Sikkim	26.23	20.58	4.50	4.00	0.90	0.80	1.13	1.13	0.30	0.30	1.00	0.75
22	Tamil Nadu	2115.22	2111.36	11.57	7.38	1.68	0.57	1.81	1.81	1.45	1.45	1.25	1.25
23	Tripura	92.58	84.03	16.00	16.00	4.20	4.20	4.20	4.20	2.50	2.00	6.45	3.00
24	Uttar Pradesh	20450.61	18482.71	5000.00	3000.00	129.10	117.45	328.16	359.94	378.87	364.96	143.02	143.01
25	West Bengal	3217.37	2576.90	450.00	400.00	150.00	150.00	150.00	150.00	100.00	90.00	100.00	90.00
	Total States	53274.75	48775.88	7226.62	4908.20	535.92	513.35	798.16	731.98	741.52	730.26	580.77	448.54
26	A & N Island	0.55	0.55	0.56	0.56	0.10	0.10	0.10	0.10	0.10	0.11	0.10	0.10
27	Chandigarh	0.12	0.12	0.10	0.10	0.02	0.02			0.06		0.02	0.02
28	D & N Haveli	0.26	0.25	0.55	0.55	0.09	0.09	0.09	0.09	0.12	0.11	0.14	0.12
29	Daman & Diu	5.39	4.94	2.20	2.00	0.80	0.00	1.69	0.00	2.19	0.00	2.20	2.20
30	Delhi	21.64	18.52	9.70	9.70	4.74	4.09	NR	NR	NR	NR	NR	NR
31	Lakshadweep	0.00	0.00	0.00	0.00	0.00	0.00						
32	Pondicherry	2.02	2.01	4.00	4.00	0.48	0.48	0.10					
	Total U.Ts.	29.98	26.39	17.11	16.91	6.23	4.78	1.98	0.19	2.47	0.22	2.46	2.44
	States & UTs	53304.73	48802.27	7243.73	4925.11	542.15	518.13	800.14	732.17	743.99	730.48	583.23	450.98

The physical achievement during Eighth Plan are anticipated and are likely to change.

Annexure-6.2.7

Details of Central Loan Assistance (CLA) released and potential created under AIBP under various projects

Category	No. of projects	Total CLA released (Rs. Crore)	Total Potential created under AIBP (000'ha)	Balance Cost (Rs. Crore)	Balance Potential (000'ha)
1	2	3	4	5	6
Project with expdr. More than 75%	49	1334.30	3840.51	3117.48	1383.10
Projects with expdr. 50 to 75%	40	1467.20	1742.43	6312.79	2320.50
Project with expdr. 30 to 50%	18	629.86	278.09	4607.98	595.32
Projects with expdr. Less than 30%	36	2194.02	397.63	25144.58	3544.80
Grand Total	143	5625.38	6258.66	39182.83	7843.72

6.3 FOOD SECURITY & NUTRITION

6.3.1 Food Security

1. Food security implies a situation where everyone has access, at all times, to the food needed for an active and healthy life. Thus, the essential elements of food security are (a) adequate availability of food, (b) efficient distribution through trade or public distribution system, and (c) availability of adequate purchasing power in the hands of the people.

2. Judicious combination of domestic production and food trade can provide a reasonable degree of stability in food availability, specially in a situation where food production is characterised by seasonal and annual fluctuations. Seasonal and annual instability in domestic supplies can also be reduced through buffer stocking operations involving accumulation and off-loading of public stock of food grains in years of good and bad harvests respectively.

3. Procurement of paddy (in terms of rice) during the financial year 2000-01 at 19.10 mn. tonnes was higher compared to 17.28 mn. tonnes during the same period of the previous year. Procurement of wheat during financial year 2000-01 was also higher at 16.36 mn. tonnes compared to 14.15 mn. tonnes during the previous year.

4. Total stocks of foodgrains with the Government at the end of March, 2001 stood higher at 44.70 mn tonnes compared to 28.91 mn. tonnes during the same period last year. The stocks of rice and wheat were placed at 23.19 mn. tonnes and 21.50 mn. tonnes, as compared with those of 15.72 mn. tonnes and 13.19 mn. tonnes, respectively a year ago.

5. A good record of food grains production over a period of years combined with a high level of procurement has led to a huge stock of food grains which is largely in excess of the requirements. The situation points to the fact that the farmers are by and large satisfied with the procurement price fixed and an undue increase in minimum support prices will lead to further accumulation of food grains stocks with FCI for which there may not be adequate demand. The problem on the food front today is one of dealing with excess stocks rather than one of scarcity.

6. One of the solutions that suggests itself in the management of surplus foodgrains is to restrict procurement to levels that are just sufficient to maintain an adequate level of buffer stock for the purpose of price stabilization. This would mean that the procurement agencies do not absorb all the foodgrains offered to them at the prescribed price. Rather the public agencies will intervene in the market within a prescribed price band buying foodgrains when prices are low and offloading when prices are high.

7. New initiatives have been taken in India in the field of decentralised procurement of foodgrains. Several state governments have for instance initiated their own food procurement operations. More such initiatives are likely in the future. In this context the task of maintaining buffer stocks will become the joint responsibility of the central and state governments.

8. The main objective of our food distribution policy should be stabilization of food prices rather than provision of food subsidies. Even today when food subsidies are provided to the BPL population only a limited proportion of the food requirements of the BPL population is met by the PDS. For the rest of their requirements even the BPL families have to depend on the private traders. Thus the objective of stabilization of food grain prices becomes important. This objective has to be achieved by appropriate buffer stocking operations and market interventions by the FCI.

9. In India with its wide network of FCI godowns and PDS outlets, a great deal of the distribution of foodgrains was handled by the public sector. The role of the private sector in this regard has been limited. In the future, there is a need to strengthen the role of private trade in the matter of storage and distribution of foodgrains. Various restrictions that continue to inhibit private initiatives in this regard need to be removed. Only then private trade will have the incentive to make huge investment in grain handling operations. Tax concessions could also be extended to the private sector to promote such investments.

10. In the operation of PDS, while it is the ultimate objective to restrict supply of subsidised foodgrains to only the population below the poverty line, the better off sections of society will be expected to meet their entire requirements by purchases from the open market. Thus as the principle of targeting is more strictly applied in the case of PDS, there is all the more reason to promote private trade in foodgrains supported by more sophisticated grain handling techniques.

11. While the National Policy on Handling, Storage and Transportation of Foodgrains is timely, its success is largely dependent upon highly regulated and controlled sectors of the economy. Unless the control regime governing storage and movement of foodgrains and other essential commodities is suitably relaxed, the degree of success would be limited. State governments have imposed many restrictions on the movement and storage of foodgrains. Even when the country has achieved food self-sufficiency, many of these controls which have outlived their utility are still continuing. There is need to relax, withdraw or dilute them urgently, keeping in view the emerging economic environment. Legislative and administrative measures for removing impediments on storage and movement of foodgrains needs to be accorded topmost priority.

6.3.2 NUTRITION

Introduction

1 At the time of Independence the country faced two major nutritional problems - one was the threat of famine and acute starvation due to low agricultural production and lack of appropriate food distribution system. The other was chronic energy deficiency due to

1. Low dietary intake because of poverty and low purchasing power
2. High prevalence of infection because of poor access to safe-drinking water, sanitation and health care and
3. Poor utilisation of available facilities due to low literacy and awareness.

Kwashiorkor, marasmus, goitre, beriberi, blindness due to Vitamin-A deficiency and anaemia were major public health problems. The country adopted multi-sectoral, multi-pronged strategy to combat the major nutritional problems and to improve nutritional status of the population.

Progress achieved

- Famines no longer stalk the country
- Country has achieved self sufficiency in food grains to meet the needs of the growing population
- There are ample food grain stocks ;

Problems faced

- Green revolution fatigue has been witnessed in some areas
- Productivity remains low
- Improved food grain availability has not resulted in eradication of hunger or reduction in under-nutrition especially in vulnerable groups .
- Very little attention is being paid to achieve integrated farming systems that will ensure sustainable evergreen revolution, and appropriate dietary diversification and achieve nutrition security.

Challenges:

- Continue to improve food grain production to meet the needs of the growing population
- Increase coarse grain production to meet the energy requirements of the BPL families at lower cost
- Increase pulse production to improve affordability of pulses and increase consumption
- Improve availability of vegetables at affordable cost through out the year in urban and rural areas

Opportunities

- Achieve substantial improvement in food security
- Achieve decline in macro and micronutrient under-nutrition

Paradigm shift needed

- Shift from food security at state level to nutrition security at the individual level
- From self sufficiency in food grains to meet energy needs to providing food stuffs needed for meeting all the nutritional needs
- From production alone to reduction in post harvest losses and value addition through appropriate processing

2. Over years there has been improvement in the access to food through PDS; food for work programme has addressed the needs of the vulnerable out of work persons. ICDS programme aimed at providing food supplementation and health care for mothers and children covers over 80% of all blocks in the country. Mid-day meal programme aims at improving dietary intake and reduction in the school drop out rates. There has been substantial improvement in access to health care. National programmes for tackling anaemia, iodine deficiency disorders and Vit A deficiency have been implemented. As a result of all these interventions there has been substantial reduction in moderate and severe undernutrition in children and some improvement in nutritional status of all segments of population. Kwashiorkor, marasmus, pellagra, lathyrism, beriberi and blindness due to severe Vitamin-A deficiency have become rare. However while mortality has come down by 50% and fertility by 40%, reduction in under-nutrition is only 20%. There has not been a substantial reduction in mild and moderate under-nutrition, low birth weight and anaemia; reduction in Vit A deficiency and IDD are sub-optimal. Under-nutrition associated with HIV/AIDS is emerging a public health problem. Alterations in the life styles and dietary intake have led to increasing prevalence of obesity and associated non-communicable diseases; the country will have to gear itself to prevent and combat the dual burden of under and over-nutrition and associated health problems.

Currently the major nutrition-related public health problems are:

- a) Chronic energy deficiency and under-nutrition
- b) Micro-nutrient deficiencies
 - Anaemia due to iron and folic acid deficiency
 - Vitamin A deficiency
 - Iodine deficiency disorders
- c) Chronic energy excess and obesity

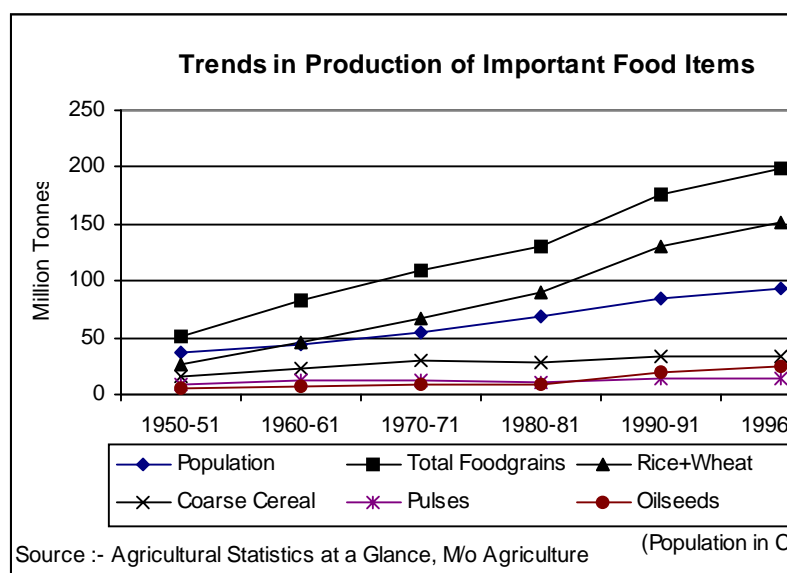
The Ninth Plan envisaged

1. Freedom from hunger through increase in food production, effective distribution, improvement in purchasing power of the population;
2. Reduction in under nutrition and its health consequences through:
 - Universalisation of Integrated Child Development Services (ICDS);
 - Screening at risk groups, growth monitoring and better targeting of food supplement to those suffering from under-nutrition;
 - Close monitoring of under-nourished persons receiving food supplements;
 - Effective intersectoral coordination between health and nutrition workers to ensure early detection and management of health problems associated with or leading to under-nutrition;
3. Prevention, early detection and effective management of micronutrient deficiencies and associated health hazards.

Changing Food Production Patterns:

3 One of the major achievements in the last fifty years has been the green revolution and self-sufficiency in food production. Food grain production has increased four fold (from 50.82 million tons in 1950-51 to 200.88 million tons in 1998-99).(Fig 1). India has moved

from chronic shortages to surplus in most food grains. The growth in food production has been higher than the growth in population.



However the increase in production is not because of high productivity. India's current position in the world in a few major crops is given in **Table-1**

Table-1

India's Current Position and Goal						
Crop	Area (1,000 hectare)		Production (million tons)		Productivity (kg/hectare)	
	India	Highest	India	Highest	India	Highest
Wheat	25122 (3)	China 29001	72.0 (2)	China 109.005	2493 (32)	Ireland 8997
Rice	42700 (1)	India	82.2 (2)	China 190.100	2811 (51)	Ukraine 7444
Maize	6150 (5)	USA 29602	8.66* (9)	USA 236.604	1408 (105)	UAE 18636
Sorghum	11700 (1)	India	10.50* (2)	USA 20.39	897 (51)	France 6182
Potato	1089 (3)	China 3502	17.94* (6)	China 46.05	16478 (51)	Ukraine 43966
Pulses	25604 (1)	India	14.8 (1)	India	608 (119)	France 4769
Cotton	8300 (1)	India	14.0 (3)	China 18.75	922 (57)	Israel 4527
Sugarcane	3870 (2)	Brazil 4826	289.7 (2)	Brazil 324.435	65892 (34)	Peru 121361

*Production figures for India are 1998-99 estimates taken from the Economic Survey. For the rest of the world, production figures correspond to the year 1996

Figures pertaining to productivity and area correspond to the year 1996. Figures in parenthesis indicate rank

1996 production figures used for those items

Source: Dr. MS Swaminathan Reprint Report Series 1/2000 Planning Commission

4 The high position India occupies in the production of several crops is to a considerable extent due to the large area covered under those crops. Productivity is, however, poor. This yield gap represents an untapped production potential; substantial increase in output of food grains in the coming decades will come through improving the yield. The 'Green Revolution' resulted in higher production through enhanced productivity; over the last few years there has been stagnation in yield levels and increasing requirement of nutrients for producing the same yield; this has been termed as a 'fatigue of the Green revolution'. The possibility that declining per capita availability of land and water and absence of technologies that can help to enhance the yield potential of major food crops, coupled with increasing population, increasing purchasing power leading to the consumption of more animal products could result in our inability to meet all the food needs has been debated. The increasing ecological damage due to widespread use of pesticides, weedicides and other chemicals is another matter of serious concern. It is imperative that the country embarks on a programme of integrated sustainable farm management system.

5 Time trends in food and nutrient consumption indicate that a substantial proportion of population has clearly intake far below RDA (Tables–2 & 3). It is estimated

Table 2

Consumption of different foods (Cu/day) Vs RDA

Food	1975	1980	1990	1995	1996-97	RDA
Cereals and millets g	523	533	490	464	450	460
Pulses	32	33	32	33	27	40
GLV	11	14	11	13	15	40
Other Veggies	51	75	49	40	47	60
Fruits	10	25	23	22	-	-
Fats and oils	9	10	13	13	12	20
Sugar/ Jaggery	19	18	29	23	21	30
Milk and milk products	80	88	96	95	86	150

Source: Krishnaswamy et al 25 years of National Nutrition Monitoring Bureau (NNMB) (1992-1997) National Institute of Nutrition, Hyderabad, NNMB (1999) report.

Table 3

Intake of Nutrients (Cu/day)

Nutrient	1975	1980	1990	1995	1996-97	RDA
Protein (g)	64	52	62	56	54	60
Energy (K cal)	2296	2404	2283	2172	2108	2425
Iron (mg)	32	30	28	26	25 (14*)	30
Vitamin A (eq.mg)	263	313	294	298	282	600
Vit.B ₂ (mg)	0.98	0.91	0.94	0.8	0.9	1.4
Vit.C(mg)	41	52	37	35	40	40

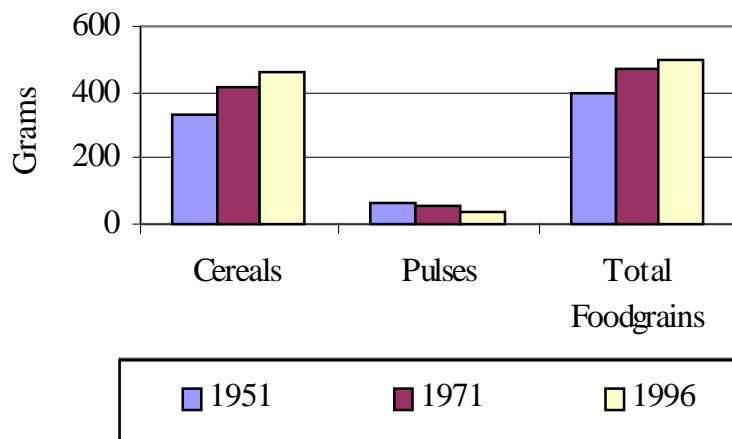
Source:Krishnaswamy et al 25 years of National Nutrition Monitoring Bureau (NNMB) (1992-1997) National Institute of Nutrition, Hyderabad, NNMB (1999) report.

that in order to meet the nutritional requirements of the population, an additional 5 million tons of food grain, significant increase in production of life stock, fish and horticultural products will be required. In order to achieve this, it will be necessary to increase yield, income and livelihoods per unit of land and water, by bringing about a paradigm shift in our agricultural research and development strategies. Farming systems that can help produce more from the available land, water and labour resources without either ecological or social harm by a shift from a commodity centered approach to an entire cropping or farming system need be adopted. A shift from a crop-centered to a systems-based approach to technology development and dissemination is essential. Research should be tailored to enhance the performance and productivity of entire production systems.

Steps to improve the stagnant pulse production

6. It is a matter of concern that while the cereal production has been growing steadily at a rate higher than the population growth rates, the coarse grain and pulse production has not shown a similar increase (Fig.1,Table 4). There has been

Figure-2
PER CAPITA NET AVAILABILITY OF FOODGRAINS



Source: NNMB

a reduction in the per capita availability of pulses (from 60.7 grams per day in 1951 to 34 grams per day in 1996 – Fig.-2) and coarse grains.

Table 4

Production of major food crops in india- m.tons

Crop	1980-81	1994-95	% increase
Cereals	86	147	71
Millets	23	25	11
Pulses	11	14	33
Oil seeds	9	21	127
Sugar cane	154	258	67

Source: K.S.Parikh, India development report (1997)

7. During the last few years the country has imported pulses to meet the requirement. There has been a sharp and sustained increase in cost of pulses; consequently there is substantial decline in per capita pulses consumption among poorer segment of population. This in turn could have an adverse impact on the protein intake.

8. The pulse component of the “Pulses and Oil Seeds Mission” need to receive a major thrust in terms of R&D and other inputs, so that essential pulse requirement of growing population is fully met. Experience gained by Swaminathan Foundation’s experiments in organizing Pulse villages in the dry districts of Pudukkotai and Ramanathapuram in Tamil Nadu indicates that rapid progress can be made in improving the production and productivity of pulses, provided the farming families of the village/watershed cooperatively undertake the harvesting of every drop of rain water. In order to ensure cooperation in water harvesting it is essential to devise mechanism for equity in water sharing. Once this is ensured pulses, which have high value but low water requirement can play an important role in ensuring that the resource-poor farmers get maximum income from the available land and water. Productivity improvement will be possible by paying attention to improving the efficiency of input use, particularly nutrients and water.

Measures to increase coarse grain production

9. Over years the coarse grain production has remained stagnant and per capita availability of coarse grain has under gone substantial reduction; there has been a shift away from coarse grains to rice and wheat consumption even among poorer segment of population. One of the benefits of this change is virtual elimination of pellagra, which was widely prevalent among low-income group population in Deccan Plateau whose staple food was sorghum.

10. Coarse grains are less expensive than rice and wheat; they can thus provide higher calories for the same cost as compared to rice and wheat. Coarse grains which are locally produced and procured if made available through targeted public distribution system (TPDS) at subsidised rate, may substantially bring down the subsidy cost without any reduction in calories provided and improve “targeting” - as only the most needy are likely to buy these coarse grains. Millets are rich in minerals and micronutrients and hence they represent one of the mechanism through which it will be possible to improve dietary intake of these vital nutrients among poorer segments of the population

Horticultural Production:

11. India ranks as first & second in production of vegetables and fruits in the world. This is primarily because of the development and adoption of location-specific improved technologies, investments in agriculture, availability of inputs and more important the receptiveness of the farmers to the new methods and use of required inputs duly supported by the favorable Governmental policies. Horticulture represents an economically viable option for persons with small land holdings. Horticulture crops contribute higher production from a unit area than cereals, have potential for exports and, therefore, add to the income of the producers and the nation. The total production of these crops in 1997-98 was nearly 125 million tons from only 24.5 million hectares as compared to 193 million tons of food grains from 124 million hectares in the same year. One hectare under vegetables yields 10 to 30 tons and above of produce as against 2 to 3 tons of cereal crops. Consequently, the earnings from the same area are higher because of higher yields and also because of higher prices these commodities command in domestic as well as international markets.

12. Information on production of fruits is in Table-5 Available data on current production, estimated demand for the population of one billion in 2000 and the projected demand for 2006 (for the population of 1094 million) are shown in Table-6

Table 5
Production of major fruits*

In lakh tons			
Crop	1991-92	1995-96	% increase
Apple	11.4	12.1	6.5
Banana	77.9	130.9	68.13
Citrus	28.2	37.9	34.4
Guava	10.9	15.0	37.6
Mango	87.5	108.1	23.5
Papaya	8.0	13.3	66.3

*Source: “Indian Horticulture Database - 1997-98” of National Horticulture Board
Kaul G.L. Paper presented in the symposium on Diversification of Agriculture for Human Nutrition. NAAS, Hyderabad, November, 1999.

Table 6**Production of fruits and vegetables Vs future demand**

	2000 Demand	2006 Demand	Production 1997/98
Fruit	45	50	40.05
Vegetables	115	130	72.83

Source :Dr Bamji : Background paper for the Sub group on Dietary diversification

13. The above demands will have to be met both by horizontal (expansion in the area) and vertical (increase in productivity of individual crops) growths in the coming years. The former approach will contribute about 30 per cent of the additions required, and can be achieved through utilisation of wastelands and diversion of the land in the dry land, arid, coastal and hilly zones which are presently lying fallow, or are under subsistence farming of cereals etc., characterised by low yields and poor returns. The apprehension normally voiced against the growth of these crops at the cost of the area presently under food grain crops is misplaced, as these will not encroach upon the prime irrigated areas, which constitute the backbone of the food grain production in the country. On the other hand, substantial part of increment in the total production could have to be derived through the latter option, scope for which is unlimited. Bulk of the existing perennial plantations/orchards is mostly senile/old and diseased, adversely affecting the national averages of yields per hectare, and at the same time are occupying lands in prime locations. Majority of these can be easily revived through appropriate rejuvenation practices to develop them into sustainable production units. Others would have to be uprooted to make way for new plantings of improved cultivars. Similarly, in the case of annual crops, such as vegetables fruits, use of high yielding varieties/hybrids would have to be resorted to extensively.

14. The above strategy can bear desired results only if the supply of quality planting and seed material of improved cultivars/ hybrids is organised on a priority basis. Private sector needs to be harnessed to get involved in production and marketing of duly certified seeds and saplings, and at the same time enforcement of quality standards needs to be carried out to compete in the world market.

15. In spite of being first and second in the world in production of fruits and vegetables in the world, per capita consumption of these in India is very low. Consumption of adequate quantities of vegetables is essential for health. In addition to vital micronutrients, vegetables provide several phytochemicals and fibre. At present there is lack of sufficient focus and thrust for cultivation and marketing of the low cost locally acceptable green leafy vegetables and yellow vegetables and fruits; because of this, utilisation of these vegetables throughout the year at affordable cost both in urban and rural areas to meet the micronutrient needs of the population has remained an unfulfilled dream. Health and nutrition education emphasizing the importance of consuming these inexpensive rich sources of micronutrients will not result in any change in food habits unless there is harnessing and effective management of horticultural resources in the country to meet the growing needs of the people at affordable cost. States like Tamil Nadu and Himachal Pradesh have initiated some efforts in increasing vegetable production and improving marketing; similar efforts need be taken up in other states also. Processing of fruits and vegetables at or near the areas where they are grown would minimize

the inevitable losses during transport and reduce transport costs. Processing units in rural areas would also provide employment opportunities and economic benefits due to value addition.

White Revolution

16. India the largest milk producer in the world is estimated to have produced 74.3 million tonnes of milk (equivalent to 203.5 million litres per day) in 1998-99 compared to 16 million tonnes at the time of independence and 20 million tonnes at the commencement of Operation Flood (OF) in 1965. This milk was produced by 70 million dairy farmers from a milch herd comprised of 57 million cows (31 millions in milk) and 39 million buffaloes (25 million in milk) with an average milk yield of 1,250 kg. Almost the entire quantity (98%) was produced in the rural sector. Only 10 percent of the milk produced (20 million litres per day) was processed in dairy plants. The value of the output of the dairy plants was Rs. 105,000 crores. The per capita availability of milk rose from 132 g/day in 1950-51 to an estimated 214 g/day in 1997-98 despite a large increase in population. Production and per-capita availability of milk, meat and egg is given in table 7.

Table 7

Production and per Capita availability of milk, meat and egg for one billion people in India (Provisional)

Animal Products	Production (m t)	Per Capita Availability (kg/year)
Milk	78.0	78.0
Meat	3.24	3.24
Cattle & buffalo	0.84	
Sheep & goat	1.13	
Pig	0.17	
Poultry	1.10	
Egg	32 (billion number)	32 number/year

Source: Pradhan K.. Paper presented in the symposium on Diversification of Agriculture for Human Nutrition. NAAS, Hyderabad, November, 1999.

17. Operation Flood has been one of the largest and most successful rural employment schemes in the world. Cooperative dairying means regular income to small farmers. Cooperative dairying has not been merely the modernisation of milk production but has larger technological, economic and social dimensions. It has created and nurtured democratic structures at grass root levels

18. The present consumption of milk is at the per capita rate of 206 grams per day. Of the liquid milk consumed in India, a substantial part is used for whitening coffee or tea. For the economically weaker sections, this use accounts for almost all milk consumed. The fat content of milk is not of much consequence for this usage, hence the sizable demand for lower cost toned and double-toned milks. The world average of per capita consumption is 300 grams per day. If India's consumers were to have a consumption of milk above the ICMR recommended rate of 220 grams per day, India's need for milk would be much greater - 110 million tonnes. It is estimated that the demand for milk may go up with growth in income to as high as 173 million tonnes per year by 2020.

19. In the traditional context, three cumulative factors have been restricting the opportunities for raising milk production. First of all, the crucial importance of animal draught power in the rural economy tends to make the bullock a more productive animal for the farmer than the buffalo. Secondly, due to high population densities in India, there is chronic scarcity of feed resources. In combination with the first factor, this leads to an allocation of resources in favour of draught animals, which leaves little quality feed for milk production. Thirdly, even though there are some excellent specialized breeds of buffaloes and cattle, an average low quality of animal stock in terms of milk productivity has been a constraint in increasing milk production. The majority of Indian bovines, are of a non-descript type. The productivity per animal in India (1,250 kg/lactation) is still very poor compared in to international levels (2,038 kg/lactation).

Homestead production:

20. It is important to promote dietary diversification to meet the nutritional needs of the population so that there will be sustained reduction in prevalence of under-nutrition and micronutrient deficiencies. Availability and deficit of life stock products is shown in Table-8.

**Table 8:
Availability and Deficit of livestock products in India**

Food Items	Per capita Availability	ICMR Recommendation	Per capita Deficit
Milk	216 g/day	250 g/day	34 g/day
Egg	30 egg/annum	180 eggs/annum	150 egg/annum
Meat	3.24 kg/annum	10.95 kg/annum	7.71 kg/annum

Source: Pradhan K. Paper presented in the symposium on Diversification of Agriculture for Human Nutrition. NAAS, Hyderabad, November, 1999.

21. Commercial production, by large/ corporate producers may not ensure food and nutrition security for the poor. Homestead production of vegetables, fruits and animal foods has been shown to improve the intake of these foods by the family including children. Such an effort should be backed by strong educational component to facilitate the right choices and utilisation. With milk, eggs, meat, fish having gone beyond the reach of the poor, there are concerns about sustaining enhanced production of animal foods. However, even without resorting to excessive commercial production of these foods, strategies can be worked out for using degraded lands and farm waste as well as food grains unfit for human consumption to increase the production of these highly nutritious foods. Back- yard poultry needs to be promoted to increase homestead production of eggs and chicken and generate employment for farm- women. Breeds suitable for back yard poultry have been developed in India. Integration of aquaculture into smallholder farming systems has shown promise in Bangladesh. Aquaculture can be integrated in rice fields. This integrated agriculture-aquaculture is reported to be successful when investments in terms of pond construction, feed and fertiliser are kept low, by utilising on-farm and near-farm resources eg. recycling

residues. Also the solutions have to be location specific and not tailor made packages for universal application.

22. Promotion of home gardens is difficult but not impossible. The commonly stated problems are: lack of space, lack of water, destruction by pests and even children. Non-availability of good quality planting material and location- specific technical advice also contributes to the failure stories. Where space is a problem, a few varieties of nutrient dense-perennial plants like drumstick (leaves rich source of all micronutrients), papaya, leguminous plants like *Sesbenia grandiflora* (Avisha), *Basella alba* (creeper spinach) etc can be planted in little space and waste water used. The seasonal varieties can be grown in the farm. Location-specific strategy, including choice of plants, good quality planting material and technical advise are needed. Establishment of decentralised nurseries and seed banks would help income generation and preserve the germ plasm for the indigenous varieties.

23. The micronutrient content of fruits and vegetables vary widely. Agriculture/horticulture scientists, planners, extension workers and farmers need to be sensitised to grow fruits and vegetables that are rich in micronutrients (GLV, yellow orange vegetables and fruits, citrus fruits, beans etc). Fortunately major increases have occurred in the production of nutritious fruits like papaya, guava, and banana (Table 5). This is an encouraging trend. But due to bad planning, glut occurs during some seasons and the grower does not get much profit.

24. Green leafy vegetables are inexpensive and very rich in micronutrients. Apart from the conventional varieties, less conventional ones grow wild during rainy season, and people can be encouraged to use them. Precious greens from vegetables like carrot, radish, turnip, cauliflower which are discarded can be easily utilised if people are educated about their edibility and value. Thailand brought down the incidence of vitamin A deficiency by promoting consumption of ivy gourd (*Coccnia indica*) leaves. In India this plant is grown widely, but only the fruit is consumed. Identification and promotion of such unfamiliar sources of micronutrient-rich foods is needed.

25. There is need to recognise and preserve the knowledge regarding traditional plant varieties and methods of growing and cooking/processing them. Today powerful molecular methods of genetic besides the conventional taxonomic characterisation of biological material are available. These should be de-mystified and made available to agricultural institutions and home science colleges for routine screening of local varieties of plants. People's knowledge about them should be documented. Facilities for analysing foods for their nutrient content and availability should be strengthened and made accessible to all including farmers and NGOs.

Food Processing and Preservation:

26. Post harvest losses presently in the range of 20 to 30 per cent, which contribute directly to the reduction in the availability of these commodities to the people, and estimated to cost Rs.23, 000 crores, are the other major constraints in achieving the goals. This is primarily due to very weak infrastructure available for post harvests handling, lack of appropriate technology for on-farm adoption and unorganised marketing practices in vogue. These in turn contribute to the high retail prices of these commodities, thus making these unaffordable to the ordinary consumers.

27. There is considerable scope and need for the expansion of agro-based industries in villages and townships dealing with food preservation and processing. This could create job opportunities for women and men. This could also lead to better production and more effective utilisation of local food resources by the community, and reduce the present considerable loss of perishable food items. Local women's organisations could be entrusted the responsibility of organising village level feeding programmes in schools and welfare programmes instead of depending on foods donated by foreign organisations and alien to the local dietary culture. Nutrition and welfare programmes could then become programmes of the people, by the people, for the people. It is important to ensure that decentralised small-scale food systems, which are today providing great employment opportunities to women and men in the country-sides are not replaced overnight by global agro-business corporations who are now attempting to control the entire food chain. Wheat and wheat flour, for instance, provide livelihood and nutrition to millions of men and women in India. In the current decentralised small-scale economy, based on millions of producers, processors and traders, people are the substitutes for capital and infrastructure. India should be careful not to allow erosion in this traditional approach, which makes optimal utilisation of the abundant human resources. Planning of agriculture and food processing in villages around towns and cities will help to increase farmers' income and rural employment considerably and will attract and retain educated youth in farming through spreading science-based precision farming and processing techniques which are both intellectually stimulating and economically rewarding.

28. Though horticulture can be economically beneficial, its perishability, lack of price stability, and need for constant care discourage farmers from diversifying into horticulture. Seasonal glut can ruin the farmers if outlets for their sale to other areas or value addition through food processing are not available.

29. Decentralised storage and processing centres need to be established in every block. Technologies such as zero energy cooling chambers, solar dryers, fermentation and pickling etc. need to be promoted not only at household level but also in these food-processing centres. These can generate employment for women. Decentralised food processing centres can do the primary processing, but they have to be linked to larger food industries for further value addition. Better-decentralised cold chain is needed for storage, but power shortage, and investment for developing infrastructure are major bottlenecks.

30. In the area of food technology, processing without loss of micronutrients particularly vitamins is a big challenge. A recent study from Coimbatore has shown that shade drying of GLV results in loss of 70% beta-carotene. On the other hand drying in a properly designed solar drier with an ultraviolet filter resulted in loss of only 20% (Bamji unpublished). Solar dryers are expensive and beyond the reach of individual small farmers, but community processing units can acquire them and dry excess fruits and vegetables for sale during lean season. Culturally acceptable processed foods do sell even in villages, as convenience foods.

Targeted Public Distribution system

31. The targeted public distribution system came into operation with effect from 1st June 1997. The objective of TPDS is to restrict the benefits of subsidized food grains to those sections whom the State wants to protect. A number of innovative features have been introduced in the TPDS to provide differential treatments to the BPL population vis-à-vis the APL population. In order to make the TPDS transparent and accountable and thereby plug the leakages, a number of steps have been taken. These include (a) release of food grains to the states subject to satisfactory completion of identification of eligible families; (b)

involvement of the Panchayats/Nagarपालikas in the identification exercise as well as for supervision of the work of the fair price shops (FPS) (c) constitution of vigilance committee at FPS, Taluk, District and State level and (d) a system of monitoring the reporting on the working of TPDS. It is essential that the functioning of the TPDS is carefully monitored and appropriate corrective measures taken to ensure that subsidized food does reach the needy. In addition to rice and wheat it might be preferable to provide coarse grains, pulses and iodised salt through TPDS to the population.

Intrafamilial distribution of food:

32. It is widely believed that in India especially among rural poor, intrafamilial food distribution is not based on the 'need'; the breadwinner gets sufficient food, the children the next share and the remains taken by the women. In times of scarcity dietary intake of women and children are likely to be most adversely affected. Several small studies in different States have reported that intrafamilial distribution of food follows this traditional pattern even today. However, this may not be applicable to all States and all strata of societies. Analysis of data from diet survey by 24 hours dietary recall method carried out by NNMB in 1975-80 shows that in 31% of households energy consumption was adequate in all members of the family. In 19% of households energy consumption was inadequate for all members of the family. It was noteworthy that in 22.5% of households energy intake was adequate among adults but not among the preschool children. Maternal education (high school and above) enabled the mothers to achieve a better intrafamilial distribution of food. It is important that adequate attention is paid to nutrition education aimed at ensuring that the preschool children especially children in the age group 6 –24 months get adequate food from the family pot; care and time spent on feeding the young child can pay rich dividends in terms of sharp reduction in under-nutrition in this age group.

Infant feeding practices and infant nutrition

33. Steps taken for protection and promotion of breast feeding have been effective and in India breast feeding is almost universal. However, the message that exclusive breast feeding upto six months and gradual introduction of semisolids after six months are critical for prevention of undernutrition in infancy has not been as effectively communicated. Data from NFHS II indicated that though median duration of exclusive breast feeding or breast feeding and water is 5.3 months even at 3 months 27.5% of infants received supplements; even at 9 months only 67.2% of infants received supplements. Too early introduction and too late introduction of breast supplements to breast feeding infants are associated with increased risk undernutrition and infection. As a result of these faulty infant feeding habits. There is a steep increase in prevalence of undernutrition (% below from 11.9% at 6 months to 58.5 % at 24 months of age) (table 9). It is important to correct these faulty infant feeding practices through nutrition education. In order to improve introduction of supplement from 6 months onwards take home cereal, pulse oil seed mixtures are being supplied to families with children between 6-36 months of age. Efforts are also under way to improve monitor of nutritional status in infancy detect infants with growth faulty and take appropriate steps to improve their nutritional status.

Table 9: Prevalance of Undernutrition (Weight for age % below – 2 SD)

Age	< 6	6 - 11	12 - 23	23 - 35
% - 2 SD	11.9	37.5	58.5	58.4
% - 3 SD	2.0	11.8	23.1	24.1

Source: NFHS II 1998-99

Time trends in adolescent nutritional status

34. Adolescence is a period of rapid growth and maturation in human development. There is very little information about dietary and nutritional status of adolescents in India. An assessment of the current diet and nutritional status of adolescents was carried out utilizing the data collected by the National Nutrition Monitoring Bureau in ten states. The anthropometrics data obtained on 12,124 adolescents and 24 hour recall dietary information on 2,579 individuals in 1996-97 were analyzed and were compared with the anthropometrics data obtained on 24,683 adolescents and dietary information on 3,313 individuals obtained from the same villages in 1975-79.

Table 10

Average daily Intake of Nutrients among 16-18 year adolescents

Nutrients	Boys		Girls	
	1975-79	1996-97	1975-79	1996-97
Protein (g)	58	62	48	52
Total Fat (g)	23	33	22	29
Energy (kcal)	2036	2371	1751	2069
Iron (mg)	27.9	29.0	23.9	23.7
Vit A (μ g)	230	426	234	258

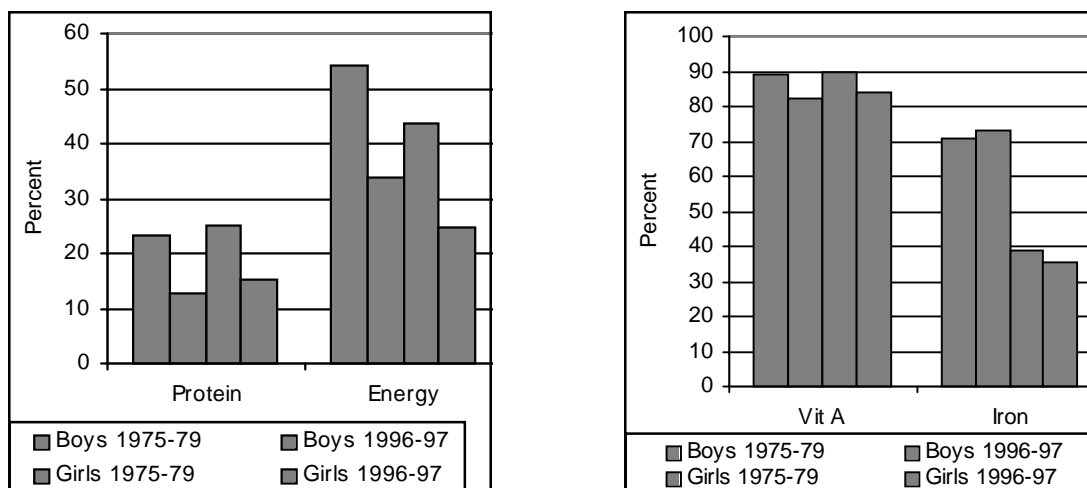


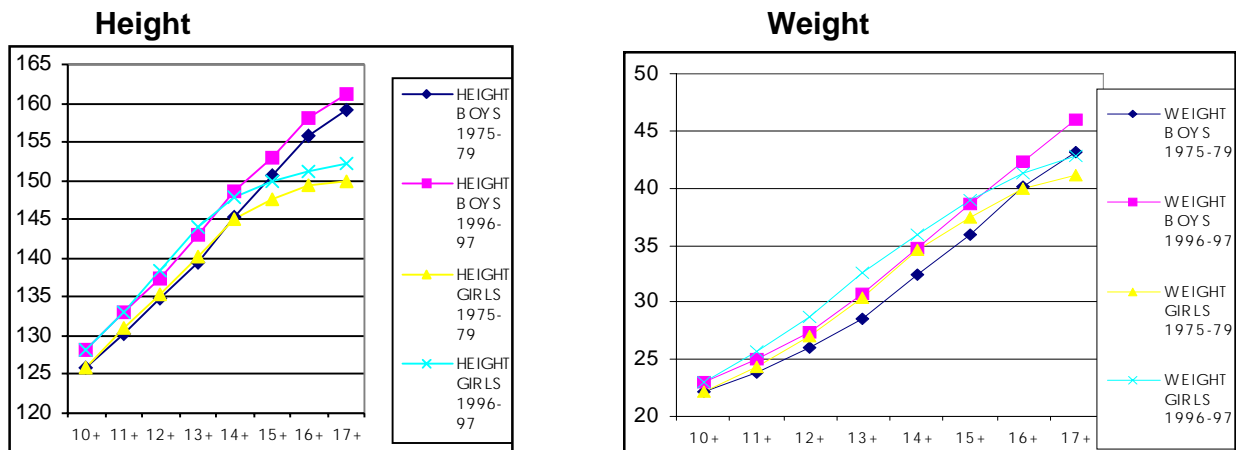
Fig.3: Distribution of adolescents with nutrient intake < 70% of RDI
Source (for both the Table and figures): NNMB Technical Report No.20

35. The proportion of adolescent girls getting married before the age of 18 years was 23%. Among them the proportion with short stature (<145 cms) was 24.1% and that with underweight (<38 kg) was 18.6%. The food and nutrient intake, in general, were below the RDA. More than two-thirds of adolescents were consuming less than 70% of RDA for Vitamin A and Iron (Fig.3). However, in general there was an improvement in nutrient intake in 1996-97 as compared to 1975-79 (Table 10). The extent of severe deficit with respect to energy

(<50% of RDA) decreased from 21% to 9% in boys and 14% to 5% in girls during 1996-97 as compared to 1975-79. The percent of underweight (<Median-2SD of NCHS weight for age) in males was 53% as compared to females (39.5%). About 39% were stunted.

36. The adolescents measured during 1996-97 were significantly taller and heavier than their counterparts studied in 1975-79 indicating secular changes in growth during a period of twenty years (figure 4). There was an increase to the extent of 2.5 to 3.5 cms in mean heights and 1-1.5 kgs in mean weights. Socio-economic variables like type of house, occupation, land holding and per capita monthly income were significantly ($p<0.05$) associated with weight and height for age.

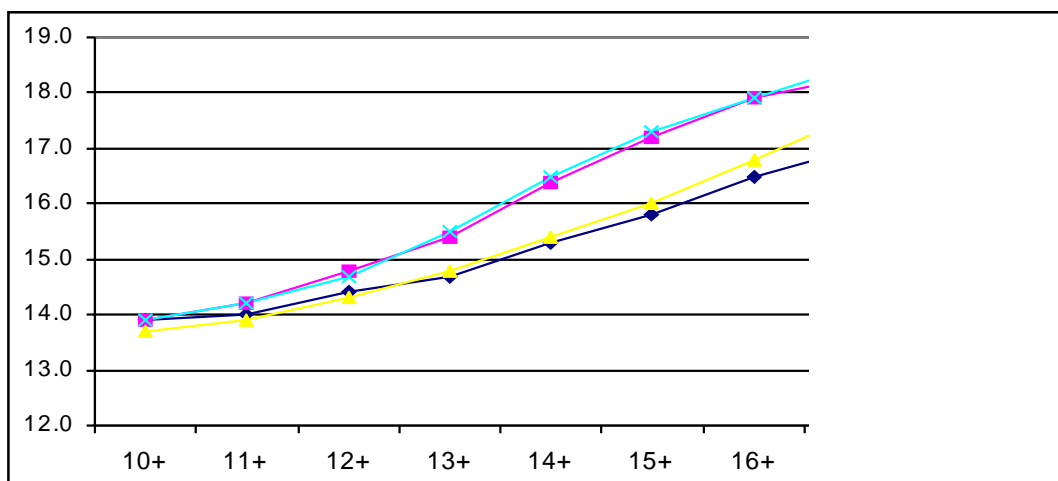
Fig.4: Average heights and weights of boys and girls by age



Source: NNMB Technical Report No.20

37. Figure 5 below gives the median Body Mass Index of adolescents age-wise in the two survey periods. As can be seen from the graph, the extent of under-nutrition was considerably less among girls than their male counterparts in each of the age groups. While in girls the BMI measured almost the same at the two time points, there is a small improvement in boys in the higher age groups.

Figure 5: Median Body Mass Index of Adolescents



Source: NNMB Technical Report No.20

Diet and Nutrition situation in the drought affected areas of Andhra Pradesh, Gujarat and Rajasthan

38. Achievement of food adequacy at the national level is a condition, necessary but not sufficient in itself, to ensure the achievement of household nutrition security. Buffer stocks do help to combat acute transient food scarcity, caused by natural disasters like floods and droughts. These acute disasters are, no doubt, now being handled more expeditiously and efficiently than in the past, and several lives are being saved by timely action. Early warning systems are in place and food can be rushed to areas of threatened distress fairly rapidly. What is proving more difficult, however is the task of combating chronic mild / moderate undernutrition in large number of poor households; India has today built up fairly adequate buffer stocks of food grains, but nearly a third of households in the country do not enjoy full nutrition security.

39. Drought in India is due to failure of monsoon and its severity depends upon the extent of failure of monsoon. It is usually measured in terms of crop failure. Monsoon failure results in very low agricultural production and agro based industrial output. This, in turn results in increased unemployment, decreased purchasing power, reduced household food security, migration to urban areas, large scale movement or death of cattle and scarcity of drinking water; small and marginal farmers and landless agricultural workers are the worst affected persons.

40. The states of Rajasthan, Andhra Pradesh and Gujarat were affected by drought during the year 2000. The national Institute of Nutrition conducted a survey in these three states to assess the impact of drought on the diet and nutritional status of the population. The survey covered a total of 1200 households from 30 villages in three districts each of Gujarat (Dahod, Jamnagar and Kutch) and Andhra Pradesh (Anantpur, Mahaboobnagar and Nalgonda) and 800 households from 21 villages in two districts of Rajasthan (Barmer and Jaisalmer).

41. All the villages surveyed experienced drop in rainfall, reduction in total area under cultivation and crop failure. The extent of failure varied from village to village as also from crop to crop. Instances of migration were reported in almost all the villages of Rajasthan and Andhra Pradesh and in 17 out of the 30 villages surveyed of Gujarat. Of the various relief measures, Andhra Pradesh benefited only from additional ration through PDS. In the other two States, other measures such as food for work, supply of drinking water, essential medicines and cattle feed were also in operation.

42. The evidence of drought in the form of dried up water tanks and emaciated cattle was seen in all the districts surveyed; 26% of the households in Gujarat, 64% in Rajasthan and 13% in Andhra Pradesh reported cattle deaths due to scarcity of water and/or fodder. Only 4%, 10% and 33% of the households respectively in Gujarat, Rajasthan and Andhra Pradesh had adequate quantity of cattle feed. Households which were food insecure was 11.3% in Andhra Pradesh, 38% in Rajasthan and 55% in Gujarat.

43. Dietary intake of foodstuffs and nutrients in the drought affected districts in 2000 and the intake in non-drought conditions from NNMB/INP surveys is indicated in the figures 6a to 6f. In respect of Andhra Pradesh and Gujarat, the intake is also compared with the intake during the earlier drought in 1987.

**MEAN INTAKE OF FOOD STUFFS
(g/cu/day) AS PERCENT OF RDA**

**MEAN INTAKE OF NUTRIENTS
(cu/day) AS PERCENT OF RDA**

ANDHRA PRADESH

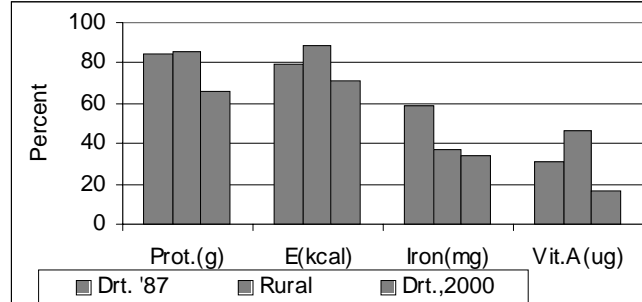
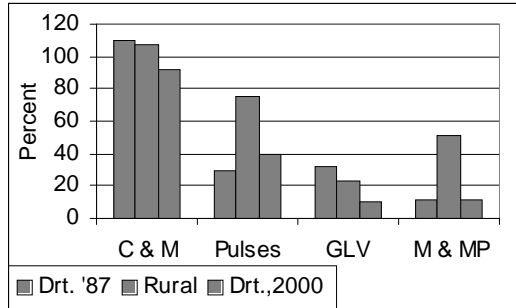


Figure 6a

Figure 6b

Source: Report on Diet and Nutritional Situation in Drought Affected Areas of Andhra Pradesh, NIN

GUJARAT

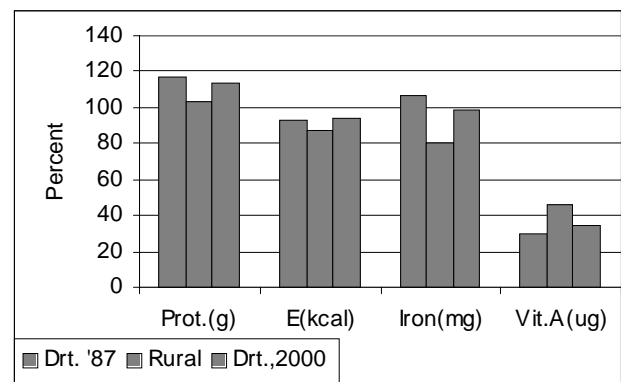
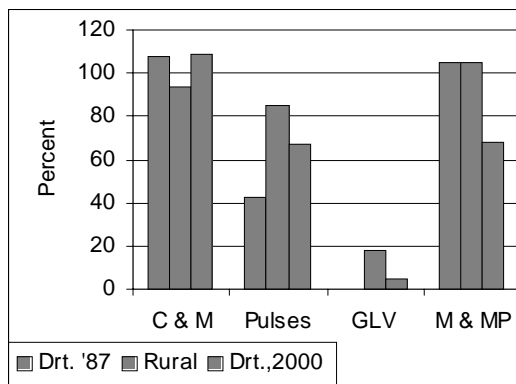


Figure 6c

Figure 6d

Source: Report on Diet and Nutritional Situation in Drought Affected Areas of Gujarat, NIN

RAJASTHAN

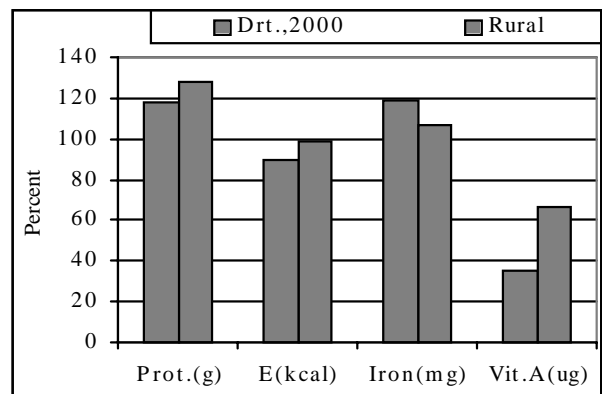
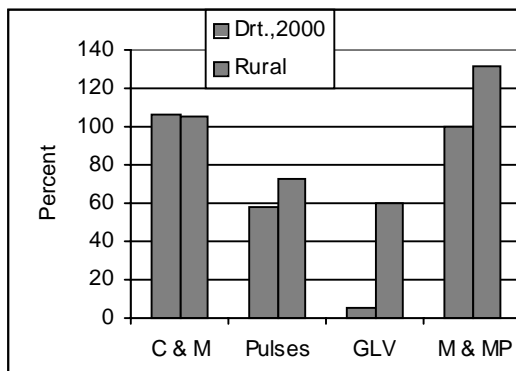


Figure 6e

Figure 6f

Source: Report on Diet and Nutritional Situation in Drought Affected Areas of Rajasthan, NIN

44. In general, at the household level, the consumption of all the foodstuffs in the drought-affected areas was lower than that reported in the rural survey by NNMB except for cereals and millets in Gujarat and Rajasthan. When compared with the drought of 1987, the consumption of all foodstuffs except pulses was lower in Andhra Pradesh. In Gujarat, the intake was more as compared to drought 1987 except for milk and milk products and other vegetables.

45. In respect of nutrient intake, the pattern widely varies among the three states; in Andhra Pradesh, the intake during drought, 2000 was lower in respect of all nutrients as compared to that during non-drought conditions; in Rajasthan, the intake was lower in respect of all except iron; in Gujarat the intake of all nutrients except calcium and vitamin A was more during the drought. In Andhra Pradesh, the intake is lower not only as compared to non-drought conditions but also than that during previous drought 1987. In Gujarat the intakes during both the droughts were comparable except for Vitamin A.

46. Surveys on nutritional status of the rural population conducted by NNMB have revealed that the intake of important nutrients like energy, vitamins and minerals the agricultural labourers is lower as compared to the others and, therefore, they are likely to be worst affected (table 11). Among the agriculture families, the children and pregnant are likely to be most adversely affected.

Table 11: Nutrient Intake by Occupation

MAJOR OCCUPATION	Protein (g)	Energy (Kcal)	Iron (mg)	Vitamin A (ug)
Landless Agri. Lab.	51.7	1989.3	23.6	197.6
Other Lab.	47.9	2041.5	24.7	381.2
Owner cultivator	57.2	2205.3	25.8	324.7
Owner+Tenant cult.	54.7	2213.3	27.5	528.0
Tenant Cult.+Agri Lab	53.6	2142.2	26.4	234.6
Others	54.4	2187.0	23.6	308.0
Pooled	53.7	2108.3	24.8	299.9

Source: NNMB Technical Report No.18

47. Data on anthropometric measurements and deficiency signs in drought-affected states was compiled. In Rajasthan, there was no increase in prevalence of CED (BMI<18.5) in adults as compared to the non-drought period. However, there was an increase in the prevalence of under-nutrition in pre-school children (64.8%) as compared to non-drought period (46.7%). In Gujarat and Andhra Pradesh, prevalence of CED in children and adults was not more in the drought-affected districts than the prevalence reported under NNMB survey for the entire state. These data suggest that except in children in Rajasthan, the adverse consequences of drought on nutritional status were not significant. This might perhaps be due to the effective measures to provide minimum essential food stuff in the drought affected areas in these states.

Nutritional Component of the Integrated Child Development Scheme (ICDS)

48. ICDS, perhaps the largest of all the food supplementation programmes in the world, was initiated in 1975 with the following objectives:-

- i) To improve the health and nutrition status of children 0-6 years by providing supplementary food and by coordinating with state health departments to ensure delivery of required health inputs;
- ii) To provide conditions necessary for pre-school childrens' psychological and social development through early stimulation and education;
- iii) To provide pregnant and lactating women with food supplements;
- iv) To enhance the mother's ability to provide proper child care through health and nutrition education;
- v) To achieve effective coordination of policy and implementation among the various departments to promote child development.

49. The initial geographic focus was on Scheduled tribes, drought-prone areas and blocks with a significant proportion of scheduled caste population. In 1975 there were 33 ICDS blocks. Over the last two decades the ICDS coverage has progressively increased. As of 1996, there are 4,200 ICDS blocks with 5,92,571 anganwadis in the country; the number of beneficiaries rose from 5.7 million children and 1.2 million mothers in 1985 to 18.5 million children and 3.7 million mothers in 1996.

ICDS during the Ninth Plan:

Efforts are to be made to - a) ensure that bottlenecks in food supply are eliminated; b) improve the regularity and quality of services c) effective inter sectoral coordination between health, family welfare and nutrition programmes. Growth monitoring, targetted nutritional supplements to children and mothers with CED, nutrition and health education are to be intensified through the joint coordination of activities of Anganwadi Workers/ANMs; active community/ PRI participation in planning, implementation and monitoring of ICDS activities at village level is to be attempted. The efforts should be to focus on detection of moderately or severely undernourished children and women who will receive available supplements on priority basis from existing ICDS programme. These efforts should be intensified.

Evaluation of food supplementation programmes under ICDS and TINIP:

50. National Institute of Nutrition undertook an evaluation of ongoing ICDS programmes in Andhra Pradesh and Orissa and the end evaluation of Tamil Nadu Integrated Nutrition Project. The findings in terms of achievement against the targets set at the time of initiation of the projects are indicated in the table below:

Parameter evaluated	Tamil Nadu		Andhra Pradesh		Orissa	
	Target	Achvt.	Target	Achvt.	Target	Achvt.
1. Reduction in the prevalence of grade III & IV children in the 6-36 months age group	50% in TINPII areas 25% in TINPI areas	48.1% in TINP-II 49.3% in TINP-I	50% of base line	67.5% in old 54.1% in new	50% of base line	15% in old 10% in new
2. Increase in normal and grade-I children of 6-36 months	50% in TINPII areas 25% in TINPI areas	7.2% in TINP-II 12% in TINP-I	25%	34% in old 38% in new	25%	3.8% in old 1% in new
3. Additional weaning foods by the age of 6 months	50%	57%	60%	More than 90% in both the areas	50%	27% in old 30% in new
4. Immunization of 12-24 months children	100%	90% of the gr. III & IV children	90%	68% in old 73% in new	85%	68% in old 78% in new
5. Proportion of children who received mega dose of vitamin A	90%	32% (recd. 2 doses)	80%	45% in old 26.7% in new	80%	17% in old 13% in new
6. Proportion of children who had regular growth monitoring	90%	43%	80%	62% in old 68% in new	80%	76% in old 64% in new
7. Coverage of grade II, III & IV children for supplementary feeding		65% children in 6-36 months age group	90%	79% of 6-36 months and 53% of 36-72 months in old 55% of 6-36 months and 53% of 36-72 months in new	90%	88% of 6-36 months and 95% of 36-72 months in old 76% of 6-36 months and 78% of 36-72 months in new

Parameter evaluated	Tamil Nadu		Andhra Pradesh		Orissa	
	Target	Achvt.	Target	Achvt.	Target	Achvt.
8. Proportion of children who had received ORT during an episode of diarrhoea	60%	74.8% of gr.III & IV children; 88.7% of 36-60 months old children	60%	44.4% in old 54.4% in new	50%	90% in old 77.5% in new
9. Proportion of 36-72 months children who were weighed regularly	70%	15%	80%	53% in old 53% in new	60%	79% in old 69% in new
10.Children referred to health personnel	100% for 6-36 months	20% of 6-36 months old 15% of 36-60 months old				
11.Lactating women who were registered for ANC during the last pregnancy		95%	100%	90% in old 85% in new	100%	78% in old 66% in new
12.Proportion of women who underwent all components of ANC			100%	37% in old 43% in new	100%	6% in old 5% in new
13.Proportion of women who had received atleast one dose of TT during last pregnancy	80%	94%(2 doses)	90%	94.8% in old 92.2% in new	80%	87% in old 82% in new
14.Women who received supplementary food during last pregnancy	60%	48%(recd. For more than 16 weeks)	80%	41% in old 58% in new	60%	34% in old 34% in new

Parameter evaluated	Tamil Nadu		Andhra Pradesh		Orissa	
	Target	Achvt.	Target	Achvt.	Target	Achvt.
15. Women who received more than 90 folifer tablets	60% (IFA)	9%	90%	14.4% in old 29.2% in new 72% recd. IFA tablets	60%	37% in old 30% in new 76% recd. IFA tablets
16. Registered women who were assessed for obstetric and nutritional risk	100%	67%				
17. Lactating women who received supplementary food for more than 16 weeks	90%	52%				
18. Lactating women who breast fed their offspring for more than 4 months		52%				
19. Coverage of mothers for post-partum vitamin A supplementation		11%				

Source: Annual Report, 1998-99 National Institute of Nutrition

51. As can be seen from the above table, though the nutritional status of the children had improved in general, yet the achievements were far below the target. Some of the reasons for this could be inadequate coverage of children below 3 years of age who are at greatest risk of malnutrition, irregularity of food deliveries to anganwadis and hence irregular feeding and inadequate rations, and poor nutrition education of mothers to improve community participation. Even though the programme envisages special targeting towards malnourished children, who are to be given double the quantity of the supplement, in practice most beneficiaries of supplementary feeding are not selected through nutritional screening.

Nutrition component under PMGY:

52. To improve the coverage of children below three years who are nutritionally one of the most vulnerable population and whose needs do not get properly addressed under the ICDS programme, a component to specially address their needs was included under the Pradhan Mantri Gramodaya Yojana introduced in the last financial year. Funds under PMGY are to be used for providing take home food supplements consisting of cereals, pulses and oil seed mix for children 6-36 months of age. The programme is being implemented by the Department of Women and Child Development through the ICDS centers. There were some

initial delay in getting appropriate proposals as well as statements of expenditures from the States; these are getting sorted out.

53. The allocation of funds for states follows the same norm as distribution of central assistance under the Gadgil Mukherjee formula. According to this formula, the special category states with only 6% of the country's population get 30% of the funds under PMGY. Therefore these states have more funds under PMGY than would be required to feed all children in the 6-36 months age group. In view of the fact that there are substantial gaps in providing nutrition supplements under the ICDS programme and that under-nutrition is wide spread, it was decided to allow the states with surplus funds under PMGY to utilize it to ensure better coverage of pregnant and lactating women as well as to ensure that children with grade III & IV malnutrition get double ration of supplements as specified under ICDS. The scheme is being continued in the current financial year as well with increased allocation (Rs.2800 crore). The States have been informed that they should allocate atleast 15% of the PMGY outlay for the nutrition component.

Monitoring of Nutritional Status:

54. Nutritional status based on weight for age is documented and reported in ICDS project. They are seldom analysed and used because of the fear that the data may not be robust enough to permit its use for monitoring trends. Utilising the data sent by 'routine' reporting of ICDS workers block-wise GIS mapping of the severe and moderate under nutrition in 0-3 years age groups and 4-6 age groups in 229 ICDS blocks in Orissa was done. The GIS maps clearly bring out trends in under nutrition in different areas, different seasons and in different age groups. Based on the data appropriately targeted interventions could be initiated. Increasing use of the data would encourage workers to correctly file their monthly reports. The CDPOs will develop confidence in the AWW's report and utilise the data to organise intervention at appropriate time right at the village level. These encouraging state level studies need to be utilised to improve of monitoring of ICDS. Efforts should be made to improve quality of weighment and reporting of under nutrition in all ICDS blocks. Once the good quality data on a regular basis become available at block and district level it should be used as an instrument for:

- a) Monitoring ICDS activities in terms of reduction in under nutrition.
- b) Planning appropriate interventions based on the data and
- c) Mechanism for nutritional surveillance in vulnerable groups

Micro-nutrient Deficiencies

55. Micronutrient (vitamins and minerals) deficiencies have come to be recognized as being as common and as important as chronic energy deficiency. Among the micronutrient deficiencies, those of iron, vitamin A and iodine have received greater attention because of the morbidity and mortality associated with them. Calcium, zinc, vitamin B-complex, C & D deficiencies are being reported. For tackling the problem of micronutrient deficiencies it is useful to take a holistic view and evolve strategies that would ensure adequate intake of all micronutrients through dietary sources. The ultimate goal should be to eliminate the recognized diseases due to micronutrient deficiencies and substantially reduce if not eliminate sub-clinical deficiency.

Vitamin A deficiency:

56. Vitamin A deficiency resulting in Xerophthalmia and blindness was a public health problem in fifties and sixties. The massive dose Vitamin A programme was initiated in 1973 to combat this problem. The coverage under this programme has been low; there has not been any significant increase in consumption of vitamin A rich food. However blindness due to vitamin A deficiency has become rare and there has been substantial decline in prevalence of Bitot's spots.

57. During the Ninth Plan coverage for the first dose has been reported to range between 60-70% but coverage for other doses is as low as about 20% only. In an attempt to improve coverage for second and subsequent doses of Vit A, some States like Orissa had linked administration of Vit. A with pulse polio immunization campaign. It is reported that the State took precautions to prevent overdosing by stopping Vit A administration in preceding 6 months. The State reported improved coverage. Similar attempts in other states like UP have not been successful. The problem associated with this strategy is that special efforts need to be made to ensure that only children between 1-3 years receive Vit.A and 0-5 yrs. old children receive polio. This may not be easy as PPI is a massive campaign covering over 12 crore children and the booths are manned by persons who are not health professionals. Another problem is that the second dose of Vit. A for the year has to be administered through alternative strategy.

Ninth Plan strategy for control of vitamin A deficiency included:

- Continuing providing the first dose with measles vaccination.
- Improving the coverage of subsequent doses of massive dose Vit A.
- Ensuring adequate availability of Vit. A
- Health education to improve consumption of foods rich in B-carotene and backed up by efforts to improve their availability at affordable cost.

The target for the Ninth Plan is to control Vitamin A deficiency so that the incidence of blindness due to Vit.A deficiency becomes less than 1/10,000 not only at the national level but also in every State.

National consultations

58. Vitamin A prophylaxis in children was provided as a national programme primarily for prevention of blindness in children caused due to vitamin A deficiency. Subsequently, several studies have shown that in areas where vitamin A deficiency is common, vitamin A prophylaxis reduces childhood mortality largely by decreasing case fatality related to common diseases such as diarrhea and measles. In a national consultation on the subject held on 29th and 30th September 2000, at the ICMR it was noted that in a few studies including one in India the mortality sparing impact of vitamin A prophylaxis was not found. The majority of studies on the subject did however show a positive impact on child mortality between six months and three years of age.

59. There was a National Consultation on Benefits and Safety of Administration of Vitamin A to Pre-School Children and Pregnant and Lactating Women in 2000; the Indian Academy of Paediatrics (IAP) also had a consultation on Vitamin A administration in children. The major conclusions of the IAP consultations were:

- There is an unambiguous evidence of appreciable secular decline in clinical Vitamin A deficiency in children below five years in the country.
- Recent data indicates that Vitamin A supplementation in infancy does not have any beneficial effect on growth, morbidity and mortality.
- Linking Vitamin A administration to the pulse polio program is inappropriate as the routine programme may be destabilized. There would be difficulties in keeping adequate record of Vitamin A dosing with possibility of toxicity or side effects due to multiple dosing within six months and a negative impact on Vitamin A administration through the routine services. The change strategy that all nutrition and health workers would have to be instructed to discontinue routine Vitamin A administration and establish systems for distribution of Vitamin A supplies would become immobilized. When pulse polio programme ceases to exist, re-initiation of routine Vitamin A administration would have obvious implications in terms of retraining logistics and supplies.

60. In view of this it might be preferable to use the sustainable strategy for improving Vit. A status of children such as:

- Administration of massive dose of Vit.A through AWW twice a year say April and October every year
- Nutrition education by AWW to improve intake of green/yellow vegetables

61. In India, the magnitude of clinical Vitamin A deficiency has declined significantly but in some parts it still exists as a public health problem. Dietary surveys have shown that the intake of Vitamin A is on an average significantly lower than the recommended daily allowance in young children, adolescent girls and pregnant women. It is important to note that in these vulnerable sub groups multiple nutritional problems coexist including inadequate intake of energy as well as of micronutrients other than Vitamin A.

62. The need is for broad based programmes aimed to improve the overall nutritional status of the population particularly the vulnerable categories of children, adolescent and women. Nevertheless, because Vitamin A prophylaxis is in existence since long and as dietary intakes of Vitamin A are still low in large segments of the population the existing massive dose Vitamin A supplementation programme should be continued and its implementation strengthened.

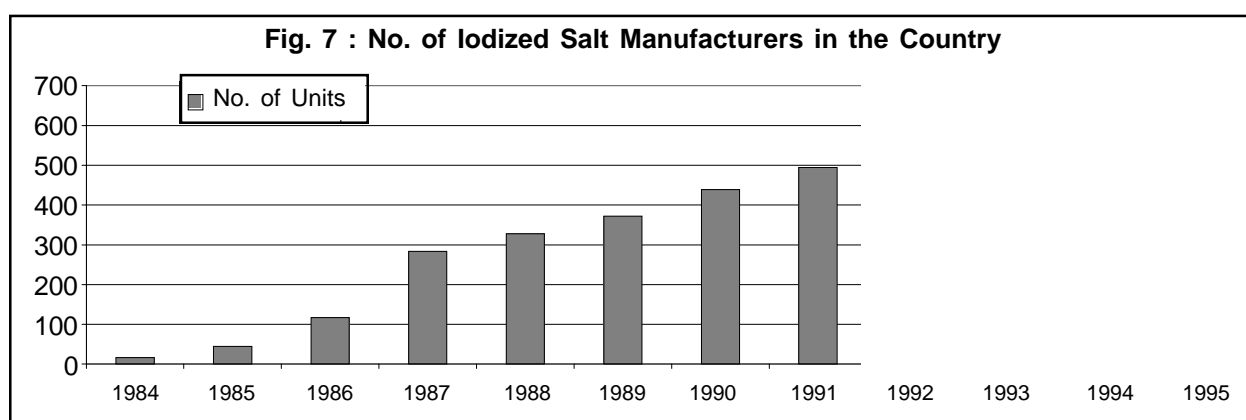
Iodine Deficiency Disorder (IDD)

63. IDD has been recognized as a major public health problem. Unlike other micronutrient deficiencies, IDD is due to deficiency of iodine in water, soil and foodstuffs and affects all socioeconomic groups living in defined geographic areas.

64. Following the successful trial of iodized salt in the Kangra Valley, Himcahal Pradesh, a National Goitre Control Programme(NGCP) was launched by the Government of India in 1962. In spite of the fact that the technology was available and affordable the intervention programme did not result in substantial reduction in the magnitude of the problem. In August 1992, the NGCP was renamed as National Iodine Deficiency Disorders Control Programme (NIDDCP) taking into its ambit control of wide spectrum of IDD like mental and physical handicap, deaf mutism, cretinism, still birth etc. The objectives of the programme were (i)

to carry out surveys to assess the magnitude of IDD in the country (ii) produce and supply iodized salt in place of common salt (iii) to resurvey the area after five years to assess the impact of the iodized salt programme (iv) laboratory monitoring of iodised salt and urinary excretion and (v) health education. The Goal of the NIDDCP is to reduce the prevalence of IDD below 10% in endemic districts of the country.

65. Based on the recommendations of the Central Council of Health, the Govt. took a policy decision to iodise the entire edible salt in the country by the year 1992. There has been a steady progress in the production of iodized salt over the past few years in India. There are about 650 iodized salt production units in the country located mainly in Gujarat, Rajasthan and Tamil Nadu; of these 557 (86%) are registered with the Salt Dept. The yearwise progress in the number of salt manufacturers is given in Fig.7. The year wise number of iodisation units, capacity and supplies of iodised salt is given in Table 12.



Source: Evaluation of Universal Salt Iodisation In India, Salt Deptt., Min. of Industry, Govt. of India

Table 12

Year	No. of Iodisation Units	Capacity	Supplies
1983	13	3.86	1.41
1986	115	16.08	5.98
1989	353	48.71	21.34
1992	529	65.33	26.87
1993	519	65.67	27.23
1994	572	75.04	28.01
1995	657	82.33	34.88
1996	699	87.28	40.92
1997	784	107.50	39.07
1998	809*	115.21*	37.42

*As on 31st March, 1998

Source : National Consultation on 'Benefits and Safety of Iodised Salt, Salt Department, Government of India, Jaipur

66. All these efforts together with the active participation of salt manufacturers and traders has made India the second largest producer of iodised salt in the world today after China. The requirement and current supplies of edible salt is shown in Table 13. The production of iodised

salt has reached a level of 40 million tones providing access to iodised salt to over 75% of the population in the country. All the State Governments except Kerala, Andhra Pradesh and Maharashtra (partly) had issued notifications prohibiting sale of non-iodised salt for edible use.

Table 13
POPULATION, REQUIREMENT & SUPPLIES OF EDIBLE SALT – 2000

Sl. No.	Name of State	Prov. Popn. as per 2001 Census	Requirement @5 kgs in 000 tonnes	Supplies during 2000 in '000 tonnes (Salt Comm.)
	INDIA	1,027,015,247	5135.1	5221.2
1	Andhra Pradesh	75,727,541	378.6	523.6@
2	Arunachal Pradesh	1,091,117	5.5	4.5
3	Assam	26,638,407	133.2	192.1
4	Bihar	82,878,796	414.4	671.0
5	Jharkhand	26,909,428	134.5	
6	Goa	1,343,998	6.7	1.0
7	Gujarat	50,596,992	253.0	206.4
8	Haryana	21,082,989	105.4	14.5
9	Himachal Pradesh	6,077,248	30.4	4.8
10	Jammu & Kashmir	10,069,917	50.3	34.0
11	Karnataka	52,733,958	263.7	115.3
12	Kerala	31,838,619	159.2	274.2@
13	Madhya Pradesh	60,385,118	301.9	336.3
14	Chhatisgarh	20,795,956	104.0	
15	Maharashtra	96,752,247	483.8	492.7@
16	Manipur	2,388,634	11.9	
17	Meghalaya	2,306,069	11.5	
18	Mizoram	891,058	4.5	4.7
19	Nagaland	1,988,636	9.9	10.8
20	Orissa	36,706,920	183.5	203.7
21	Punjab	24,289,296	121.4	59.4
22	Rajasthan	56,473,122	282.4	43.3
23	Sikkim	540,493	2.7	4.7
24	Tamil Nadu	62,110,839	310.6	193.9
25	Tripura	3,191,168	16.0	19.8
26	Uttar Pradesh	166,052,859	830.3	930.3
27	Uttaranchal	8,479,562	42.4	
28	West Bengal	80,221,171	401.1	654.5
29	Andaman & Nicobar Islands*	356,265	1.8	0.6
30	Chandigarh	900,914	4.5	27.4
31	Dadra & Nagar Haveli	220,451	1.1	
32	Daman & Diu	158,059	0.8	0.1
33	Delhi	13,782,976	68.9	189.2
34	Lakshadweep	60,595	0.3	
35	Pondicherry	973,829	4.9	1.4
36	Defence			7.0

@ Non iodised salt: 675.6 Iodised salt : 4545.6 Total 5221.2

67. For quality control, analysis of iodized salt samples is being done by iodometric titration (92% of the iodisation units) method and Spot Testing Kits (72% iodisation units, in addition to the titration method). External monitoring of the production and quality of iodized salt is being done by the Salt Dept. and a study has shown that 97.2% of the salt units reported that samples were drawn by the Salt Dept. officials. Quality testing at retail and household level is low.

68. Most of the manufacturers transported salt both by rail and road; 24.7% of the manufacturers dispatched salt exclusively by rail, and 22% exclusively by road (Fig.8). There is no check on whether the salt transported by road is iodised or not, especially if it is transported for short distances (<250 kms).

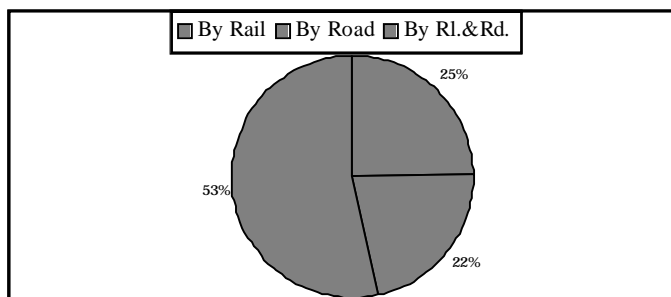


Figure-8

Source: Evaluation of Universal Salt Iodisation In India, Salt Deptt., Min. of Industry, Govt. of India

69. Wholesalers received iodized salt directly from manufacturers both by road (43%) and rail (50%). About 69% of them were distributing iodized salt only in bulk packing, another 19% in retail and remaining 12% were distributing in bulk and retail packing (Fig.9). The proportion of storage of iodised salt stored in various sites by the manufacturers is given in Fig.10. Most of the wholesalers (85.7%) do not repack the iodized salt for further distribution to retailers and most of them (74%) have adequate storage space.

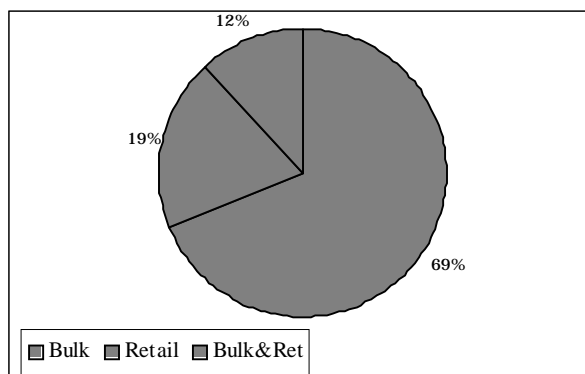


Figure 9

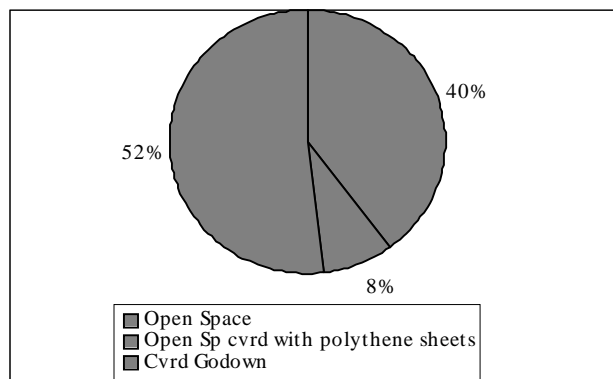


Figure 10

Source: Evaluation of Universal Salt Iodisation In India, Salt Deptt., Min. of Industry, Govt. of India

70. The cost of iodisation varies depending on the quality of raw salt used, packing material etc. Powdered iodized salt in 1 Kg, polythene pouch is available at about Re.1 per kg. at the production centers. The cost of iodisation percentage distribution of various components is given in Fig. 11. The price of iodised salt at retail level depending upon the

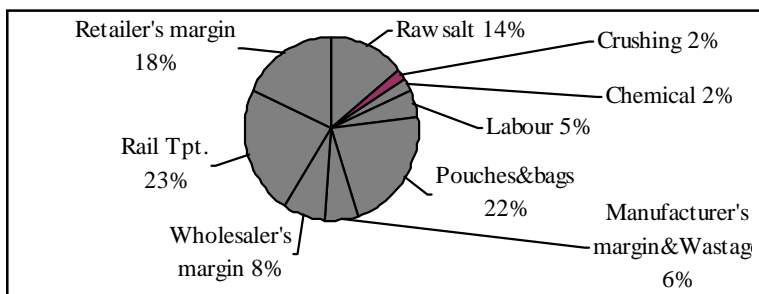


Figure-11

Source: Evaluation of Universal Salt Iodisation In India, Salt Deptt., Min. of Industry, Govt. of India

variety packing ranges from Rs.1.5 to Rs.6 per Kg as indicated below:

Crystal iodised salt in loose	:	Rs.1.50 – 2.00
Powdered/Crushed iodised salt in loose	:	Rs.2.00 - 2.50
Powdered iodised salt in pouches	:	Rs.2.50 - 4.50
Refined iodised salt in pouches	:	Rs.5.50 & above

71. On an average the purchase price of iodised salt at the retailer level is Rs.3.5 per kg. as compared to Rs.1.4 per kg. for loose salt. The average selling price of iodized salt to consumers was Rs.4.3 per kg. as against Rs2.5 per kg. for common salt. The State-wise retail price of salt and the price through PDS is given in Table 14.

Table 14
PDS Selling Price and Retail Price of Salt

Sl. No.	Name of State	PDS Selling Price in Rs.per kg	Retail Price during Dec., 2000 in Rs./kg
1.	Andhra Pradesh	N.A.	3.00 loose 6.50 packed
2.	Arunachal Pradesh	2.60	2.35 loose
3.	Assam	2.00 powdered 3.00 packed	1.99-2.07 loose 2.05-3.15 packed
4.	Bihar		6.50 packed
5.	Goa		4.00 loose 6.00 packed
6.	Gujarat	0.50 (Rs.1.82 subsidy comp.)	
7.	Haryana		N.A.
8.	Himachal Pradesh		7.00 packed
9.	Jammu & Kashmir	N.A.	
10.	Kerala	2.25 crystal salt 4.65 free flow	
11.	Maharashtra	2.90 DPAP areas 1.65 TTDP areas	
12.			
13.	Meghalaya	N.A.	3-3.50 loose 5-7 packed
14.	Mizoram	N.A.	N.A.
15.	Orissa	2.00	
16.	Rajasthan	3.25	6.00 packed
17.	Sikkim	N.A.	
18.	Tamil Nadu	2.50	
19.	Tripura	1.90	3-3.50 loose 5-6 packed
20.	West Bengal	N.A.	2.50 packed
21.	Delhi	2.50 3.50 ref. free flow	6.00 packed
22.	Lakshadweep	2.50	
23.	Pondicherry	N.A.	6.50 loose/packed

The Ninth Plan strategy for prevention of IDD included:

- Production of adequate quantity of iodised salt of appropriate quality.
- Appropriate packaging at the site of production to prevent deterioration in quality of salt during transport and storage.
- Facilities for testing the quality of salt at production level, at retail outlets and household level so that consumers get and use good quality salt.
- IEC to ensure that people consume only good quality iodised salt and
- Reduction in the price differentials between iodised and non-iodised salt through subsidy to people below poverty line, improving ready access to iodised salt through TPDS

72. In the nineties there has been substantial increase in the availability and consumption of iodised salt. A study of 4500 households using the spot testing kits showed that 89% of the households were using iodised salt and as high as 70% of the households were using iodised salt with 15 ppm and more iodine. The consumption was higher in urban areas (78.1%) compared to rural areas (63.3%). The recent NFHS-II Survey showed that only 49% of households use cooking salt that is iodised at a recommended level of 15 ppm or more, about 28% of the households use salt that is not iodised at all and 22% use salt that is inadequately iodised. State-wise use of iodised salt is indicated in Fig. 6. The data shows that in coastal states like Tamil Nadu, Andhra Pradesh, Kerala, and Gujarat, the percentage of households consuming adequate iodised salt is much lower than many of the northern states where availability of iodised salt is more than 90%. One of the reasons could be that the salt transported by road are not subject to any kind of check regarding iodisation and this loophole in the law permits transport of non-iodised salt by road to areas upto 250 kms.

73. The ongoing IEC strategy under IDD control programme is mainly focused on sensitizing producers, traders and wholesalers. At the consumer level the strategy is to educate people regarding need for iodised salt, problems that could arise if iodised salt is not used and proper storage of iodised salt by the households. In addition to mass media campaign, inter personal communication includes home visits, and Mahila Mandal/ Gram Sabha meetings are utilised.

74. The Ministry of Health and Family Welfare is the nodal Ministry for NIDDCP. The Programme is implemented through participational coordination of several Depts. of the Government including Ministry of Health & Family Welfare, Ministry of Industry (Salt Dept.), Ministries of Railway, Education, Food & Civil Supplies etc.

75. Despite significant progress made in the last 15 years, questions were raised about the benefits and safety of iodised salt, effect of this programme on traditional salt

manufacturers, cost of iodised salt etc. A national consultation was held in April 1999 to discuss the cumulative, scientific and epidemiological evidence on benefits and safety of iodised salt in prevention and control of IDD. The consensus statement that emerged from the National Consultation stated that

1. A safe daily intake of iodine has been estimated to be between 50 mcg and 1000mcg. The desirable dietary intake of iodine by an adult is 100-300 mcg/day.
2. Iodine has a wide margin of safety. On the basis of toxicological studies it has been confirmed that potassium iodate is very safe at the level of used in salt iodization.
3. Since iodine, when ingested in large amounts is easily excreted in the urine, iodine intake even at very high levels is safe; normal people exposed to excess iodine remain euthyroid and free of goiter through adaptive mechanism. However, high intakes of dietary iodine may induce hypothyroidism in autoimmune thyroid diseases and may inhibit the effects of thioazide drugs. Iodine induced hyperthyroidism is an adverse effect, which may occur primarily in older people where severely iodine deficient populations increase their iodine intake, even when the total amount is within the usually accepted range of 100-200 mcg/day. Epidemiologically, iodine induced hyperthyroidism represents a transient increase in the incidence of hyperthyroidism which disappears in due course with the correction of iodine deficiency. From a public health point of view, the benefits of correcting iodine deficiency through universal iodisation of salt greatly outweigh the risk of iodine induced hyperthyroidism.
4. The daily intake of upto 1 mg is entirely safe. In India, daily consumption of 10 gms of salt containing 15 parts per million of iodine would add a maximum of only 150 mcg of iodine, the likelihood of exceeding an intake of 1 mg/day is negligible.

Impact of Universal Iodisation of salt

76. A countrywide study of over 14,000 school children to assess the iodine nutritional status and goiter prevalence among them was carried out during 1997-2000. This study showed following widespread availability of iodised salt there was normalization of urinary iodine excretion indicating adequate iodine intake in 95% of the school children with remarkable decline in goitre prevalence from pre salt iodisation levels (Table 5.4.4.12). The most dramatic impact of the programme was seen in those districts/states which were worse affected in the pre salt iodisation phase. Concurrently urine iodisation excretion studies in the same regions showed marked improvements of iodines intake by the people. A small study on comparison of IQ score in iodine deficient area before and after salt iodisation among children below 10 years and 11-14 years showed significant increase in IQ scores after iodisation of salt showing that use of iodised salt is reducing mental and physical developmental retardation (fig. 12 & 13).

Figure-12

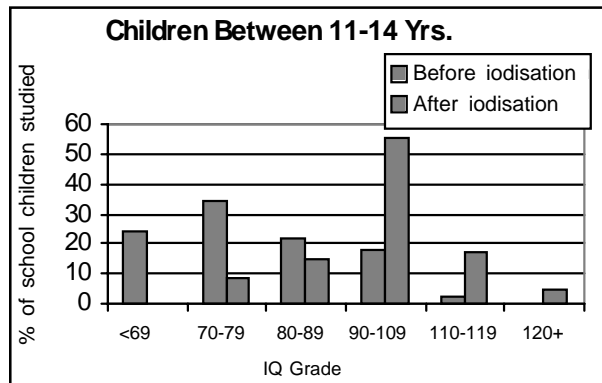
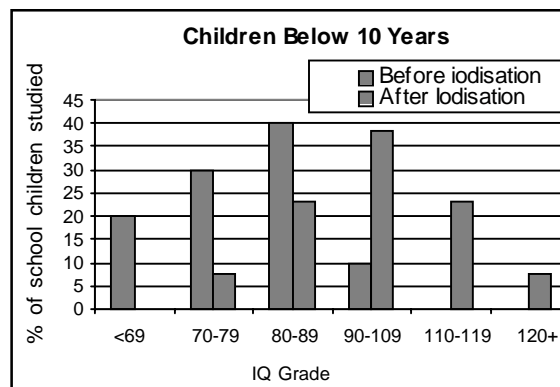


Figure-13



Source: Dr. Manju Mehta, Additional Professor, Psychometry, Deptt. of Psychiatry, AIIMS & Dr. Kochupillai, Prof. & Head of Endocrinology, AIIMS

77. In October 2000, the central government lifted the ban on sale of non-iodised salt for human consumption. So far, at the State level, the ban order has not been with drawn and because of this availability of iodised salt has not declined in many States. However, in May 2001, Government of Orissa has lifted the ban order. If more States follow this practice there might be substantial reduction in the availability and use of iodised salt.

Iron deficiency anaemia:

78. Nutritional anaemia due to iron and folate deficiency is a major global public health problem; India is one of the countries with the highest prevalence of anaemia. Low dietary intake and poor iron and folic acid intake are major factors responsible for high prevalence of anaemia in India. Poor bioavailability of iron in phytate fibre rich Indian diet aggravates the situation. Anaemia due to deficiency of other micronutrients like copper, zinc, pyridoxine and vitamin B12 are rare in India.

79. Various studies conducted by ICMR show that prevalence of anaemia is highest in pregnant women – estimated prevalence range between 50 – 90%. However, these surveys have not been conducted nation wide using appropriate sampling and same methodology; hence they may not provide comparative data on prevalence of anaemia in different states and income groups. The NFHS-2 was the first national survey to undertake measurement of haemoglobin levels of all ever-married women in the age group 15-49 years and their children under three years of age. Prevalence of anaemia in pregnant women was 49.7%, which is substantially lower than earlier reports. This might be partly due to the fact that Haemocue method for estimating haemoglobin, which was used in NFHS Survey, is reported to under estimate prevalence of anaemia.

80. There is very little information on haemoglobin levels in children below 3 years. Data from NFHS-2 indicates that 74% of children in this age group are anaemic. Prevalence of anaemia in women during reproductive age is also high (Fig.14, 15).

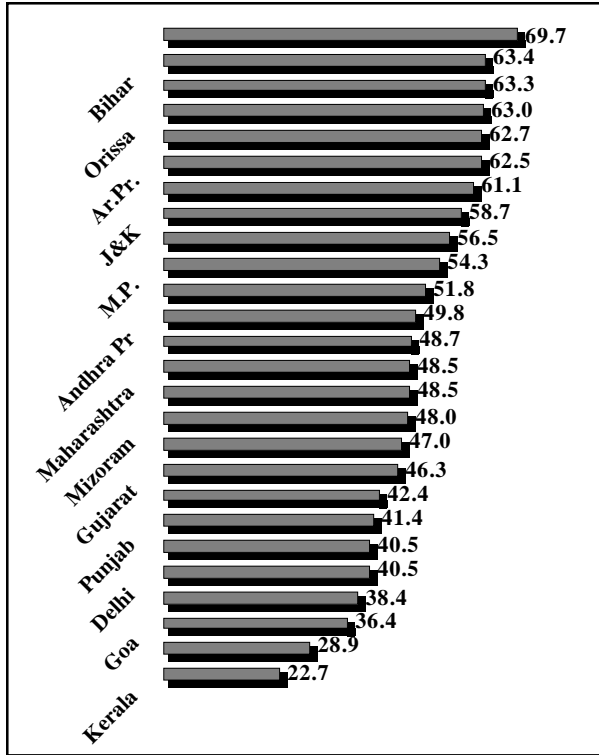


Figure-14: Anaemia among ever married women by State

Source : NFHS 1998-99

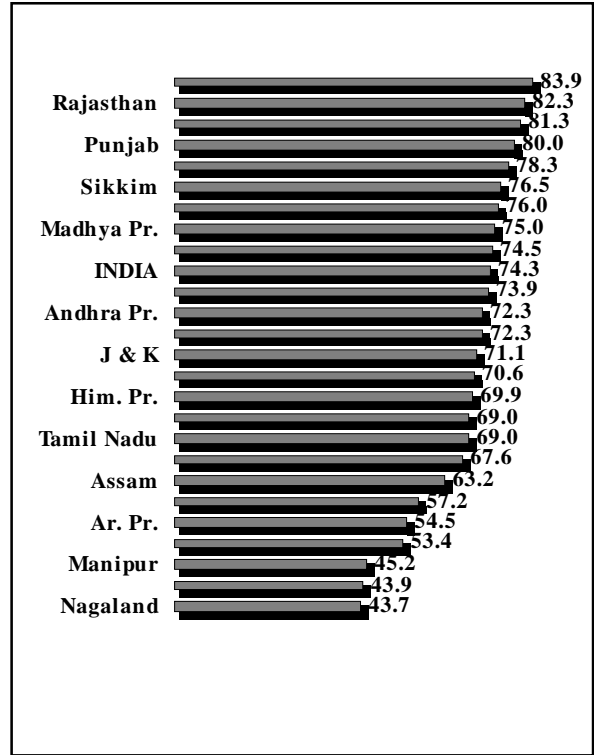
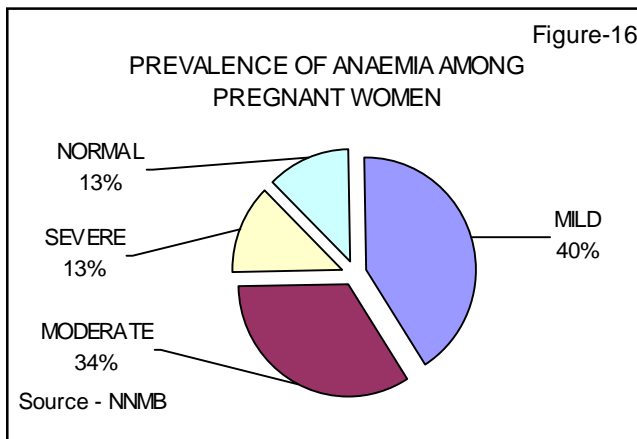


Figure-15: Anaemia among children 6-35 months

81. Data from NFHS –2 indicate that there are substantial variation in prevalence of



anaemia between states and between income groups. Prevalence of anaemia in pregnant women is high and what is more important, the moderate and severe forms of anaemia (<8 gms.% and < 5gms %) associated with adverse obstetric outcomes continue to remain high (Fig.16). There is very little data on prevalence of anaemia in adolescence (especially adolescent girls), men in different age groups and elderly (both men & women).

82. Realising the magnitude of the problem, obstetricians made screening and effective management of anaemia an essential component of antenatal care. The National Anaemia Prophylaxis Programme of iron and folic acid distribution to all pregnant women was initiated in 1972. Available data from hospital records and information from community-based surveys on prevalence of anemia in urban and rural population, suggests that the prevalence and the adverse consequences of anaemia in pregnancy have remained essentially unaltered

over the past three decades. The programme was revamped and renamed as National Nutritional Anaemia Control Programme. NNACP aims to reduce anaemia among women of the reproductive age and pre-school children by providing iron-folate supplements, identifying and treating cases of severe anaemia and promoting the consumption of iron-rich foods.

1. Ninth Plan operational strategy for prevention of Anaemia:

For general Population:

- Fortification of common foods with iron to increase dietary intake of iron and improve haemoglobin status of the entire population including children, adolescent girls and women prior to pregnancy.
- Health and Nutrition education to improve consumption of iron and folate rich foodstuffs such as green leafy vegetables
- Horticultural interventions to improve availability of green leafy vegetables in urban and rural areas at affordable costs throughout the year.

2. Prevention & Management of Anaemia in pregnancy:

- Double fortification of salt with iron and iodine
- Hemoglobin estimation of all pregnant women for detection of anaemia
- Oral iron folate prophylactic therapy for all non-anaemic pregnant women
- Iron folate oral medication at maximum tolerated dose for all pregnant women with Hb 8-11 g/dl
- Intra-muscular (IM) iron for all pregnant women with Hb 5-<8 g/dl
- Hospital admission and intensive personalised care for women with Hb < 5 g/dl
- Promoting utilisation of available facilities for antenatal and intra parterre care

The current intervention is:

- One tablet of Iron and Folic Acid tablets (100 mg elemental iron) to all pregnant women for 100 days,
- Two tablets of Iron and Folic Acid to the pregnant women who show clinical signs of severe anaemia for 100 days.

83. In an effort to ensure that adequate number of tablets are available each Sub Centre receives 30,000 tablet of IFA large every year as part of Drug Kit A. The iron folic acid tablets are also available free of cost in all government health centres. Data from NFHS II showed that coverage under IFA was only 57.6%. The major causes for the unsatisfactory coverage have been identified as irregular supply of drugs and improper storage, poor acceptance by women, poor knowledge of the programme among health functionaries and poor monitoring of the programme in the States. A number of steps have been initiated during the Ninth Plan to improve the situation. The packaging of the tablets has been improved and these are now available in aluminium strip packs. This will take care of the problem of moisture and discoloration of the tablets and also improve acceptability. There is an urgent need to operationalise universal screening for anaemia in pregnancy and initiate appropriate treatment in anemic pregnant women as envisaged in RCH programme.

Vitamin D

84. Vitamin D deficiency leading to rickets in children and osteomalacia in adults especially women had been a well recognized clinical entity in the earlier half of the twentieth century. However, during the second half it was reported that persons living in sunny India do not any longer suffer from Vitamin D deficiency. Studies among Indian emigrants in UK during the eighties documented high prevalence of Vitamin D deficiency especially in the women and neonates. Studies carried out among north Indian population in All India Institute of Medical Sciences, Delhi in the nineties showed that except the one group with lot of exposure to direct sunlight, all others had sub normal concentration of 25(OH) Vit.D₃ (Table 15). Vitamin D₃ level shows seasonal variation with lower levels being recorded in winter.

Table 15: Direct Exposure to Sunlight and 25 (OH) Vitamin D Status

Group	Maximum Exposure (min/day) to Sunlight	25 (OH) D (mol/l)	DTH (intact) (mg/l)	Total Calcium (mol/l)
Soldiers	370+3 ¹	47.17+11.73 ¹	17.6+4.8 ²	2.35+0.17 ¹
Physicians/ Nurses	25+5 ²	7.98+3.49 ³	38.8+18.2 ¹	2.17+0.10 ²
Depigmented Subjects	5+5 ³	18.2+11.23 ²	35.5+12.6 ¹	2.22+0.10 ³

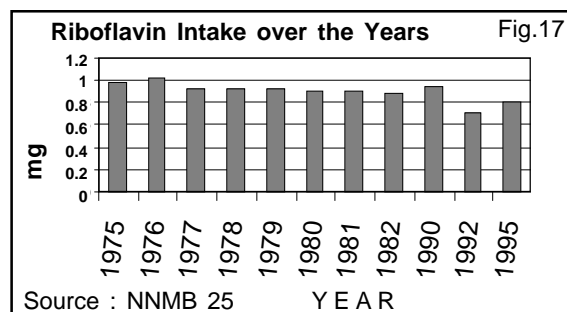
Note: Values are mean + S.D. Values in the same column with different superscript are significantly different of $p < 0.05$

Source: Dr. Kochupillai NFI Bulletin Vol.22 No.1 Jan.2001

85. Vitamin D deficient group tended to have imbalance of bone mineral metabolism homeostasis when exposed to winter weather, low dietary calcium with high phytate content, low calcium and high parathyroid hormone level- all suggestive of sub-clinical osteomalacia. Whether sub-clinical Vit.D deficiency is also prevalent in Southern India has not been explored. In view of the changing lifestyles and indoor living in most population groups in India, it might be worthwhile to undertake studies to find out magnitude if any of Vit.D deficiency and take simple preventive steps to increase exposure to direct sunlight through health education and appropriate change in life style.

Vitamin B Complex and Vitamin C Deficiency

86 Intake of Vitamin B Complex such as riboflavin is far below RDI and has not improved over years (Figure 17). Biochemical evidence of Vitamin B Complex deficiency especially riboflavin and folic acid are widespread among poorer segments of population. Prevalence of clinical signs of Vitamin B Complex deficiency such as glossitis and angular stomatitis are common in poorer



segments of population. Prevalence of clinical signs of deficiency is higher during pregnancy, lactation and childhood, following antibiotic treatment and after infections. There is ample evidence of the importance of these vitamins in normal metabolic processes. Folic acid is essential for erythrocyte maturation and prevention of anaemia. Folic deficiency has been reported to be associated with neural tube defects; folate deficiency and consequent high homocysteine level in blood have been reported to be associated with increased risk of cardio vascular diseases. Riboflavin is important for energy transduction reactions. Riboflavin deficiency might therefore impair optimal utilization of macronutrients for generation of chemical energy. The problem of B12 deficiency in India has not been investigated intensively. In view of largely vegetarian nature of the Indian diet B12 deficiency might perhaps be present but masked by widespread iron and folic acid deficiency. It is generally assumed that Vitamin C intake in India is adequate (Figure 18). However there are substantial losses due to cooking and so the actual availability may be far lower than what is consumed. The extent of Vitamin C deficiency and its possible consequences is not documented in the country. Vit. C and Vit. B Complex deficiencies have not been shown to be associated with severe adverse health consequences and, therefore, these deficiencies have not been investigated as the others (clinicians treat the deficiencies as and when detected). It is important to monitor the extent of these problems and also take up appropriate interventions but there is no specific intervention programme.

