Chapter 4

IRRIGATION, FLOOD CONTROL AND COMMAND AREA DEVELOPMENT

Introduction

The Ninth Year 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 million hectare area (m.ha.), further expansion of irrigation, including additional irrigation through modernisation/renovation of irrigation capacities, is needed as a critical input to achieve the targeted growth rate of agriculture. .

Issues & Imperatives in Irrigation Sector

A. The biggest single malady in major and medium irrigation sector right from First Plan has been the tendency to start more and more new projects resulting in wanton proliferation of projects, thin spreading of resources and consequent time and cost over runs. Table NO. 4 shows the number of projects taken up and completed from Fifth Plan onwards. Prioritisation of projects (within each state) for resource concentration is imperative as also their early completion. .
B. Conjunctive use of ground water and surface water resources need to be planned in the irrigation projects from the beginning. For ongoing projects the conjunctive use could be included now if it has not been planned and States could formulate an action plan formulated accordingly.
C. There is a need to take steps for improving water use efficiency through renovation and modernisation of existing systems (which have deteriorated over the years) and making radical changes in water distribution and field level management policies.
D. There is acute need for reforms in the irrigation sector in the States. Cost of irrigation management needs to be reduced, rates/water charges raised and water use rationalised. Programmes like Accelerated Irrigation Benefit Programme (AIBP) need to be re-oriented to act as instrument of reforms.
E. Institutional finance plays an important role in implementation of Minor Irrigation Schemes. However, the total credit refinanced by National Bank for Agricultural and Rural Development (NABARD) for minor irrigation has decreased from Rs. 795.32 crore in 1995-96 to Rs. 477.91 crore in 1997-98. In addition, the institutional investment being provided under normal programme by Land Development Banks decreased from Rs. 37.29 crore in 1995-96 to Rs. 10.72 crore in 1997-98. This situation needs to be remedied.
F. There is a need for protection and regulation of Ground Water Development particularly in areas where groundwater is getting depleted. Measures should be taken to check its over exploitation. Soil degradation due to irrigation induced waterlogging, salinity and

alkalinity is to be checked . There is need to map water quality and prevent its deterioration due to man-made causes.

G. At present only about 25% of ground water resource has been developed in major eastern States and there is scope to tap the available vast unutilised ground water resource potential in co-terminus areas in Bihar, Orissa, Eastern parts of UP and West Bengal for irrigation. This would, however, require secure supply of electric power in this region.

H. NABARD is providing loan assistance to the States for irrigation schemes under Rural Infrastructural Development Fund. The details (Annexure-12) of releases made for the irrigation sector under different tranches of RIDF (Rural Infrastructure Development Fund) by NABARD show a decline.

I. In the light of the experience gained so far, broad basing of the Command Area Development Programme (CADP) and certain modifications in the programme are under consideration.

J. In spite of the emphasis placed on farmers participation in the management of irrigation, the progress so far in this regard is rather slow. For the success of the programme legal, financial and technical support/ backup is required to be given to water user associations. There is an urgent need for farmers' participation from the initial stages of project development.

K. An area of 40 million ha. is flood prone out of which about 32 m. ha. can be provided with reasonable degree of flood protection . However, at the end of Eighth Plan a total area of 19.02 m. ha. was provided with reasonable flood protection which is about 59.4 % of the total area protectable . There is a need for higher level of funding for flood protection works by the States.

L. The National Water Policy was adopted in 1987. Since then a number of problems and challenges have emerged in the development and management of the water resource sector. The existing water policy needs to be revised .

M. Most of the States at present have very low irrigation water rates and some of the States have not revised these rates for the last 2-3 decades . Even some States do not have water rates. Therefore, the State Governments may revise/levy water rates to reach a level adequate to cover at least operation and maintenance cost of irrigation systems. In addition steps may be taken by them for reducing their establishment costs and improving the collection efficiency of water rates.

N. Water resources are very unevenly distributed over the country. Some regions have abundance while other States suffer from acute scarcity. To meet the essential requirements of regions with acute scarcity, there is need to consider a limited and feasible amount of inter-basin transfer.

O. The construction of big dams in the country has contributed to large areas being submerged and large scale displacement of people from their original habitats. Therefore, a national rehabilitation and resettlement policy needs to be formulated early .

P. Water storages are subject to silting. Sedimentation of reservoirs is a matter of vital concern to all water resources development projects. The problems of sedimentation need careful consideration and there is an urgent need to review the status of reservoir

sedimentation. Project authorities should earmark adequate funds for this purpose as a part of operation and maintenance of reservoirs.

Q. There is need for encouraging private sector participation in the Irrigation Sector.

R. The traditional methods of water harvesting and water storages need to be reviewed. Tanks were very important source of water storage traditionally but have deteriorated or are silted or gone into complete disuse due to negligence. These need to be renovated and reconstructed.

Ninth Plan Strategy For Irrigation Development

2. The overall strategy of irrigation development and management during the Ninth Plan has the following core ingredients:

(a) To improve water use efficiency by progressive reduction in conveyance and application losses;

(b) To bridge the gap between the potential created and its utilisation by strengthening the Command Area Development Programme, institutional reforms and promoting farmers' involvement in irrigation management;

(c) To complete all the ongoing projects, particularly those which were started during pre-Fifth and Fifth Plan periods, in a time bound programme to yield returns on the investments made;

(d) To restore and modernise old irrigation systems which were executed long years ago.

(e) To introduce rational pricing of irrigation water, based initially on O&M (operation and maintenance) cost and then to encourage higher level of water use efficiency;

(f) To take concrete steps towards comprehensive and integrated development of natural water resources, taking into account the possibility of inter-basin transfer of surplus water ;

(g) To promote adaptive research and development to ensure more cost-effective and efficient execution and management of irrigation systems;

(h) To promote Participatory Irrigation Management (PIM) with full involvement of the water user community, which will be at the centre stage of Ninth Plan implementation strategies;

(i) To encourage and implement the conjunctive use of ground and surface waters towards optimal utilisation of water resource and to have its development environmentally sustainable as well; and

(j) To accelerate the development and utilisation of ground water, particularly in the eastern region, on sound technical, environmental and economic considerations along with proper regulatory mechanisms.

Financial Outlays & performance

3. The financial performance in first three years of the Ninth Plan is summarised in the following table.

Table NO. 1
Central Sector

(Rs. Crores)

	9th Plan Outlay	Actual Exp. 1997-98	Actual. Exp. 1998-99	Outlay 1999-2000	Percentage outlay in the First three Years w.r.t. 9th Plan Outlay	
Major & Medium Irrigation	330.12	36.72	49.03	55.80	43	141.55
Minor Irrigation	385.00	42.84	48.29	55.41	38	146.54
Command Area Development	860.00	129.26	174.90	177.00	56	481.16
Flood Control	716.13	67.17	74.57	81.79	31	223.53
Total	2291.25	275.99	346.79	370.00	43	992.78

State Sector

(Rs. Crores)

	9th Plan Outlay	1997-98 Actual Expenditure	1998-99 Revised Outlay	Approved Outlay 1999-2000
Major & Medium Irrigation	42629.22	7523.16	9273.12	12228.81
Minor Irrigation	8977.03	1456.59	1746.81	2117.79
Command Area Development	2032.11	303.43	303.60	315.39
Flood Control	2212.12	351.87	573.21	662.36
Total	55850.48	9635.05	11896.74	15324.35

Major & Medium Irrigation

Plan outlays & expenditure

4. The table given below indicates the outlays and expenditure for major and medium irrigation projects during the Ninth Plan.

Table NO. 2

(Rs. Crores)

Year	Central Sector		State Sector	
	Approved Outlay	**Actual Expenditure**	**Approved Outlay**	**Actual/Ant. Expenditure**
9th Plan	330.12		42629.22	
1997-98	44.69	36.72	8362.91	7523.16
1998-99	50.25	49.03	10024.03	9273.12
1999-2000	55.80	48.12	12228.81	11002.42

5. The ultimate irrigation potential through major and 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. during Ninth Plan. The physical performance is given below:

Table No. 3

(M.Ha.)

Period	Target	Achievement
IX Plan	9.81	
1997-98	1.03	0.66
1998-99	0.88	0.65
1999-2000	0.83	

6. Given the proliferation of projects, the following table shows the number of projects taken up and completed from Fifth Plan.

Table NO. 4

Plan Period	Major		Medium	
	Taken Up	**Completed**	**Taken Up**	**Completed**
Fifth Plan (1974-78)	68	6	303	70
Annual Plans (1978-80)	11	2	55	18
Sixth Plan(1980-85)	31	30	89	138
Seventh Plan (1985-90)	11	14	36	137
Annual Plans(1990-92)	2	7	--	12
Eighth Plan (1992-97)	19	9	72	48
Total	**142**	**68**	**555**	**423**

7. As part of the Ninth Plan strategy, it has been decided to complete the ongoing projects particularly those which were started during pre-Fifth and Fifth Plan period as a time bound programme to yield benefits from the investments already made. As such the State Governments may not take up new projects unless the needs of the ongoing ones are fully met.

The States may draw up an action programme with a fixed time frame not only for expeditious completion of ongoing projects but also for achieving better utilisation from completed projects.

8. At the beginning of Ninth Plan there were 171 major projects with a spillover cost of Rs.60,806 crore , 259 medium projects with a spillover cost of Rs. 5,743 Crore and 72 Extension, Renovation and Modernisation (ERM) projects with a spillover cost of Rs. 9,142 crore. They all added up to Rs. 75,691crore involving an additional irrigation potential of about 16.50 M Ha. State-wise details may be seen in Annexure 5.

Priority for Ongoing Projects

9. There is an urgent need for prioritisation of ongoing and new projects. Suitable guidelines in this regard may be framed for deriving optimum benefits. The desirable attributes of a project for receiving the priority could be (i) advanced stage of construction (ii) efficiency of the remaining part of the project in creating residual benefits at low residual cost, (iii) projects addressing regional imbalances like irrigation inequalities (iv) need for developing benefits for tribal inhabitants in the command (v) drought prone areas (vi) inter state aspects (vii) projects with bulk water supply (viii) projects with no change in scope (ix) formulation and management of Environment/Forest/R&R (Rehabilitation & Resettlement) Action Plan, (x) simultaneous planning and design of secondary canal network (xi) multipurpose projects (xii) submission of revised estimates (xiii) Geological (xiv) design and (xv) quality control infrastructure at field level. In addition to the above attributes, the State Government could provide special weightage for one or two locally important attributes decided by a documented and notified State policy. It is also emphasised that investment may be judiciously phased and examined in depth for each of the ongoing and new schemes.

10. The Planning Commission has recently identified 43 major irrigation projects which were started during the Pre-Fifth Plan period. An exercise has been initiated for their time bound completion. Annexure 6 indicates the funds released under Accelerated Irrigation Benefit Programme for completion these projects. There is an urgent need for prioritisation of projects within each state for resource concentration and early completion.

Conjunctive Use of Ground Water and Surface Water

11. This concept recognises *water as a single natural resource* although the method of exploitation may involve both surface and groundwater structures. Internationally conjuncture management is being viewed as the integrated operation of surface and ground water systems to optimise the availability of water.

12. The National Water Policy 1987 recognises the need for conjunctive use and recommends planning for conjunctive use right at the formulation of project itself. The country can no longer afford to plan to utilise surface and ground water resources almost in isolation from each other.

13. The Ministry of Water Resources took up evaluation studies on 17 project commands which have revealed that the utilisation of ground water in the command area is generally very low and it has not been accounted for in the water budget at the time of project conception and as a result the ground water table has risen in several cases. Under the circumstances there is a need for taking the following steps.

a. At the project preparation stage the conjunctive use of the surface and ground water needs to be planned by the project authorities.

b. In the case of ongoing projects necessary steps should be initiated to include conjunctive use of ground water with surface water. In the case of completed projects, Action Plans may be formulated by States to ensure conjunctive use of groundwater and surface water for the benefit of farmers.

14. Recharge is an important component of groundwater management. The recharge activities being undertaken by the Government and through private initiatives need to be intensified.

Water Use Efficiency

15. Water use efficiency is at present estimated to be only 38% to 40% for canal irrigation and about 60% for ground water irrigation schemes. Being the major water user, the share of irrigation 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 the year 2025 and, as such, the question of improving the present level of water use efficiency in general and for irrigation in particular assumes great significance in water resource planning. With a 10% increase in the present level of water use efficiency, it is estimated, an additional 14 m.ha area can be brought under irrigation from existing irrigation capacities. This would involve a very moderate investment as compared to the investment that would be required to create equivalent potential through new schemes.

Renovation & Modernisation Of Irrigation Projects

16. The effective irrigation area can be increased through timely renovation and modernisation of the irrigation and drainage systems, including reclamation of waterlogged and salinised irrigated lands through low-cost techniques. This 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. Large areas 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 crore to Rs30,000 crore over a period of 20 years. A Water Resource Consolidation Project with World Bank assistance is in progress at present in the States of Haryana (estimated cost - Rs.1,858 crore), Tamil Nadu (Rs.815 crore) and Orissa (Rs.1,409 crore) . Recently, a World Bank-aided Andhra Pradesh Irrigation Project (Phase-III) has been taken up for modernisation/renovation of select

irrigation projects. However, there is a need to take steps for improving water use efficiency through modernisation/renovation of existing systems which have deteriorated over the years. In his 1999-2000 budget speech, the Union Finance Minister proposed larger assistance to States that rationalise their water rates to cover O&M costs., Following it up, a proposal for taking up renovation and modernisation of irrigation systems is under consideration of the Government .

Accelerated Irrigation Benefit Programme (AIBP)

17. AIBP was launched by the Central Government in 1996-97 for expeditious completion of approved ongoing major/medium irrigation projects . Central assistance is given under the programme in the form of loan and is provided to those projects which have investment clearance by the Planning Commission. From 1999-2000, minor irrigation schemes, both new as well as ongoing, are eligible under this programme in case of Special Cateogry States. and Kalahandi-Balangir-Koraput (KBK) districts of Orissa. Further, as per the revised guidelines Central Loan Assistance (CLA) for the projects is provided to the Non Special Category States in the ratio of 2:1 (Centre : State). For Special Category States the funding is in the ratio of 3:1. The projects benefitting KBK districts of Orissa are treated on 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 . In 1997-98 and 1998-99 the releases were Rs.952.19 crore and Rs.1,119.18 crore respectively. During 1999-2000 against a budget provision of Rs.1,600 crore which was reduced to Rs. 1,400 crore in the revised estimates (RE), releases amounting to Rs.1,397.89 crore were made for major and medium projects and Rs. 62.70 crores for 1783 minor irrigation schemes.

18. The State-wise utilization of AIBP funds is indicated in Annexure 7. These figures show some skewness and certain States have not been able to take full benefit of the programme. With this point in view the scope and pattern of funding have been modified during 1999-2000 as mentioned earlier.However, there is a need for reorientation in AIBP to make it act as a vehicle to usher in reforms in irrigation system.

19. Under the 1999 guidelines for Accelerated Irrigation Benefits Programme (1999), major/ medium irrigation projects which are in advanced stage of construction are to be considered for inclusion under this programme except irrigation projects in the initial stages of construction benefiting KBK districts of Orissa . On the basis of available information the following broad conclusions emerge:

Table No. 5

S. NO.	Item	Total	Stage of construction in terms of level of expenditure as % of LEC as on March 1997		
			More than 75%	30% to 75%	Less than 30%
1.	No. of Projects under AIBP	104	24	56	24
2.	Amount Released (Rs. Crores)	3173.52	437.47	1273.91	1462.14
3.	Physical Benefits upto March, 99 (000 hac.)	305.23	58.01	194.99	52.206

20. From the above it can be seen that the share of irrigation projects at advanced stage i.e. having expenditure level more than 75% is just 14% in the total AIBP funds released during the period 1996-2000 . Similarly out of 104 projects now under AIBP only 24 projects are in advanced stage of implementation. Similarly, the share of the projects at advance stage of implementation is less than 20% in total additional irrigation potential as reported to have been created by AIBP funding.

21. There is a need to avoid such distortions in the releases of AIBP funds. Before accepting an irrigation project for AIBP funding, Central Water Commission (CWC) in consultation with the State Governments should thoroughly examine the full portfolio of ongoing projects of the State to identify projects on the basis of their expenditure level as well as the criticality of the stage of implementation in order to fulfil the objective of AIBP to yield bulk benefit with the least investment .

External Assistance for Development of Water Resources

22. Development of water resources in various regions of the country requires large financial investments; external assistance from different funding agencies is required to fill up the resource gap. World Bank continues to be the primary source of external assistance in this sector. The other donors are European Economic Commission, OECF-Japan, Kfw Germany and the Netherlands Government..

23. A brief account of the ongoing schemes with World Bank assistance in various States is as per Annexure 8:

Utilisation of External Assistance

24. During the period 1997-98 to March, 2000 an amount of Rs. 2,386.53 crore has been received from the World Bank , European Economic Community and other bilateral agencies and used in implementation of various externally aided projects in the water sector.

Minor Irrigation

25. All ground water and surface water schemes having culturable command area up to 2000 ha individually are classified as *minor* irrigation schemes. The ultimate irrigation potential from minor irrigation schemes has been assessed as 81.43 m. ha. comprising 17.38 m. ha from surface water schemes and 64.05 m. ha from ground water schemes. Up to the end of the Seventh Plan, the potential created through minor irrigation schemes was 46.6 m. ha. and at the end of Eighth Plan it was estimated at 56.60 m. ha. Hence, the balance potential available at the beginning of Ninth Plan works out to 24.83 m. ha. The target of potential creation during the Ninth Plan has been fixed at 7.24 m. ha. The year-wise potential created and potential utilised during the Ninth Plan is given in the following table.

Table No. 6

(Mill.Ha.)

Year	**Potential Created**		**Potential Utilised**	
	Target	**Achievement**	**Target**	**Achievement**
9th Plan	7.24	-	4.93	-
1997-98	0.54	0.80	0.52	0.73
1998-99	1.61	0.74	0.88	0.73
1999-2000	0.58		0.45	

Plan Outlays and Expenditure

26. The minor irrigation schemes are funded from plan funds , institutional finance and private investments by farmers. The following table indicates the outlays and expenditure for minor irrigation during the Ninth Plan.

Table No. 7

(Rs.Crore)

Year	**Central Sector**		**State Sector**	
	Approved Outlay	**Actual/Ant Exp.**	**Approved Outlay**	**Actual/Ant Exp.**
9th Plan	385.00		8977.03	
1997-98	70.16	42.84	1799.20	1456.59
1998-99	67.00	48.29	2057.20	1746.81
1999-2000	55.41	54.62	2117.79	1769.80

Institutional Investment for Minor Irrigation

27. Institutional finance plays an important role in implementation of Minor Irrigation schemes. The Land Development Banks,. State Cooperative Banks, Commercial Banks and NABARD provide credit facilities to the farmer and institutions for development of minor irrigation facilities. Institutional finance by NABARD for minor irrigation schemes has been decreasing over the last three years. The total credit refinanced by NABARD for minor irrigation has decreased from Rs.795.32 crore in 1995-96 to Rs.477.91 crore in 1997-98. State-wise details are given in Annexure 9. In addition the institutional investment being provided under the normal programme by the Land Development banks/cooperative banks has decreased from Rs.37.29 crores in 1995-96 to Rs. 10.72 crore during the year 1997-98. State-wise details are presented in Annexure 10. In order to find out the reasons for decline in credit disbursement , a meeting was held in July, 1999 in the Ministry of Water Resources. At the meeting it was pointed out by several cooperative banks that the meetings of the Unit Cost Committee set up by NABARD were not held on a regular basis. Since the unit cost has not been revised, the lending for minor irrigation sector has reduced.. It was also pointed out that in many cases the ground water availability report as given by State Government Ground Water Board was not updated and in several cases found to be inaccurate.. A similar Central Ground Water Board operates more than 13,000 observation wells in the country and the Board regularly conducts studies on water availability as well as its behavior in different parts of the country. It was decided, therefore, that the studies by the Central Board be used for the purpose of providing financial assistance to the minor irrigation sector. It was also noted that late approvals by NABARD contributed to delay in granting credit to this sector. There was a general consensus that the eligibility conditions for institutional finance for minor irrigation should be less restricted. There has been a decline in institutional finance due to persisting default by some States as the recovery level is very low in these States. The Ministry of Water Resources is taking steps to remove the above problems and ensuring that the credit disbursement provided by NABARD and State cooperative banks for minor irrigation does not decline.

Ground Water Development and Related Issues

Over-Exploitation of Ground Water

28. Though a localized phenomenon now, over-exploitation of ground water is steadily posing a serious concern in the overall ground water development and management in the country. With rapid expansion in groundwater extraction the number of over-exploited and dark blocks has increased over the years as may be seen from the following Table.

Table No. 8
No. of Overexploited and Dark Blocks.

State	1984-85	1998-99
Andhra Pradesh	0	30
Bihar	14	1
Gujarat	6	26
Haryana	31	51
Karnataka	3	18
Kerala	N.A.	1
Madhya Pradesh	0	3
Maharashtra	----	34
Punjab	64	70
Rajasthan	21	56
Tamil Nadu	61	97
U.P.	53	41
Total	**253**	**428**

29. Although the number has declined in some locations, an overall increase of 51 percent has occurred over a period of seven to eight years. If this rate continues, the number of over-exploited and dark blocks will double every twelve-and –a-half years. This points to the need for protection and regulation of ground water development..

30. The Central Ground Water Board (CGWB) has assessed that there is a feasibility of installing 9.1 million ground water structures (6.4 million dug wells, 2.6 million shallow tube wells and 0.1 million deep tube wells) in the Eastern region of the country. The availability of replenishable ground water potential in this region and the above structures put together can provide irrigation potential of about 20 m.ha. out of which about 14 m.ha. is from shallow and deep tube wells.

31. In Gujarat, pumping depressions due to agriculture greatly affect the availability of water for urban areas such as Gandhinagar. The impact of agricultural pumping on the availability of rural drinking water has also been reported in several cases. A sample survey by the Rajiv Gandhi National Drinking Water Mission in 1994 found that one-third of sample households had experienced seasonal or permanent drops in water level. The decline in water level can affect the domestic water supply even where there is no real threat of overdraft. Fluctuations in the water table, which are due to ground water extraction for agriculture, reduce the reliability of shallow wells as sources of drinking water. Water quality is another major concern. Increases in flouride above acceptable levels in drinking water have for example, been directly correlated with pumping rates and declines and fluctuations in the water level in some places. Similarly, over-exploitation of ground water in coastal area has resulted in seawater ingress in a few cases, Madras for example. In the arid and semi-arid regions of Rajasthan, Punjab, Haryana, Gujarat etc. over-pumping of fresh ground water has resulted in mixing of fresh ground water with saline ground water thereby deteriorating the ground water quality. There is a need to map water quality and phase out its deterioration due to man-made causes.

Regulation of Ground Water Extraction:

32. Central Ground Water Authority was constituted by the Government under the directions of the Supreme Court. The Authority was first set up for a period of one year which was later extended for five years on 13 January 1998 for purposes of regulation and control of ground water development and management. The initial approach of the Authority is to put a major thrust on educating the people on conservation and proper utilisation of water. There is need to encourage Involvement of masses through community participation in the regulation of ground water usage and its augmentation through artificial recharge. Mass awareness programmes are to be launched on a large scale for achieving this goal. However, in areas where the situation is fast deteriorating, further stringent measures are to be adopted to check further depletion/ pollution of the resource. This may include declaration of such areas as 'Notified Area', permission of Authority for installation of new bore wells in 'Notified Areas', prohibition on extraction of ground water for commercial purposes, etc. Central Ground Water Authority declares areas of steady depletion of ground water and areas suffering from ground water contamination as 'Notified Area' for the purpose of restricted usage of ground water.

33. Central Ground Water Authority registers persons/agencies engaged in the construction of wells. More than 900 drilling agencies have been registered so far on an All India basis. The Authority has tested water samples at different locations through its mobile chemical laboratory to re-evaluate the quality of ground water and to identify toxic elements.

34. Groundwater management needs and options vary between areas and change over time. Artificial recharge of acquifer systems is gaining importance as one of the strategies of water management in the context of ever growing demands for water resources CGWB has taken up artificial recharge studies under the Central Sector Scheme in the dark and over exploited blocks. Rainwater harvesting and similar recharging techniques requires to be popularised and implemented with participation of NGOs and water user Associations.

Monitoring and Evaluation

35. A majority of ground water pollution incidents reported in scientific literature were discovered some time after sub-surface contamination began and, in most cases, contamination of water supply wells was the first indication of groundwater pollution problem. In India, the Central Ground Water Board and various state Ground Water Departments are the main agencies monitoring periodic ground water quality from the wells. It would be in the fitness of things if all this enormous data so generated are properly computerised and maps are prepared relating to distribution of various solutes viz-a-viz aquifer geometry, aquifer lithology and other hydraulic parameters for different areas and various periods. This would help identification of type, magnitude and causes of ground water pollution in various parts of the country and would also help in evolving suitable measures for arresting the ground water pollution.

36. In a country like India where more than half the population is dependent on ground water, pollution of ground water is a serious matter. Due to limited cost-effective treatment options for this, the affected resource is generally lost for drinking purposes and other utilities. In order to forecast any ground water pollution threat, studies on ground water pollution need to

be carried out in more industrial, rural and urban areas by establishing ground water pollution monitoring stations. These stations could be established around large industrial and urban establishment in the first phase followed by intensively cultivated areas. Soil deqradation due to irrigation- induced water logging, salinity and allied problems need to be checked.

Water Resource Development for increasing Agricultural Output in Eastern Region

37. The eastern region comprising Bihar, West Bengal, Orissa, parts of eastern Uttar Pradesh and eastern Madhya Pradesh is bestowed with abundance of rainfall, river flows and fertile soils. The ultimate irrigation potential of this region is 52.73 M.ha. roughly about 47% of the entire nation. Surface water is the predominant source of irrigation in this region. The irrigation potential of major and medium projects is 19.66 Mha., while that of minor irrigation projects is 33.07 Mha. including 12 Mha. from groundwater. In spite of the fact that the region is served by several rivers such as the Ganges, Mahanadi, Sharada, Gandak, Kosi and Sone, irrigation has been uncertain and undependable. There is scope – and much need -- for tapping the available vast unlimited ground water resource potential in these States for irrigation; this would, however, require secure supply of electric power in this region. A scheme to harness the available ground water potential in the eastern region for increasing agricultural production is under consideration.

Financial Support For Accelerating Completion of Irrigation Projects: Rural Infrastructure Development Fund

38. A Rural Infrastructure Development Fund (RIDF) was set up in NABARD in 1995-96 with a corpus of Rs. 2,000 crore with contributions by Scheduled Commercial Banks (excluding foreign banks operating in India) to the extent of shortfall in agricultural lending in priority sector targets, subject to a maximum of 1.5% of net bank credit. Under RIDF at present, loan assistance is provided for major , medium and 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 provided up to 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.

39. The following table shows details of sanctions and disbursement under different tranches of RIDF.

Table No. 9

(As on 30.09.99) (Rs. Crores)

			Total		**Major,Medium & Minor Irrgn.**	
	Impl. Period	**Fund Provision**	**Sanctions**	**Disbursements**	**Sanctions**	**Disbursements**
RIDF I (1995-96)	1995-97	2000	1825	1568	1708	1416
RIDF II (1996-97)	1996-99	2500	2610	1610	1231	578
RIDF III (1997-98)	1997-2000	2500	2678	879	941	189
RIDF IV (1998-99)	1998-2001	3000	3135	300	942	14
RIDF (1999-2000)	1999-2002	3500	1280		222	

40. The above table shows that the share of major, medium and minor irrigation schemes -- which was about 90% of the RIDF-I disbursements -- had declined to 36% in RIDF-II. State-wise details are given in Annexure 11. The purpose-wise sanctions under RIDF may be seen in Annexure 12.

41. A meeting was held under the Chairmanship of Deputy Chairman, Planning Commission, to review the RIDF programme. In this meeting, the following decisions were taken to improve the funding:

(a) Environment mitigation costs should be included in the projects
(b) The drawal claims can be submitted by the State Government even on a fortnightly basis as against the present practice of quartely claims.
(c) States must keep a shelf of projects ready for each sanction; these must also be prioritised. Whenever money is available or a new tranche is announced, projects can be sanctioned immediately.
(d) State Governments should take proper care of maintenance aspects which are not given due consideration.

COMMAND AREA DEVELOPMENT PROGRAMME

42. The CAD Programme was launched during 1974-75 as a Centrally Sponsored Scheme with the main objective of improving utilisation of irrigation potential and optimising agricultural production and productivity from the irrigated areas by integrating all functions related to irrigated agriculture. This programme is being implemented in the select commands by the State Governments.

43. In 1974-75, there were only 60 irrigation projects covered under the programme with a Culturable Command Area (CCA) of 15 M.Ha. and by the end of March 1999 , there were 227 such projects covering CCA of 21.95 M.Ha. spread over 23 States and 2 Union Territories .

Physical Performance

44. The physical achievements in respect of core components under the programme are as follows.

Table No. 10

(M.Ha.)

	Field Channels	**Warabandi**	**Land Levelling**	**Field Drains**
Achievement till 3/92	12.20	6.12	1.99	0.59
Achievement during 8th Plan (1992-93 to 1996-97)	1.76	2.52	0.11	0.19
Achievement 1997-98	0.32	0.42	0.01	0.03
Achievement during 1998-99	0.32	0.34	0.02	0.06
Achievement 1999-2000	0.14	0.10	0.01	0.01
Cumulative upto March, 2000	14.74	9.50	2.14	0.88

45. The physical progress has been slow in the case of Warabandi, construction of field drains and levelling. There is a need for coordinated approach and speed up progress for optimum benefits under the programme. Certain modifications in CADP are under consideration.

Plan Outlays & Expenditure

46. 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 No. 11

(Rs. Crore)

Year	**Central Sector**		**State Sector**	
	Approved Outlay	**Actual/Ant. Expenditure**	**Approved Outlay**	**Actual/Ant. Expenditure**
9th Plan	860		2032.11	
1997-98	140.00	129.96	371.35	303.43
1998-99	187.00	174.90	348.48	303.60
1999-2000	177.00	165.30	315.39	312.13

Participatory Irrigation Management:

47. The performance of the irrigation sector has not matched the expectations, be it in terms of pace of development, use of facilities and their impact on productivity of land. A number of problems have been associated with major and medium surface irrigation projects. The ones which deserve mention are inordinate delays in completion and cost escalation, under-utilisation of the created irrigation potential, low cost recovery and sustainability of such projects. The under-utilisation of irrigation potential and sustainability of the projects are threatened mainly by virtual non-maintenance of irrigation structures because of meagre funds. The answer to the problem is being found in participatory irrigation management (PIM), particularly at the level of Government of India. During the last two decades, the PIM concept in India has passed through three distinct phases. Starting from around 1975 and for about a decade until 1985, the emphasis was on creating outlet- based water user organisations and later on an equitable distribution of water among the irrigators, maintenance of water conveyance, micro structures and resolution of conflicts amongst the water users. . As a result, the government's strategy for CAD -- from the start -- included farmer organisations as necessary entity to run the micro-system. During the second phase (1985-90), the emphasis shifted to experimentation with PIM. Therefore, a number of pilot projects were started and developed all over the country. Ministry of Water Resources, Government of India, World Bank and USAID aided and assisted in the establishments of those pilots while Non Governmental Organisations (NGOs) played a catalytic role in mobilising farmers and sustaining the pilots. The third phase starting from early 1990s has seen the emergence and propagation of the idea of hand over/turnover of irrigation systems in case of smaller systems and hand over of management of sub-systems in case of larger systems to the irrigating farmers. The progress achieved so far in PIM is rather slow . The relevant details are given in Annexure 13. The irrigated area transferred to Water Users Associations (WUAs) in India is about 7% as against 45% in Indonesia, 51% in Mexico, 66% in Philippines, 22% in Thailand, 35% in Turkey and 19% in Sri Lanka.

48. A number studies on PIM were carried out by various research institutes through funding provided by the Government of India and Ford Foundation as well as by other external funding agencies. These studies have shown that the success of PIM depends upon factors listed out below: -

(i) Critical Necessity of Canal Water for comfortable living and even for survival of the farmers.

(ii) The right kind of local leadership is the second most important pre -requisite for the success of WUAs.

(iii) A number of studies indicate that incentives must be built around PIM if the programme has to succeed at least in the initial stage. Amongst other incentives which could be considered are: Giving some concession say 5% to WUAs on timely payment of water charges; , WUAs are provided water on a volumetric basis which comes much cheaper to water calculated on area basis and the freedom to WUAs to decide the crop pattern. Further, the first priority should be

given to WUA- managed commands for rehabilitation of the irrigation sub-system to its designed level or at least to a workable operation level.

(iv) Close Involvement of the Irrigation Department (ID) Officials with WUAs

(v) Assistance from NGO or from Others

(vi) Memorandum Of Understanding(MOU) between State Departments and WUAs.

There should be a formal instrument in the form of Memorandum of Understanding (MOU) in order explicitly to specify the nature and details of responsibilities as well as functions on the part of the State Irrigation Department/State agency concerned and Water User Associations.

(i) ***Absence of a Policy Statement***

The WUAs can sustain only if they receive continued technical assistance and co-operation from the officials' side until they are self-sufficient. In the initial stage WUAs need assistance for registration, accounting system and development of internal structures which are conducive to high level participation. On the contrary, the irrigation bureaucracy works in a set mindset. The officials think it is not their work and an extra and unnecessary job has been imposed on them. Further, they are also not trained in this respect to appreciate this kind of work. They take up the work under the compulsion of targets. Further, the commitment and priority of higher ups for this kind of work go on changing. Thus, in the absence of a clear-cut policy backed by a commitment to fulfil a time bound action plan, ad hocism is the reigning principle.

(ii) Undue Delay in Completing Preliminary Requirements

The stage of PIM comes after preliminary requirements are fulfilled. These include registration of WUA, joint inspection of the system, identifying operational deficiencies in the system, signing of MOU and hydraulic testing of the system. As found from some case studies in Maharashtra, registration requires as per the Act two months time, but it takes several months, even years.

Once registration is over, the joint inspection is not carried out in time and it gets delayed unnecessarily. Views of representations of WUAs are not incorporated in the joint inspection report on the ground they are non-technical. Estimates of rehabilitatation works in many cases are not shown to the WUA representatives and work costs are inflated. Execution of the work is not done properly particularly of the embankments and masonry structures. Finally, a hydraulic testing which is mandated by the agreement is not done before handing over the system to the WUA.

(iii) ***Delay in Rehabilitation works***

The main obstacle to PIM is the rehabilitation of the minor system, which lags far behind due to non-availability of funds. The WUAs have to often take over the systems even though the rehabilitation work is incomplete.

(iv) ***Lack of Transparency***

One of the biggest impediments in PIM programme is the lack of openness in preparation of estimates and the execution of work.

(v) Training

The scale of training needs to be hiked up at two levels: one at the level of the irrigation bureaucracy and the other of WUAs to cover farmers and WUA functionaries. Formal and informal training should help in capacity building of concerned officers and field staff of the Irrigation Department and of farmers and office bearers of WUA to form and run the WUAs smoothly and profitably.

(vi) Monitoring and Evaluation

In the sphere of minor and medium irrigation projects, which are tightly controlled and regulated in all respects like water allotment, distribution, fee collection and cropping pattern by departmental procedures, any steps towards PIM are fraught with all kinds of hurdles. It should, therefore, be necessary that the progress is closely monitored and impact duly evaluated.

Steps to Promote PIM:

50. In 1997 the Government of Andhra Pradesh enacted an A.P. Farmers' Management of Irrigation System Act under which election to more than ten thousand WUAs has already been held. The State Government has been providing technical and financial help to these associations. It has decided to extend the implementation of PIM to all commands in a move designed to increase efficiency of irrigation , expand the irrigated area, raise agricultural productivity and step up production in the irrigated commands. In Bihar, the State Government announced an Irrigation Policy in 1993 which provides for farmers organisations to take over management of irrigation system. Government of Goa has also amended its CAD Act to provide for the establishment of WUAs. Government of Gujarat has taken up l3 pilot projects to study the modalities of implementation of PIM; it has also issued instructions to accord priority to cases of construction and rehabilitation where farmers are ready to form Associations and share part of the costs. The Government of Haryana has agreed to implement PIM in the Water Resources Consolidation Project. In Kerala PIM has been implemented in projects under CADP. A high level group under the Chairmanship of Chief Secretary was constituted by the Himachal Pradesh Government for effective implementation of PIM. In Karnataka, PIM is being implemented in five CADs. The Government of Orissa has initiated PIM in the projects taken up for modernisation under Water Resources Consolidation Projects. In similar measures, the Government of Madhya Pradesh passed the MP Sinchai Prahandhan Main Krishikon Ki Bhagidari Act 1999 while the State of Tamil Nadu brought a Bill in the Legislative Assembly called Tamil Nadu Farmers Management of Irrigation System Bill, 1999.

51. The Union Government has taken several initiatives for expanding the PIM. These, inter-alia, include a National Conference on PIM which adopted a plan of action envisaging conferences at State level for creation of awareness and understanding of issues, initiation of measures for legal changes necessary to implement PIM, preparation of manuals, training of farmers/officials etc. As a follow-up, State/Regional-level conferences were held. Training programmes are conducted on PIM at the National level for officers and at State level for officers and farmers. Work on the preparation of manuals for PIM in regional languages has been initiated. The Ministry has requested State Governments to set up a high level group under Chief Secretary to prepare policy guidelines for implementing the PIM. The Governments of Gujarat , Himachal Pradesh, Karnataka, Kerala, Orissa, Rajasthan, Tamil Nadu and Uttar Pradesh have already set up such groups.

52. The Indian Network on PIM (India NPIM) has been set up as a registered society, with the objective of promoting PIM through dissemination of ideas and information, initiating policy dialogue on PIM, organising training, creating data base and a library of literature on the subject and publishing literature including a newsletter.

Evaluation of CAD Programme

53. To evalute system performance to cover water availability , water delivery and water use and project infrastructure, the Ministry of Water Resources carried out a comprehensive study of impact of CAD activities on 10 projects in 1997. The main findings of these studies are as under:

Construction of Field Channel

- The quality of construction of field channels was found to be generally good but the progress has been found to be slow.
- The major impediments in speedy construction were short period of survey and construction and inadequate funding and attention by State Governments.
- At the current average rate of execution it may take another 21 years to complete the balance work of construction for projects included under the programme.

Construction of Field Drains

- Field drains are being constructed for draining excess water from the fields.
- Construction of field drains till the initial part of Seventh Plan was helped by financial institutions and thereafter the Centre and States provided for 50% grant and 50% loan, with equal share to each. was made equally by Centre and States was made.
- During the Eighth Plan, a 100% grant was made admissible on matching basis to States.
- Maharashtra and Uttar Pradesh have done good work under this activity

Construction of Land Levelling and Shaping

- Major progress has been made in Andhra Pradesh, Gujarat, Karnataka, Maharashtra and Rajasthan. In Chambal, Kota(Rajasthan) , this activity has been taken up as a part of on-farm development works with good results.

- Since the need for taking up this activity is based on certain parameters such as land slope, soil depth, reliability in availability of irrigation water and cost of land levelling , this activity may be kept at a low key.

Realignment of Field Boundaries and Consolidation of holdings:

- These activities considerably improve the effectiveness of OFD works and they are doing well in Chambal project, Rajasthan, and in the projects of Orissa. In other States this has not picked up due to lack of completed land records and for other reasons.
- The entire process of realignment of field boundaries and consolidation of holdings and land levelling should be taken up as a single package.

Enforcement of Warabandi

- It has helped in equitable distribution of water among farmers and in improving utilisation of irrigation potential as well as agricultural productivity.

Extension Services Support

- Irrigation facilities have triggered interest and need to switch over to more remunerative, high value crops in the irrigated commands.
- To help farmers in this area, Extension Service Support has been considered very important.

Selection and Introduction of Suitable Cropping Pattern

- Suitable cropping pattern and improved varieties of crops having better water efficiency have been introduced in many irrigation projects replacing non-remunerative crops.
- In some projects, high water use crops like paddy, sugarcane have been introduced in head reaches, and these create the problem of waterlogging on one hand and deprive tail- enders of water on the other hand.

Conjunctive use of Surface and Ground Water

- Ground water development works out to 55% on area basis (32% on volumetric basis) compared to the total irrigation potential created till 1993 (35.4 m.ha.).
- Major constraints for slow pace of ground water development includes small and fragmented holdings, poor economic status of the farmers, cumbersome institutional financial support and poor supply of electricity and diesel to operate pumps and perceived inadequate subsidy to farmers.

Modernisation, Maintenance and Efficient Operation of the Irrigation System Upto One Cusec Outlet

- To ensure the reliability of water supply at the outlet at a predetermined time and space proper upkeep and operation of the system has been recognised as essential.
- For achieving efficiency in irrigation, emphasis have to be given on maintenance of the system.

Bridging the Gap between irrigation potential creation and utilisation

- Utilisation of Irrigation potential increased from 76.5% to 80.2% in the irrigated commands from 1974-75 to 1994-95.
- The improvement in the percentage utilisation has been better where field channels have been constructed .

Increase in Agriculture productivity and production

- Out of the data available for 34 projects (15 crops), it has been reported that the productivity increased from 2% to 5% per annum. for 29 project (13 crops) of 3 years and above,

Increase in income of farmers

- On account of various sizes of holdings, cropping pattern being followed and irrigation intensity being achieved, it has been found difficult to find out the exact increase in the income of farmers.

Increase in the irrigation intensity

- The data analysed during the study of 4 projects reveals that irrigation intensity has increased considerably.

Overall Impact of the CADP in relation to defined Objectives of the Programme

- It has been inferred that there has been an impact of CADP implementation on the achievement of the programme objectives.

FLOOD CONTROL

Flood Management

54. The extent of country's flood prone area has been assessed by the Rashtriya Barh Ayog, at 40 m.ha out of a geographical area of 328 M. Ha.. About 32 m.ha of flood prone areas can be provided with a reasonable degree of flood protection by various measures. A National Programme of Flood Management was launched in 1954. It was estimated that an area of 14.37 m.ha. was covered at the beginning of Eighth Plan through various flood management measures. During the Eighth Plan an additional area of 1.82 m.ha was estimated to have benefited. against a (revised) target of 1.36 m.ha. At the end of Eighth Plan, then, a total area of 19.2 m.ha. (including 3 M.ha. before 1954) was provided with reasonable flood protection -- about 59.4% of the total area protectable in the country.

55. The table given below indicates outlays and expenditure in flood control programmes during the Ninth Plan .

Table NO. 12

(Rs. Crores)

Year	Central Sector		State Sector	
	Approved Outlay	**Actual/Ant. Expenditure**	**Approved Outlay**	**Actual/Ant. Expenditure**
9th Plan	716.13		2212.12	
1997-98	86.15	67.17	363.86	351.87
1998-99	91.75	74.57	639.94	570.58
1999-2000	81.79	83.48	662.36	559.03

Flood Forecasting and Warning and Dissemination of Forecasts

56. Flood forecasting and prior warning to flood prone areas are among the most important and cost-effective measures for flood management. The Central Water Commission has set up 157 flood forecasting stations, covering 62 river basins in the country. The forecasting network needs to be extended to the remaining flood-prone rivers, ensuring close coordination and effective participation of India Meteorology Department (IMD), National Remote Sensing Agency (NRSA) and Indian Space Research Organisation (ISRO). Also, existing arrangements need to be strengthened to reach out the forecasts to the people in advance of an impending calamity. The flood forecasts are normally issued 24 hours to 48 hours in advance so as to give sufficient time to the concerned departmental authorities for dissemination of information, and providing relief and rescue measures to people, as well as for protecting important engineering works/structures. But much more is required to be done to improve the hydro meteorological networks, automation in data communication, accurate forewarnings and instant dissemination of forewarnings, and modernisation of the forecasting system for automatic data acquisition and transmission through VHF and satellite. A flood forecasting model MIKE II has been developed for water level forecasting and flood management technique on a real- time basis and the model is in operation in Damodar Catchment covering the system reservoirs Yamuna and Upper and Lower Godavari Basins. The experience gathered from these works would be helpful for similar application in other basins.

Flood Plain Zoning

57. Keeping in view the need for adopting non structural measures like regulation of economic and human activities in the flood plains, a model bill was circulated in 1975 to all the States for its enactment. So far, only the Government of Manipur has enacted such a law.

River Morphological Studies

58. An Atlas of Eastern Rivers for taking up Morphological studies is being prepared by Central Water Commission since 1992. Morphological studies of Brahmaputra and Barak rivers have been completed and such studies are in progress in the river Ganga (from Allahabad to its confluence of Ghagra) and in rivers Krishna and Narmada.

Centrally Sponsored Schemes

59. The following Central Sector/Centrally Sponsored Schemes for mitigating flood/erosion problems in the country are under formulation.

(a) Pagladiya Dam Project in Assam

(b) Flood Control in Brahmaputra-Barak Valley

(c) Critical Anti-Erosion waters in the Ganga basin states including maintenance of flood protection works on Kosi and Gandak rivers in Bihar.

National Water Policy

60. A National Water Policy was adopted by National Water Resources Council of India in 1987 . Since then, a number of problems and challenges have emerged in the development and management of the Water Resources sector . The National Agenda for Governance provides for adoption of a National Water Policy for effective and prompt settlement of disputes and their time bound implementation.

61. The existing Water Policy needs to be revised in the light of problems and emerging challenges and also keeping in view the experiences of around last ten years of its implementation. Accordingly the National Water Board, at its meeting held on 29.10.98, considered the proposals for changes in the policy and finalised the draft National Water Policy, 1998 which would be placed before the National Water Resources Council for its consideration and adoption.

Water Pricing

62. 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, 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.

63. The Planning Commission had set up a Water Pricing Committee popularly known as Vaidyanathan Committee . Subsequently a Group of Officials was constituted by the Commission to consider the recommendations made by the above Committee. This Group unanimously recommended that full O&M (operation and maintenance)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. Subsequently, 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 recommendations also included the setting up of Irrigation and Water Pricing Boards by all the States and a mandatory revision of water rates -- at least every 5 years -- with an opportunity for users to present their views. 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. During Ninth Plan, all States would need to to implement the recommendations in a first phase of implementing the Water Pricing Committee's Report.

64. Most States at present have very low irrigation water rates at substantially varying levels and some of them have not revised these for the last two to three 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 a 5-years period at a time with a provision for 10% annual hike so as to cover the full O&M cost as well as interest payable on the public deposits raised through irrigation bonds. Also, State Governments of Andhra Pradesh, Madhya Pradesh, Rajasthan , Haryana and Orissa revised the water rates recently.

65. During the meetings of the Working Group to discuss the Annual Plan 1999-2000 and 2000-2001 the State governments have been requested to revise the water rates at least to a level adequate to cover the O&M expenses. They have also been advised to cut down the establishment cost and to improve the collection efficiency of the Water rates.

Integrated Planning of River Basin Systems and Management

66. River basin development initially denoted primarily construction of smaller projects and development of water resources for immediate needs and objectives. In course of time, however, the concept came to be recognized to mean an integrated development through construction of large projects involving coordinated and harmonious development of various component system units in relation to all reasonable possibilities in a river basin,. Lately , the concept has changed to the comprehensive development of the river basin for general welfare of the people, aiming at development of total water resources alongside development of land, minerals industry and trade. Concern is also being expressed for environmental quality and social betterment. Water resources river basin systems are elaborate and complex systems and formed through combinations of a large number of system units; they include storage, diversion, regulation, and conveyance and specific facilities. All these serve a variety of purposes which may be complementary or competitive and meet the water demands of the people for their general welfare. As water resources are limited, these are to be conserved and allocated among a variety of uses to meet the projected demands in the best possible manner. Emphasis may be placed on economic use and conservation of resources such that maximum benefit is derived from each unit of water resource. Modern techniques of system approach and use of computer in planning and management of river basin development need to be applied on an increasing scale for the purpose. Management planning studies are needed at the planning stage and operation stage in order to obtain fuller benefits from them. These studies may have a number of components such as appraisal of water resources, projections of water demands, integration of supply and demand, planning of crop patterns, integrated operation of the complex channel systems and overall river basin system development.

67. For the planned development of river basins as a whole, a River Boards Act was passed by Parliament in 1956 for preparation of water resources development schemes and for advising the States on the regulation and other aspects. River Basin Development and Management involves issues of multi-disciplinary nature. Successful water management requires legislation and regulation to prevent human activity from degrading the natural heritage. Any degradation or unauthorised activity has to be the subjected to fines and fees payable by the users and the polluters. The entire basin has to be integrated in the management functions including the whole of watershed, the banks, the valley and the basin, each being dependent upon the other. For such an integration to be successful, people's participation in the whole process is very crucial. The Central Government had constituted a High Power Commission in September 1996 to formulate an Integrated Water Resources Development Plan, taking a holistic view of the overall water resources in the country and how to maximise the availability and its utilisation including consideration of inter-basin transfers. The report of the Commission has been submitted and its recommendations are being processed by the Ministry of Water Resources (MOWR).

Rehabilitation and Resettlement

68. Systematic irrigation development and construction of big dams in the country have caused land to be submerged and led to large-scale displacement of people from their original habitat. Almost half of the displaced persons are tribals who have least resources, experience, and temperament to negotiate their lives after displacement. Due to the submergence of areas the project-affected persons (PAPs) face numerous problems.

69. There are no reliable statistics with break-up of social and economic classification of the people displaced by each of large projects since Independence. Many researchers place their estimates at between 10 million and 25 million. The implementation of R&R programmes for the Project Affected Families (PAF) have thrown up the following important issues which need consideration.

i) Prior Consultation and information to Project Affected Persons

ii) Need for National Rehabilitation Policy

iii) Provision for Land from Command area to those who bore land in the catchment area.

iv) Availability of basic infrastructural facilities like health, education etc at relocation cites.

v) Policies to take into account specific problems of most vulnerable sections of the displaced including tribals.

70. The Central Government is in the process of formulating a new national R&R policy. The draft NRR 1998 was prepared and widely debated by the Government. The R&R policy will seek to minimise the trauma of displacement on account of compulsory acquisition of land,

and establish statutory minimum standards for packages and benefits to ensure that displaced persons are better off as a result of the project.

71. There is also a need for comprehensive, initial benchmark studies to establish the numbers and categories of those displaced. These studies should also document the pre-project living standards of the various categories of displaced persons,so as to be able to monitor and assess the success of R&R against the guiding premise that the affected populations should be better off as a result of the project.

72. The project designers should try for rehabilitation of displaced persons in the command area and the beneficiaries must make sacrifice by sparing part of their lands for this purpose. The process of decision-making on these projects also needs to be made more open so that the public at large and, in particular, those directly affected can have access to more information about the assumptions and calculations on which a project is judged by the authorities to be technically and economically viable. This will help the people satisfy themselves that sufficient safeguards have been built into the project to take reasonable care of those who are affected by the projects and also of the potential adverse ecological consequences flowing from the construction of the project and its operation. The people will also get an opportunity to place their objections and concerns before the concerned authorities along with concrete suggestions for alternative, cheaper/safer ways of achieving objectives which the project is supposed to serve.

Impact of Siltation on Life of Large Reservoirs

73. Uncontrolled deforestation, forest-fires, over-grazing, improper methods of tillage, unwise agricultural practices and other activities are responsible for accelerated soil erosion. It has been estimated that about 6 billion tonnes of soil are eroded every year from about 80 million ha. of cultivable lands, thereby causing a loss of 8.4 million tons of nutrients. If this nutrient loss is to be compensated by application of chemical fertilizers; a huge investment would be needed. Further, according to some studies, it is estimated that 2.2 billion tonnes of sediments is transported each year by the Ganga-Brahmaputra river systems into the Bay of Bengal. Central Water Commission (1991) found from an analysis of capacity survey data of 46 reservoirs in India that there was a wide variability in sedimentation rate of those reservoirs. The sedimentation rate is affected by multiple factors like hydrometeorology, physiography, climate etc. Considering these factors the whole country has been classified into seven regions. The sedimentation rates in reservoirs region-wise are given below : -

Table NO. 13
Region wise Sedimentation Rate in Reservoirs

Sl.No	Region	Sedimentation rate Ha m/100 km2/year
1.	Himalayan region (Indus, Ganga, Brahmputrta region)	Varies from 5.658 to 27.85
2.	Indo Gangetic Plateau	Varies from 0.3 to 16.3
3.	East flowing rivers excluding Ganga upto Godavari	6.08 in case of Hirakud Reservoir
4.	Deccan Peninsular east-flowing rivers Including Godavari	Varies from 0.15 – 12.16
5.	West flowing rivers upto Narmada	-
6.	Narmada Tapti Basin	Varies from 3.64 – 7.16
7.	West flowing rivers	Varies from 0.96 – 25.4

74. During the last four decades India has constructed several major/medium river valley projects involving construction of dams and creation of reservoirs for flood controls, irrigation and hydropower. As the storages are subject to silting, sedimentation of reservoirs is a matter of vital concern to all water resources development projects. Silting not only occurs in the dead storage but also encroaches into the live storage capacity which impairs the intended benefits from the reservoirs. Therefore, the problem of sedimentation needs careful consideration and there is an urgent need to review the status of reservoir sedimentation.

Review of Reservoir Performance and Economic Life

75. The dead storage provided in reservoir capacity is allowed for sedimentation. Actually all the sediment load does not go in dead storage. It encroaches upon live storage also. The encroachment and its distribution depend upon many factors such as reservoir operation, valley characteristics, capacity inflow ratio and sediment content in the inflow etc. For a reservoir, its *Useful Life* is reckoned till its capacity is reduced to about 20% of the designed capacity. The rate of silting in some select reservoirs in the country and its effect in term of loss of storage capacity is shown in Annexure 14.

76. When sedimentation encroaches on live storage, it gradually reduces the capacity and tends in course of time to interfere with the operation and makes it uneconomic. It is, therefore, necessary to make an economic review of each project during the years of operation and particularly in those projects where sedimentation rate has proved much higher than what was estimated earlier at the time of project design. Such a review is necessary to ascertain the period when the project may prove economically inefficient. Further, such studies are also required for ascertaining the need for change in the system operation and in the interest of future overall project planning for the country. Also, for better operation and management of existing reservoirs, it is imperative to conduct hydrographic surveys at regular intervals. At present, such capacity surveys of reservoirs are generally being conducted using conventional methods and

equipment. There is need to introduce high technology i.e. HYDAC system, remote sensing in conducting these surveys to save time and obtain more reliable periodic data. These data will be useful in realistic assessment of sediment load and, thus, of the available live reservoir capacity besides helping better sedimentation planning of future reservoirs. The project authorities should earmark adequate funds for this purpose as a part of operation and maintenance of reservoirs and should furnish the survey data regularly to the Central Water Commission for compilation, and analysis and to bring out a compendium every five years or so.

Private Sector Participation

77. Some states like Maharashtra, Madhya Pradesh and Andhra Pradesh have initiated action for privatisation of irrigation projects. The proposed privatisation is on the basis of Build-Own-Operate (BOO) mode, , or Build-Own-Operate-Transfer (BOOT) or Build-Own-Lease (BOL) basis. In the case of projects on BOO basis, the Irrigation Department may buy water in bulk from the agency at mutually agreed price for distribution to the farmers. Apart from this, funds have been raised by public bonds from private market by Mahrashtra Krishna Valley Development Corporation (MKVDC) of Krishna Valley Projects, Sardar Sarovar Narmada Nirman Limited (SSNNL) of Sardar Sarovar Projects in Gujarat and Jal Bhagya Nigam for Upper Krishna Projects, Karnataka.

78. A High Level Committee was constituted in 1995 to examine the feasibility and scope of private sector participation in irrigation and multi-purpose projects. The Committee in its report submitted in December 1995, concluded that private sector participation is feasible in respect of all irrigation (surface and ground water) and multi-purpose projects but it would be desirable to introduce this on a pilot basis. The recommendations of the Committee have been sent to the States for follow- up action.

Tank Irrigation in India

79. Construction of small and big tanks for irrigation has been taken up in the country since ancient times. Tanks are more useful in storing the rain water and conserving it for further use. In Drought Prone Areas, their utility and necessity is manifold. They also help in preserving the environment and ecology of the region. Under the present policy of the Government a big thrust is to be given to this programme.

80. As per Minor Irrigation Census (1987), there were about 5 lakh tanks in various States. The States of Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra had a greater density. While in 1962-63, the area under tank irrigation reached an all time high of 47.8 lakh ha., it came down to 30.71 lakh ha. in 1985-86 in spite of thousands of new tanks added during this period. It clearly indicates that the up-keep of the tanks has been neglected and their capacity due to siltation. Several tanks have completely dried up. Fore shore areas have been encroached by urbanization. In the last 25 years, about 17 lakh hectare of net area has been lost under tank irrigation.

81. Next to lift irrigation through wells which are, of course, individually owned, tank irrigation offers the simple source that could be easily and economically maintained by the Government jointly with the beneficiaries for substantial benefits to the agricultural sector. Also the tank irrigation system is of special significance in the rural sector as the poor in large numbers dependent it.

82. Partly due to ageing over centuries and partly to inadequate and indifferent maintenance, the tank systems have gone into bad repair and require special attention. Common features which impair efficient irrigation may be listed as follows.

(a) Inadequate flows into the tank

(b) Weak bunds susceptible for frequent breaches

(c) Leaky sluices with poor controlling devices

(d) Silting up of the tank bed over a long time

(e) Poorly maintained irrigation channels and

(f) Absence of on-farm works below the outlets.

83. There is thus a lot left to be desired not only in the up- keep and maintenance of physical tank system but also in the water regulation. Though farmers have taken up high yielding varieties and other modern techniques of farming, they are still poorly informed in respect of water use and water regulation and have not paid much attention to this.. This is perhaps because it requires joint management, part of the system being under the care of the Governmental agencies and part under their own care. Rehabilitation and modernisation of tanks is to be given greater importance. The programme deserves top priority to regain the lost irrigation potential of 17 lakh hectare in the shortest possible time,. It needs to be planned on watershed basis taking into account the comparative techno-economic feasibility of renovating an existing tank vis-à-vis construction of supplementary tanks upstream and downstream. Modernisation of the existing tank could go a long way to utilise the already developed irrigation potential with greater efficiency.

Assistance from the European Economic Community

SN	Name of the Project	State	Date of Commencement	Date of Completion	Amount of Assistance (in ECU Million.)	Utilisation of Assistance (upto 31.12.98)
1	Tank Irrigation System (Ph. II) in Tamilnadu	Tamil Nadu	24.07.89	31.12.99	24.5	19.787
2	Kerala Minor Irrigation Project	Kerala	21.05.92	31.12.2000	11.8	2.770
3	Sidmukh and Nohar Project	Rajasthan	07.06.93	31.12.2000	45.0	32.740
4	Orissa Minor Irrigation Project	Orissa	03.07.95	31.12.2004	10.70	0.465
5	Tank Rehabilitation Project Pondicherry	Pondicherry	21.02.97	21.02.2003	6.650	--
6	Saline Land Reclamation Project, Phase-II	Maharashtra	02.06.97	31.12.2005	14.3	--

United Nations Development Programme Assistance

S. No.	Name of the Project	State	Amount of Assistance(in US$ M.)	Utilisation of Assistance (upto 31.12.98)
1.	Automatic Operation of Irrigation Canal System	CWPRS, Pune	0.691	--

Bilateral Assistance

Sl. No	Name of the Project	State	Date of Commen-cement	Date of Comple-tion	Amount of Assistance(in Million Yen) US$ M.)	Utilisation of Assistance (upto 31.12.98)
	Japan					
1.	Modernisation of Kurnool Cuddapah Canal	Andhra Pradesh	11.01.96	26.03.2003	16049	90.015
2.	Rajghat Canal Major Irrigation Project	Madhya Pradesh	25.02.97	31.03.2003	13222	438.700
3.	Rengali Irrigation Project	Orissa	12.12.97	05.02.2003	7760	644.322
	France					
4.	Hydroplus Fusegates on 8 Dams in Gujarat	Gujarat	10.12.98	10.12.2000	FF 17.85 M	--
5.	Pilot Project for ozonisation and nitrification plant for Drinking Water	Delhi	31.12.92	31.12.98	FF 9.73	FF 8.76
6.	Ground Water exploration project in North-West of Imphal, Manipur	Manipur	26.06.97	30.06.2002	FF 4.53	--
	Netherlands					
7.	Community Irrigation Project	Kerala	15.12.93	30.06.2000	DFL 11.02 M	DFL 1.39 M
8.	Andhra Pradesh Ground Water Project (APWELL)	Andhra Pradesh	14.11.94	14.11.99	DFL 37.00 M	DFL 1.023 M
9.	Bundelkhank Integrated Water Resources Management Project	Uttar Pradesh	12.06.96	31.05.99	DFL 13.388 M	DFL 1.352 M

	Australian Assistance					
10.	Exploitation of Ground Water Project (Trench-II)	Orissa	31.07.92	31.07.98	US$ 13.089 M	US$ 7.939 M
	Canadian Assistance					
11.	Rajasthan Agriculture and Drainage Research Project (RAJAD)	Rajasthan	13.03.90	31.12.99	C$ 60.76 M	C$ 7.887 M
	Germany					
12.	Rajasthan Minor Irrigation Project	Rajasthan	29.04.87	31.12.98	DM 2.70 M	DM 1.635 M
13.	Orissa Lift Irrigation Project	Orissa	19.12.93	31.12.2000	DM 55.00 M	DM 31.120 M

Ninth Five Year Plan 1997-02

Annexure I

(Rs. in crore)

S.No.	Name of States & UTs	A G R E E D O U T L A Y				
		Major & Medium	Minor	CAD	Flood Control	Total
1	2	3	4	5	6	7
1	Andhra Pradesh	5027.16	775.73	76.50	127.41	6006.80
2	Arunachal Pradesh	2.30	202.48	5.65	69.52	279.95
3	Assam	135.12	429.99	25.07	120.24	710.42
4	Bihar	1450.00	725.00	125.00	400.00	2700.00
5	Goa	237.02	27.31	7.31	6.46	278.10
6	Gujarat	7358.00	963.55	50.00	10.00	8381.55
7	Haryana	1372.43	172.13	68.22	60.41	1673.19
8	Himachal Pradesh	35.00	196.55	7.30	20.00	258.85
9	Jammu & Kashmir $	173.85	148.20	22.32	80.75	425.12
10	Karnataka	5500.00	500.00	120.00	50.00	6170.00
11	Kerala	650.00	250.00	40.00	88.00	1028.00
12	Madhya Pradesh	1915.76	782.90	18.69	4.67	2722.02
13	Maharashtra	8969.08	1568.56	388.46	2.70	10928.80
14	Manipur	222.00	44.00	18.60	36.00	320.60
15	Meghalaya	15.00	60.00	5.00	18.00	98.00
16	Mizoram	0.40	17.52	0.19	0.00	18.11
17	Nagaland	9.85	40.28	1.50	5.37	57.00
18	Orissa	3084.76	267.32	16.50	20.00	3388.58
19	Punjab	238.25	252.82	384.47	409.70	1285.24
20	Rajasthan	1855.54	196.30	422.86	51.16	2525.86
21	Sikkim	0.00	10.00	1.00	30.00	41.00
22	Tamil Nadu	1000.00	357.65	90.00	0.00	1447.65
23	Tripura	60.55	105.36	0.10	28.00	194.01
24	Uttar Pradesh	2600.12	490.00	120.00	80.00	3290.12
25	West Bengal	710.93	347.86	16.33	328.45	1403.57
	Total States	**42623.12**	**8931.51**	**2031.07**	**2046.84**	**55632.54**
26	A & N Islands	0.00	5.77	0.00	4.23	10.00
27	Chandigarh	0.00	1.20	0.00	0.00	1.20
28	D & N Haveli	4.50	7.00	0.74	0.00	12.24
29	Daman & Diu	1.60	1.02	0.30	2.19	5.11
30	Delhi	0.00	13.03	0.00	120.00	133.03
31	Lakshadweep	0.00	0.00	0.00	17.36	17.36
32	Pondicherry	0.00	17.50	0.00	21.50	39.00
	Total U.Ts.	**6.10**	**45.52**	**1.04**	**165.28**	**217.94**
	Total States & Uts.	**42629.22**	**8977.03**	**2032.11**	**2212.12**	**55850.48**
	***Central Sector**	**330.12**	**385.00**	**860.00**	**716.13**	**2291.25**
	Grand Total	**42959.34**	**9362.03**	**2892.11**	**2928.25**	**58141.73**

*The Fig.Of Rs330.12crore under the Major & Medium component includes a total of Rs. 37.79 Crore for R&D and Rs.8.75 Crore for Sectt.& Eco.Services.

Fig.Rs 716.13 includes Rs.110.00 crore for Farakka .

Barrage Project under Transport Sector.

$ The Outlays indicated are based on Ninth Plan Outlay of Rs. 9500 Crore.

Annexure 2

Actual Expenditure in respect of Major & Medium Irrigation,

Minor Irrgn., CAD & Flood Control for the year 1997-98

(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	659.70	111.04	7.16	17.85	795.75
2	Arunachal Pradesh	0.36	16.73	0.98	3.76	21.83
3	Assam	30.34	89.70	3.19	16.24	139.47
4	Bihar	240.67	41.15	11.30	42.34	335.46
5	Goa	23.49	3.51	1.20	0.94	29.14
6	Gujarat	1212.95	148.16	11.32	4.00	1376.43
7	Haryana	214.75	30.00	12.14	20.71	277.60
8	Himachal Pradesh	10.12	41.35	1.09	3.65	56.21
9	Jammu & Kashmir	21.41	26.07	3.53	17.61	68.62
10	Karnataka	1308.29	70.05	24.11	10.31	1412.76
11	Kerala	153.58	41.67	11.54	22.13	228.92
12	Madhya Pradesh	375.47	139.62	3.84	0.72	519.65
13	Maharashtra	1606.24	348.69	53.14	0.98	2009.05
14	Manipur	34.60	6.41	1.50	6.84	49.35
15	Meghalaya	1.50	6.06	0.25	1.50	9.31
16	Mizoram	0.04	1.96	0.04	0.00	2.04
17	Nagaland	0.86	2.42	0.20	0.20	3.68
18	Orissa	519.98	81.39	4.00	18.31	623.68
19	Punjab	51.15	26.82	43.77	51.05	172.79
20	Rajasthan	386.95	34.58	58.99	12.34	492.86
21	Sikkim	0.00	2.16	0.00	1.09	3.25
22	Tamil Nadu	87.96	42.66	16.73	0.00	147.35
23	Tripura	6.33	5.84	0.02	4.64	16.83
24	Uttar Pradesh	473.87	99.34	30.58	14.40	618.19
25	West Bengal	102.04	30.39	2.60	62.32	197.35
	Total States	**7522.65**	**1447.77**	**303.22**	**333.93**	**9607.57**
26	A & N Island	0.00	2.41	0.00	0.00	2.41
27	Chandigarh	0.00	0.22	0.00	0.00	0.22
28	D & N Haveli	0.31	1.60	0.21	0.00	2.12
29	Daman & Diu	0.20	0.12	0.00	0.40	0.72
30	Delhi	0.00	0.84	0.00	10.02	10.86
31	Lakshadweep	0.00	0.00	0.00	3.69	3.69
32	Pondicherry	0.00	3.63	0.00	3.83	7.46
	Total U.Ts.	**0.51**	**8.82**	**0.21**	**17.94**	**27.48**
	Total States & Uts.	**7523.16**	**1456.59**	**303.43**	**351.87**	**9635.05**
	Central Sector	**36.72**	**42.84**	**129.26**	**67.17**	**275.99**
	Grand Total	**7559.88**	**1499.43**	**432.69**	**419.04**	**9911.04**

Annexure-3

Anticipated Expenditure in respect of Major and 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	790.70	148.11	13.00	49.00	1000.81
2	Arunachal Pradesh	0.31	12.87	0.78	4.16	18.12
3	Assam	45.91	68.61	3.19	20.27	137.98
4	Bihar	121.00	27	12.00	43.00	203.00
5	Goa	20.54	6.25	1.82	1.16	29.77
6	Gujarat	1347.32	251.82	13.19	5.00	1617.33
7	Haryana	342.79	58.75	12.50	20.00	434.04
8	Himachal Pradesh	12.25	47.67	0.30	5.88	66.10
9	Jammu & Kashmir	73.52	39.31	4.11	26.12	143.06
10	Karnataka	1354.27	86.28	11.46	7.00	1459.01
11	Kerala	140.00	39.6	12.00	24.00	215.60
12	Madhya Pradesh	425.85	209.24	4.49	1.00	640.58
13	Maharashtra	2627.99	366.26	72.40	1.16	3067.81
14	Manipur	36.65	9.5	11.05	5.10	62.30
15	Meghalaya	4.00	6.45	0.30	2.00	12.75
16	Mizoram	0.03	4.89	0.03	0.00	4.95
17	Nagaland	0.04	4.27	0.10	0.09	4.50
18	Orissa	602.81	92.96	5.00	15.00	715.77
19	Punjab	58.62	38.04	17.20	184.84	298.70
20	Rajasthan	436.74	49.4	69.18	4.53	559.85
21	Sikkim	0.00	0.85	2.84	0.02	3.71
22	Tamil Nadu	294.96	72.89	21.88	0.80	390.53
23	Tripura	7.58	8.93	0.02	3.24	19.77
24	Uttar Pradesh	470.00	68.15	14.08	45.90	598.13
25	West Bengal	58.12	18.65	0.61	82.22	159.60
	Total States	9272.00	1736.75	303.53	551.49	11863.77
	Union Territories					
26	A & N Island	0.00	2.75	0.00	0.00	2.75
27	Chandigarh	0.00	0.22	0.00	0.00	0.22
28	D & N Haveli	0.78	1.2	0.07	0.00	2.05
29	Daman & Diu	0.34	0.09	0.00	0.28	0.71
30	Delhi	0.00	1.17	0.00	15.81	16.98
31	Lakshadweep	0.00	0	0.00	2.63	2.63
32	Pondicherry	0.00	4.63	0.00	3.00	7.63
	Total U.Ts.	1.12	10.06	0.07	21.72	32.97
	Total States & Uts.	9273.12	1746.81	303.60	573.21	11896.74
	Central Sector	49.03	48.29	174.90	74.57	346.79
	Grand Total	9322.15	1795.10	478.50	647.78	12243.53

Annexure 4

APPROVED OUTLAY 1999-2000 FOR MAJOR & MEDIUM,

MINOR IRRIGATION , CAD & FLOOD CONTROL SECTOR

(Rs. Crores)

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	22.14	0.90	4.25	27.63
3	**Assam**	45.91	65.78	3.19	27.57	142.45
4	**Bihar**	680.00	64	12.00	110.00	866.00
5	**Goa**	57.70	4.5	1.00	0.85	64.05
6	**Gujarat**	1580.00	237.3	10.00	5.00	1832.30
7	**Haryana**	490.00	60	11.00	20.00	581.00
8	**Himachal Pradesh**	16.85	54.83	0.35	8.12	80.15
9	**Jammu & Kashmir**	68.46	45.67	4.11	32.11	150.35
10	**Karnataka**	1641.09	124.62	14.78	6.89	1787.38
11	**Kerala**	159.72	46	12.00	24.00	241.72
12	**Madhya Pradesh**	463.43	181.18	5.05	1.01	650.67
13	**Maharashtra**	3449.00	378.61	52.78	0.99	3881.38
14	**Manipur**	60.00	18	1.60	15.30	94.90
15	**Meghalaya**	6.00	11	1.00	3.00	21.00
16	**Mizoram**	0.05	6.95	0.05	NIL	7.05
17	**Nagaland**					4.50
18	**Orissa**	520.30	115.43	4.16	12.63	652.52
19	**Punjab**	124.95	42.23	47.51	105.39	320.08
20	**Rajasthan**	491.72	86.09	62.11	3.55	643.47
21	**Sikkim**	0.00	20	0.50	0.02	20.52
22	**Tamil Nadu**	337.44	41.21	21.87	17.77	418.29
23	**Tripura**	7.92	65.13	0.02	5.85	78.92
24	**Uttar Pradesh**	845.00	106.79	30.00	23.53	1005.32
25	**West Bengal**	126.25	96.58	7.07	165.30	395.20
	Total States	**12227.77**	**2102.67**	**315.05**	**635.13**	**15280.62**
26	**A & N Island**	0.00	2.5	0.00	0.00	2.50
27	**Chandigarh**	0.00	0.25	0.00	0.00	0.25
28	**D & N Haveli**	1.00	1.26	0.24	0.00	2.50
29	**Daman & Diu**	0.04	0.05	0.10	0.18	0.37
30	**Delhi**	0.00	1.25	0.00	20.00	21.25
31	**Lakshadweep**	0.00	0	0.00	3.05	3.05
32	**Pondicherry**	0.00	9.81	0.00	4.00	13.81
	Total U.Ts.	**1.04**	**15.12**	**0.34**	**27.23**	**43.73**
	Total States & Uts.	**12228.81**	**2117.79**	**315.39**	**662.36**	**15324.35**
	Central Sector	**55.80**	**55.41**	**177.00**	**81.79**	**370.00**
	Grand Total	**12284.61**	**2173.20**	**492.39**	**744.15**	**15694.35**

Annexure – 5.

List of Ongoing Projects and Spillover Cost.

(Rs. Crores)

Sl. No.	State	Ongoing Projects			Spillover Cost to IX Plan		
		Major (Nos.)	Medium (Nos.)	ERM (No.)	Major	Medium	ERM (No.)
1.	Andhra Pradesh	12	19	5	6417	145	1431
2.	Assam	4	5	0	224	61	0
3.	Bihar	15	29	4	4578	757	286
4.	Goa	1	1	0	420	38	0
5.	Gujarat	9	13	8	6306	173	1063
6.	Haryana	5	0	5	304	0	1535
7.	Himachal Pradesh	1	2	0	136	1	0
8.	Jammu & Kashmir	1	8	5	28	69	94
9.	Karnataka	14	15	5	6866	524	967
10.	Kerala	7	5	1	1338	617	6
11.	Madhya Pradesh	24	31	4	7894	391	54
12.	Maharashtra	44	85	6	12272	2107	128
13.	Manipur	2	2	4	326	42	27
14.	Meghalaya	0	1	0	0	23	0
15.	Nagaland	0	0	0	0	0	0
16.	Orissa	6	12	2	3741	366	1240
17.	Punjab	0	1	5	142	88	47
18.	Rajasthan	6	6	5	3314	162	274
19.	Tripura	0	3	0	0	125	0
20.	Tamil Nadu	0	2	1	0	7	1120
21.	Uttar Pradesh	17	2	6	5357	15	221
22.	West Bengal	3	17	6	1143	31	649
	Grand Total	171	259	72	60806	5743	9142

Annexure 6.

List Of Pre-Vth Plan On-Going Irrigation (Major)Projects and funds released under AIBP

S.No.	State	Funds released under AIBP			
		1996-97	1997-98	1998-99	1999-2000 (Ist Installment)
1	**Karnataka**				
	Third Five Year Plan (1961-66)				
	Malaprabha	1.500	12.000	10.000	13.500
	Fourth Five Year Plan (1969-74)				
	Upper Krishna Stage I	57.000	50.000	50.000	100.00
2	**Madhya Pradesh**				
	Fourth Five Year Plan (1969-74)				
	Sindh Phase I	--	--	--	1.000
	Jonk Diversion	--	--	--	1.000
3	**West Bengal**				
	First Five Year Plan(1951-56)				
	Barrage Irrigation Damodar Valley Corporation	-	1.000	0.000	--
	Second Five Year Plan (1956-61)				
	2. Kangsabati	--	4.000	0.000	6.00
4	**Andhra Pradesh**				
	Second Five Year Plan (1956-61)				
	1.Nagarjuna Sagar	--	--	9.00	--
	Third Five Year Plan (1961-66)				
	2.Sriramsagar Stage I	31.50	50.00	25.00	38.00
5	**Maharashtra**				
	Third Five Year Plan (1961-66)				
	Bhima	--	12.500	19.750	12.255
	Fourth Five Year Plan (1969-74)				
	Upper Tapi	--	2.500	0.000	3.800
6	**Bihar**				
	Third Five Year Plan (1961-66)				
	1.Western Kosi Canal	10.00	--	14.635	30.57

S.No.	State	Funds released under AIBP			
		1996-97	1997-98	1998-99	1999-2000 (Ist Installment)
7	**Haryana**				
	Third Five Year Plan (1961-66)				
	1.Gurgoan Canal	2.500	0.000	0.000	--
	Goa				
	Fourth Five Year Plan(1969-74)				
	1.Salauli	--	5.25	--	3.50
	Kerala				
	Third Five Year Plan (1961-66)				
	Kallada	3.750	15.000	0.000	--
	Rajasthan				
	Fourth Five Year Plan (1969-74)				
	Mahi Bajaj Sagar	--	--	--	16.670
	UTTAR PRADESH				
	Third Five Year Plan (1961-66)				
	Sarada Sahayak	15.000	10.000	16.000	40.000
	Gujarat				
	Fourth Five Year Plan (1969-74)				
	DAMANGANGA	--	5.00	3.25	1.220
	Watrak	--	1.00	1.65	0.460
	Orissa				
	Fourth Five Year Plan (1969-74)				
	Rengali Dam	9.900	20.000	50.000	28.300

Annexure-7

CLA RELEASED UNDER A.I.B.P – Major & Medium Projects

State	1996-97	1997-98	1998-99	1999-2000
Andhra Pradesh	35.25	74.00	79.67	65.015
Assam	5.23	12.40	13.95	13.02
Bihar	13.50	14.04	47.83	144.04
Goa	0.00	5.25	0.00	3.50
Gujarat	74.77	196.90	423.82	272.70
Haryana	32.50	12.00	0.00	0.00
Himachal Pradesh	0.00	6.50	5.00	14.555
Jammu & Kashmir	1.30	0.00	0.00	4.68
Karnataka	61.25	90.50	94.50	157.14
Kerala	3.75	15.00	0.00	0.00
Madhya Pradesh	63.25	114.50	90.75	105.845
Maharashtra	14.00	55.00	50.86	49.875
Manipur	4.30	26.00	10.78	20.31
Orissa	48.45	35.00	71.50	81.35
Punjab	67.50	100.00	0.00	42.00
Rajasthan	2.68	42.00	140.05	106.665
Tamil Nadu	20.00	0.00	0.00	0.00
Tripura	3.77	5.10	3.98	6.30
Uttar Pradesh	43.50	78.00	76.50	286.00
West Bengal	5.00	20.00	10.00	25.00
Total	500.00	952.19	1119.18	1397.895

Minor Irrigation Projects

State	No. of Schemes	
Orissa	16	8.90
Assam	6	1.52
Manipur	108	1.50
Mizoram	10	1.43
Tripura	626	28.35
Meghalaya	39	2.69
Arunachal Pradesh	339	7.50
Himachal Pradesh	42	6.71
Nagaland	468	2.73
Sikkim	129	1.36
	1783	62.69

Annexure 8

External Assistance

World Bank Assisted Projects

S. No.	Name of the Project	State	Date of Commence-ment	Date of Comple-tion	Amount of Assistance (in US$ M.)	Utilisation of Assistance (upto 31.12.98)
1.	Dam Safety Assurance and Rehabilitation Project	Multi-State	10.06.91	30.09.99	102.973	58.179
2.	Hydrology Project	Multi-State	02.09.95	31.03.2002	142.00	21.545
3.	Haryana Water Resources Consolidation Project	Haryana	06.04.94	31.12.2002	258.00	101.602
4.	Tamil Nadu Water Resources Consolidation Project	Tamil Nadu	19.04.95	31.03.2002	282.9	18.268
5.	Orissa Water Resources Consolidation Project	Orissa	05.01.96	30.09.2002	290.9	91.535
6.	Andhra Pradesh III Irrigation Project	Andhra Pradesh	03.06.97	31.01.2002	325.0	60.252

Annexure 9

Institutional finances for Minor Irrigation development for the year 1995-96, 1996-97 and 1997-98 under schemes refinanced by NABARD.

(Rs. In Crores)

Sl.	States/UT s	1995-96		1996-97		1997-98	
		Furnished by State Coop. Banks	Furnished by NABARD	Furnished by State Coop. Banks	Furnished by NABARD	Furnished by State Coop. Banks	Furnished by NABARD
1.	Andhra Pradesh	6239	11764	10082	10326	8178	9325
2.	Assam	-	2	-	-	-	1
3.	Bihar	650	647	1036	1217	777	572
4.	Goa	6	6	11	20	30	30
5.	Gujarat	1100	4070	787	1377	699	1732
6.	Haryana	5294	3125	6485	5043	5698	4756
7.	Himachal Pradesh	175	40	362	55	376	43
8.	J&K	-	8	11	1	-	-
9.	Karnataka	3793	8190	3948	7490	3001	4750
10.	Kerala	1304	3503	1598	2944	1501	1807
11.	Madhya Pradesh	1730	2467	1899	2033	1510	2237
12.	Maharashtra	404	14882	4601	9275	2886	8231
13.	Orissa	106	1509	334	1251	1	1302
14.	Punjab	-	1852	3092	2864	3281	3069
15.	Rajasthan	5435	5383	5689	6105	5153	5534
16.	Tamilnadu	284	4968	305	617	329	901
17.	Uttar Pradesh	20116	16314	18650	14321	14756	3061
18.	West Bengal	617	745	373	573	344	402
19.	Pondicherry	26	57	22	17	37	38
		47279	79532	59285	65529	48557	47791

Annexure 10

Advances by Land Development Banks

(Rs. In lakhs)

S. NO.	States	Banks of the concern States	1995-96		1996-97		1997-98	
			Under N.P	Under NABARD	Under N.P	Under NABARD	Under N.P	Under NABARD
1.	A.P.	A.P State Coop. Bank Limited	228	6239	540	10082	195	8178
2.	Bihar	Bihar State Coop. Land Developme nt Bank Ltd.	-	650	Nil	1036	Nil	777
3.	Goa	Goa State Coop. Bank Ltd.	6	6	2	11	-	30
4.	Gujarat	Gujarat State Coop. Bank Limited.	70	1100	45	787	15	699
5.	Haryana	Haryana State Coop. Land Dev. Bank Ltd.	553	5294	503	6485	196	5698
6.	Himachal Pradesh	Himachal Pradesh State Coop. Agri. & R. Dev. Bank Ltd.	-	175	Nil	362	Nil	376
7.	J&K	J&K Coop. Central Land Dev. Bank Limited.	-	-	-	11	*	*
8.	Karnataka	Karnataka State Coop. Agri. & R.D. Bank Ltd.	97	3793	116	3948	296	3001
9.	Kerala	Kerala State Coop. Agri. & R.D. bank Ltd.	11	1304	43	1597	57	1501
10.	M.P.	M.P State	118	1730	48	1899	288	1510

		Coop. Land Dev. Bank Ltd.						
11.	Maharash tra	Maharashtr a Coop. Agri. & R D Bank Ltd.	-	404	30	4601	1	288+6
12.	Orissa	Orissa State Agri. & RD Bank Ltd.	-	106	-	334	Nil	1
13.	Punjab	Punjab State Coop. Agri Dev Bank Ltd.	2536	-	Nil	3092	Nil	3281
14.	Rajasthan	Rajasthan Coop. Land Dev. Bank Ltd.	96	5435	162	5689	5	5153
15.	Tamilnadu	Tamilnadu State Land Dev. Bank Ltd.	6	284	3	305	17	329
16.	U.P.	U.P. Coop RD Bank Ltd.	-	20116	Nil	18650	Nil	14756
17.	Delhi	Delhi State Coop. Bank Ltd.	1	70	1	Nil	1	Nil
18.	West Bengal	West Bengal State Coop. Agri. & RD Bank Ltd.	-	617	Nil	373	Nil	344
19.	Pondicher ry	Pondicherry Coop.Centr al Land Dev. Bank Ltd.	7	26	0	22	1	37
Total			3729	47285	1503	59283	1072	48556

Annexure 11

Sanctions and disbursement of RIDF under NABARD

(As on 25.02.2000)

(Rs. In crores)

S.l.	**State**	**RIDF-I**		**RIDF-II**		**RIDF-III**		**RIDF-IV**	
		State Total		State Total		State Total		State Total	
		San	Disb	San	Disb	San	Disb	San	Disb
1	Andhra Pradesh	227.08	206.19	333.39	241.16	275.10	142.42	305.41	66.16
2	Assam			63.29	42.62	16.07	7.24	64.72	9.30
3	Bihar	2618.13				62.31	-	118.50	-
4	Goa	6.85	6.85					8.93	4.96
5	Gujarat	141.48	133.63	129.63	86.22	160.60	92.75	136.36	33.82
6	Haryana	18.28	16.54	61.06	39.80	74.98	39.18	102.42	10.53
7	Himachal Pradesh	14.23	14.23	49.50	42.57	50.11	33.47	88.58	23.82
8	Jammu & Kashmir	6.14	6.04	8.06	0.57	35.95	10.18	105.87	22.80
9	Karnataka	169.51	126.76	172.46	132.40	171.83	90.00	179.86	6.30
10	Kerala	95.93	82.80	87.60	58.21	92.93	27.00	64.55	10.01
11	Madhya Pradesh	198.51	164.61	207.60	106.13	248.70	94.83	242.84	33.51
12	Maharashtra	173.74	151.34	231.66	156.13	254.31	38.46	301.98	
13	Manipur	1.75	0.96						
14	Meghalaya	3.39	3.39	0.00		8.25	2.14	9.33	2.33
15	Mizoram	2.38	2.37						
16	Nagaland	1.38	1.38					0.72	-
17	Orissa	158.09	146.13	125.14	96.68	162.91	70.20	162.52	52.73

18	Punjab	60.50	60.50	62.50	62.05	88.85	73.73	109.96	30.83
19	Rajasthan	123.51	111.27	148.22	119.53	162.88	95.66	152.95	14.24
20	Tamil Nadu	-	-	266.68	198.12	195.75	95.97	179.66	42.12
21	Tripura							21.70	4.31
22	Uttar Pradesh	292.35	292.35	491.65	281.75	432.98	180.74	525.77	105.02
23	West Bengal	102.52	102.52	158.70	94.05	176.76	50.52	214.32	26.25
24	Sikkim							21.29	6.65
	Total	1797.62	1585.96	2597.73	1757.99	2671.27	1152.49	3118.28	219.86

Annexure 12

Rural Infrastructure Development Fund
Purpose Wise Sanctions (As On 25.02.99)

(Rs.Crores)

	RIDF-IV	RIDF III	RIDF II	RIDF I
Corpus	3000.00	2500.00	2500.00	2000.00
Sanctions Issued	3118.28	2671.28	2597.76	1797.63
Type of Projects				
1. Major Irrigation	317.37	223.88	412.51	227.73
2. Medium Irrigation	170.96	203.99	237.28	838.88
3. Minor Irrigation	436.67	512.68	581.15	616.36
Total (1+2+3)	925.00	940.15	1230.94	1682.97
4. Rural Roads & Bridges	1991.95	1588.90	1258.21	28.21
5. Water Shed Mgt.	32.28	20.43	108.61	78.88
6. Flood Protection	48.63	96.47		7.57
7. Rural Market Yards		20.93		
8. CADA		4.00		
9. Drainage	117.20	-	-	-
10. Cold Storage	0.72	-	-	-
11. Fisheries	2.50	-	-	-

Annexure 13

Progress achieved in PIM

State	No.of WUA	Area covered (Th.ha.)
A.P.	10292	4800
Assam	2	1
Bihar	1	l2.20
Goa	39	4.59
Gujarat	476	19
Haryana	554	110.80
Himachal Pradesh	875	35
Jammu & Kashmir	1	1.00
Karnataka	l93	138.38
Kerala	3712	148.48
Madhya Pradesh	65	26.80
Maharashtra	l42	55.80
Manipur	62	49.27
Orissa	88	34.31
Rajasthan	35	15.93
Tamil Nadu	328	426.40
Uttar Pradesh	1	0.25
West Bengal	10000	37.00
Total	**26866**	**5916.21**

Annexure 14

RATE OF SILTING IN VARIOUS RESERVOIRS IN INDIA

S.NO.	Name of Reservoir	Name of river	Storage capacity (Mm^3)	Catchment area (Km^3)	Year of impounding	Designed Rate or sedimentation	Observed Rate of Silting in Ha.m/100 Km^3 per year			Total Storage lost upto last survey (Mm^3)	Yearly average loss in capacity
							At first survey	At last survey	Average Period		
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**			**9**	**10**
ANDHRA PRADESH											
1.	Sriramasagar	Godavari	3171.94	91751	1970	3.57	N.A. (1972)	6.186 (1984)	6.186 (14 years)	794.57	1.79
2.	Nizamsagar	Manjira	841.18	21694	1930	2.38	N.A. (1961)	4.298 (1975)	4.8911 (45 years)	477.48	1.26
BIHAR											
3.	Panchet Hill	Damodar	1581.00	10878	1956	6.67	12.13 (1962)	3.36 (1985)	5.887 (29 years)	185.40	0.404
4.	Maithon	Barakae	1348.80	6294	1955	9.05	12.53 (1963)	9.056 (1979)	10.247 (24years)	154.80	0.48
GUJARAT											
5.	Ukai	Tapi	8510.00	62224	1972	1.49	6.20 (1979)	8.903 (1984)	7.16 (12 years)	547.00	0.53
6.	Kadana	Mahi	1543.00	255520	1977	1.30	4.898 (1980-81)	2.612 (1964)	3.918 (7 years)	70.00	0.65
HIMACHAL PRADESH											
7.	Pongb	Beas	8579.00	12562	1974	-	22.17 (1980)	39.12 (1986)	27.85 (112 years)	419.75	0.41

S.NO.	Name of Reservoir	Name of river	Storage capacity (Mm^3)	Catchment area (Km^3)	Year of impounding	Designed Rate or sedimentation	Observed Rate of Silting in Ha.m/100 Km^3 per year			Total Storage lost upto last survey (Mm^3)	Yearly average loss in capacity
							At first survey	At last survey	Average Period		
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**			**9**	**10**
KARNATAKA											
8.	Tunghbhadra	Tunghbhadra	3751.17	28180	1953	4.29	17.90 (1963)	9.66 (1985)	6.48 (32 years)	584.43	0.49
9.	Bhadar	Bhadar	239.22	2434.6	1963	7.6	11.607 (1974)	11.607 (1974)	11.607 (11 years)	31.09	1.18
MAHAYA PRADESH											
10.	Gandhi Sagar	Chambal	7740.00	23025	1960	3.57	8.958 (1976)	8.958 (1976)	8.958 (16years)	330.00	0.29
MAHARASHTRA											
11.	Girna	Girna & Panzan	608.81	4729.33	1965	0.56	7.487 (1979)	7.487 (1979)	7.487 (14 years)	49358	0.58
12.	Shivaji Sagar (Koyna)	Koyna	2987.83	891	1961	6.67	N.A. (1966)	7.7104 (1971)	7.7104 (10 years)	6.87	0.023
ORISSA											
13.	Hirakud	Mahanadi	8105.00	83395	1957	2.50	5.568 (1978)	0.702 (1984)	6.618 (27 years)	1490.30	0.61
PUNJAB											
14.	Bhakra	Sutluj	9869.00	56980	1958	4.29	0.0281 (1958)	6.532 (1987)	5.568 (29 years)	935.056	0.32

UTTAR PRADESH											
15.	Matatila	Betwa	11.32	20720	1956	1.33	11.82 (1962)	5.286 (1984)	6.005 (28 years)	348.40	1.10
16.	Ramganga	Ramganga	2449.60	3134	1975	4.25	N.A. (1978)	22.94 (1985)	22.94 (10 years)	79.06	0.29
17.	Ichari	Tons	11.55	4913	1972	N.A.	1.262 (1977)	1.669 (1978)	1.3298 (6 years)	3.92	0.65
19	Dhukwan	Betwa	106.45	21340	1907	0.432	0.425 (1937)	0.12 (1980)	0.304 (73 years)	47.42	0.61
WEST BENGAL											
20.	Mayurakshi	Mayurkshi	607.70	1860	1955	3.75	N.A. (1964-65)	16.826 (1970)	16.826 (15 years)	46.945	0.515

Publication (1991) “Compendium on silting of Reservoirs in India”

Major & Medium Irrigation Schemes - Physical achievement upto Eighth Plan and Target for Ninth Plan **Annexure 15** **(000' ha.)**

Sl. No.	Name of States & U.Ts.	Ult. Irrgn. Pot.	Achievement to end of March 1992		Eighth Plan Target 1992-97		Achievement During 1992-97		Achievement Upto March 97		Ninth Plan Target Major & medium		1997-98 Target Major & Medium		1997-98 Achievement Major & Medium		1998-99 Antcpd. Achiv. Major & Medium		Target 1999-2000	
			Pot.	Utl.	Pot.	Utl.	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	17	18	19	20	21
1	Andhra Prd.	5000.00	2999.00	2847.00	419.00	208.00	46.10	36.80	3045.10	2883.80	579.13	506.28	115.51	152.78	76.52	12.10	116.17	158.79	151.41	151.50
2	Arunachal Prd	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Assam	970.00	176.00	111.00	120.00	74.80	20.67	27.17	196.67	138.17	6.50	4.00	1.15	0.20	4.20	2.00	1.30	1.00	0.02	0.02
4	Bihar	6500.00	2766.00	2295.00	315.00	410.00	36.50	29.20	2802.50	2324.20	492.00	518.00	25.57	25.50	4.33	4.33	27.10	22.10	53.46	0.00
5	Goa	62.00	13.00	12.00	36.20	14.23	0.02	0.07	13.02	12.07	16.22	12.00	7.00	2.50	3.50	1.00	0.02	0.02	0.89	0.89
6	Gujarat	3000.00	1246.00	986.00	448.00	404.00	104.00	214.00	1350.00	1200.00	1867.00	1892.00	65.00	60.00	17.14	20.62	16.08	20.00	15.00	20.00
7	Haryana	3000.00	2035.00	1791.00	296.00	270.00	43.79	42.62	2078.79	1833.62	197.71	211.21	45.00	41.00	1.66	1.66	3.49	3.49	7.00	3.00
8	Himachal Prd.	50.00	8.00	4.00	2.64	2.00	2.55	1.59	10.55	5.59	3.00	1.50	0.30	0.15	0.30	0.15	0.15	0.34	0.15	0.34
9	J&K	250.00	158.00	136.00	20.50	23.00	15.70	11.57	173.70	147.57	29.90	40.10	2.45	5.69	2.07	2.62	0.22	2.86	0.70	5.30
10	Karnataka	2500.00	1377.00	1192.00	401.00	361.00	289.02	279.70	1666.02	1471.70	1109.88	887.90	119.21	95.36	45.44	36.35	35.17	35.17	100.00	80.00
11	Kerala	1000.00	416.00	367.00	148.00	148.00	97.31	97.31	513.31	464.31	373.12	373.12	32.23	30.61	32.23	30.61	14.00	14.00	30.00	30.00
12	Madhya Prd.	6000.00	1962.00	1395.00	450.00	300.00	355.60	225.95	2317.60	1620.95	384.75	195.11	53.30	23.30	32.00	23.30	20.70	10.30	28.00	13.60
13	Maharashtra	4100.00	2030.00	1036.00	400.00	444.00	307.00	251.70	2337.00	1287.70	1755.00	1700.00	151.00	150.00	151.00	150.00	187.00	187.00	200.00	187.00
14	Manipur	135.00	59.00	50.00	54.16	43.39	4.00	2.00	63.00	52.00	50.38	42.33	0.77	1.53	1.00	1.00	12.00	10.00	4.00	4.00
15	Meghalaya	20.00	0.00	0.00	3.88	3.00	0.00	0.00	0.00	0.00	3.88	3.88	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
16	Mizoram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Nagaland	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.50	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Orissa	3600.00	1409.00	1326.00	334.00	340.00	148.75	116.66	1557.75	1442.66	915.39	819.27	120.63	54.14	34.57	54.14	40.39	191.30	62.51	40.39
19	Punjab	3000.00	2367.00	2309.00	218.10	218.10	145.86	142.25	2512.86	2451.25	126.25	126.25	21.60	12.22	12.62	22.85	5.01	5.01	1.77	1.77
20	Rajasthan	2750.00	1999.00	1887.00	288.61	232.13	274.88	201.39	2273.88	2088.39	469.26	394.92	48.60	46.46	58.90	46.46	11.50	98.70	19.00	27.78
21	Sikkim	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	Tamil Nadu	1500.00	1545.00	1541.00	10.30	10.57	0.51	4.49	1545.51	1545.49	4.80	3.80	2.18	0.00	2.18	2.18	0.00	0.00	1.62	1.62
23	Tripura	100.00	2.00	2.00	13.20	12.00	0.30	0.30	2.30	2.30	22.92	11.05	0.85	0.85	0.85	0.85	0.20	0.80	1.00	0.80
24	Uttar Pradesh	12500.00	6789.00	5751.00	889.00	600.00	254.00	363.00	7043.00	6114.00	1000.00	600.00	140.00	75.00	129.00	33.00	112.00	75.00	125.00	75.00
25	West Bengal	2300.00	1353.00	1258.00	552.39	474.85	79.68	57.28	1432.68	1315.28	395.00	355.00	74.00	67.00	53.41	43.22	50.00	40.00	28.00	20.00
	Total States	58367.00	30709.00	26296.00	5419.98	4593.07	2226.24	2105.05	32935.24	28401.05	9806.59	8702.22	1026.35	844.29	662.92	488.44	652.50	876.85	829.53	663.01
26	A & N Island				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
27	Chandigarh				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
28	D & N Haveli				0.00	0.00	0.00	0.00	0.00	0.00	2.20	-	0.10	0.40	0.10	0.40	--	0.55	--	
29	Daman & Diu				1.71	1.71	3.22	2.00	3.22	2.00	3.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00
30	Delhi				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NR	NR	NR	NR		NR
31	Lakshadweep				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
32	Pondicherry				2.50	2.50	0.29	0.29	0.29	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Total U.Ts.	98.00	15.00	7.00	4.21	4.21	3.51	2.29	18.51	9.29	5.20	3.00	0.10	0.40	0.10	0.40	0.00	0.55	3.00	0.00
	Total States & Uts.	58465.00	30724.00	26303.00	5424.19	4597.28	2229.75	2107.34	32953.75	28410.34	9811.79	8705.22	1026.45	844.69	663.02	488.84	652.50	877.40	832.53	663.01

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

ANNEXURE-16 **(000 ha.)**

MINOR IRRIGATION - PHYSICAL DETAILS

Sl. No.	Name of States & U.Ts.	Ult. Irrgn. Pot.	Achievement to the end of Mar-92		Eighth Plan Target		Achievement During 1992-97		Achievement Upto March 1997		Target Ninth Plan Minor Irrigation		Target 1997-98 Minor Irrigation		Achievement 1997-98 Minor Irrigation		Anticpd. Achiev. 1998-99 Minor Irrigation		Target 1999-2000	
			Pot.	Utl.	Pot.	Utl.	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	17	18	19	20	21
1	Andhra Prd.	6260.00	2877.34	2662.63	500.00	400.00	24.53	24.53	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 Prd.	168.00	64.89	55.84	20.00	20.00	18.53	9.70	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	1900.00	575.28	466.97	180.00	120.00	17.48	17.48	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	6847.00	4876.90	4357.19	1832.00	1466.00	231.34	216.51	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	54.00	18.41	16.71	4.00	3.00	2.11	1.06	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	3103.00	1900.30	1804.22	180.00	150.00	35.00	35.40	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	1512.00	1524.47	1483.72	100.00	90.00	52.30	47.90	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 Prd.	303.00	141.61	122.45	25.00	20.00	8.77	5.97	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	J & K	1108.00	363.62	352.31	40.00	40.00	11.00	8.85	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	3474.00	1435.48	1395.51	220.00	200.00	95.53	93.20	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	1679.00	518.04	482.41	100.00	85.00	55.08	55.08	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 Prd	11932.00	2560.52	2375.02	500.00	375.00	97.00	47.00	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	4852.00	2457.40	2212.10	400.00	325.00	90.00	129.00	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	469.00	49.57	41.21	15.00	12.00	10.82	9.98	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	148.00	42.51	37.19	7.30	5.55	4.06	4.06	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	70.00	10.54	9.03	6.00	4.00	2.19	2.19	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	75.00	65.10	55.93	13.00	10.00	2.14	2.00	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	5203.00	1245.38	1126.18	150.00	150.00	112.09	100.87	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	2967.00	3290.45	3238.19	76.00	70.00	63.72	57.93	3354.17	3296.12	241.61	241.61	19.75	19.75	14.72	19.75	13.41	19.75	16.56	12.00
20	Rajasthan	2378.00	2388.71	2316.63	300.00	280.00	32.53	20.15	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	50.00	22.19	17.07	5.00	4.00	4.04	3.51	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	4032.00	2107.91	2102.52	110.00	107.00	7.31	8.84	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	181.00	87.38	78.83	27.00	16.00	5.20	5.20	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 Prd.	17999.00	15806.00	13886.00	5439.00	5000.00	4644.61	4596.71	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	4618.00	2772.37	2309.90	450.00	400.00	445.00	267.00	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	81382.00	47202.37	43005.76	10699.30	9352.55	6072.38	5770.12	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	0.55	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	0.12	0.12	0.10	0.10	0.02	0.02			0.06		0.02	0.02
28	D & N Haveli						0.26	0.25	0.26	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	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	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	0.00	0.00						
32	Pondicherry						2.02	2.01	2.02	2.01	4.00	4.00	0.48	0.48	0.10					
	Total U.Ts.	46.00	0.00	0.00	0.00	0.00	29.98	26.39	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	81428.00	47202.37	43005.76	10699.30	9352.55	6102.36	5796.51	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 Eihth Plan are anticipated and are likely to change.

Annexure 17

PHYSICAL ACHIEVEMENTS IN RESPECT OF LAND LEVELLING UNDER THE CAD PROGRAMME.

(Unit : 000 ha)

Sl. No.	Name of the State	1995-96		1996-97		1997-98	
		Target	Achievement	Target	Achievement	Target	Achievement (Provisional)
1	Andhra Pradesh	0.00	0.00	0.00	0.00	28.00	0.00
2	Arunachal Pradesh	0.00	0.00	0.00	0.00	0.00	0.00
3	Assam	0.82	0.30	1.75	0.01	2.78	0.52
4	Bihar	0.00	0.00	0.00	0.00	6.88	0.00
5	Goa	1.18	0.00	0.00	0.00	0.00	0.00
6	Gujarat	0.00	0.00	0.05	0.00	1.73	0.00
7	Haryana	0.00	0.00	0.00	0.00	0.00	0.00
8	Himachal Pradesh	0.00	0.00	0.00	0.00	0.00	0.43
9	Jammu & Kashmir	1.43	1.38	1.72	1.40	2.05	2.27
10	Karnataka	1.00	0.01	12.90	0.66	5.10	0.25
11	Kerala	0.00	0.00	11.23	4.48	23.30	16.37
12	Madhya Pradesh	1.51	0.02	0.00	0.00	0.00	0.00
13	Maharashtra	25.02	16.65	62.21	9.81	0.00	0.00
14	Manipur	1.19	0.98	2.07	0.47	1.48	0.07
15	Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00
16	Nagaland	0.00	0.00	0.00	0.00	0.00	0.00
17	Orissa	14.85	9.72	11.40	8.23	5.00	5.06
18	Rajasthan	0.00	2.87	2.50	2.60	2.50	2.78
19	Tamil Nadu	0.00	0.00	0.00	0.00	0.00	0.00
20	Tripura	0.00	0.00	0.00	0.00	0.00	0.00
21	Uttar Pradesh	4.00	0.00	705 KM	0.00	581 KM	453.71 km
22	West Bengal	0.00	0.00	0.00	0.00	0.00	0.00
23	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00
24	Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00
	Total	51.00	31.93	105.83	27.66	78.82	27.75
				+		+	+
				705 km		581 km	453.71 km

Note: Daman Ganga Project comes under Gujarat, Daman & Diu and Dadra & Nagar Haveli. The physical achievements for this project are shown accordingly.

Annexure 18

PHYSICAL ACHIEVEMENTS IN RESPECT OF FIELD CHANNELS UNDER THE CAD PROGRAMME.

(Unit : 000 ha)

Sl. No.	Name of the State	1995-96		1996-97		1997-98	
		Target	Achievement	Target	Achievement	Target	Achievement (Provisional)
1	Andhra Pradesh	1.17	0.09	33.35	0.03	29.20	2.15
2	Arunachal Pradesh	0.00	0.00	0.00	0.00	0.00	0.00
3	Assam	1.67	0.74	3.05	0.15	1.90	0.44
4	Bihar	0.84	0.00	120 km	0.00	1.27	30.81 km
5	Goa	1.45	0.27	0.80	0.10	0.32	0.00
6	Gujarat	10.31	22.04	29.74	10.53	22.94	7.24
7	Haryana	34.27	33.95	42.50	35.79	45.83	28.21
8	Himachal Pradesh	0.69	0.01	0.40	0.55	0.84	1.41
9	Jammu & Kashmir	3.82	3.95	4.49	4.52	4.76	6.97
10	Karnataka	30.16	13.04	29.90	23.75	17.86	11.03
11	Kerala	28.50	17.75	18.20	14.39	15.45	7.89
12	Madhya Pradesh	6.04	8.95	2.88	1.41	4.63	4.23
13	Maharashtra	28.43	39.49	62.21	20.88	53.94	25.23
14	Manipur	2.45	2.50	9.15	2.24	8.26	3.33
15	Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00
16	Nagaland	0.00	0.00	0.00	0.00	0.00	0.00
17	Orissa	10.12	8.80	13.00	18.66	6.80	7.00
18	Rajasthan	24.31	51.83	76.50	69.39	64.00	54.25
19	Tamil Nadu	52.55	43.94	42.60	41.61	44.74	46.61
20	Tripura	0.00	0.00	0.00	0.00	0.00	0.00
21	Uttar Pradesh	144.03	116.55	121.00	126.87	99.63	112.20
22	West Bengal	4.19	5.64	8.80	5.35	4.55	0.82
23	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00
24	Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00
	Total	385.00	369.54	498.57	376.22	426.92	319.01
				+			+
				120 km			30.81 km

Note: Daman Ganga Project comes under Gujarat, Daman & Diu and Dadra & Nagar Haveli. The physical achievements for this project are shown accordingly.

Annexure 19

PHYSICAL ACHIEVEMENTS IN RESPECT OF FIELD DRAINS UNDER THE CAD PROGRAMME.

(Unit : 000 ha)

Sl. No.	Name of the State	1995-96		1996-97		1997-98	
		Target	Achievement	Target	Achievement	Target	Achievement (Provisional)
1	Andhra Pradesh	4.20	7.41	4.70	6.00	1.20	3.89
2	Arunachal Pradesh	0.00	0.00	0.00	0.00	0.00	0.00
3	Assam	0.00	0.00	0.20	0.00	0.80	0.00
4	Bihar	0.00	0.00	0.00	0.00	0.00	0.00
5	Goa	0.03	0.01	0.04	0.00	0.03	0.01
6	Gujarat	0.15	0.00	0.75	0.05	2.17	0.03
7	Haryana	1.05	0.65	0.63	0.51	0.72	0.47
8	Himachal Pradesh	0.00	0.00	0.00	0.00	0.00	0.00
9	Jammu & Kashmir	1.18	2.27	2.57	1.91	1.73	2.27
10	Karnataka	27.13	0.00	0.00	0.00	0.00	0.00
11	Kerala	0.11	0.20	0.71	0.08	0.52	0.23
12	Madhya Pradesh	0.00	0.00	0.00	0.00	0.00	0.00
13	Maharashtra	0.85	0.73	0.00	1.45	0.00	0.00
14	Manipur	2.30	1.28	2.17	0.00	3.70	0.35
15	Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00
16	Nagaland	0.00	0.00	0.00	0.00	0.00	0.00
17	Orissa	0.00	3.73	3.64	0.16	0.00	0.00
18	Rajasthan	0.00	3.01	2.64	0.60	4.50	3.98
19	Tamil Nadu	0.00	0.00	0.00	0.00	0.00	0.00
20	Tripura	0.00	0.00	0.00	0.00	0.00	0.00
21	Uttar Pradesh	0.00	0.00	0.00	0.00	0.00	0.00
22	West Bengal	0.00	0.00	0.02	0.00	0.05	0.00
23	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00
24	Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00
	Total	37.00	19.29	18.07	10.76	15.42	11.23

Note: Daman Ganga Project comes under Gujarat, Daman & Diu and Dadra & Nagar Haveli.
The physical achievements for this project are shown accordingly.

Annexure 20

PHYSICAL ACHIEVEMENTS IN RESPECT OF WARABANDI UNDER THE CAD PROGRAMME.

(Unit : 000 ha)

Sl. No.	Name of the State	1995-96		1996-97		1997-98	
		Target	Achievement	Target	Achievement	Target	Achievement (Provisional)
1	Andhra Pradesh	14.53	11.04	32.50	11.49	29.20	4.80
2	Arunachal Pradesh	0.00	0.00	0.00	0.00	0.00	0.00
3	Assam	1.13	0.00	1.10	0.02	1.75	0.86
4	Bihar	2.34	0.00	1.16	0.00	7.27	0.00
5	Goa	1.69	1.50	1.50	1.50	0.80	0.00
6	Gujarat	20.45	7.06	51.40	12.43	21.00	5.87
7	Haryana	21.82	9.58	8.59	2.17	0.00	0.00
8	Himachal Pradesh	2.01	0.13	0.25	0.25	1.83	2.38
9	Jammu & Kashmir	31.00	28.37	31.20	30.92	46.06	45.64
10	Karnataka	8.93	9.63	35.67	7.49	25.67	16.23
11	Kerala	15.20	3.97	21.25	11.15	14.60	9.11
12	Madhya Pradesh	0.00	8.48	7.00	0.00	2.33	0.17
13	Maharashtra	15.06	4.25	51.00	4.87	21.50	21.24
14	Manipur	1.87	1.36	0.90	0.51	1.33	0.57
15	Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00
16	Nagaland	0.00	0.00	0.00	0.00	0.00	0.00
17	Orissa	73.82	56.55	60.00	0.00	14.00	15.00
18	Rajasthan	20.49	53.86	76.50	69.39	64.00	54.25
19	Tamil Nadu	56.27	58.34	63.55	60.84	72.55	75.31
20	Tripura	0.00	0.00	0.00	0.00	0.00	0.00
21	Uttar Pradesh	293.39	198.45	225.00	204.61	155.00	170.26
22	West Bengal	0.00	0.00	1.00	0.00	0.00	0.00
23	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00
24	Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00
	Total	580.00	452.57	669.57	417.64	478.89	421.69

Note: Daman Ganga Project comes under Gujarat, Daman & Diu and Dadra & Nagar Haveli.
The physical achievements for this project are shown accordingly.