

Report of
The Steering Committee on
Water Resources
For
Eleventh Five Year Plan
(2007-2012)

Government of India
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1. Introduction

The Steering Committee on Water Resources for the formulation of the Eleventh Five Year Plan was constituted by the Planning Commission vide Office Order No 25(1)/05-WR Dated 7.3.2006 under the Chairmanship of Dr Kirit S Parikh , Member Planning Commission. The Terms of Reference of the Steering Committee were as under. The Constitution Order is at Annexure.

(i) To review the progress and to guide the Working Group on Water Resources on approach, strategy, objectives and targets for the programmes of water sector.

(ii) To consider the Approach Paper and Action Plan for Rural Water Supply and Sanitation and recommend the strategy for these two sub sectors for the Eleventh Plan.

(iii) The Steering Committee will devise its own procedure and may co-opt any other official/non official Member, if necessary.

The Planning Commission also constituted one comprehensive Working Group on Water Resources Chaired by Secretary, Ministry of Water Resources to formulate and devise strategy for the development of various sub sectors in Water Resources Development. For Rural Water Supply and Sanitation the Approach Paper prepared by the Department of Drinking Water Supply for the Eleventh Five Year Plan provided the platform for development of strategies and policies for the sector.

The following is the Report of the Steering Committee, taking into consideration the inputs made available by the Working Group on Water Resources and the Approach Paper for the Eleventh Five Year Plan by Department of Drinking Water Supply , discussions held in the meetings of the Steering Committee.

2. Water Management

2.1 Water availability and requirement

India with 2.4% of the world's total area has 16% of the world's population; but has only 4% of the total available fresh water. This clearly indicates the need for water resources development, conservation and their optimum use. Fortunately, at a macro level India is not short of water. The problems that seem to loom large over the sector are manageable and the challenges facing it are not insurmountable.

The water resources potential of the country has been assessed from time to time by different agencies. The different estimates are shown in *Table 2.1*. It may be seen that since 1954, the estimates have stabilized and are within the proximity of the currently accepted estimate of 1869 billion cubic metre(BCM) which includes replenishable groundwater which gets charged on annual basis.

Table 2.1: Estimates of Water Resources of India

Agency	Estimate in BCM	Deviation from 1869 BCM
First Irrigation Commission (1902-03)	1443	- 23 %

Agency	Estimate in BCM	Deviation from 1869 BCM
Dr. A.N. Khosla (1949)	1673	-10%
Central Water & Power Commission (1954-66)	1881	+ 0.6%
National Commission on Agriculture	1850	- 1 %
Central Water Commission (1988)	1880	+ 0.6 %
Central Water Commission (1993)	1869	-

Within the limitations of physiographic conditions, socio political environment, legal and constitutional constraints and the technology available at hand, the utilizable water resources of the country have been assessed at 1123 BCM, of which 690 BCM is from surface water and 433 BCM from ground water sources. (CWC-1993). Harnessing of 690 BCM of utilizable surface water is possible only if matching storages are built. Trans-basin transfer of water, if taken up to the full extent as proposed under the National Perspective Plan, would further increase the utilizable quantity by approximately 220 BCM. The irrigation potential of the country has been estimated to be 139.9 million hectare (m.ha.) without inter-basin sharing of water, and 175 m.ha. with inter-basin sharing.

While the total water resources availability in the country remains constant, the per capita availability of water has been steadily declining since 1951 due to population growth. The twin indicators of water scarcity are per capita availability and storage. A per capita availability of less than 1700 cubic metres (m^3) is termed a water stressed condition while if it falls below 1000 cubic meters, it is termed as water scarcity condition. While on an average we may be nearing the water stressed condition, on an individual river basin wise situation, 9 out of our 20 river basins with 200 million populations are already facing a water scarcity condition. Even after constructing 4525 large and small dams, the per capita storage in the country is $213 m^3$ as against $6103 m^3$ in Russia, $4733 m^3$ in Australia, $1964 m^3$ in USA and $1111 m^3$ of China. It may touch $400 m^3$ in India only after the completion of all the ongoing and proposed dams.

The requirement of water for various sectors has been assessed by the “National Commission on Integrated Water Resources Development” (NCIWRD) in the year 2000. This requirement is based on the assumption that the irrigation efficiency will increase to 60% from the present level of 35 to 40%. The Standing Committee of MoWR also assesses it periodically.

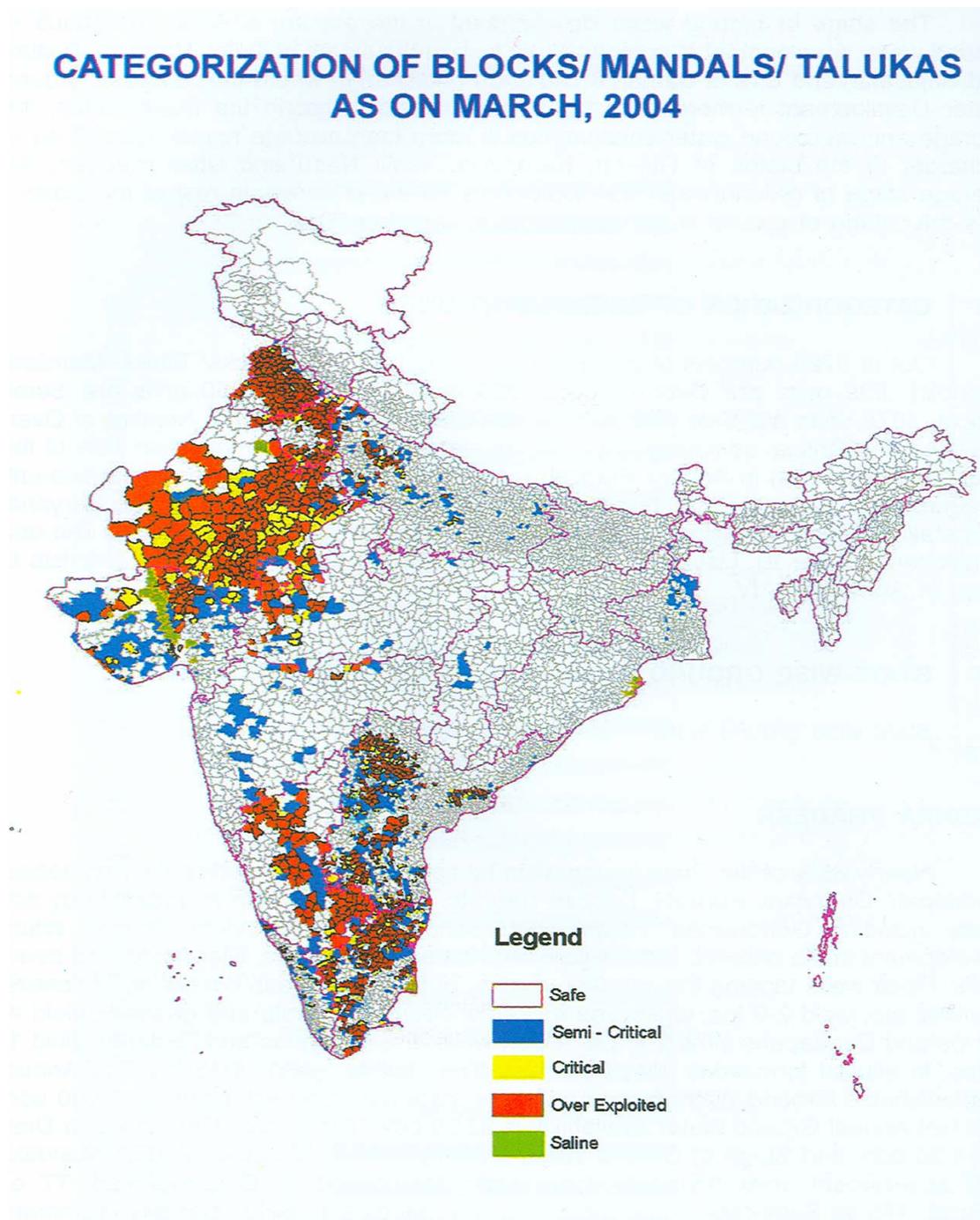
Water Requirement for Various Sectors

Sector	Water Demand in km^3 (or BCM)					
	Standing Sub-Committee of MoWR			NCIWRD		
Year	2010	2025	2050	2010	2025	2050
Irrigation	688	910	1072	557	611	807
Drinking Water	56	73	102	43	62	111
Industry	12	23	63	37	67	81
Energy	5	15	130	19	33	70
Others	52	72	80	54	70	111
Total	813	1093	1447	710	843	1180

2.2 Depletion of groundwater

The rapid development of ground water has led to over exploitation of ground water in the country. In 15% of the blocks the annual extraction of ground water exceeds annual recharge and in 4 % of blocks it is more than 90% of recharge. As the ground

water recedes wells have to be deepened and more energy has to be used to pump water. Figure below shows the status of ground water use in the country. The map shows two challenges: how to restrain ground water use to sustainable level in over exploited regions and the second to develop the large untapped ground water potential in Eastern India.



2.3 Climate Change and Water Resources.

The threat of climate change is now considered an established fact. General Circulation Models (GCM) simulate the behavior of the atmosphere and paint “what if” scenarios for various levels of Green House Gases emissions. Using these models the weather experts have predicted that global warming will intensify the hydrologic cycle; more intense rainfall will occur in fewer spells; floods and droughts both will become more intense; the floods will be more frequent; the rainfall will shift towards winter; and

there may be a significant reduction in the mass of glaciers, resulting in increased flows in the initial few decades but substantially reduced flows thereafter.

Ministry of Water Resources has already initiated some studies in co-operation with research institutions and reputed academic institutions to assess the impact of climate change on water resources.

The hydrologists are yet to translate what climate change means for the water availability, its distribution in time and space, and changes in demand. An increase in mean temperatures would increase the energy flux for evapo-transpiration. The increased potential evapo-transpiration in the forests could trigger major changes in the environment, and in the farms it would result in an increased crop water requirement. The changes in seasonal temperatures could change the crop seasons. Enough data is now available to paint “what if” scenarios for different possibilities, and to formulate some tentative plans to respond to these possibilities.

In the post climate change scenario, systems that are more resilient will fare better than systems that are less so. Engineering infrastructure that enable the water managers to store and transfer water with greater certainty can reduce the impact of uncertainty. Climate change considerations need to be factored in as we plan water resources infrastructure.

2.4 Water Stress and overcoming strategies

Sustainable development and efficient management of water is an increasingly complex challenge in India. Increasing population, growing urbanisation and rapid industrialisation combined with the need for raising agricultural production generates competing claims for water. There is a growing perception of a sense of an impending water crisis in the country. Some manifestations of this crisis are:

- There is hardly any city which gets 24 hours supply of drinking water.
- Many rural habitations which had been covered under the drinking water programme are now being reported as having slipped back with target dates for completion continuously pushed back. There are pockets where arsenic, nitrate and fluoride in drinking water are posing a serious health hazard.
- In many parts, the ground water table declines due to over exploitation imposing an increasing financial burden on farmers who need to deepen their wells and replace their pump sets and on State Governments whose subsidy burden for electricity supplies rises.
- Many major and medium irrigation projects seem to remain under execution forever as they slip from one plan to the other with enormous cost and time overruns.
- Due to lack of maintenance the capacity of the older systems seems to be going down.
- The gross irrigated area does not seem to be rising in a manner that it should given the investment in irrigation. The difference between potential created and area actually irrigated remains large. Unless we bridge the gap, significant increase in agricultural production will be difficult to realise.
- Floods are a recurring problem in many parts of the country. Degradation of catchment areas and loss of flood plains to urban development and agriculture have accentuated the intensity of floods.
- Water quality in our rivers and lakes are far from satisfactory. Water in most parts of rivers is not fit for bathing, let alone drinking. Untreated or partially treated sewage from towns and cities is being dumped into river.
- Untreated or inadequately treated industrial effluents pollute water bodies as also contaminate ground water.

- At the same time water conflicts are increasing. Apart from the traditional conflicts about water rights between upper and lower riparians in a river, conflicts about quality of water, people's right for rain water harvesting in a watershed against downstream users, industrial use of ground water and its impact on water tables and between urban and rural users have emerged.

The overall strategies for water management would inter-alia include

- Augmenting water availability through rain water harvesting including roof top rain water harvesting, groundwater recharge, water shed development, increasing the storage capacities, inter linking of rivers etc.
- On the demand management side improving the water use efficiency in general and irrigation in particular, adopting cropping pattern suited to the agro climatic zones, reducing the water demand especially in water intensive industries and household are suggested.
- There is a need for effective Participatory Water Management covering irrigation and water supply. This would imply people's participation in planning of projects starting at the grass root Panchayat level.
- Converging of funds available to various programmes for Water Resources development.
- Ensuring gender equity and making women partners in decision making and implementing water management schemes especially at village/local level.

These strategies are further elaborated in the following paragraphs.

3. Irrigation Development and Status

3.1 Ultimate irrigation potential

Demand for irrigation water in India is very large. However, the limits to storage and transfer of water restrict the potential for irrigation. The ultimate irrigation potential (UIP) reassessed by the Committee constituted by MoWR in May 1997, Potential Created (PC) & Potential Utilised (PU) up to end of Tenth Plan are given in Table below.

Ultimate Irrigation Potential, Potential Created and Potential Utilised (in m.ha)

Sector	Ultimate Irrigation Potential	Potential Created		Potential Utilised	
		Till end of IX th Plan	Anticipated in X th Plan	Till end of IX th Plan	Anticipated in X th Plan
Major & Medium Irrigation (MMI)	58.47	37.05	5.3	31.01	3.41
Minor Irrigation (MI)					
(a) Surface Water	17.38	13.6	0.71	11.44	0.56
(b) Ground Water	64.05	43.3	2.81	38.55	2.26

Sector	Ultimate Irrigation Potential	Potential Created		Potential Utilised	
		Till end of IX th Plan	Anticipated in X th Plan	Till end of IX th Plan	Anticipated in X th Plan
Sub-Total	81.43	56.9	3.52	49.99	2.82
Total:	139.9	93.95	8.82	81.00	6.23

The assessment of UIP needs to be periodically reviewed to account for revision in scope, technological advancement, inter basin transfer of water, induced recharging of ground water, etc. The creation of irrigation potential depends upon efficiency of the system for delivering the water and its optimal use at the application level. With the modern techniques of integrating micro irrigation with canal irrigation as has been done in case of Narmada Canal Project, Rajasthan, the ultimate irrigation potential can further be increased. Similarly in the case of ground water innovative methods of recharging the ground water and also storing water in flood plains along the river banks may enhance the ultimate irrigation potential from ground water to more than 64 m.ha.

3.2 History of irrigation development

The planned development of irrigation sector started in a big way since First Five Year Plan (1951-56). New projects were taken up in Second Five Year Plan, Third Five Year Plan and Annual Plans 1966-69. During Fourth Five Year Plan emphasis was shifted to completion of ongoing schemes. The widening gap between potential creation and utilisation was felt in Fifth Plan (1974-78) and accordingly Command Area Development (CAD) programme was launched. The Annual Plans 1978-80 and Sixth Plan witnessed new starts and then the focus was shifted towards completion of irrigation projects. By the end of VIII Plan (1996-97), central assistance was provided under Accelerated Irrigation Benefit Programme to help the State Governments in early completion of projects.

Although plan expenditure on irrigation has increased from Rs.441.8 crore in the Ist Plan to Rs. 95743.42 crore (outlay) in the X Plan, the share in total plan expenditure has decreased from 23% in the Ist Plan to 6.3% in the X Plan.

3.3 Major and Medium irrigation – performance, Accelerated Irrigation Benefit Programme, strategies and way forward for XI Plan.

The potential creation target fixed for Tenth Plan by Planning Commission was 9.93 mha. It was revised to 6.5 mha. during Mid Term Appraisal of the Plan. The performance during the first three years of the Tenth Plan and anticipated performance for remaining two years is given in *Table below*.

Physical and Financial Performance of MMI Sector during Tenth Plan

Year	Physical (in mha)		Financial (in Rs. crore)	
	Potential created	Potential utilised	Revised outlay	Expenditure
2002-03	0.812	0.532	13131.51	9655.68
2003-04	0.922	0.639	12334.79	11046.40
2004-05#	1.064	0.685	15483.05	15483.05
2005-06#	1.069	0.625	30263.83	30263.83
2006-07*	1.428	0.928		
Total	5.295	3.409	71213.18	66448.96

anticipated * targeted

A total number of 490 projects spilled into X Plan from previous plans, and another 231 projects were to be taken up during X Plan. Besides, it was also anticipated, based on the current financial and physical status of the projects, that 103 major, 210 medium and 62 Extension, Renovation and Modernisation (ERM) projects could be completed with adequate provision of funds. Since irrigation is a state subject, the projects are largely executed by state governments. The Working Group for Water Resources for Eleventh Five Year Plan has now assessed that 179 New Projects have been taken up in Tenth Plan, while 178 projects including 48 major, 91 medium and 39 ERM projects would be completed during Tenth Plan. The reasons for non-completion of the projects from the projected level include inadequate funds due to thin spread of funds over many projects, revision in the estimated costs, change in scope of the works, unforeseen bottlenecks involving other agencies, opposition by the Project Affected Persons (PAPs) etc.

Spill over projects into Eleventh Five Year Plan

In the course of analysing the status of ongoing projects likely to spill over, it is observed that a number of previously unreported projects have now been reported; some of the ongoing projects deferred while some of the projects have been interchanged among the classified heads of major, medium & ERM projects. After accounting for the number of new projects taken up in Tenth Plan, projects likely to be completed in Tenth Plan, and other factors inducing changes in the number of projects, the number of spill over projects into the Eleventh Five Year Plan works out to 477 including 166 major, 222 medium and 89 ERM projects. The status is given in ***Table below***.

Spill over Major, Medium and ERM Projects into XI Plan

Plan of Start of project	Major	Medium	ERM	Total
I	0	0	0	0
II	2	0	0	2
III	5	1	0	6
1966-69	2	0	0	2
IV	8	5	4	17
V	33	19	1	53
1978-80	2	9	3	14
VI	25	19	6	50
VII	10	13	11	34
1990-92	2	2	0	4
VIII	19	48	11	78
IX	20	40	17	77
X	38	66	36	140
Total	166	222	89	477

Projects of all three types have been under execution for many years, some from as far back as the Second Five Year Plan. Around 63% of the above 477 projects are unapproved by the Centre and are ineligible for central assistance.

Unapproved Projects

2.1. The schemes under Plan sector require formal investment clearance from Planning Commission before execution. Accordingly, major schemes are scrutinised for techno-economic feasibility, inter-state and international aspects, ecology are environmental aspects and rehabilitation aspects by the concerned Central Ministries. Recommendations of various expert agencies are then considered by the Advisory Committee of the MoWR. Thereafter the proposal is considered by Planning

Commission for investment clearance. In case of major and medium irrigation projects the State Planning Boards are empowered to clear the proposals if inter-state issues are not involved. In spite of well-defined policy and guidelines in place, a large number of major and medium projects have been under execution without investment clearance from Planning Commission. The unapproved projects in the Tenth Plan comprising of 90 major, 136 medium and 74 ERM projects are likely to spill over into Eleventh Five Year Plan . Expenditure likely to be incurred on these projects up to Tenth Plan will be about Rs. 41,128 crore with the break-up as in *Table below*.

Unapproved Major, Medium and ERM Projects.

	Number of unapproved (U.A) projects	Latest estimated cost	Expenditure up to X Plan	Ultimate Potential	Potential created up to X Plan
		(Rs. in crore)			(th.ha)
Major projects	90	100017.85	31004.66	5960.58	930.85
Medium projects	136	12947.09	5943.78	809.82	153.16
ERM	74	9095.30	4234.31	1177.07	135.10
Total	300	122060.24	41127.75	7947.47	1219.11

Accelerated Irrigation Benefit Programme (AIBP)

The additional irrigation potential created in the country from the beginning of Sixth Plan (i.e. 1980) to the end of the annual rolling plan of 1992 for the period of 12 years was 24.48 m.ha, which is at the rate of 2.04 m.ha. per annum. This rate of creation sharply came down to 1.03 m.ha. per annum during the VIII Plan. Responding to this sudden decline in the rate of creation of irrigation potential as well as allocation to the irrigation sector in the States Annual Plan, the Central Government initiated AIBP from the year 1996-97 under which central assistance is being extended to the large irrigation schemes for the early completion and accelerating creation of additional irrigation potential.

Under this programme all the projects which have the investment approval of Planning Commission are eligible for assistance. The programme which was entirely a loan from Centre in the beginning had been modified as per programmes of the Normal Central Assistance with a grant and loan component (mixed) from 2004-05. Also the reform measures like revision of water rates to cover Operation & Maintenance (O&M) charges have been introduced but the results were not satisfactory because of the sluggish efforts of State Governments to comply with the reform measures. Moreover, the incentive to the State Government i.e. 70% loan was not attractive enough to carry out the reforms. In the year 2005-06, Government of India launched *Bharat Nirman* Programme where 10 m.ha. of additional irrigational potential creation was targeted in a period of 4 years and to achieve this target, the AIBP guidelines were further modified in December, 2006 wherein Central Assistance has been kept in the form of 25% grant of project cost under AIBP for non special category States and 90% grant of project cost for special category states and projects benefiting drought-prone and tribal areas. It was also decided to treat projects in the undivided Koraput, Bolangir and Kalahandi (KBK) districts of Orissa *at par* with Special Category States.

Performance of AIBP

229 major and medium irrigation projects have been included under AIBP, out of which, 91 have been reported completed by July, 2007. The ultimate irrigation potential of the AIBP assisted major and medium projects/components is 82.76 lakh ha. Out of this the irrigation potential created up to March, 2007 is 43.56 lakh ha which is about 53% of the ultimate irrigation potential of all AIBP projects. Up to March 2007, 6205 minor

irrigation schemes were provided assistance under AIBP of which 4418 schemes have been completed. The ultimate irrigation potential of minor irrigation schemes included in AIBP was 3.85 lakh ha and potential of 1.87 lakh ha has been created up to March 2007. The completion rate has been quite satisfactory in respect of AIBP assisted minor irrigation schemes as these have low gestation periods.

However, the performance of major and medium irrigation projects in terms of completion of the projects as well as the potential creation is not very satisfactory. The outlays under the AIBP have been continuously stepped up since 1996-97. Creation of irrigation potential in the country under major and medium sector received fillip after commencement of AIBP. During the Eighth Plan period, irrigation potential of 22.10 lakh ha. was created in the country under Major and Medium sector at an annual rate of 4.4 lakh ha. per annum. During Ninth Plan, when AIBP was in operation, irrigation potential created in the Major & Medium Sector was 41.0 lakh ha. out of which 16.5 lakh ha. (nearly 40%) was through AIBP schemes. The highest creation of irrigation potential from First Plan to Eighth Plan is in the Fifth Plan and this is 40.28 lakh ha. With the introduction of AIBP the same pace of additional irrigational potential could be restored in 9th Plan and subsequently in the Tenth Plan.

The following steps could be taken for major, medium irrigation sector for the Eleventh Five Year Plan :

Major and Medium irrigation projects

1. Funds would be earmarked by the Planning Commission in the State Plans so that the ongoing schemes under AIBP can be completed in time and cost over run is avoided.
2. Since the fund requirement for medium/minor irrigation projects are less, adequate fund may be made available for completion of these projects, without jeopardising programme for important major projects. ERM Projects should be given due priority where the eroded potential can be restored with moderate expenditure.
3. Foremost priority should be given for completion of ongoing projects.
4. Ongoing projects which have already achieved 90% or more of the ultimate potential should be considered as completed. Critically review all such projects which are having only marginal benefit left or are near impossible to complete because of various problems, and declare them completed or curtailed or deleted. The balance cost of the remaining projects should be updated realistically for consideration during XI Plan.
5. *Inter-se* priority should be decided considering various aspects such as externally aided projects, interstate projects, projects benefiting drought prone or tribal areas, etc. as per the guidelines prepared by National Commission for Integrated Water Resources Development Plan.
6. High priority should be accorded to the Pre-Seventh and Seventh Plan Projects for funding under AIBP to complete these projects during XI Plan.
7. Schemes should be given out on fixed cost time certain contract basis with incentive and penalty clause.
8. Remote sensing satellite monitoring should be the basis for the performance of the implementation and accordingly the next release of funds should be made.
9. The CAD works and Project execution should be in one package to ensure the availability of the water upon completion of the project.

10. The extension, renovation and modernisation projects are being funded under AIBP assistance and their funding should be linked with improvement in efficiency of the irrigation system and for this purpose a minimum threshold target efficiency should be considered.
11. To improve efficiency, irrigation projects should be benchmarked for performance evaluation by an independent expert group so that optimum use of water is realised. The AIBP assistance in the form of grant should be made according to performance parameters.
- 11a. A separate budget head up to 15% of Plan fund may be provided as Irrigation Maintenance Fund (IMF) and full amount of irrigation revenue as collected should be credited to IMF.
12. In addition to liabilities of completed projects and provision for ongoing and new projects, the State plan proposals should incorporate provisions for special repairs of existing irrigation systems, dam safety measures, improved water management and water development aspect encompassing survey and investigation, research and development, training and National Hydrology Project.
13. System maintenance and revenue realisation should be handed over to beneficiaries groups or WUA's.
14. The existing regional/state level institutions such as WALMIs should be strengthened and brought into mainstream activities for irrigation management improvement.
15. Dam safety measures should be taken up systematically for Disaster Prevention and Management. 5% of Plan fund may be allocated for undertaking Dam Safety Activities to ensure that dams in distress get special and timely attention.
16. The performance evaluation of completed projects needs to be continued for benchmarking and improvement in irrigation efficiency.
17. New projects should be undertaken only after confirming that adequate funds for ongoing programmes are available, in the State Plan as well as the availability of Central Assistance by the Planning Commission
18. Introduce the concept of National Projects.
19. Review the requirements and process of environmental clearance.

3.4 Minor Irrigation – performance, strategies and way forward for XI Plan

Over 1951 to 2007, irrigated area from major projects has increased to 3.47 times, from tanks 1.9 times and from ground water 6.3 times. Ground water use has expanded as it provides control over irrigation to the farmer and its growth stimulated by spread of electrification and subsidised power. Even in the command area of major irrigation projects, farmers often use ground water as a matter of routine to supplement canal water to maximise agricultural production.

The outlay provided for Tenth Plan by the Planning Commission was Rs.13,873 crore for a target of 6.8 mha. The outlay has been subsequently revised to Rs.14,764 crore and during mid term appraisal the target was revised to 4.0 mha. However, it is now anticipated that the achievement may be around 3.5 mha, out of which 2.81 mha is anticipated through ground water development. The performance during the first three years of the Tenth Plan and anticipatory performance for remaining two years is given in *Table below*.

Physical and Financial Performance of MI Sector during X Plan

Year	Physical (in mha)		Financial (in Rs. crore)	
	Potential Created	Potential Utilised	Revised outlay	Expenditure
2002-03	0.687	0.548	1950.45	1639
2003-04	0.628	0.502	2634.63	1957
2004-05	0.740	0.592	2780.35	2780.35
2005-06#	0.545	0.440	7398.75	7398.75
2006-07*	0.918	0.734		
Total	3.518	2.816	14764.18	13775.1

anticipated * targeted

The broad reasons for low performance are as under:

- Poor economic status of small and marginal farmers.
- Non-availability of assured power supply.
- Highly subsidised water rates in canal command, whereas, no provision of subsidy for development of ground water.
- In hard rock areas, probability of obtaining ground water resource is low.
- Over extraction in critical areas which has caused depletion of water tables resulting in failure of wells.

Surface water schemes based on tanks and ponds have developed slowly. Due to the success of the Government in providing canal irrigation and heavily subsidised electricity for use of ground water there has been neglect of local storage through village ponds, tanks etc. Many of these have begun to disappear. This is partly due to village communities losing a sense of their own responsibility for managing water optimally. Restoration of water bodies has been taken up in 24 districts of 14 states namely Andhra Pradesh, Chhattisgarh, Gujarat, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamilnadu and West Bengal. In the Eleventh Five Year Plan 20,000 water bodies are likely to renovated and restored.

The strategy for the Minor Irrigation Sector for the Eleventh Five Year Plan is as under.

1. Renovation and Restoration of old tanks as well as old diversion channels in hilly regions may be given high priority.
2. Micro Irrigation System in water deficit areas should be promoted.
3. Ground Water Development in areas having untapped/unutilised potential Particularly in the Eastern Region should be promoted through a time bound programme.
4. A comprehensive strategy as recommended by the expert group for regulation of ground water development and use on sustainable basis should be implemented.

3.5 Bharat Nirman and Irrigation

Under Bharat Nirman the creation of average rate of irrigation potential creation is to be increased from 1.4 mha/annum (i.e. the average rate of creation from 1951-2002) to 2.5 mha/annum. With this objective, it is targeted to create 10 mha of irrigation potential through a combination of major and medium projects, minor irrigation and restoration of water bodies. The year wise physical details are given in table.

Irrigation Targets under Bharat Nirman

Unit in Million hectares

Components	2005-06	2006-07	2007-08	2008-09	Total
I Major & Medium Irrigation					
‣ Completion of on-going Projects	0.90	1.10	1.10	1.10	4.20
‣ Extension, Renovation. Modernisation of Major & Medium Irrigation Projects	0.25	0.25	0.25	0.25	1.00
Major & Medium Irrigation Total	1.15	1.35	1.35	1.35	5.20
II Minor Irrigation					
‣ Surface Water	0.25	0.25	0.25	0.25	1.00
‣ Ground Water	0.45	0.75	0.80	0.80	2.80
‣ Repair, Renovation & Restoration of Water bodies/ ERM of MI Schemes	0.05	0.05	0.45	0.45	1.00
Minor Irrigation Total	0.75	1.05	1.50	1.50	4.80
Grand Total	1.90	2.40	2.85	2.85	10.00

The creation of additional irrigation potential of 4.30 mha was targeted in the first two years of the Bharat Nirman programme against which the achievement reported up to March 2007 is 2.587 mha which is about half of the target. Clearly the acceleration of potential creation has not been as targeted.

Eleventh Five Year Plan would target to create 16 mha potential. During the first two years of XI Plan, it was proposed to create 5.7 mha irrigation potential through Bharat Nirman. This would call for higher outlays for irrigation from states, liberal assistance under Accelerated Irrigation Benefit Programme (which is now only a grant and available for surface minor irrigation schemes also) for completion of ongoing projects. External assistance for restoration of lost potential by restoring tank irrigation would be utilized. Ground water potential would be utilised in the states where there is still scope for development. Close monitoring of the projects with remote sensing and completing the projects on a fixed cost turn key mode is required to achieve the Bharat Nirman targets.

4.0 Efficiency, Equity and Sustainability

4.1 Increasing irrigation efficiency

For a gross irrigated area of about 87 m.ha., the water use is 541 BCM which gives a delta of 0.68 m per ha. of gross irrigated area. The average annual rainfall is 1170 mm (1.17m). Taking 70% of the rainfall as effective for crop consumptive use, the gross water use is about 1.45m (4.8 feet) per ha. of the gross irrigated area. This is very high as compared to water use in irrigation systems in say USA where water allocation is about 3 feet. This overuse in the country reflects a low irrigation efficiency of about 25% to 35% in most irrigation systems, with efficiency of 40% to 45% in a few exceptional cases. A basin wise study conducted by Dr. A. Vaidyanathan and K. Sivasubramaniam of the Madras Institute of Development Studies using potential evapotranspiration data and gross water withdrawals reports the overall irrigation efficiency in the country as 38%. The study reveals that the Krishna, Godavari, Cauvery and Mahanadi systems have a very low efficiency of around 27% while the Indus and Ganga systems are doing better with efficiencies in the range of 43%-47%. This is understandable as the peninsular rivers have large areas under irrigation in delta areas, where the water management practices are poor, while the rotational water supply ('warabandi') is practised in Indus and Ganga systems. However, this is only a macro level study. Project level data availability on irrigation efficiency unfortunately is minimal. It needs to be appreciated that 55% of the

area irrigated is by ground water sources where the efficiencies are quite high (70 to 80%) in view of absence of long conveyance systems. Consequently the efficiencies in surface irrigation systems must be much lower than the average figure of 38%.

Reasons for Low Irrigation Efficiency

The reasons that contribute to low irrigation efficiency can be identified as follows:

- (i) Completion of dam/ head works ahead of canals
- (ii) Dilapidated irrigation systems
- (iii) Unlined Canal Systems with excessive seepage
- (iv) Lack of field channels
- (v) Lack of canal communication network.
- (vi) Lack of field drainage
- (vii) Improper field leveling.
- (viii) Absence of volumetric supply
- (ix) Inadequate extension services

- (x) Low rate for water.

4.2 Participatory Irrigation Management

The equitable and optimal use of water from canal irrigation has been a matter of continuing concern. The traditional approach of pursuing these objectives through the field level functionaries of irrigation department had its limitations. The participation of actual beneficiaries through Participatory Irrigation Management (PIM) and the maintenance of village level distribution channels through Water Users Associations (WUAs) have been found useful. There is broad consensus that this has been a step in the right direction. This needs to be pursued more vigorously with genuine empowerment of Water User Associations. The objective should be to cover the entire command of all major and medium projects with WUAs by the end of the 11th Plan. The experience across states has been uneven. It is reported that 55,501 Users Associations has been created and state-wise position is indicated in *Table* below:

Statewise number of WUA's formed and irrigated area covered

Sl. No.	Name of State	Number of WUAs formed	Area covered ('000 ha)
1.	Andhra Pradesh	10790	4800.00
2.	Arunachal Pradesh	2	1.47
3.	Assam	37	24.09
4.	Bihar	37	105.80
5.	Chattisgarh	945	N.A.
6.	Goa	42	5.00
7.	Gujarat	576	96.68
8.	Haryana	2800	200.00
9.	Himachal Pradesh	875	35.00
10.	J&K	1	1.00
11.	Karnataka	2279	1052.41
12.	Kerala	3930	148.48
13.	Madhya Pradesh	1470	1501.45
14.	Maharashtra	1299	444.00
15.	Manipur	62	49.27
16.	Meghalaya	99	N.A.
17.	Nagaland	25	N.A.

Sl. No.	Name of State	Number of WUAs formed	Area covered ('000 ha)
18.	Orissa	11020	907.00
19.	Punjab	957	116.95
20.	Rajasthan	506	219.65
21.	Tamil Nadu	7725	474.28
22.	Uttar Pradesh	24	10.55
23.	West Bengal	10000	37.00
Total		55501	10,230.08 <i>say, 10.23 M ha</i>

4.3 Command Area Development and Water Management

The increasing difference between irrigation potential created and potential utilised is ascribed to number of reasons. Irrigation systems are designed for extensive irrigation for a 75 percent confidence level. Thus water availability in some basins would be less the designed amount. Excess withdrawal by farmers near the head of canals deprives farmers at the tail end of water. Inadequate development of field channels, required to be developed by farmers, contribute to the gap. The missing links or breaks in the canal network may also reduce utilisation. A part of this gap can be reduced by command area development programmes. Under the CAD Programme, 311 projects (with total Culturable Command Area (CCA) of 28.58 m.ha.) have been included so far. Till end of March 2006, the construction of field channels has been completed in an area of 17.43 mha. The Programme is presently going on in 136 projects with total CCA of 17.06 mha.

4.4 Coverage under Command Area Development and Water Management

Details of physical progress achieved in respect of core components under the Command Area Development and Water Management (CADWM) Programme during Tenth Plan till end of March, 2006 and likely to be achieved till end of X Plan are given in the *Table* below.

Physical Progress Under CAD and Water Management (CADWM) Programme in Xth Plan

(in m.ha.)

S.No.	Item	Progress till end of March, 2006	Anticipated Progress during 2006-07	Total Anticipated Progress for X Plan
1.	Field Channels	1.671	0.373	2.044
2.	Field Drains	0.476	0.108	0.584
3.	Warabandi	0.929	0.124	1.053
4.	Land Leveling *	0.050	-	0.050

* This component was discontinued w.e.f. 1.4.2004

5.0 Flood Management

5.1 Review

At the beginning of the Tenth Plan (2002), the area benefited or the area provided with a reasonable degree of protection was about 16.44 mha. The Planning Commission approved an outlay of Rs.4619 crore for State Sector to protect 1.93 mha. The area likely to be protected as reported by the states in their respective annual plan documents is 1.78 mha. Thus, total area reasonably protected against flood by end of Tenth Plan is likely to be 18.22 mha. The physical achievements per unit investment follow a reducing

trend because of cost escalation and increased allocation for stabilisation of existing works.

The year-wise outlays of the state and central sectors for Tenth Plan and the actual/anticipated expenditures are given in *Table below*

Financial Performance in Flood Management during X Plan

(Rs. crore)						
Year	Approved/Revised Outlay			Expenditure(actual/anticipated)		
	States	Centre	Total	States	Centre	Total
2002-03	624	151	775	698	86	785
2003-04	496	156	652	523	96	619
2004-05	669	184	853	644	100	744
2005-06	933	232	1165	830	181	1011
2006-07	1034	680	2520	1116	194	1310
Total	4562	1403	5965	3811	657	4468

During the first three years of the Tenth Plan, the flood damages as reported by the States and the relief fund released are given in *Table below*.

Table : Flood Damage and Relief in Tenth Plan

(Rs. crore)		
Year	Flood Damage Reported	Recommended Calamity Relief Fund
2002-03	2575	1600
2003-04	4434	1587
2004-05	3337	1286

The aforementioned relief funds also include assistance for cyclones and other such natural calamities. It would be seen from the above table that during the first three years of Tenth Plan, the expenditure on relief was significantly high and corresponding Plan outlays were inadequate. It is necessary that a more rational approach and optimum programme of works is adopted for flood management.

5.2 Strategies and Way Forward for XI Plan

Every year some part or other of the country gets flooded. A multi-pronged approach consisting of measures of prevention, protection, management, forecasting and early warning are needed.

Prevention and protection

Floods can be prevented or significantly moderated by watershed management of the catchment area of rivers. Agriculture, who is the nodal Ministry for the watershed management works should work out a detailed programme in consultation with the Ministry of Water Resources. For international rivers originating in Nepal and Bhutan, a joint mechanism for watershed management needs to be evolved. Another way is to preserve and augment flood cushions like natural swamps and lakes which can be developed into detention basins. Also capacity of existing depressions can be improved for absorbing flood waters. Special drives for development of Tal and Diara areas are needed. Construction of dams and reservoir schemes with adequate flood-cushion provide

long term solution of flood problems. Efforts should also be made for utilising the existing reservoirs in the country for flood moderation to the extent possible. Even in Reservoirs constructed for power or other purposes, the rule curves may be framed in such way that effective flood moderation is achieved. Rule curves guide the operation of a reservoir and ensure that a desired level of storage cushion is maintained to absorb floods of specified probability. Raising and strengthening of the existing embankments, if required after detailed studies of hydrological, morphological, topographical and developmental aspects, provide some protection.

Watershed management in the hilly catchments of the rivers originating in Nepal, Bhutan and hilly areas of India should be selectively chosen and funded fully. Implementation should be done through a joint mechanism.

The ideal solution for flood control is the creation of adequate storages in flood prone river systems. The Damodar Valley Corporation (DVC) is the best example of a series of storage projects which have made floods in the Damodar river basin a matter of history. The Ganga-Brahmputra-Barak basins are our most flood prone basins. There is clearly need to build storage reservoirs in the Northern tributaries of the Ganga and in the Brahmaputra and its tributaries in the North East. These storage projects need to be investigated designed and executed expeditiously. For the Northern tributaries of the Ganga cooperation with Nepal would be required. Negotiations would need to be pursued with vision and constructive pragmatism.

The strategy of flood control through embankments has been pursued by the States over the years. A holistic view of an entire tributary or a large stretch of a tributary needs to be taken. Where feasible a one time decisive investment for a flood protection project should be made. The recommendations of Expert Groups and contemporary international experience in other rivers in Asia with monsoon climate need to be looked into.

Managing floods

Construction at appropriate location of spilling sections/sluices in the flood embankment for the controlled flooding of the protected areas for restoring fertility, recharge of soil moisture and ground water can be useful. Drainage sluices should be integral part of embankments to prevent water-logging in the protected areas. Flood management schemes should be integrated with other infrastructural development programmes in the sectors of roads, railways, inland waterways and canal/command area development works. Drainage improvement in critical areas in the country to be given priority. Also dredging at selective locations i.e. outfalls etc. in the rivers and the tributaries help reduce flood levels in low lying areas and help in quick drainage. Erosion of land by rivers to be minimised through suitable cost effective measures. Centre should continue to assist the States in Ganga and Brahmaputra Valleys through Plan Funds to counter land erosion by river action. In order to give adequate emphasis on the operation and maintenance (O&M) of the flood protection measures already created, a percentage of outlay of the flood sector should be earmarked for this purpose. R&D activities for improved flood management needs to be encouraged.

To the extent ground water is intensively utilised for irrigation for multiple cropping in North Bihar and Bengal and local water bodies are restored, the capacity for recharge of ground water in the monsoon period would increase and flooding would get mitigated partially. In other parts of India flash floods would get minimised if local drainage and restoration/creation of local water bodies was done with watershed planning under NREGP, BRGF etc.

Forecasting and early warning

Development of digital elevation model of flood prone areas for taking up schemes for inundation forecast, preparation of flood risk maps, planning of flood management schemes etc should be taken up. Steps should be taken to ensure implementation of Action Plan prepared by National Disaster Management Authority for flood management .

6.0 Rural Water Supply

6.1 Status and Coverage

The status of provision of water and sanitation has improved slowly. According to Census 1991, 55.54% of the rural population had access to an improved water source. ***As on 1.4.2007, Department's figures show that out of a total of 15,07,349 rural habitations in the country, 74.39%(11,21,366 habitations) are fully covered, and 14.64%(2,20,165 habitations) are partially covered. Further, present estimates shows that out of the 2.17 lakh water quality affected habitation as on 1.4.05, about 70,000 habitations have since been addressed for providing safe drinking water***

Government of India's major intervention in water sector started in 1972-73 through Accelerated Rural Water Supply Programme (ARWSP) for assisting States/UTs to accelerate the coverage of drinking water supply. In 1986, the entire programme was given a mission approach with the launch of the Technology Mission on Drinking Water and Related Water Management. This Technology Mission was later renamed as Rajiv Gandhi National Drinking Water Mission (RGNDWM) in 1991-92. In 1999, Department of Drinking Water Supply (DDWS) was formed under the Ministry of Rural Development (MoRD) to give emphasis on rural water supply as well as on sanitation. In the same year, new initiatives in water sector had been initiated through Sector Reform Project, later scaled up as *Swajaldhara* in 2002. With sustained interventions, DDWS remains an important institution to support the States/UTs in serving the rural population with water and sanitation related services all across India.

An investment of about Rs.72,600 crores has been made (under both State and Central Plans) from the beginning of the planned era of development in rural water supply sector. As per available information, this investment has helped to create assets of over 41.55 lakh hand pumps, around 15.77 lakh public stand posts, around 1.60 lakh mini-piped water supply schemes and 45000 multi village schemes in the country under the Rural Water Supply Programme. Of these systems, 88.21% hand pumps, 93.49% stand posts, 91.95% mini schemes and 96.26% 5 multi village schemes are reported functional by the States. During the Xth Plan, the approved outlay for the programme was Rs.13,245 crores. The programme was well funded during 10th Plan (being a part of Bharat Nirman Programme) and by the end of March 2007, an amount of Rs.16,103 crore was released to the states under the scheme. On the physical achievement side, **3,52,992** habitations have been reported covered by the states during 10th Plan.

6.2 Issues in Rural Water Supply

The main problems are of sustainability of water availability and supply, poor water quality, centralised vs. decentralised approaches and financing of operation and maintenance costs

Habitations which are covered earlier years slip back to not covered or partially covered status due to reasons like sources going dry or lowering of groundwater, sources become quality affected, systems working below their capacity due to poor operation and

maintenance (O&M) and normal depreciation. Increasing population leading to emergence of new habitations also increase the number of unserved habitation.

Whenever the community has been involved from planning stage, the programme has always become sustainable. While our programmes have elaborate guidelines for community involvement, it is obvious that field level adoption is far from satisfactory. The 73rd and 74th Constitutional amendments have devolved the water supply responsibility to Panchayati Raj Institutions/local bodies. Due to their inherent weaknesses like funding constraints, low technical ability etc the devolution of power is yet to make a desirable impact on the ground. While sporadic success stories are trickling in, this aspect has yet to go a long way. States have to play an important role in placing the Twelfth Finance Commission (TFC) grants devolved to Panchayats and placing the implementation agency at the command of local bodies. The second is simply absent in many states.

Financing of the Capital Cost and O&M (Rural Water Supply Programme)

States have been expressing constraints in providing adequate matching share for availing Accelerated Rural Water Supply Programme funds. The Department of Drinking Water Supply has suggested that funding pattern of the programme should change from the current 50:50 (Center:State) to 75:25 for Non Special Category States and 90:10 for Special Category States.

The Bharat Nirman Programme has nearly doubled the fund available for the sector through the Accelerated Rural Water Supply Programme. The Centre is also encouraging the external assistance for this sector. The average cost of coverage of not covered, slipped back and quality affected habitations have gone up considerably

The Twelfth Finance Commission has provided enough funds for the O&M of the water supply systems in rural areas. Also the rural community is not averse to paying charges for a reliable supply. Convergence of various programmes would also bring additional funds. While the funding for the programme would be provided for through various sources, what is more important for the success of the programme is the change in the approach (community based local solutions) and mind set (moving away from the pure asset creation towards service delivery approach).

6.3 Strategies and Way Forward in XI Plan

The problems of sustainability of water availability, maintenance of supply system and dealing with the issue of water quality are the major challenges in the Eleventh Five Year Plan. ***The conjunctive use of groundwater ,surface water and roof top rain water harvesting systems will be required to be encouraged as means of improving sustainability and drinking water security.*** While convergence of various programmes for funds and physical sustenance is most important, states should put in place an effective coordinating mechanism for attaining success. Otherwise the vicious cycle of coverage and slip back would continue in the next plan also. The Eleventh Five Year Plan proposes to deal with the various issues as follows:

The Twelfth Finance Commission awards for maintaining the water supply systems by local bodies must be implemented and schemes transferred to Panchayats. State can share a part of the O&M cost of such Panchayat as a hand holding support for first few years before the local bodies become self sustainable. To enable local bodies, an effective Management Information System for knowing the status of water supply in every habitation in the state should be put in place. State should earmark funds for this

purpose. All the states information system should be connected to the all India server at Delhi and this MIS should be web enabled for moving to the larger objective of public monitoring. Also adequate training at local bodies' level should be undertaken for enhancing their technical capacities for maintaining the water supply systems. The implementing agencies must be made accountable to the local bodies for providing water supply services. However major engineering schemes can be with the state level agencies.

Local Participation and Convergence

In order to universalise access to safe drinking water, it needs to be isolated from agriculture and other uses wherever possible. To prevent lowering of water tables due to excessive extraction, cooperation with agricultural users becomes necessary. A cooperative mechanism of water users and Panchayat representatives has to regulate use within average annual recharge level. All groundwater based resources should be provided with a recharge structure which would help keep the source alive. Also rain water harvesting in schools and community buildings should be made compulsory ***and individual household rooftop rain water harvesting system like individual household toilets should be promoted***, if necessary, special funds should be earmarked for this purpose.

Where groundwater quality ***and availability***, is unsatisfactory surface water sources need to be developed. Restoration and building of tanks and other water bodies ***along with rainwater harvesting structures for recharge and for direct collection at community and household levels*** constitute an attractive option. The Central Government should support the states for tapping the maximum external assistance for this purpose, a part of the assistance could be shared by the Centre as decided in the case of the external assisted Water Bodies Restoration programme wherein 25% grant of the project cost is passed on to the states. The assistance here could be restricted to covering the quality affected habitations in various states.

Another alternative is to bunch the habitations into large numbers and involve the technically sound private service providers to cover the quality affected habitations on an annuity basis for a certain period. Meanwhile parallel efforts to restore the source through water augmentation programme should continue in these habitations as an alternative arrangement ***provided such systems are proposed by and have the consent of the Panchayati Raj Institutions(PRI's) and Local Bodies.***

Involvement of the community in the monitoring of the water supply works should be made a primary condition for release of funds for completed work. Department of Drinking Water Supply has initiated monitoring of the water quality under the National Rural Drinking Water Quality Monitoring and Surveillance Programme under which the Gram Panchayat/Village Water and Sanitation Committee provided with user friendly field test kits for testing both bacteriological and chemical contaminants followed by testing of the samples at district and state level laboratories. Such initiatives need to be extended to the other regular programmes under the Accelerated Rural Water Supply Programme also. ***Involving the community in bringing quality and sustainability to the village level drinking water supply systems should be encouraged, rewarded and recognised in an appropriate manner along the lines of the Nirmal Gram Puraskar which has galvanised communities and local bodies for an enthusiastic and effective response to the Total Sanitation Campaign of the Government of India.***

While our programme guidelines do recognise the role of women in planning and post implementation maintenance with some success stories of women maintaining the hand pumps and tube wells, the success has to spread far and wide. Of late, the country is realising the potential of women in the form of Self Help Groups. Women Self Help Groups are functioning well in states like Tamil Nadu & Gujarat. Women Self Help

Groups also should be given the responsibility for collection of maintenance funds after the source is handed over to them for maintenance. Women self help groups should be encouraged for taking up the O&M of the existing functional systems. If the source is dysfunctional, the state should incur one-time expenditure to set it right and encourage SHG to take them over. The resources required could be easily mobilised if the various programmes can be converged to work in complementary ways.

The National Rural Employment Guarantee Programme (NREGP) has seven identified work component related to water. Rural Development Ministry is implementing major water shed schemes through Department of Land Resources. There are other programmes like Backward Region Grant Fund, artificial recharge of groundwater schemes and rain water harvesting, restoration of water bodies scheme (both pilot and external assisted) by Ministry of Water Resources *the National Project for Renovation of Water Bodies and schemes such as the National Afforestation Programme, River Valley Project, Flood Prone River Programme, Integrated Wasteland Development Programme, Grants under Twelfth Finance Commission, Hariyali* and the states own schemes. Convergence of these programmes should help to augment funds and bring institutions together for sustainable water supply.

7.0 Rural Sanitation

7.1 Status and Coverage

Sanitation is to be seen as a basic need, as basic as drinking water or food. A sanitary toilet within or near home, provides privacy and dignity to women. Mahatma Gandhi emphasized the link between sanitation and health as a key goal for our society. Sanitation coverage, which ought to be a way of life to safeguard health, is inadequate in our country. In fact, problems like open defecation continue to remain the only form of sanitation for the majority of the population in rural areas. The practice of open defecation in India is due to a combination of factors—the most prominent of them being the traditional behavioral pattern and lack of awareness of the people about the associated health hazards.

Recognizing the link between healthy environment and sanitation, the Millennium Development Goals (MDGs) stipulate, inter alia, halving, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. The Total Sanitation Campaign (TSC) programme, the flagship programme of the Government, has set an ambitious target, beyond the MDG's and aims to achieve universal sanitation coverage in the country by the end of the Eleventh Plan.

Performance Review of Rural Sanitation Sector TSC in Tenth Plan

The TSC is being implemented in 578 districts of 30 States/UTs with support from the Central Government and the respective State/UT Governments. Against a target of 10.85 crore individual household toilets, the toilets reported completed is about 2.89 crore up to Jan 2007. In addition, about 3.12 lakh school toilets, 8900 sanitary complex for women and 99150 balwadi toilets have been constructed. The approved outlay for the programme in the Tenth Plan was Rs 955 crore and the anticipated financial utilization is about Rs 2000 crores. The Eleventh Five Year Plan targets to complete 7.29 crore individual toilets for achieving universal sanitation coverage in rural areas.

7.2 Issues in Rural Sanitation Coverage

The current programme emphasis on construction of household toilets though laudable, needs to reorient itself to a vigorous Information and Education Campaign mode to bring about a change in mind set. The evaluation study of the programme has

shown that 20% of the toilets are not used or used for other purposes like storage. The super structure for the toilet, the one that guarantees privacy and dignity, was provided funds under the programme starting only in March 2006.

The issue of convergence of the programme with health awareness received a boost only after the launch of National Rural Health Mission. While it was introduced earlier at school level, at the community level it was expanded later. However school programme had a cascading effect on the individual household and children helped to change attitudes. The awareness is now picking up and the programme needs to capitalize on this for increasing the sanitation coverage. Lack of priority for the programme by many states leading to inadequate provision of funds for the state share for the TSC, lack of emphasis on personal communication on sanitation at village level and inadequate capacity building at grass root level are some of the common issues seen across the states which hinder expansion of sanitation coverage.

Eleventh Plan Priorities

While the hardware part of the programme for assisting the states in providing the various types of sanitation would continue, the focus now should be more on changing behaviour patterns. The Nirmal Gram Puraskar has brought a sea change in the attitudes of the community and it is promoting a healthy competition among the Panchayats for achieving total sanitation. Low cost technology options for constructing the toilets should be tried and community should be given freedom to choose the various options. The focus on school sanitation needs to continue. In addition, solid waste management in villages should be the next focus area. Ten per cent of the TSC funds are earmarked for this purpose already. Adequate funding for the programme would have to be provided so that the momentum generated is not lost.

7.3 Strategies and Way Forward for XI Plan

- Open defecation free status is the basic objective of the programme. The sanitation campaign should focus on creating awareness about the importance of sanitation among people with special emphasis on children. Awareness can spread rapidly from children to parents to community which will create demand for sanitation. The software component of the programme like IEC, NGP will receive more priority.
- Once individual or community toilets are provided demand for water would increase.
- Rural sanitation has to be promoted on low water, low-cost and eco-sanitation models without causing further stress on water resources. Such systems will be actively promoted, encouraged, incentivised and rewarded.
- As an incentive mechanism, the Nirmal Grams should be provided funds under Accelerated Rural Water Supply Programme (ARWSP) for higher service levels from 40 lpcd to 55-60 lpcd per capita. This should be with commitment for meeting the O&M cost from the society.
- Specific policy directives for sanitation campaigns to include special needs of women, adolescent girls, infants, disabled and the aged will be given.
- Sufficient focus of rural sanitation should be laid on the needs of disaster prone areas such as hills, mountains, coastal areas, etc.
- The investments required in training, skill development for production of low-water, low-cost sanitation appurtenances suitable for rural areas and training of self-groups of women, youth, etc. as masons and mistries for embarking on large-scale simple toilet construction activities throughout the country will be made available. The community should be encouraged to avail soft micro credits from the Self-Help Groups and for which a separate revolving fund should be provided.

- There is a need to have a monitoring system for the villages, which got the Nirmal Gram Puraskar award so that the success obtained is sustained. Community monitoring with women and children would be the primary choice. A close monitoring mechanism to oversee the coverage of BPL household and in SC/ST household also should be put in place at every state level.
- Schools provided with sanitation facilities should have a separate rain water harvesting system to meet the water requirement for the sanitation purposes.
- The Nirmal Gram Puraskar model of recognizing and rewarding entire village panchayats and PRIs which has been able to bring about total sanitation in many villages through awareness, peer pressure and local competitive spirit amongst the PRIs will continue to be promoted.
- Segregation of degradable and non-degradable solid waste, black and grey liquid wastewater and holistic environmental protection and cleanliness through rural sanitation, solid and liquid waste programmes will be promoted as the next area of focus.
- Decentralised sanitation solid and liquid waste management as business models under various employment and self-employment programmes with appropriate incentives will be encouraged

8.0 Urban Water Supply

8.1 Status and Coverage

Water supply in urban areas is far from satisfactory. As on 31.3.2004, about 91% of the urban population has got access to water supply facilities. However, this access does not ensure adequacy, equitable distribution and the per capita availability is not as per norms in many areas. Average access to drinking water is highest in class I towns (73%), followed by class II towns (63%), class III towns (61%) and other towns (58%). Poor people in slums and squatter settlements are generally deprived of these basic amenities. The population coverage in the past decades and as of March 2004 is as shown in *Table 5.1* below:

The quantity of urban water supply is also poor. Water is supplied only for few hours of the day which leads to lot of waste as taps are kept open and water is stored not all of which is used. This is so, despite the fact that per capita availability of water in cities like New Delhi exceeds that in Paris, where water is supplied round the clock.

Table 5.1: Percentage of population covered with Water Supply Facilities

Year	Urban Population (million)	Percentage of Population Covered with Water Supply
1981	152	78
1991	217	84
2001	285	89
2004	308 (projected)	91

8.2 Issues in Urban Water Supply

Sustainability in the urban water supply is addressed mainly through supply side augmentation. Distant perennial sources are identified and long distance piped water transfer to the cities and towns are common. Augmentation plans are generally gigantic and engineering oriented and has greater acceptability all levels. The demand management is the least preferred option. However when it comes to payment of water charges, the decision is invariably with the elected Government and not with the

executing agency, which has to depend on the grants for operation and maintenance, for sustaining the quantity and quality.

There is a huge gap between the demand and supply of water in urban areas, which is also growing due to population and urbanisation. Norms for various places depending upon the level of development have been established and it is maximum for metropolitan cities. The regular Plan programmes by states are heavily tilted in favour of supply side management. Recycling and reuse of water, reducing the water demand through rain water harvesting, using water efficient household equipments including flushing cisterns would go a long way in conserving water and reducing demand. Proper metering of water and rational tariff would reduce water demand and encourage conservation. We need to have a concept of Water Efficient Homes in urban areas and for this there is a need to have a well orchestrated information campaign. Long distance piped water transfer and desalination of water in coastal areas as augmentation measures are very capital intensive. Demand management is necessary to achieve sustainability.

Provision of water supply in urban areas is basically a responsibility of urban local bodies. The Public Private Partnership (PPP) efforts to attract financing of water supply projects are finding its place, though so far only in few cases (*See Box 5.4*). PPP is important to leverage government investments and to access private sector management efficiencies. Reforms are a necessary precondition for gaining success through PPP. It is paradoxical that urban utilities receive funds from institutions like HUDCO, LIC, and Government etc without any reform conditionalities, but on the other hand, states are given additional financial support towards implementing reforms through schemes like JNNURM.

Tariff and Operation and Maintenance (O&M)

Evolving realistic water tariff so as to discourage excessive use of treated/potable water is one of the important management tool for demand management. Not much has been done on this important aspect in many urban local bodies in the country except a few larger cities which have undertaken some measures by way of installing water meters for consumers. The major reason for slow progress in this regard is that good quality meters are not available on a large scale since the meter manufacturing facility is vested with small-scale industries at present, which do not have the capacity to produce meters on a large scale.

Poor O&M due to inadequate financial resources is one of the primary reasons for low sustainability and equity in water supply. The responsibility of operation, maintenance and revenue collection is generally vested with the elected urban local body (ULB), while the specialised bodies are not able to raise the water tariff without the approval of the provincial Governments. The local bodies generally receive grant assistance ranging from 10% to 60% for capital works on water supply and sanitation from the State Government. Usually, they do not receive any grant assistance for operation and maintenance (O&M) of water supply and sewerage. Municipal bodies in many parts of the country suffer from inadequate resources. Assessment of demand and 'willingness to pay' by the communities, would help to arrive at a basis for pricing water management services and to clarify the scope for adopting 'full cost recovery' policies to achieve financial sustainability.

8.3 Strategies and Way Forward for XI Plan

The Eleventh Five Year Plan will address the issues faced by the sector and to achieve the goal of universal water supply coverage and sustainability as follows:

Priority for Drinking water

- While designing and constructing multi purpose dams/reservoirs, adequate care would be taken to reserve/apportion sufficient quantity of water for domestic use in the urban areas. Keeping in view the National Water Policy, top most priority would be given by the State Govts. to the drinking water supply needs of cities and towns from the available water sources. This needs to be operationalised by all States in the form of State Water Policy as desired in National Water Policy, 2002.
- Under JNNURM and UIDSSMT programmes, special attention will be given to towns and cities affected by surface and ground water contamination due to the presence of chemicals such as iron, manganese, fluoride, salinity, arsenic, pesticides etc. in excess of the prescribed limits. Such drought prone and water shortage areas as well as the cities and towns having water quality problems would be given top priority in the selection process by State Governments/ULBs.

Maintenance of Assets

- Adequate thrust may be given to the O&M of the assets created for their optimal and efficient use by evolving suitable strategy and creating adequate infrastructure facilities within State Departments/concerned ULBs.
- Computerised MIS is a must for developing a strong data base at local, State and Central levels on Urban Water Supply and Sanitation sector for decision making, planning and mid course corrections from time to time. In most States, elaborate computerised MIS is not in place. It is recommended that MIS Cells may be created with central funding at State and Central levels for exchanging information and to develop good data base for the sector.

Metering of Water for Volumetric Change

- Telescopic water tariff/user charges should be formulated and levied to discourage excessive use of water while providing a basic quantity of water at a low tariff. Metering of water supplies should be made mandatory in a phased manner with a view to conserve water as well as to generate revenue on a realistic basis.
- The ULBs need to be given greater autonomy in respect of fixing tax rates; user charges etc. and also ensure regular revision of such rates. 74th Constitutional Amendment needs to be implemented in its entirety. There is a need for regulatory regime in water supply and sanitation sector to enthuse confidence among the private players.

Reducing Waste and Promoting Conservation

- Intensive leak detection and rectification programme should receive priority. Severe penalties should be levied on those found responsible for leakage and wastage of water. ULBs may be asked to enact necessary changes in the Municipal Acts.
- To reduce wastage of water, adoption of low volume flushing cisterns, waste not taps etc. should be adopted so as to minimise the need for fresh water. Ministry/TCPO may take up the matter with the States and ULBs to promote usage of such cisterns so as to conserve fresh water. CPWD may also widely use such cisterns in the buildings constructed by them.

Augmenting Availability

- It must be made mandatory to install rain water harvesting systems in both public and private buildings including industrial and commercial establishments so as to conserve water. The ULBs should make it a point not to approve building plans having no provision for such systems. It is also equally important to ensure proper implementation of the approved system by the builders.
- The State Govts. and ULBs may implement schemes for artificial recharge of ground water as per techniques developed by the Central Ground Water Board (CGWB).

Water Quality

- Water quality surveillance and monitoring should be given top most priority by the State Govts./ULBs so as to ensure prevention and control of water borne diseases. For this purpose, water quality testing laboratories have to be set up in every city and town backed by qualified personnel to handle such laboratories and where such labs already exist, they should be strengthened with equipment, chemicals, manpower etc., if necessary.

Finance

- Efforts should be made to step up the quantum of funds through institutional financing, foreign direct investment, assistance from bilateral, multi-lateral agencies, newly launched Pooled Finance Development Scheme (PFDs), tax free municipal bonds, MPLAD funds etc. apart from involving private entrepreneurs.

Human Resources

- Trained technical human resources are must for successful implementation and maintenance of various water supply and sanitation schemes. However, in some States as well on in many ULBs the water utilities do not have adequate trained technical personnel, due to which the sector is affected badly. Under the circumstances, the PHE training programme of the Ministry of UD has to be toned up further with adequate funds to enable CPHEEO to impart training to the various technical personnel of the State Govts./ULBs on a variety of technical subjects and management aspects.

9.0 Urban Sanitation and Solid Waste Management

9.1 Status and Coverage

On the basis of information furnished by the State agencies in charge of Urban Water Supply and Sanitation Sector, about 91% of the urban population has got access to water supply and 63% to sewerage and sanitation facilities (47% from sewer and 53% from low cost sanitation) as on 31.3.2004. However, adequacy, equitable distribution and per-capita provision of these basic services may not be as per prescribed norms in most of the cities. For instance, the poor, particularly those living in slums and squatter settlements, are generally deprived of these basic facilities.

As per assessment made by the Central Pollution Control Board (CPCB) on the status of wastewater generation and treatment in Class I cities and Class-II towns during 2003-04 , about 26,254 MLD of wastewater is generated in 921 Class I cities and Class II towns in India (housing more than 70% of urban population). The wastewater treatment capacity developed so far is about 7044 MLD – accounting for 27% of waste water generated in these two classes of urban centers.

Status of WS, Wastewater Generation and Treatment in Class I Cities/Class II Towns in 2003-04

Parameters	Class I Cities	Class II Towns	Total
Number (as per 2001 census)	423	498	921
Population (millions)	187	37.5	224.5
Water Supply (MLD)	29782	3035	32817
Water Supply (lpcd)	160	81	146
Wastewater generated (MLD)	23826	2428	26054
Wastewater generation (lpcd)	127	65	116
Wastewater treated (MLD)	6955 (29%)	89 (3.67%)	7044 (27%)
Wastewater untreated (MLD)	16871 (71%)	2339 (96.33%)	19210 (73%)

It is estimated that about 1,15,000 MT of Municipal Solid Waste is generated daily in the country. Per capita waste generation in cities varies from 0.2 kg to 0.6 kg per day depending upon the size of population. An assessment has been made that per capita waste generation is increasing by about 1.3% per year. With growth of urban population ranging between 3 to 3.5% per annum, the annual increase in overall quantity of solid waste generated in the cities is assessed at about 5%. The collection efficiency ranges between 70 to 90% in major metro cities, whereas in several smaller cities it is below 50%. It has been estimated that the Urban Local Bodies spend about Rs.500 to Rs.1500 per tonne on solid waste collection, transportation, treatment and disposal. About 60-70% of this amount is spent on street sweeping, 20-30% on transportation and less than 5% on final disposal of waste, which shows that hardly any attention is given to scientific and safe disposal of waste. Landfill sites have not yet been identified by many municipalities and in several municipalities, the landfill sites have been exhausted and the respective local bodies do not have resources to acquire new land. Due to lack of disposal sites, even the collection efficiency gets affected.

9.2 Issues in Urban Sanitation and Solid Waste Management

The major issues in urban sanitation are how to expand sewerage and sanitation facility to cover all the people in all cities and towns; how to find resources to do that; how to create awareness about the importance of sanitation and solid waste management; how to prepare and execute plans that keep up with growing population; and how to finance the operation and maintenance costs of the facilities created?

9.3 Strategies and Way Forward for XI Plan

Initiatives Required in Eleventh Five Year Plan

- Recycling and reuse of sewage after the desired degree of treatment (depending upon the end use) for various non-potable purposes should be encouraged. Industries and commercial establishments must be persuaded to adopt reuse of treated sewage and recycle treated trade effluents to the extent possible in order to cut down the fresh water demand. Moreover, incentives in the form of rebate on water cess, concessions in customs and excise duty on equipment and machinery, tax holiday etc., should be considered by GOI for agencies dealing with planning, developing operating such reuse treatment plants as well as users of treated sewage and trade effluents. Similarly for dense urban neighbourhoods, decentralised waste treatment systems which are cheaper and reduce the distance that the sewage is transported form a viable alternative to large treatment plants.
- Targeted subsidy may be made available to SC and ST and other disadvantaged groups living in urban slums on taking house service connections for water supply/sewerage, metering, construction of latrine and subsidized water rates etc. and accordingly adequate funds may be ear-marked for the purpose so as to avoid any possible diversion of funds by the State Governments/ULBs. At the same time

internal ear-marking of funds for the urban slums under JNNURM/UIDSSMT schemes should be made mandatory. It is also very much necessary to monitor the physical and financial progress of the implementation of such programmes on a regular basis by the funding agencies so as to ensure fulfillment of the envisaged objectives.

- Comprehensive storm water drainage system has to be provided in all the cities and towns based on need, in order to avoid water logging in residential areas/flooding of streets during monsoon period.
- There is a need to have a National Centre for Water Excellence, which looks at especially the drinking water and sanitation sector in rural and urban water areas.
- We need to find a way to provide sewerage facilities to unauthorised housing colonies without giving them a right to the land by implication.

Solid Waste Management (SWM)

- Urban waste management by ULBs is already under stress because of paucity of resources and inadequacies of the system. Unless concerted efforts are made to improve the flow of resources to Solid Waste Management and build up systems which incorporate the basic requirements of a proper waste management practice, the problem of urban waste will be further aggravated and cause environmental health problems.
- It is recommended that all the cities and towns have to be provided with appropriate Solid Waste Management facilities giving due emphasis to the magnitude of the problem.
- Soil fertility is being badly affected by excessive use of chemical fertilizers and inadequate use of organic fertilizers. Large quantities of urban waste can be a useful solution to this problem. Compulsory production of compost from urban solid waste in cities and towns and promotion of application of this organic manure in agriculture and horticulture should be implemented, as this may have a significant positive impact on soil fertility.
- The Report of the Inter Ministerial Task Force on the “Integrated Plant Nutrient Management using city compost” constituted by the Ministry of Urban Development in March, 2005 as per the directive of Hon’ble Supreme Court of India has recommended technical, financial, qualitative, marketing and sustainability aspects of utilization of Municipal Solid Waste for compost purpose. Recommendations of the Task Force need to be implemented through provision of various fiscal incentives/concessions.
- Quality standards for compost will have to be prescribed by Bureau of Indian Standards (BIS) at the earliest. At the same time, it should be made mandatory that compost sold in the market should clearly indicate the exact chemical composition (NPK etc) on the bags for the benefit of users.
- To the extent possible materials such as metal, glass, plastic, rubber, tin and paper available in the municipal waste must be recycled back as they have adequate salvage value. Inorganic and inert material such as sand, grit, stones, bricks, concrete, rubble, etc. may also be used for making low cost bricks, road material, aggregates, etc. As such, efforts should be made to reuse the same and enough incentives in the form of tax concessions, subsidies etc. may be given to the entrepreneurs dealing with such materials/processes.
- Our cities are littered with uncollected solid waste and no public place or street is free of litter. Though much recycling takes place by rag pickers and waste collectors, a lot is left to be disposed off. To keep cities clean, citizen involvement is essential, to sort waste at source and minimize waste that needs to be collected and disposed. A programme should be implemented to obtain citizens’ cooperation. NGOs should be

encouraged to provide organizational support and identity to the rag pickers so that better recycling occurs. Adequate land should be earmarked/allotted at the planning stage itself by the respective ULBs for setting up of sanitary land fills; compost plants and other processing units including provision for future expansion.

- Awareness campaigns on various aspects of water quality, importance of safe drinking water, its handling and storage, water conservation in homes, use of sanitary toilets, separate storage of dry and wet garbage and its hygienic disposal, vector control, personal hygiene etc. should be mounted.

PPP in Urban Sanitation and Solid Waste Management

Though privatization of water supply and sanitation sector could not make significant progress as of now, there is substantial potential and urgent need for the same in near future. By and large, the tariff rates being charged from the consumers are very low and there is a general reluctance for enhancing the same. Under the circumstances, without aiming at full cost recovery, privatization cannot be a successful proposition. It is felt that it would be easier and convenient to introduce privatization in new areas where the private companies will have a free hand to take up the task of planning, designing, execution, operation and maintenance, billing and collection including tapping of raw water from the selected source either on BOO or BOOT basis. The successful award of Chennai service contract for operation and maintenance of 61 sewage pumping stations in the city and Rajkot and Surat example of contracting out a number of municipal services to private firms as well as community groups are a few examples to infuse confidence in private entrepreneurs.

There were some public concerns on PPP projects in the water supply sector in the country because of which the projects were either stalled or dropped. If community could be involved in PPP projects there would be more acceptability to such projects. PPP can be redesigned as Public Private Community Partnership (PPCP) to overcome the hurdle.

25(1)/05-WR
Government of India
Planning Commission
(Water Resources Division)

Yojana Bhavan, Sansad Marg,
New Delhi 110001, Date 7.3.06

ORDER

Subject: Constitution of a Steering Committee on Water Resources for the Eleventh Five-Year Plan (2007-2012).

It has been decided to set up a Steering Committee on Water Resources for the formulation of Eleventh Five Year Plan with the following composition.

1.Member (Water&Energy), Planning Commission	Chairman
2.Secretary, Ministry of Water Resources	Member
3.Secretary, Department of Drinking Water Supply	Member
4.Managing Director, NABARD	Member
5.Adviser (WR), Planning Commission	Member-Convener
Non Official Members	
6.Prof A.Vaidyanathan (Former Member, Planning Commission)	Member
7.Shri A.K.Goswami (Former Secretary, DoDWS & MOWR)	Member
8.Prof Subhash Chander (Former Professor and Head of Civil Engineering Department, IIT Delhi)	Member
9.Prof. Dilip Biswas (Former Chairman, Central Pollution Control Board)	Member

The Terms of Reference to the Committee will be

(i)To review the progress and to guide the Working Group on Water Resources on approach, strategy, objectives and targets for the programmes of water sector.

(ii)To consider the Approach Paper and Action Plan for Rural Water Supply and Sanitation and recommend the strategy for these two sub sectors for the Eleventh Plan.

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3. The Steering Committee will devise its own procedure and may co-opt any other official/non official Member, if necessary.

4. The expenditure on TA/DA of official Members in connection with the meetings of the Committee will be borne by the parent Department/Ministry/ Organization as per the rules of entitlement applicable to them. This expenditure in respect of non-official Members will be borne by the Planning Commission as per SR190 (a).

5. The Steering Committee will submit its report to Planning Commission by September 30th, 2006.

6. Shri A.Sekhar, Adviser (Water Resources) (Telephone 011-23096578) will be the nodal officer for this Steering Committee and any further correspondence / query may please be made with him.

(K.K.Chhabra)
Under Secretary (Administration)

To

1. Chairman and all Members of the Steering Committee.
2. PS to Deputy Chairman, Planning Commission
3. PS to all Members/Minister of State, Planning Commission
4. SPS to Member-Secretary, Planning Commission
5. Adviser (Agri), Planning Commission
6. Director (PC), Planning Commission

(K.K.Chhabra)
Under Secretary (Administration)