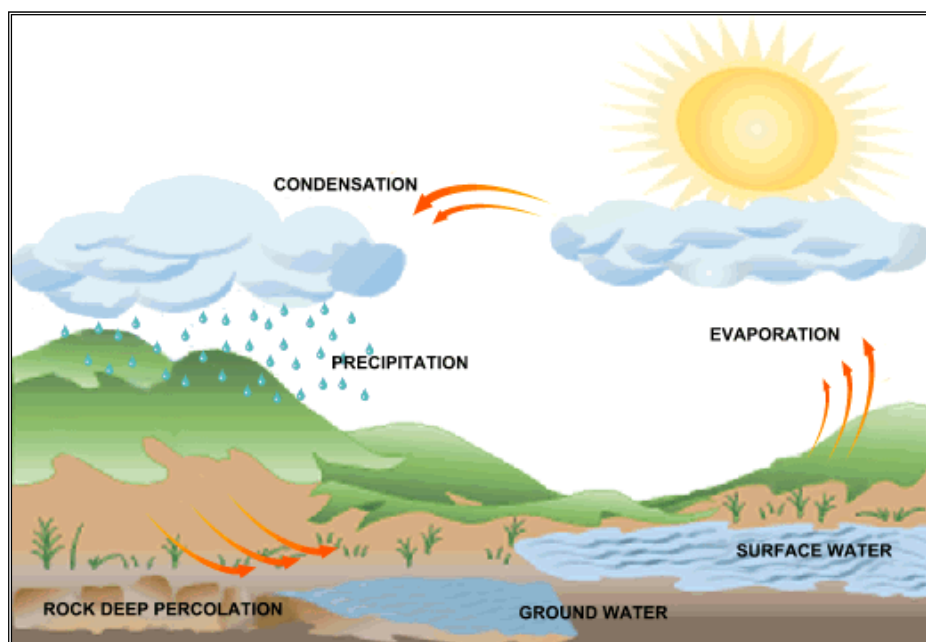


GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES

NATIONAL WATER MISSION
under
National Action Plan on Climate Change



COMPREHENSIVE MISSION DOCUMENT

Volume - I

New Delhi
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Comprehensive Mission Document of National Water Mission

C o n t e n t s

Chapter	Description	Page No.
Volume - I		
	Executive Summary	iii
1.	Introduction	1
2.	Objectives of National Water Mission	3
3.	Goals and Strategies	5
3.1	Comprehensive water data base in public domain and assessment of impact of climate change on water resource	6
3.2	Promotion of citizen and state action for water conservation, augmentation and preservation	10
3.3	Focused attention to over-exploited areas	13
3.4	Increasing water use efficiency by 20%	14
3.5	Promotion of basin level integrated water resources management	18
4.	Monitoring and Evaluation Mechanism, Institutional Setup and Plan of Action	21
4.1	Proposed monitoring and evaluation mechanism	22
4.2	Institutional set-up	23
4.3	Action Plan and timelines	24
5.	Research & Development, Training and Capacity Building	25
6.	Additional Fund Requirements	27
Annexure -I	Specific Strategies / Strategies related to Water Resources as identified in the Technical Document annexed with the “National Action Plan on Climate Change”	29
Annexure -II	Composition of Advisory Board under the chairmanship of Union Minister of Water Resources	31

Chapter	Description	Page No.
Annexure -III	Composition of High Level Steering Committee for National Water Mission	32
Annexure-IVa	Composition of Inter-sectoral Advisory Group for Goal-I: Comprehensive Water Data Base In Public Domain and Assessment of Impact of Climate Change on Water Resources	33
Annexure-IVb	Composition of Inter-sectoral Advisory Group for Goal-II: Promotion of Citizen and State Action for Water Conservation, Augmentation and Preservation	34
Annexure-IVc	Composition of Inter-sectoral Advisory Group for Goal-III : Focused Attention to over-Exploited Areas	35
Annexure-IVd	Composition of Inter-sectoral Advisory Group for Goal-IV: Increasing Water use Efficiency By 20%	36
Annexure-IVe	Composition of Inter-sectoral Advisory Group for Goal-V: Promotion of Basin Level and Integrated Water Resources Management	37
Annexure -V	Composition of Technical Committee on Climate Change and Water Resources	38
Annexure -VI	Composition of Secretariat for National Water Mission	39
Annexure -VII	Action Plan and Timelines for identified Strategies under “National Water Mission”	40
Annexure -VIII	Additional Fund Requirements for Identified Activities during XI Plan	61
Volume-II		
Appendix-I	Report of the Sub-Committee on “Policy and institutional Framework”	I/1 -I/55
Appendix-II	Report of the Sub-Committee on “Surface Water Management”	II/1 - II/105
Appendix-III	Report of the Sub-Committee on “Ground Water Management”	III/1 - III/50
Appendix-IV	Report of the Sub-Committee on “Domestic and industrial Water Management”	IV/1 - IV/140
Appendix-V	Report of the Sub-Committee on “Efficient Use of Water for Various Purposes”	V/1 - V/51
Appendix-VI	Report of the Sub-Committee on “Basin level Planning and Management.”	VI/1 - VI/36

Comprehensive Mission Document of National Water Mission

EXECUTIVE SUMMARY

The main objective of the National Water Mission is “conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management”. The five identified goals of the Mission are: (a) comprehensive water data base in public domain and assessment of impact of climate change on water resource; (b) promotion of citizen and state action for water conservation, augmentation and preservation; (c) focused attention to over-exploited areas; (d) increasing water use efficiency by 20%, and (e) promotion of basin level integrated water resources management.

Various strategies for achieving the goals have been identified which lead to integrated plan for sustainable development and efficient management with active participation of the stakeholders after identifying and evaluating the development scenario and management practices towards better acceptability on the basis of dependable projection of the impacts of climate change on water resources based on reliable data and information. Identified strategies of the Mission also aim to review (a) National Water Policy, (b) policy for financing water resources projects, and (c) criteria for design and planning for water resources projects. The most important strategy is to identify and evaluate development scenario and management practices towards better acceptability with due consideration to integrated water resources planning and emphasis on ensuring convergence among various water resources programmes.

Some of the important features of the Mission are:

- Review of National Water Policy;
- Research and studies on all aspects related to impact of climate change on water resources including quality aspects of water resources;
- Expeditious implementation of water resources projects particularly the multipurpose projects with carry over storages;
- Promotion of traditional system of water conservation;
- Intensive programme for ground water recharge in over-exploited areas;
- Incentivize for recycling of water including wastewater;
- Planning on the principle of integrated water resources development and management.
- Ensuring convergence among various water resources programmes; and

- Intensive capacity building and awareness programme including those for Panchayati Raj Institutions, urban local bodies and youths.
- Sensitization of elected representatives of over exploited area on dimensions of the problem and to orient investment under NREGA towards water conservation.

For achieving the objectives of the Mission, long-term sustained efforts both in terms of time bound completion of identified activities and ensuring the implementation of identified policies and enactment of necessary legislation through persuasion at different levels with the State Governments have been envisaged. The first and foremost action is to put in place appropriate mechanism for coordinated actions followed by intensive capacity building and awareness programme up to lower most level of management i.e., Panchayati Raj Institutions, urban local bodies, Water User Associations etc. All sections of the society, particularly youths are planned to be actively involved in the process. Apart from research activities related to implementation of development programmes, particularly about conservation of water through storages - both above and below the ground (which need to be continued on long-term basis), some of the specific action points which are planned to be completed in a time bound manner are as under.

- **Comprehensive water data base in public domain and assessment of the impact of climate change on water resources**
 - Review and establishment of network for collection of additional necessary data by March 2011.
 - Development of water resources information system and bringing all information in public domain except the data of classified and sensitive nature by March 2012.
 - Reassessment of basin wise water situation by March 2011.
 - Impact of climate change on water resources based on reliable data by March 2012.
- **Promotion of citizen and state actions for water conservation, augmentation and preservation**
 - Expeditious formulation of river interlinking projects by March 2012.
- **Focused attention to over-exploited areas**
 - Intensive rainwater harvesting and groundwater recharge programme to cover 1120 over-exploited, critical and semi-critical blocks during XI Plan and rest to be covered in XII Plan and 30% of the urban areas by March 2012.

- Intensive rainwater harvesting and groundwater recharge programme to cover all the blocks by March 2017.
- **Increasing water use efficiency at least by 20%**
 - Development of guidelines for incentivizing for recycling of water including wastewater by March 2011.
 - Development of guidelines for incentives for water-neutral and water-positive technologies by March 2011.
 - Development of guidelines for improving efficiency of urban water supply system by March 2011.
 - Preparation of guidelines and manuals for mandatory water audit including those for drinking water purpose by March 2011.
 - Review of financing policy and allocations by March 2010.
 - Undertake Pilot studies in collaboration with States by March 2012.
- **Promotion of basin level integrated water resources management**
 - Guidelines for different uses of water e.g., irrigation, drinking, industrial etc particularly in context of basin wise situations by March 2011.
 - Review of National Water Policy and adoption of revised Policy by March 2013.

A dedicated Mission Secretariat has also been proposed through creation of three posts i.e., one Mission Director and two Advisors and with provision for either outsourcing or redeploying services of professional as per requirements.

Chapter - 1

Introduction

India is faced with the challenge of sustaining its rapid economic growth while dealing with the global threat of climate change. This threat emanates from accumulated greenhouse gas emissions in the atmosphere, anthropogenically generated through long term and intensive industrial growth and high consumption lifestyles in developed countries. While engaged with the international community to collectively and cooperatively deal with this threat, India needs a national strategy to firstly, adapt to climate change and secondly, to further enhance the ecological sustainability of India's development path.

Climate change may alter the distribution and quality of India's natural resources and adversely affect the livelihood of its people. With an economy closely tied to its natural resource base and climate-sensitive sectors such as agriculture, water and forestry, India may face a major threat because of the projected changes in climate.

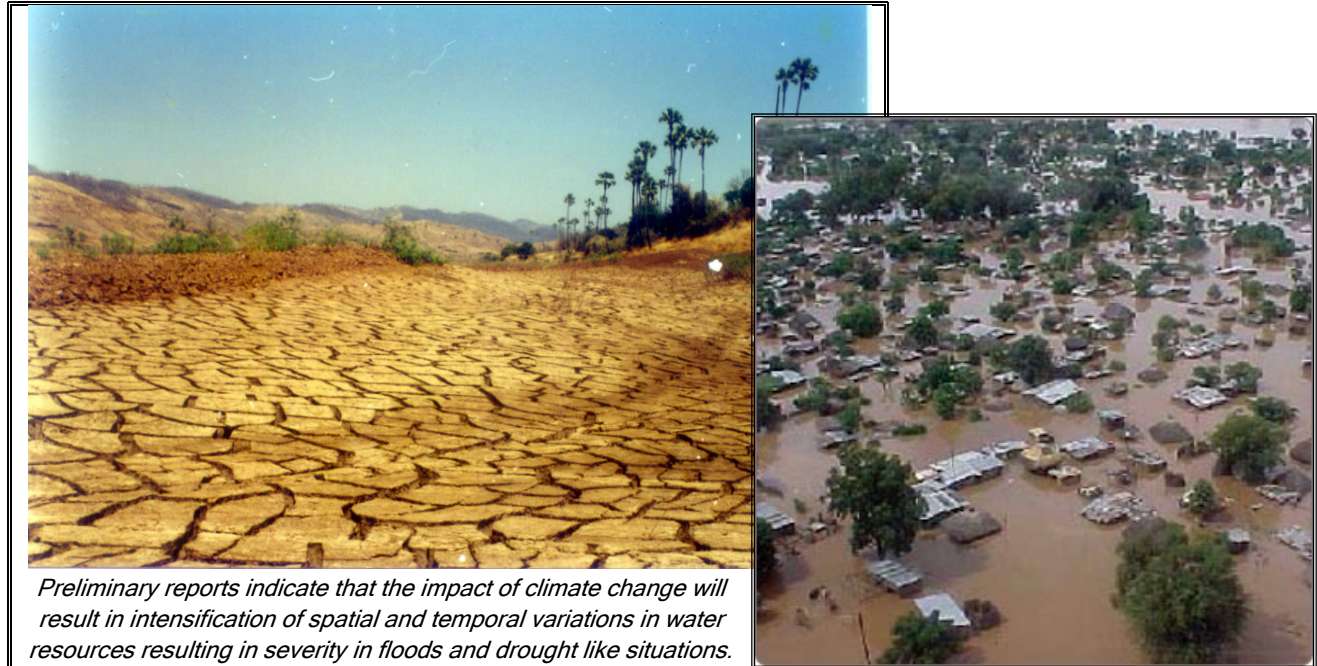
The global warming may affect the hydrological cycle which could result in further intensification of temporal and spatial variations in precipitation, snow melt and water availability. The report on "India's Initial National Communication to the United Nations Framework Convention on Climate Change" published by Ministry of Environment and Forests, Government of India identifies the following projected impacts of climate change on water resources.

"It is obvious that the projected climate change resulting in warming, sea level rise and melting of glaciers will adversely affect the water balance in different parts of India and quality of ground water along the coastal plains. Climate change is likely to affect ground water due to changes in precipitation and evapo-transpiration. Rising sea levels may lead to increased saline intrusion into coastal and island aquifers, while increased frequency and severity of floods may affect groundwater quality in alluvial aquifers. Increased rainfall intensity may lead to higher runoff and possibly reduced recharge."

Some of the possible identified implications of climate change on water resources are listed below:

- Decline in the glaciers and the snowfields in the Himalayas;
- Increased drought like situations due to overall decrease in the number of rainy days over a major part of the country;
- Increased flood events due to overall increase in the rainy day intensity;
- Effect on groundwater quality in alluvial aquifers due to increased flood and drought events;

- Influence on groundwater recharge due to changes in precipitation and evapo-transpiration; and
- Increased saline intrusion of coastal and island aquifers due to rising sea levels;



With a view to address the related issues, the National Action Plan on Climate Change (NAPCC) has been prepared by the Government of India, which has been released by the Hon'ble Prime Minister on 30th June 2008. The NAPCC has laid down the principles and has identified the approach to be adopted to meet the challenges of impact of climate change through eight National Missions namely, (a) National Solar Mission, (b) National Mission for Enhanced Energy Efficiency, (c) National Mission on Sustainable Habitat, (d) National Water Mission, (e) National Mission for Sustaining the Himalayan Eco-system, (f) National Mission for a Green India, (g) National Mission for Sustainable Agriculture, and (h) National Mission on Strategic Knowledge for Climate Change.

This Comprehensive Mission Document of “National Water Mission” identifies the strategies for achieving the goals of (a) Comprehensive water data base in public domain and assessment of the impact of climate change on water resource, (b) Promotion of citizen and state actions for water conservation, augmentation and preservation, (c) Focused attention to over-exploited areas, (d) Increasing water use efficiency by 20%, and (e) Promotion of basin level integrated water resources management.

Objectives of National Water Mission

The National Action Plan on Climate Change (NAPCC) describes the features of National Water Mission as under:

“A National Water Mission will be mounted to ensure integrated water resource management helping to conserve water, minimize wastage and ensure more equitable distribution both across and within states. The Mission will take into account the provisions of the National Water Policy and develop a framework to optimize water use by increasing water use efficiency by 20% through regulatory mechanisms with differential entitlements and pricing. It will seek to ensure that a considerable share of the water needs of urban areas are met through recycling of waste water, and ensuring that the water requirements of coastal cities with inadequate alternative sources of water are met through adoption of new and appropriate technologies such as low temperature desalination technologies that allow for the use of ocean water.

The National Water Policy would be revisited in consultation with States to ensure basin level management strategies to deal with variability in rainfall and river flows due to climate change. This will include enhanced storage both above and below ground, rainwater harvesting, coupled with equitable and efficient management structures.

The Mission will seek to develop new regulatory structures, combined with appropriate entitlements and pricing. It will seek to optimize the efficiency of existing irrigation systems, including rehabilitation of systems that have been run down and also expand irrigation, where feasible, with a special effort to increase storage capacity. Incentive structures will be designed to promote water-neutral or water-positive technologies, recharging of underground water sources and adoption of large scale irrigation programmes which rely on sprinklers, drip irrigation and ridge and furrow irrigation.”

The NAPCC also describes the procedure for implementation of the Mission as under:

“These National Missions will be institutionalized by respective ministries and will be organized through inter-sectoral groups which include in addition to related Ministries, Ministry of Finance and the Planning Commission, experts from industry, academia and civil society. The

institutional structure would vary depending on the task to be addressed by the Mission and will include providing the opportunity to compete on the best management model.

Each Mission will be tasked to evolve specific objectives spanning the remaining years of the 11th Plan and the 12th Plan period 2012-2013 to 2016-2017. Where the resource requirements of the Mission call for an enhancement of the allocation in the 11th Plan, this will be suitably considered, keeping in mind the overall resources position and the scope for re-prioritization.

Comprehensive Mission documents detailing objectives, strategies, plan of action, timelines and monitoring and evaluation criteria would be developed and submitted to the Prime Minister's Council on Climate Change by December 2008. The Council will also periodically review the progress of these Missions. Each Mission will report publicly on its annual performance.

Building public awareness will be vital in supporting implementation of the NAPCC. This will be achieved through national portals, media engagement, civil society involvement, curricula reform and recognition / awards, details of which will be worked out by an empowered group. The Group will also consider methods of capacity building to support the goals of the National Missions.

We will develop appropriate technologies to measure progress in actions being taken in terms of avoided emissions, wherever applicable, with reference to business as usual scenarios. Appropriate indicators will be evolved for assessing adaptation benefits of the actions.

These Eight National Missions taken together, with enhancements in current and ongoing programmes included in the Technical Document, would not only assist the country to adapt to climate change, but also, importantly, launch the economy on a path that would progressively and substantially result in mitigation through avoided emissions."

The 'Technical Document' annexed with the NAPCC has identified key areas related to (a) studies on management of surface water resources, (b) management and regulation of ground water resources, (c) upgrading storage structures for fresh and drainage system for wastewater, (d) conservation of wetland, and (e) development of desalination technologies etc. required to be considered while preparing the comprehensive document for the National Water Mission. The details are at Annexure-I.

Chapter - 3

Goals and Strategies

Water resources schemes and projects are multidisciplinary in nature and are implemented by several departments and agencies of State Governments and various ministries/departments of Central Government. Therefore, it has been considered necessary to examine all related issue through a consultative process. Accordingly, Ministry of Water Resources (MoWR) constituted six Sub-Committees to examine all related aspects in the field of:

- a. Policy and Institutional Framework;
- b. Surface Water Management;
- c. Ground Water Management;
- d. Domestic and Industrial Water Management;
- e. Efficient Use of Water for Various Purposes; and
- f. Basin Level Planning and Management.

The reports of the Sub-Committees are given in Volume-II of the Comprehensive Mission Document as Appendix-I to Appendix -VI. Based on the (a) objectives of the National Water Mission, (b) identified key areas to be addressed, and (c) recommendations of the Sub-Committees, the following goals have been identified.

- a. Comprehensive water data base in public domain and assessment of the impact of climate change on water resource
- b. Promotion of citizen and state actions for water conservation, augmentation and preservation
- c. Focused attention on over-exploited areas
- d. Increasing water use efficiency by 20%
- e. Promotion of basin level integrated water resources management

Strategies for each of the identified goals are discussed hereunder.

3.1 Goal - 1: Comprehensive water data base in public domain and assessment of the impact of climate change on water resource

The first and the foremost action required is to have a comprehensive data base in public domain (except for the data of sensitive nature) and to have a assessment of the impact of climate change on water resources in terms of availability as well as the quality of the water from surface and ground water sources, which inter-alia includes (a) collection of necessary data; (b) research and studies to project impact of climate change on water resources; (c) development of suitable models; and (d) development of suitable techniques for efficient utilization of water and conversion of poor quality water into fresh water.



In recent years, increase in the rate of recession of glaciers have been observed which many scientists attribute to climate change



Sea level rise could impact (a) low lying coastal areas, (b) salinity in ground water, (c) estuarine and wetlands, (d) tidal hydraulics etc.

The key areas identified in the NAPCC in respect of data base & assessment of impact of climate change on water resources and the identified strategies to achieve the objectives are summarized as under:

Table - 1: Recommended strategies for Goal 1- Comprehensive water data base in public domain and assessment of the impact of climate change on water resource

Key areas highlighted in NAPCC	Recommended strategies and identified action points	
(a) Estimating river flow in mountainous areas, (b) Extending isotopic tracer based techniques of monitoring river water discharge to all major river monitoring stations, (c)	Strategy I.1	Review and establishment of network for collection of additional necessary data
		a. Review of network of hydrological observation stations
		b. Review of the network of automatic weather stations and automated rain gauge stations and

Key areas highlighted in NAPCC	Recommended strategies and identified action points
<p>Strengthening the monitoring of glacial and seasonal snow covers to assess the contribution of snowmelt to water flow of Indian rivers that originate in the Himalayas, (d) Establishment of a wider network of automatic weather stations and automated rain-gauge stations, (e) Developing an inventory of wetlands, especially those with unique features, (f) Water purification technologies, and (g) Mapping of catchments and surveying and assessing land use patterns with emphasis on drainage, vegetation cover, silting, encroachment, conservation of mangrove areas, human settlements and human activities and its impact on catchments and water bodies.</p>	<p>establishment of additional stations especially in respect of : (i) <i>Better network for evaporation data, and (ii) Rain fall data collection network through automated sensors.</i></p> <p>c. Collection of necessary additional hydro-meteorological and hydrological data for proper assessment of impact of climate change particularly in Himalayan region, coastal region etc including other improvements required in hydrometric networks to appropriately address the issues related to the climate change. The data should inter-alia include (i) <i>Coastal and estuarine water, salinity and tidal water levels and the changing discharges in both directions in estuarine areas,</i>(ii) <i>Hydrological and hydro-meteorological data in low rainfall areas,</i> (iii) <i>Hydrological and hydro-meteorological data above permanent snowline, glaciated areas, seasonal snow areas in Himalayan region,</i> (iv) <i>Better network for collection of evaporation and rain gauge data using automated sensors,</i> (v) <i>Establishment/strengthening of ground water monitoring network through construction of purpose built observation wells, sanctuary wells for coastal aquifer management and water quality monitoring,</i> (vi) <i>Repeated collection of data about river geometry and morphology for monitoring erosion and carrying capacity,</i> (vii) <i>Massive tidal hydraulics data collection, and</i> (viii) <i>Surface and ground water quality data collection.</i></p>
<p>Strategy I.2</p>	<p>Development / implementation of modern technology for measurement of various data</p> <p>Development and implementation of modern techniques including isotopic tracer based techniques for measurement especially for the areas like storm surge, tidal hydraulics, salinity and unsteady flow.</p>
<p>Strategy I.3</p>	<p>Developing inventory of wetland</p>
<p>Strategy I.4</p>	<p>Development of water resources information system (except the data of sensitive and classified nature, all information to be in public domain)</p> <p>Development of Water Resources Information</p>

Key areas highlighted in NAPCC	Recommended strategies and identified action points	
<p>(a) Customizing climate change models for regional water basins, and (b) Developing models of urban storm water flows and estimating drainage capacities for storm water and for sewer based on the simulations.</p>	<p>Strategy 1.5</p>	<p>System which, in addition to hydrological, hydrometeorological and other relevant informations would also include (i) inventory of glaciated lakes and water bodies, (ii) wetland especially, those with unique features; and (ii) mapping of catchments and surveying and assessing land use patterns with emphasis on drainage, vegetation cover, silting, encroachment, conservation of mangrove areas, human settlements. All information except the data of sensitive and classified nature would be in public domain.</p> <p>Research and studies on all aspects related to impact of climate change on water resources including quality aspects of water resources with active collaboration of all research organizations working in the area of climate change</p> <p>Research and studies specifically for projection of impact of climate change on surface and ground water including its water quality in areas of (i) Basin efficiency, (ii) Possibilities of increasing dam heights, (iii) Identification of minor tanks where FRL can be raised without raising dam heights by installing gates and evaluation of the same, (iv) Identification of tanks and water bodies which can be effectively de-silted, where silt has commercial value and evaluation of the same, (v) Improving intra-national equity in usable water for drought management like conducting economics considering land, water and livelihood to plan how much water is necessary to yield reasonable income, (vi) Water harvesting, provided this is socially desirable and provided that corresponding water saving is possible elsewhere in the region, (vii) Impact on Intensity-Duration-Frequency relationships in urban areas, (viii) Impact on Magnitude-Duration-Frequency of drought (agricultural, meteorological and hydrological), (ix) Study of Water-energy-Climate Change relationships, (x) Planning tidal embankments to protect against tides and increased flood frequency and increased sea level, (xi) Effect of sea level rise on ground water salinity and prospective</p>

Key areas highlighted in NAPCC	Recommended strategies and identified action points
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measures like groundwater recharge, (xii) Possible tidal channels for fresh water storage, (xiii) Preparation of sediment budgets and accounts for each basin, (xiv) Review the interpretation of regime maintenance on Ganga, after climate change, (xv) Isotope applications in GW dating and contaminant transport, (xvi) GW basin models for conjunctive use of SW & GW and application of RS/GIS in GW management, (xvii) Assessment and strategies for development potential of deeper aquifers, (xviii) Coastal aquifer management including use of hydraulic barriers for control of sea water ingress, (xix) Assessment of feasibility and viability of rainwater harvesting in existing domestic and commercial buildings, (xx) Supporting researchable issues specifically of (xxi) Atmospheric Science Groups towards downscaling of GCM or RCM to basin/project level and also understanding the effect of climate change on monsoons, (xxii) Supporting water and climate related researches towards studying the sensitivity of different hydrologic types of water projects to different climate change scenarios and improvements required in hydrometric networks to incorporate climate change, (xxiii) Building a Universal Soil Loss model depicting erosion and sediment transport etc. Proving the model based on sediment flow and reservoir sedimentation data, Actuating the above model for changed rainfall regime and changed management practices, (xxiv) Developing, through R&D effort, a combined unsteady flow hydraulics-cum-sediment transport model capable of depicting river erosion in each flood event. Using the model to test river management works, (xxv) Water quality modeling for each major river and aquifer, and (xxvi) Hydro chemical and solute transport modeling in areas vulnerable for seawater ingress and water quality problems.

**Strategy
I.6**

Reassessment of basin wise water situation

- a. Reassessment of basin wise water situation in present scenario including water quality by using latest techniques, which inter-alia may include (i) development or adoption of comprehensive water balance based model (ii)

Key areas highlighted in NAPCC	Recommended strategies and identified action points
Strategy I.7	<p data-bbox="813 247 1406 373">fitting models to basin using current data, and (iii) assessment of likely future situation, with changes in demands, land use, precipitation and evaporation.</p> <p data-bbox="740 394 1406 489">b. Comprehensive Reassessment of the ground water resources up to Block / Mandal / Taluka level for the entire country.</p> <p data-bbox="740 527 1406 590">Projection of the impact of climate change on water resources</p> <p data-bbox="813 632 1406 789">Projection of water resources availability as a result of impact of climate change which would inter-alia include the likely changes in the characteristics of water availability in time and space.</p>

Details of the strategies are discussed in the recommendations of the Sub-Committees and the same are included in the volume - II of the Mission Document.

3.2 Goal - 2: Promotion of citizen and state action for water conservation, augmentation and preservation

The studies in respect of impact of climate on water resources indicate that various components of the hydrological cycle would be affected resulting in further intensification of temporal and spatial variations of the water availability. This situation calls for urgent steps for conservation of the available water resources. It is also necessary to take immediate steps for augmentation of the utilizable water resources. The objective of water conservation can be achieved through storages over the surface as well as under the ground through very active participation of all stakeholders. The objective of augmentation of water resources can be achieved by transferring the surplus flood water into utilizable water and also through desalination of sea and brackish water. Mass awareness and capacity building are key strategies.

The key areas identified in the NAPCC and the identified strategies to achieve the objectives are summarized in the following table.

Table - 3.2: Recommended Strategies in respect of Goal 2 - Promotion of citizen and state action for water conservation, augmentation and preservation

Key areas highlighted in NAPCC	Recommended strategies and identified action points	
<p>(a) Enhancing storage capacities in multipurpose hydro-projects and integration of drainage with irrigation infrastructures, (b) Restoration of old water tanks, (c) Formulating and implementing a regulatory regime to ensure wise use of wetland at the national, the State, and District levels, (d) Environmental appraisal and impact assessment of developmental projects on wetland, (e) Strengthen links with afforestation programmes and wetland conservation, and (f) Planning of watershed management in mountain ecosystems.</p>	<p>Strategy II.1</p>	<p>Expeditious implementation of water resources projects particularly the multipurpose projects with carry over storages</p> <p>a Expeditious implementation of projects by States in areas / situations sensitive to climate change.</p> <p>b Expeditious implementation of ERM of irrigation projects by States in areas / situations sensitive to climate change.</p> <p>c Expeditious implementation of minor irrigation schemes including schemes for ground water development by States in areas / situations sensitive to climate change.</p> <p>d Adequate allocations to be made for undertaking projects and their time bound completion</p> <p>e Review of policies related to financing of water resources projects</p>
	<p>Strategy II.2</p>	<p>Promotion of traditional system of water conservation</p> <p>Expeditious implementation of programme for repair, renovation and restoration of water bodies in areas / situations sensitive to climate change by (i) Increasing capacity of minor tanks, and (ii) Rehabilitating water bodies, with changed focus.</p>
	<p>Strategy II.3</p>	<p>Conservation and preservation of wetland</p>
<p>(a) Exploring options to augment water supply in critical areas (b) The Mission to seek to ensure that a considerable share of the water needs of urban areas are met through recycling of wastewater; and ensuring that the water requirements</p>	<p>Strategy II.4</p>	<p>Promotion of water purification and desalination techniques</p> <p>a Research for development of cost effective water purification and desalination technologies.</p> <p>b Encourage PPP model for desalination - preparation of necessary guidelines etc.</p>

Key areas highlighted in NAPCC	Recommended strategies and identified action points	
<p>of coastal cities with inadequate alternative sources of water are met through adoption of new and appropriate technologies such as low temperature desalination technologies that allow for use of ocean water, (c) Seawater desalination using Reverse Osmosis and multistage flash distillation to take advantage of low grade heat energy e.g. from power plants located in the coastal region or by using renewable energy such as solar, and (d) Brackish water desalination.</p>	<p>Strategy II.5</p>	<p>c Provide incentive for desalination - preparation of necessary guidelines and initiation of necessary actions by the respective States and concerned central ministries.</p> <p>Empowerment and involvement of Panchayati Raj Institutions, urban water bodies and primary stake holders in management of water facilities.</p>
<p>Developing digital elevation models for flood prone areas of forecasting flood, and Mapping areas likely to experience floods and developing schemes to manage floods.</p>	<p>Strategy II.7</p>	<p>Promote participatory irrigation management.</p> <p>a Encourage participatory irrigation management through “Command Area Development and Water Management Programme”.</p> <p>b States to enact appropriate Participatory Irrigation Management (PIM) Act.</p> <p>Systematic approach for coping with floods</p> <p>Mapping of areas likely to experience floods, establishing hydraulic and hydrological models and developing comprehensive schemes for flood management & reservoir sedimentation.</p>
<p>Building public awareness will be vital in supporting implementation of the NAPCC, and the Group will also consider methods of capacity building to support the goals of the National Mission.</p>	<p>Strategy II.8</p>	<p>Capacity building and awareness programme including those for Panchayati Raj Institutions, urban local bodies dealing with water and primary users</p> <p>a Interactive session with policy makers for sensitization.</p> <p>b Capacity Building for professionals from various departments / organizations associated with water resources development and management.</p> <p>c Promotion of do-it-yourself action by citizens through intensive social communication.</p>

Key areas highlighted in NAPCC	Recommended strategies and identified action points
	d Mass awareness programme including through school curriculum.

Details of the strategies are discussed in the recommendations of the Sub-Committees and the same are included in the volume - II of the Mission Document.

3.3 Goal - 3: Focused attention to over-exploited areas

There is urgent need for appropriate measures in areas where the water resources, particularly the groundwater resources are declining due to overuse. In about 15% of the assessment blocks, groundwater has been over-exploited and about 14% of the blocks are in critical or semi-critical state. The key areas identified in the NAPCC and the identified strategies to address the issues related to such areas are summarized in the following table.

Table - 3.3: Recommended Strategies in respect of Goal 3 - Focused attention to over-exploited areas

Key areas highlighted in NAPCC	Recommended strategies and identified action points
(a) Enhancing recharge of the sources and recharge zones of deeper ground aquifers, (b) Mandating water harvesting and artificial recharge in relevant urban areas, (c) Regulation of power tariffs for irrigation, and (d) Incentive structures will be designed to promote recharging of underground water resources.	<p>Strategy III.1</p> <p>Physical sustainability of groundwater resources</p> <p>a. Pursuing the enactment of bill for ground water regulation and management.</p> <p>b. Expedious implementation of programme for conservation of water through recharge of ground water including rainwater harvesting in areas / situations sensitive to climate change including (i) Preparation of state-wise implementation plan for rain water harvesting and artificial recharge based on Master Plan of CGWB both for rural and urban areas and monitoring mechanism, (ii) Implementation of rain water harvesting and artificial recharge in over exploited assessment units, critical and semi-critical areas and their impact assessment, and (iii) Identify and evaluate incentives for adopting and sustaining roof top rain water harvesting systems.</p>

Key areas highlighted in NAPCC	Recommended strategies and identified action points
	<ul style="list-style-type: none"> c. Active community participation in ground water regulation & management. d. Promotion of a Panchayat /district level model for ground water regulation. e. Exploration of ground water including ground water exploration to decipher deeper fresh water aquifers up to 1000/1500m.
Strategy III.2	<p>Intensive programme for ground water recharge in over-exploited areas</p> <ul style="list-style-type: none"> a Rainwater harvesting and artificial recharge to ground water. b Expansion of programme for recharge of ground water through dug well.
Strategy III.3	<p>Intensive programme for addressing the quality aspects of drinking water particularly in rural area</p>
Strategy III.4	<p>Sensitization of elected representative of over exploited areas on dimensions of the problems and to orient investment under NREGA towards water conservation.</p>

Details of the strategies are discussed in the recommendations of the Sub-Committees and the same are included in the volume - II of the Mission Document.

3.4 Goal - 4: Increasing water use efficiency by 20%

One of the most important goals of the National Water Mission is to improve the efficiency of water use at least by 20%. The objective can be achieved by ensuring improved efficiency both on the demand side as well as the supply side. Research in the area of increasing the water use efficiency in agriculture, industry and domestic water is very important strategy. Similarly, full utilization of the created facilities and better design and proper operation and maintenance would considerably help in improving the efficiency on supply side. Use of micro irrigation, promotion of water neutral and water positive technologies, recycling of water etc. are also very important measures for

increasing the efficiency. At the same time adoption of better management practices are also very important.

The key areas identified in the NAPCC and the identified strategies to address the issues related to such areas are summarized in the following table.

Table - 3.4: Recommended Strategies in respect of Goal 4 -Increasing water use efficiency by 20%

Key areas highlighted in NAPCC	Recommended strategies and identified action points	
<p>(a) The Mission to take into account the provisions of the National Water Policy and develop a framework to optimize water use by increasing water use efficiency by 20%, (b) Increase in the efficiency of water use in domestic and industrial sector, (c) Need for incentives to adopt water-neutral or water-positive technologies, (d) Water recycle and reuse, (e) Ensuring more effective management of water resources, (f) The Mission to seek to ensure that a considerable share of the water needs of urban areas are met through recycling of wastewater; and ensuring that the water requirements of coastal cities with inadequate alternative sources of water are met through adoption of new and appropriate technologies such as low temperature desalination technologies that allow for use of ocean water.</p>	<p>Strategy IV.1</p>	<p>Research in area of increasing water use efficiency and maintaining its quality in agriculture, industry and domestic sector</p> <p>Improvement in efficiency of water use and that of water utilization facilities for increasing food and water security through increasing usable water by (i) Minimising inadvertent evaporation from water logged areas, barren land, agricultural fields between crops, wet soil between crop rows in irrigated fields, (ii) Increasing storages in water use systems by use of ground water space as storage, through enhanced fluctuations like pumping water from Terai to deplete ground water before floods, conjunctive use in time, with larger ground water use in bad years, more efficient use of vadose zone moisture storage, repeated use of surface storage during wet season, increasing storages and carry over storages through implementing a programme for raising dam heights, (iii) Increasing water use efficiency by encouraging re-use of return water, modernization of canals and distribution systems, (iv) Participatory management by water users for increased efficiency, and (v) Identification and evaluation of crop varieties using extreme conditions of water, design for appropriate cropping patterns and adoption of integrated farming system etc. including incentives for efficient use of water.</p>
	<p>Strategy IV.2</p>	<p>Incentivize recycling of water including wastewater</p> <p>a Incentivize recycling of water including wastewater.</p> <p>b Preparation of necessary guideline for</p>

Key areas highlighted in NAPCC	Recommended strategies and identified action points
	<p>encouraging PPP model for recycling and wastewater treatment.</p> <p>c Provide technical and financial support for common wastewater treatment and recycling plants.</p> <p>d Strict enforcement of provisions in respect of wastewater treatment.</p>
	<p>Strategy IV.3 Development of Eco-friendly sanitation system</p>
	<p>Strategy IV.4 Provide incentives for water neutral and water positive technologies</p>
	<p>a Provide incentives for water neutral and water positive technologies including attractive fiscal package.</p> <p>b Review the policies on effluent treatment in water scarce areas.</p> <p>c Encourage reuse of treated effluent.</p>
<p>(a) Mandatory water assessments and audits; ensuring proper industrial waste disposal, (b) The Mission to seek development of new regulatory structures, combined with appropriate entitlements and pricing</p>	<p>Strategy IV.5 Improve efficiency of urban water supply system</p> <p>a Initiate benchmark studies for urban water use and introduce concept of water efficiency index for urban areas.</p> <p>b Develop knowledge bank for urban water supply and use.</p> <p>c Adopt volumetric metering for urban water supply.</p> <p>d Water supply system to be made sustainable through appropriate pricing.</p>
	<p>Strategy IV.6 Efficiency labeling of water appliances and fixtures</p>
<p>(a) Ensuring more effective management of water resources, (b) National Water Mission to seek to optimize the efficiency of</p>	<p>Strategy IV.7 Promotion of water efficient techniques and technologies</p> <p>a Promotion of micro irrigation techniques such</p>

Key areas highlighted in NAPCC	Recommended strategies and identified action points	
<p>existing irrigation systems, including rehabilitation of systems that have been rundown and also expand irrigation, where feasible, with a special effort to increase storage capacity, and (c) incentive structures to be designed to promote adoption of large scale programmes which rely on sprinklers, drip irrigation and ridge and furrow irrigation.</p>		<p>as sprinkler and drip irrigation.</p> <p>b Expand “Farmers’ Participatory Action Research Programme”.</p>
	<p>Strategy IV.8</p>	<p>Incentivize use of efficient irrigation practices and fully utilize the created facilities</p> <p>a Preparation of appropriate guidelines.</p> <p>b Initiation of actions by the States and other agencies.</p>
	<p>Strategy IV.9</p>	<p>Promote mandatory water audit including those for drinking water purposes.</p> <p>a Preparation of guidelines and manuals.</p> <p>b Pursue the implementation with State governments and other agencies.</p>
	<p>Strategy IV.10</p>	<p>Undertake Pilot projects for improvement in water use efficiency in collaboration with States.</p> <p>a. Pilot project for improving water use efficiency.</p> <p>b. Pilot project for improving efficiency of water system.</p>
<p>Where the resource requirements of the Mission call for an enhancement of allocation in the XI Plan, this will be suitably considered, keeping in view the overall resource position and the scope for re-prioritization.</p>	<p>Strategy IV.11</p>	<p>Incentive through award for water conservation & efficient use of water.</p>
	<p>Strategy IV.12</p>	<p>Adequate provision for operation & maintenance of water resources projects</p>
		<p>Provisions for operation and maintenance of the projects to be appropriately enhanced.</p>

Details of the strategies are discussed in the recommendations of the Sub-Committees and the same are included in the volume - II of the Mission Document.

3.5 Goal - 5: Promotion of basin level integrated water resources management

Promotion of basin level integrated water resources management is a very important goal identified for national water Mission. The key areas identified in the NAPCC and the identified strategies to address the issues related to such areas are summarized in the following table.

Table - 3.5: Recommended Strategies in respect of Goal 5 - Promotion of basin level integrated water resources management

Key areas highlighted in NAPCC	Recommended strategies and identified action points	
<p>(a) National Water Policy to be re-visited in consultation with States to ensure basin level management strategies to deal with variability in rainfall and river flows due to climate change, (b) National Water Mission to ensure more equitable distribution both across and within States, and (c) Prioritizing watersheds vulnerable to flow changes and developing decision support systems to facilitate quick and appropriate responses.</p>	<p>Strategy V.1</p>	<p>Review of National Water Policy</p> <p>a Review of National Water Policy by MoWR particularly with a view to ensure (i) integrated water resources management for helping to conserve water, minimize wastage and ensure more equitable distribution, (ii) consideration of precipitation as basic water resource, (iii) evaporation management as an important strategy, (iv) basin level management strategies, (v) appropriate entitlement and pricing, and (vi) appropriate regulatory mechanism.</p> <p>b Consultation with States and the Stakeholders.</p> <p>c Adoption of revised policy by the Government.</p>
	<p>Strategy V.2</p>	<p>Review of State Water Policy</p>
	<p>Strategy V.3</p>	<p>Guidelines for different uses of water e.g., irrigation, drinking, industrial etc particularly in context of basin wise situations</p> <p>(a) Encourage water harvesting, (b) Encourage non-agricultural type developments of the type where not much water is required, (c) Piped surface water for clusters of villages with ground water quality problems, (d) Careful use of dual pipe supply systems to conserve water with due consideration to simultaneous planning for sewerage lines in urban areas to ensure prevention of pollution of water sources (e)</p>

Key areas highlighted in NAPCC	Recommended strategies and identified action points	
<p>(a) National Water Mission to ensure integrated water resource management helping to conserve water, minimize wastage and ensure more equitable distribution both across and within States, and (b) Integrated water policies to cope with variability in rainfall and river flow at the basin level.</p>	<p>Strategy V.4</p> <p>Strategy V.5</p>	<p>Encouraging leakage control programmes (f) Consideration of desalination as an option, for supply to urban coastal communities, (g) Regulation for in-house water withdrawals of industries, through royalties and licenses, (h) Extending subsidies and incentives for recycling and recovery, (i) Revise water tariff based on cost recovery principle, (j) Option of programme based Clean Development Mechanism (CDM) in industrial and domestic wastewater as against project approach, potential of efficient water use systems, exploring bilateral joint ventures for funding CDM projects, (k) Promotion of water efficient fixtures, (l) Incentivisation for recycling waste water.</p> <p>Planning on the principle of integrated water resources development and management</p> <ul style="list-style-type: none"> a Preparation of appropriate guidelines. b Interaction with States. c Adoption and application of guidelines by project authorities and appraising agencies. d Amendment to River Board Act under entry 56 of Union list to make it more effective. e Setting up of river basin organizations. <p>Inter-basin integration particularly for augmenting water by converting surplus flood water into utilizable water.</p> <p>Expeditious formulation of the projects for utilization of surplus flood water for beneficial use of the society and implementation of projects after evaluating costs and land acquisition problems.</p>

Key areas highlighted in NAPCC	Recommended strategies and identified action points	
	Strategy V.6	<p data-bbox="740 264 1435 331">Ensuring convergence among various water resources programmes</p> <p data-bbox="740 369 1435 852">Convergence among various programmes related to water resources development and management particularly (i) CAD&WM, RRR of Water Bodies, Ground water recharge through dug wells programmes of Ministry of water resources, (ii) NREGA of Ministry of Rural Development, (iii) Drinking water supply of Department of Drinking Water Supply (Ministry of Rural Development), (iv) Integrated watershed development programme of Ministry of Agriculture, (v) various water conservation programmes of Ministry of Environment and Forests.</p>

Details of the strategies are discussed in the recommendations of the Sub-Committees and the same are included in the volume - II of the Mission Document.

As mentioned above, the strategies are described in details in the report of the Sub-committees and the same are included in the volume - II of the Mission Document. More than one Sub-committees have discussed some of the strategies. This is due to the fact that various issues related to the impact of climate change on water resources are closely inter-related and there is considerable inter-dependence. However, efforts have been made to minimize the scope of duplication while identifying the strategies and finalizing the overall target and the timeliness for planning and monitoring by the High Level Steering Committee [as discussed in chapter 4].

Chapter - 4

Monitoring & Evaluation Mechanism, Institutional Setup and Plan of Action

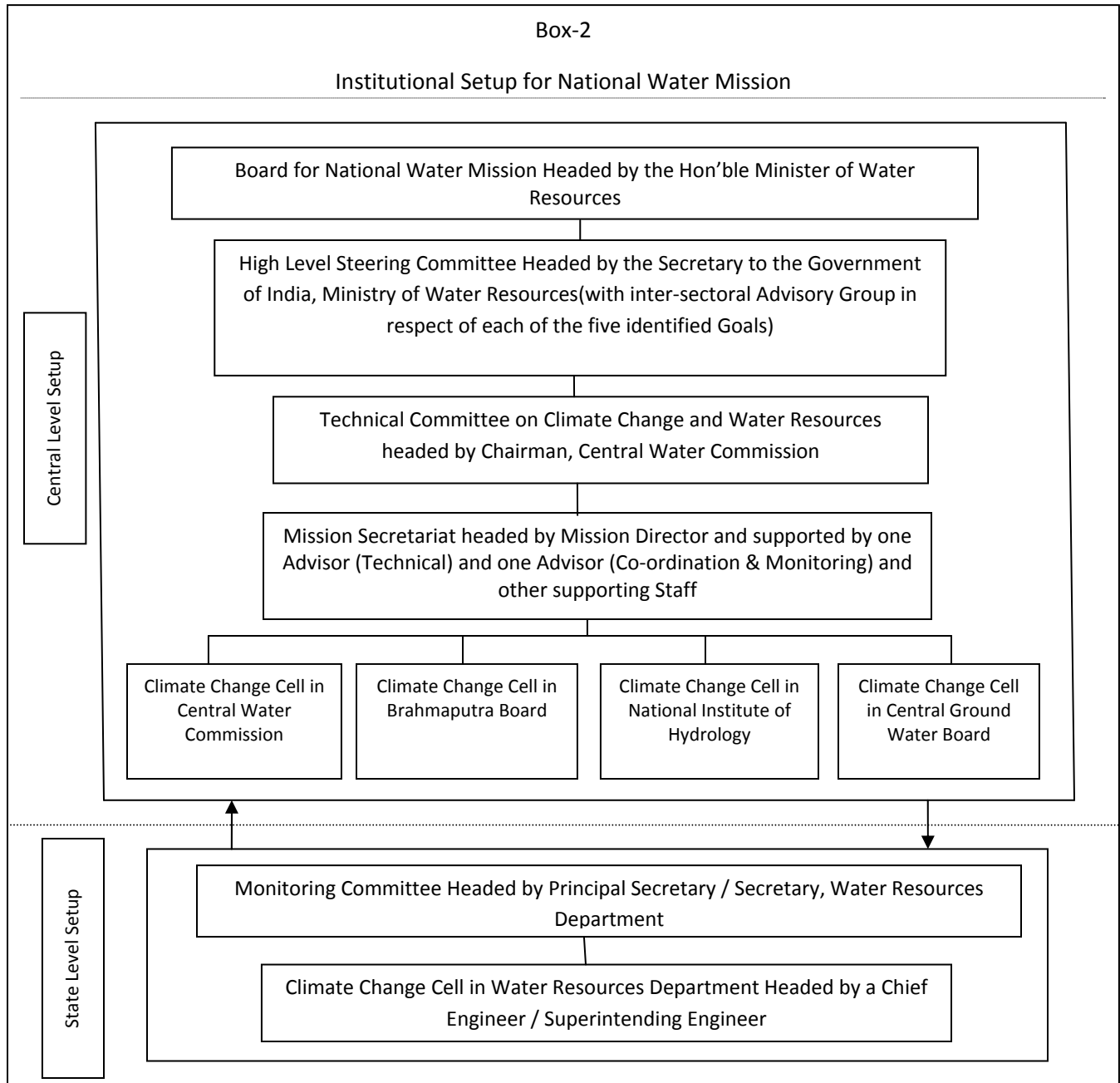
As discussed earlier, the impact of climate change could primarily be in the form of further intensification of variability in river flow and increase in the intensity of extreme events, which requires to be established in quantitative terms. Therefore, the first and the foremost task is to carry out research and studies for realistic assessment of the impact of climate change followed by expeditious actions on implementation of projects in respect of conservation of water resources and adoption of better management practices with emphasis of optimal utilization and increase in efficiency. Obviously, this calls for immediate review of the policies and continuous monitoring of the implementation of programme, their critical review from time to time and identification of corrective measures.

Most of the programmes related to water resources comes under the purview of the State Governments and are being implemented by them. Further several Central Ministries and Organisations are responsible for implementation of activities related water resources [Refer Box-1].

Box-1 Central Ministries / Organisations responsible for various Activities related to Water Resources Development and Management		
Sl. No.	Activities	Ministry / Organisations
1.	Overall Policy Issues, Assessment of Water Resources, Major and Medium Irrigation, Minor Irrigation, Ground Water and Flood Management	Ministry of Water Resources
2.	Rural Drinking Water	Department of Water Supply, Ministry of Rural Development
3.	Urban Drinking Water	Ministry of Urban Development
4.	Industrial Water	Ministry of Urban Development / Ministry of Commerce and Industry
5.	Hydropower Development	Ministry of Power
6.	Inland Navigation	Ministry of Transport
7.	Environmental Issues	Ministry of Environment and Forests
8.	Overall Planning for Water Resources Development and Fund Allocation	Planning Commission
9.	Watershed Development	Ministry of Agriculture / Ministry of Environment and Forests / Ministry of Rural Development
10.	(a) Water planning for Agriculture, (b) Micro Irrigation & (c) Management of Water related Disaster (Drought)	Ministry of Agriculture
11.	Management of Water related Disaster (Flood)	Ministry of Home Affairs

4.1 Proposed monitoring and evaluation mechanism

In view of above cited position, appropriate measures for mitigation of the impact of climate change on water resources, as also the adaptive measures are required to be undertaken by respective ministries and the State Governments. However, for identification of the most appropriate measures from the national perspectives and for ensuring effective implementation of the identified activities, it is necessary to have proper co-ordination among all the stakeholders on one hand and the various implementing agencies on the other hand.



In view of above, a two-tier setup has been proposed one at Central level and the other at State level. The setup is illustrated in Box-2. A Board under the chairmanship of Hon'ble Union Minister of Water Resources is proposed to be apex body for framing the policies and guidelines for implementation of the National Water Mission. The proposed Board will have representative from States and Central Ministries / Organizations, experts, representatives from professional organizations etc. The composition of the Board is at Annexure-II. A High Level Steering Committee headed by the Secretary to the Government of India, Ministry of Water Resources and comprising of members representing concerned Ministries, Experts, Non-Governmental Organisations (NGOs) etc. has since been constituted. It is proposed to further expand the Steering Committee to include representatives from State Governments and representatives from professional organizations and private agencies dealing with water resources. The proposed composition of the High Level Steering Committee is at Annexure - III. There would be inter-sectrol Advisory Group for each of the five identified goals of the Mission. The composition of the Advisory Groups are at Annexure IV (a) to IV (e)

Similarly, MoWR has also constituted a Technical Committee on Climate Change and Water Resources under the Chairmanship of Chairman, CWC. The Technical Committees also includes representatives from NGOs. It is proposed to further strengthen the Committee by including representatives from Water Resources Departments of State Governments / State Government Organizations dealing with research and management of water resources. The revised Composition of the Technical Committee is at Annexure - V. Specific cells for carrying out research and studies on the impact of climate change on water resources have been created at National Institute of Hydrology, Central Water Commission and Brahmaputra Board. A similar cell is proposed to be created at Central Ground Water Board.

4.2 Institutional set-up

As indicated above, the objective of the “National Water Mission” can be achieved only through proper co-ordination, closed monitoring and in-depth evaluation at regular interval. Therefore, a dedicated Secretariat is considered necessary. It is proposed to have a very compact Mission Secretariat headed by a Mission Director (who could be a professional or an expert) in the rank of Additional Secretary to the Government of India. The Mission Director would be equipped with necessary financial & administrative powers and would be accountable for implementation of the identified programme. The Mission Director would be supported by two Advisors - one Advisor to be fully devoted to technical evaluations and the other for co-ordination and monitoring. The advisors could be in the rank of Joint Secretary (or equivalent) or Director (or equivalent), the choice being mainly on the basis of the expertise and capability of the persons. MoWR would be required to make an appropriate choice depending upon the work requirements and suitability of the persons with a view to ensure that the

objectives of the National Water Mission are implemented in a time bound manners. The posts of Mission Director for National Water Mission and the two Advisors are proposed to be created. Necessary secretarial assistance could be either provided by the MoWR or outsourced. The proposed composition of the Mission Secretariat is at Annexure - VI. The three cells created in NIH, CWC and BB and the one proposed at CGWB for research and studies on impact of climate change on water resources would provide necessary input and assistance to the Mission Secretariat. The Mission Secretariat may also engage the services of consultant or outsource the services of professionals on specific matters as and when required.

State Governments would be requested to set up Monitoring Committee under the Chairmanship of the Principal Secretary / Secretary in charge of Water Resources. The State Government would also be requested to create Climate Change Cell at appropriate level. In case of States with considerable potential for water resources development, the cell should be headed by an officer in the grade of Chief Engineer whereas in smaller States, it could be headed by a Superintending Engineer.

4.3 Action Plan and timelines

The identified strategies for addressing the issues related to impact of climate change on water resources are described in Chapter - 3. Specific targets, the timeline for implementation of the identified strategies and action points and the nodal agencies / organizations are at Annexure -VII.

Research and Development, Training and Capacity Building

One of the most important area for research and development is the “Climate changes and water resources”, particularly in the field of (a) impact of climate change on water resources, (b) efficacy for various measures for mitigating the impact of the projected changes in the water resources, (c) changes needed in policy & planning and management practices to optimally utilize the resources; and (d) adaptation measures, their impacts and efficacy. MoWR has duly identified the need for research in the area of impact of climate change on water resources and this area constitutes an important component of the scheme for “Research and Development” for XI Plan. IIT, a premier research institute in the field of hydrology has already initiated research in the area. CWC and BB have also taken up studies in the field and have initiated actions for establishment of additional hydrological observation sites particularly those required for assessment of impact of climate change and glaciers and snowmelt. With a view to actively associate the reputed academic institutions, MoWR has also decided to establish “Professorial Chairs”. These institutions have been associated for specific studies related to impact of climate change on water resources. Indian Institute of Technology, Roorkee and National Institute of Technology, Srinagar are associated with studies in respect of Indus basin. Indian Institute of Technology, Kanpur and National Institute of Technology, Patna has been assigned with the responsibility of research and studies related to Ganga basin. Indian Institute of Technology, Guwahati and Indian Institute of Technology, Kharagpur will contribute in assessment of impact of climate change in respect of Brahmaputra basin. MoWR has also assigned studies to Indian Institute of Science, Bangalore in respect of impact of climate change in rainfall and water resources of peninsular river basins. Depending upon the specific requirements, more institutions could be associated.

Capacity Building, particularly those of Research Institutes, Water and Land Management Institutes and Academic Institutions in various states has been identified as an important activity under the Plan scheme for “Research and Development” of the MoWR. Ministry has already invited proposals from various institutes in this regard.

Mass awareness programme, focused awareness programmes for policy makers and training of professionals is very important and is considered necessary for better understanding of the complex issues and identification of strategies in right perspective. This is more so in view of the fact that the present techniques for projection of impact of climate change on water resources etc. are based on numerous assumptions and need considerable improvement. Further, in view of considerable variation in factor affecting such changes, the techniques developed in a specific country or in a region may not be replicated. It is considered necessary to have trained professional in the area. Although

there are schemes for training in the area of water resources, it is proposed to provide additional resources for the purpose and ensure that the policy makers are fully conversant with various aspects and the professional are adequately trained to address the issues. The training programme may include study tours and specialized training abroad also.

Additional Fund Requirement

The important issue of climate change and its impact on water resources were duly considered by the “Working Group for XI Plan on Water Resources” constituted by the Planning Commission. The related issues are broadly reflected in the recommendations of the Working Group. The XI Plan scheme of the MoWR for “Research and Development” has also laid due emphasis on the research in the area of impact of climate change as also on the need for improving the efficiency of water use and that of the facilities created for water utilization. The allocations for XI Plan have, therefore, some specific provisions in respect of research and development in the area of impact of climate change on water resources.

The various Sub-Committees have identified additional funds requirements for implementation of activities for addressing the specific issues related to impact of climate change on water resources. The total estimated additional fund required during XI plan for addressing the specific issues related to impact of Climate Change on water resources works out to be Rs 28,651 crores with Rs 10,038 crores in Central sector and Rs 18,613 crores in State sector. It is also proposed to make necessary provisions for setting up of a dedicated Secretariat at the Ministry of Water Resources for which the fund requirement has been estimated to be Rs 5 crores during XI Plan. Thus the total additional fund requirement for XI Plan works out to be about Rs 28,656 crores. The various Sub-committees have also assessed the additional fund requirements of Rs 60,445 crores for XII Plan with Rs 8,088 crores for the central sector and Rs 52,357 crores for the State sector. The details of the specific activities and the additional fund requirements for the same during the XI Plan are given at Annexure - VII. The projections for the additional fund requirements are over and above the outlay provided for various activities during the XI Plan.

In this regard, it is observed that most of the activities are to be implemented by the respective State Governments. Further, the activities are closely inter-linked with the several ongoing schemes for water resources development and management. It may also be observed that the allocation for water sector - both State Plan and Central Plan has been considerably increased during XI Plan. The total allocation under State and central plan for irrigation, command area and flood control has been increased from about Rs. 95,700 crore during X Plan to Rs. 2,32,311 crore during XI Plan.

It is, therefore, considered necessary to seek the views of the State Governments on the proposed additional fund requirements and suitably modify the same at the stage of mid-term appraisal of the XI Plan. The fund requirement during XII plan for

addressing the specific issues related to impact of climate change on water resources would be finalized at the stage of formulation of XII plan.



Reliable data collection on scientific basis is the most important tool to understand the impacts of climate change on water resources.

Specific Strategies / Strategies related to Water Resources as identified in the Technical Document annexed with the “National Action Plan on Climate Change”

General

- Increasing the efficiency of water use
- Exploring options to augment water supply in critical areas
- Ensuring more effective management of water resources
- Need for new regulatory structures with appropriate entitlements and pricing and incentives to adopt water-neutral or water positive technologies
- Integrated water policies to cope with variability in rainfall and river flows at the basin level

Studies on Management of Surface Water Resources

- Estimating river flows in mountainous areas
- Customizing climate change models for regional water basins
- Extending isotopic-tracer-based techniques of monitoring river water discharge to all major river monitoring stations
- Developing digital elevation models of flood prone areas for forecasting floods
- Mapping areas likely to experience floods and developing schemes to manage floods
- Strengthening the monitoring of glacial and seasonal snow covers to assess the contribution of snowmelt to water flows of Indian rivers that originate in the Himalayas
- Establishment of a wider network of automatic weather stations and automated rain gauge stations
- Planning of watershed management in mountain ecosystems

Management and Regulation of Ground Water Resources

- Mandating water harvesting and artificial recharge in relevant urban areas
- Enhancing recharge of the sources and recharge zones of deeper groundwater aquifers
- Mandatory water assessments and audits; ensuring proper industrial waste disposal
- Regulation of power tariffs for irrigation

Upgrading Storage Structures for Freshwater and Drainage Systems for Wastewater

- Prioritizing watersheds vulnerable to flow changes and developing decision support systems to facilitate quick and appropriate responses
- Restoration of old water tanks
- Developing models of urban storm water flows and estimating drainage capacities for storm water and for sewers based on the simulations
- Strengthen links with afforestation programmes and wetland conservation
- Enhancing storage capacities in multipurpose hydro projects, and integration of drainage with irrigation infrastructures

Conservation of Wetlands

- Environmental appraisal and impact assessment of developmental projects on wetlands
- Developing an inventory of wetlands, especially those with unique features
- Mapping of catchments and surveying and assessing land use patterns with emphasis on drainage, vegetation cover, silting, encroachment, conservation of mangrove areas, human settlements and human activities and its impact on catchments and water bodies
- Creating awareness among people on importance of wetland ecosystems
- Formulating and implementing a regulatory regime to ensure wise use of wetlands at the national, the state, and district levels

Development of Desalination Technologies

- Sea water desalination using Reverse Osmosis and multistage flash distillation to take advantage of low grade heat energy e.g. from power plants located in the coastal region or by using renewable energy such as solar
- Brackish water desalination
- Water recycle and reuse
- Water purification technologies

**Composition of Advisory Board under the chairmanship of
Union Minister of Water Resources**

1.	Minister of Water Resources	Chairman
2.	Minister In charge of Water Resources from 5 States/UTs [by	Member
to	rotation for 2 years]	
6.		
7.	Finance Secretary (or nominee)	Member
8.	Principal Advisor, Planning Commission	Member
9.	Secretary, Ministry of Science & Technology (or nominee)	Member
10.	Secretary, Department of Agriculture and Cooperation (or nominee)	Member
11.	Secretary, Ministry of Environment and Forests (or nominee)	Member
12.	Secretary, Department of Drinking Water Supply (or nominee)	Member
13.	Secretary, Ministry of Urban Development (or nominee)	Member
14.	Secretary, Ministry of Earth Sciences (or nominee)	Member
15.	Secretary, Ministry of Water Resources	Member
16.	Secretary, Ministry of Rural Development	Member
17.	Secretary, Ministry of Commerce and Industry	Member
18.	3 Experts on water resources [preferably one each on surface	Member
to	water, ground water & planning] by rotation for 2 years	
20.		
21.	Representatives of 3 NGOs actively associated with water	Member
to	resources [by rotation for 2 years]	
23.		
24.	Representatives of 3 organizations representing industries,	Member
to	professional organization etc. [CII, FICCI, Chamber of	
26.	Commerce, Association of Pump Manufacturers, IWRS, IAH etc.] by rotation for 2 years	
27.	Additional Secretary, Ministry of Water Resources	Member
28.	Chairman, Central Water Commission	Member
29.	Chairman, Central Ground Water Board	Member
30.	JS&FA, Ministry of Water Resources	Member
31.	Mission Director	Member- Secretary

Composition of High Level Steering Committee for National Water Mission

1.	Secretary, Ministry of Water Resources	Chairman
2.	Finance Secretary (or nominee)	Member
3.	Principal Advisor, Planning Commission	Member
4.	Secretary, Ministry of Science & Technology (or nominee)	Member
5.	Secretary, Department of Agriculture and Cooperation (or nominee)	Member
6.	Secretary, Ministry of Environment and Forests (or nominee)	Member
7.	Secretary, Department of Drinking Water Supply (or nominee)	Member
8.	Secretary, Ministry of Urban Development (or nominee)	Member
9.	Secretary, Ministry of Rural Development (or nominee)	Member
10.	Secretary, Ministry of Earth Sciences (or nominee)	Member
11.	Secretary, Ministry of Commerce and Industry	Member
12.	Director, National Centre for Medium Range Weather Forecasting	Member
13.	Director, India Meteorological Department	Member
14.	Representatives of two Non Governmental Organizations (by rotation for a period of 2 years)	Member
15.		
16.	Representatives of two professional Organizations (by rotation for a period of 2 years)	Member
17.		
18.	2 Experts / representatives of academic institutions (by rotation for a period of 2 years)	Member
19.		
20.	Principal Secretary / Secretary of Water Resources of five States to Government / Union Territories (by rotations for 2 years)	Member
24.		
25.	Chairman, Central Water Commission	Member
26.	Additional Secretary, Ministry of Water Resources	Member
27.	Chairman, Central Ground Water Board	Member
28.	Chairman, Brahmaputra Board	Member
29.	Director, National Institute of Hydrology	Member
30.	Director, Central Water & Power Research Station	Member
31.	Director, Indian Institute of Tropical Meteorology	Member
32.	Joint Secretary & Financial Advisor, MoWR	Member
33.	Commissioner (Project), MoWR	Member
34.	Commissioner (CAD), MoWR	Member
35.	Mission Director	Member-Secretary

Composition of the Inter-sectoral Advisory Group for Goal-I: Comprehensive Water Data Base in Public Domain and Assessment of Impact of Climate Change on Water Resources

1.	Secretary to the Government of India, Ministry of Water Resources	Chairman
2.	Additional Secretary, Ministry of Water Resources	Member
3.	Chairman, Central Water Commission	Member
4.	Chairman, Central Ground Water Board	Member
5.	Representative from Ministry of Rural Development	Member
6.	Representative from Ministry of Agriculture	Member
7.	Representative from Ministry of Environment and Forests	Member
8.	Representative from Ministry of Earth Sciences (IMD)	Member
9.	Representative from Ministry of Science and Technology	Member
10.	Representative of Department of Space	Member
11.		Members
to	Representatives of 5 States (by rotation for 3 years each)	
15.		
16.	A representative of Indian Institute of Technology, Delhi	Member
17.	Director, National Institute of Hydrology	Member
18.	Commissioner (PP), Ministry of Water Resources	Member-Secretary

Composition of the Inter-sectoral Advisory Group for Goal-II: Promotion of Citizen and State Action for Water Conservation, Augmentation and Preservation

1.	Secretary to the Government of India, Ministry of Water Resources	Chairman
2.	Additional Secretary, Ministry of Water Resources	Member
3.	Chairman, Central Water Commission	Member
4.	Representative from Ministry of Rural Development	Member
5.	Representative from Ministry of Agriculture	Member
6.	Representative from NRAA	Member
7.	Representative from Ministry of Environment and Forests	Member
8.	Representative from Ministry of Urban Development	Member
9.	Representative from Department of Drinking Water Supply, Ministry of Rural Development	Member
10.	Representative from Ministry of Panchayati Raj	Member
11.	Representatives of two reputed NGOs (to be nominated by the Chairman)	Member
12.	Representative of Planning Commission	Member
13.		
to	Representatives of 5 States (by rotation for 3 years each)	Members
17.		
18.	Joint Secretary (A), Ministry of Water Resources	Member
19.	Commissioner (PP), Ministry of Water Resources	Member-Secretary

Composition of the Inter-sectoral Advisory Group for Goal-III: Focused Attention to Over-exploited Areas

1.	Secretary to the Government of India, Ministry of Water Resources	Chairman
2.	Additional Secretary, Ministry of Water Resources	Member
3.	Chairman, Central Ground Water Board	Member
4.	Representative from Ministry of Rural Development	Member
5.	Representative from Department of Drinking Water Supply, Ministry of Rural Development	Member
6.	Representative from Ministry of Environment and Forests	Member
7.		
to	Representatives of 5 States (by rotation for 3 years each)	Members
11.		
12.	Joint Secretary (A), Ministry of Water Resources	Member-Secretary

Composition of the Inter-sectoral Advisory Group for Goal-IV: Increasing Water use Efficiency by 20%

1.	Secretary to the Government of India, Ministry of Water Resources	Chairman
2.	Additional Secretary, Ministry of Water Resources	Member
3.	Chairman, Central Water Commission	Member
4.	Chairman, Central Ground Water Board	Member
5.	Representative from Ministry of Agriculture	Member
6.	Representative from Ministry of Urban Development	Member
7.	Representative from Ministry of Rural Development (DoDWS)	Member
8.	Department of Industrial Policy and Promotion	Member
9.	Representative of Industries	Member
10.		
to	Representatives of 5 States (by rotation for 3 years each)	Members
14.		
15.	Commissioner (PP), Ministry of Water Resources	Member Secretary

Composition of the Inter-sectoral Advisory Group for Goal-V: Promotion of Basin Level and Integrated Water Resources Management

1.	Secretary to the Government of India, Ministry of Water Resources	Chairman
2.	Additional Secretary, Ministry of Water Resources	Member
3.	Chairman, Central Water Commission	Member
4.	Representative from Ministry of Environment and Forests	Member
5.	Director General, National Water Development Agency	Member
6.		
to	Representatives of 5 States (by rotation for 3 years each)	Members
10.		
11.	Representative of Planning Commission	Member
12.	Commissioner (PR), Ministry of Water Resources	Member-Secretary

Composition of Technical Committee on Climate Change and Water Resources

1.	Chairman, Central Water Commission	Chairman
2.	Member (River Management), Central Water Commission	Member
3.	Chairman, Brahmaputra Board	Member
4.	Chairman, Central Ground Water Board	Member
5.	Representative of Indian Meteorological Department	Member
6.	Director, Central Water & Power Research Station	Member
7.	Director, Indian Institute of Tropical Meteorology	Member
8.	Director, National Institute of Hydrology	Member
9.	Director, National Centre for Medium Range Weather Forecasting	Member
10.	Representative of State Government/State Government to Organization dealing with research and management in water resources- [5 by rotation for 2 years]	Member
14.		
15.	A representative of Ministry of Agriculture	Member
16.	A representative of National Remote Sensing Centre, Hyderabad	Member
17.	A representative of Director General, India Meteorological Department	Member
18.	A representative of Govind Ballabh Pant Institute of Himalayan Environment and Development, Koshi Katarmal, Almora	Member
19.	A representative of Director General, Survey of India	Member
20.	A representative of Director General, Geological Survey of India	Member
21.	A representative of Wadia Institute of Himalayan Geology, Dehradun	Member
22.	A representative of Space Application Centre, Ahmedabad	Member
23.	A representative of Director, Snow and Avalanche Study Establishment, Ministry of Defence	Member
24.	Chief Engineer, HSO, Central Water Commission	Member
25.	A representative of M S Swaminathan Research Foundation, Chennai	Member
26.	Chief Engineer (P&D), Central Water Commission	Member-Secretary

Composition of Secretariat for National Water Mission

1.	Mission Director	1
2.	Advisor (Technical)	1
3.	Advisor (Co-ordination and Monitoring)	1
4.	Personal Secretary	1
5.	Personal Assistant	2
6.	Section Officer	1
7.	Upper Division Clerk / Lower Division Clerk	1
8.	Peon	2

Action Plan and Timelines for Identified Strategies under “National Water Mission”

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year		
GENERAL											
0. Institutional Mechanism											
0.1 Setting up of Mission Secretariat at MoWR for National Water Mission	■									MoWR	
0.2 Setting up of Climate Change Cells in States	■									State Governments	To be setup by States
0.3 Setting up of Climate Change Cells in various organizations in MoWR	■									NIH, CWC, BB and Central Ground Water Board (CGWB)	Climate Change Cells have already been setup in NIH, CWC, and BB from their own resources.

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year		
Goal 1.- Comprehensive water data base in public domain and assessment of the impact of climate change on water resource											
I.1 Review and establishment of network for collection of additional necessary data											
a. Review of network of hydrological observation network										CWC, BB, CGWB	
b. Review of the network of automatic weather stations and automatic rain gauge stations and establishment of additional stations										IMD	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
c. Collection of necessary additional hydro-meteorological and hydrological data for proper assessment of impact of climate change particularly in Himalayan region, coastal region etc including other improvements required in hydrometric networks to appropriately address the issues related to the climate change											CWC, BB, CGWB and India Meteorological Department (IMD), State Governments	
1.2 Development / implementation of modern technology for measurement of various data											CWC, NIH	
1.3 Developing inventory of wetland											CWC, MoEF	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
I.4 Development of Water Resources Information System(except the data of sensitive and classified nature, all information to be in public domain)											CWC, State Governments	
I.5 Research and studies on all aspects related to impact of climate change on water resources including quality aspects of water resources with active collaboration of all research organizations working in the area of climate change											NIH, CWC, CGWB, BB and Research Stations	
I.6 Reassessment of basin wise water situation												
a. Reassessment of basin wise water situation in present scenario including water quality by using latest techniques											CWC and CGWB	
b. Comprehensive Reassessment of the ground water resources up to Block / Mandal / Taluka level for the entire country											CGWB, State Governments	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
I.7 Projection of the impact of climate change on water resources - Projection of water resources availability as a result of impact of climate change which would inter-alia include the likely changes in the characteristics of water availability in time and space											CWC and NIH	
Goal 2.- Promotion of citizen and state actions for water conservation, augmentation and preservation												
II.1 Expeditious implementation of water resources projects particularly the multipurpose projects with carry over storages												

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year		
a. Expeditious implementation of major and medium irrigation projects by States in areas / situations sensitive to climate change. [Creation of storage of 64 BCM is targeted through completion of on-going 205 major & medium irrigation projects during XI Plan. Creation of 9 Mha of irrigation potential is targeted through major & medium irrigation projects (including ERM projects)]										State Governments	
b. Expeditious implementation of ERM of irrigation projects by States in areas / situations sensitive to climate change										State Governments	
c. Expeditious implementation of minor irrigation schemes including schemes for ground water development by States in areas / situations sensitive to climate change										State Governments	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
d. Adequate allocations to be made for undertaking projects and their time bound completion											Planning Commission	
e. Review of policies related to financing of water resources projects											Planning Commission	
II.2 Promotion of traditional system of water conservation - Expeditious implementation of programme for repair, renovation and restoration of water bodies in areas / situations sensitive to climate change by (i) Increasing capacity of minor tanks, and (ii) Rehabilitating water bodies, with changed focus											State Governments	
II.3 Conservation and preservation of wetlands											MoEF, State Governments	
II.4 Promotion of water purification and desalination techniques												

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year		
a. Research for development of cost effective water purification and desalination technologies										M/o Earth Sciences, DST	
b. Encourage PPP model for desalination-preparation of necessary guidelines etc										M/o UD	
c. Provide incentives for desalination - preparation of necessary guidelines and initiation of necessary actions by the respective States and concerned central ministries										M/o UD	
II.5 Empowerment and involvement of Panchayati Raj Institutions, urban water bodies and primary stake holders in management of water facilities										MoWR, MoPR	
II.6 Promote participatory irrigation management											

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
a. Encourage participatory irrigation management through "Command Area Development and Water Management Programme"											MoWR	
b. States to enact appropriate Participatory Irrigation Management (PIM) Act											MoWR and State Governments	
II.7 Systematic approach for coping with floods - Mapping of areas likely to experience floods, establishing hydraulic and hydrological models and developing comprehensive schemes for flood management & reservoir sedimentation											MoWR, CWC and State Governments	
II.8 Capacity Building and awareness programme including those for Panchayati Raj institutions, urban local bodies dealing with water and primary users												

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year		
a. Interactive session with policy makers for sensitization										MoWR, CWC, CGWB and State Governments	
b. Capacity building for professionals from various departments / organizations associated with water resources development and management										MoWR CWC, CGWB and State Governments	
c. Promotion of do-it-yourself action by citizens through intensive social communication										MoWR	
d. Mass awareness programme including through school curriculum										MoWR	
Goal 3.- Focused attention to over-exploited areas											
III.1 Physical sustainability of ground water resources											

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
a. Pursuing the enactment of bill for ground water regulation and management											MoWR	
b. Expeditious implementation of programme for conservation of water through recharge of ground water including rainwater harvesting in areas / situations sensitive to climate change											State Governments and CGWB	
c. Active community participation in ground water regulation & management											MoA, MoRD, MoWR, CGWB	
d. Promotion of a Panchayat /district level model for ground water regulation												
e. Exploration of ground water including ground water exploration to decipher deeper fresh water aquifers up to 1000/1500m											State Governments and CGWB	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
III.2 Intensive program for ground water recharge in over-exploited areas												
a. Rainwater harvesting and artificial recharge to ground water											State Governments and CGWB	
b. Expansion of program for recharge of ground water through dug wells											State Governments and CGWB	
III.3 Intensive programme for addressing the quality aspects of drinking water particularly in rural area											DoDWS	
III.4 Sensitization of elected representative of over exploited areas on dimensions of the problems and to orient investment under NREGA towards water conservation											MoWR, CWC, CGWB, MoRD (DoDWS),	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
Goal 4.- Increasing water use efficiency by 20%												
IV.1 Research in area of increasing water use efficiency and maintaining its quality in agriculture, industry and domestic sector											CWC, CGWB, MoA, MoUD, MoCI, MoP, DoDWS, State Governments	
IV.2 Incentivize recycling of water including waste water												
a. Incentivize recycling of water including waste water											MoUD, MoCI	
b. Preparation of necessary guidelines for encouraging PPP model for recycling and wastewater treatment											MoUD, MoCI	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
c. Provide technical and financial support for common waste water treatment and recycling plants											MoUD, MoCI, MoEF, Department of Industrial Policy & Promotion	
d. Strict enforcement of provisions in respect of waste water treatment											MoEF, State Governments	
IV.3 Development of Eco-friendly sanitation system											MoUD, MoRD	
IV.4 Provide incentives for water-neutral and water-positive												
a. Provide incentives for water neutral and water positive technologies											MoUD, MoCI	
b. Review the policies on effluent treatment in water scarce areas											MoUD, MoCI, MoEF	
c. Encourage reuse of treated effluent											MoUD, MoCI	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
IV.5 Improve efficiency of urban water supply system												
a. Initiate benchmark studies for urban water use and introduce concept of water efficiency index for urban areas		■									MoUD	
b. Develop knowledge bank for urban water supply and use			■								MoUD	
c. Adopt volumetric metering for urban water supply		■	■								MoUD	
d. Water supply system to be made sustainable through appropriate pricing		■	■								MoUD	
IV.6 Efficiency labeling of water appliances and fixtures			■								MoUD & MoRD	
IV.7 Promotion of water efficient techniques and technologies												
a. Promotion of micro irrigation techniques such as sprinkler and drip irrigation		■	■	■	■	■	■	■	■	■	MoA	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
b. Expand “Farmers Participatory Action Research Programme”											CWC, CGWB, MoA	
IV.8 Incentivize use of efficient irrigation practices and fully utilize the created facilities												
a. Preparation of appropriate guidelines											MOA, MoWR & CWC	
b. Initiation of actions by the States and other agencies											State Governments	
IV.9 Promote mandatory water audit including those for drinking water purposes												
a. Preparation of guidelines and manuals											MoWR, MoRD & MoUD	
b. Pursue the implementation with State governments and other agencies											MoWR, MoRD & MoUD	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
IV.10 Undertake Pilot projects for improvement in water use efficiency in collaboration with States												
a. Pilot project for improving water use efficiency											MoA, State Governments	
b. Pilot project for improving efficiency of water system												
IV.11 Incentive through award for water conservation & efficient use of water											MoWR, MoUD	
IV.12 Adequate provision for operation & maintenance of water resources projects - Provision for operation and maintenance of the projects to be appropriately enhanced											13 th Finance Commission	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year		
Goal 5.- Promotion of basin level integrated water resources management											
V.1 Review of National Water Policy											
a. Review of National Water Policy by MoWR		■									MoWR
b. Consultation with States and the Stakeholders		■	■								MoWR
c. Adoption of revised policy by the government				■	■						MoWR
V.2 Review of State Water Policy				■	■						State Governments
V.3 Guidelines for different uses of water e.g., irrigation, drinking, industrial etc particularly in context of basin wise situations		■	■	■							MoRD, MoUD, MoEF, MoCI
V.4 Planning on principle of integrated water resources development and management											
a. Preparation of appropriate guidelines		■	■								CWC
b. Interaction with States			■								CWC

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks	
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year			
c. Adoptions and application of guidelines by project authorities and appraising agencies											CWC, CGWB, State Governments	
d. Amendment to River Board Act under entry 56 of union list to make it more effective											MoWR	
e. Setting up of river basin organizations											MoWR	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year		
V.5 Inter-basin integration particularly for augmenting water by converting surplus flood water into utilizable water - Expeditious formulation of the projects for utilization of surplus flood water for beneficial use of the society and implementation of projects after evaluating costs and land acquisition problems										MoWR, MoRD, MoUD, MoA, MoEF, NRAA, DST, MoES	
V.6 Ensuring convergence among various water resources programmes - Convergence among various programmes related to water resources development and management particularly (i) CAD&WM, RRR of Water Bodies, Ground water recharge through										MoWR	

Description / Recommended Strategies	XI Plan				XII Plan					Organisations / Agencies to initiate the process	Remarks
	2 nd year	3 rd year	4 th year	5 th year	1 st year	2 nd year	3 rd year	4 th year	5 th year		
dug wells programmes of Ministry of water resources, (ii) NREGA of Ministry of Rural Development, (iii) Drinking water supply of Department of Drinking Water Supply (Ministry of Rural Development), (iv) Integrated watershed development programme of Ministry of Agriculture, (v) various water conservation programmes of Ministry of Environment and Forests											

Additional fund requirements for identified activities during XI Plan

(Rs in crores)

Sl. No.	Specific areas of activities	Additional requirement of funds during XI Plan			Sl. No.	Specific areas of activities	Additional requirement of funds during XI Plan		
		Central Plan	State Plan	Total			Central Plan	State Plan	Total
1	Data collection	50	100	150	13	Ground water management	110	256	366
2	Research support	249	541	790	14	Rainwater harvesting	642	1498	2140
3	Studies related to impact of climate change on water resources	42	93	135	15	Increasing storages	133	267	400
4	River basin organizations	49	-	49	16	Conservation by reducing evaporation	167	333	500
5	Water regulatory authorities	-	90	90	17	Incentives for recycling of water	-	200	200
6	Water users' association	-	105	105	18	Domestic and industrial water management	725	1450	2175
7	Water use efficiency	42	83	125	19	Desalination	33	67	100
8	Micro irrigation	-	1000	1000	20	Flood management programme	67	133	200
9	Command area development	400	225	625	21	Awareness programme	39	462	501
10	Expeditious completion of irrigation projects including ERM projects	7000	7800	14800	22	Institutional reforms and capacity building	40	100	140
11	O&M of irrigation facilities	-	2810	2810	23	Secretariat for National Water Mission	5	-	5
12	RRR of water bodies	250	1000	1250		TOTAL	10043	18613	28656