

Water Policy and Action Plan for India 2020: An Alternative

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Preface

India is poised to play a major role in the community of nations in the twenty-first century. In order to achieve our potential it is necessary that we eliminate poverty, provide full employment and adequate purchasing power to the people and generate self-confidence among them. The optimum utilisation of our water, land and natural resources is extremely important in achieving these objectives. On April 1, 2002 the National Water Resources Council met under the Chairmanship of the Prime Minister and adopted the National Water Policy 2002, a revised version of the earlier policy of 1987. The new policy does have a number of positive elements that were not there in the earlier policy. But, in our view, it does not go far enough in preparing the nation for the optimum management of water resources in the 21st century. Also, since water is a State subject, the States are required to formulate their own water policies on the guidelines provided by the national policy and to prepare an operational action plan within two years.

We are, therefore, taking the liberty of presenting an alternative policy, which has as its thrust the genuine involvement of communities and people in the management of water resources. We are also presenting an action plan and schedule to carry out the various tasks and changes suggested by the policy. The policy and action plan presented by us take into account the larger, long-term goals before the nation, as mentioned above.

The goals we have put forward in the policy are such as would do justice to all users of water and yet would be practical and achievable. At present it is the central and state governments that play the key role in the management of water resources. The policy proposed by us, on the other hand, seeks to involve all the people at the level of the local communities so that they can conserve, develop and manage the water resource at the local level itself. For this purpose the present organisational structure would have to be suitably restructured.

Out of a total land area of 130 mha that needs watershed management only about 40-50 mha has received attention yet and that too primarily from the government with little involvement of the people. Thus, the current watershed management effort is neither adequate nor likely to be sustained by the people in the long run. A net area of 54 mha is irrigated at present. This can go up to a maximum of 65 mha by 2020 and 85 mha in the next 50 years¹. It is obvious that during this period much greater attention—from the lowest to the highest level—has to be given to watershed management and development.

The policy we have put forward suggests suitable changes at the macro level in the governmental organisational structures and the adoption of the river basin approach to the integrated planning and management of water resources. At the micro level the policy suggests the setting up of community organisations throughout the country—Watershed Management Associations (WMAs) in rainfed areas, Water Users Associations (WUAs) in irrigated areas, Joint Forest Management (JFM) committees in forest areas and Resident Welfare Associations (RWAs) in urban areas. These community organisations will be the organisational mechanism through which people can be involved in the management of water resources². The steps

¹ See Table 1 for current land area of the country by categories of usage along with projections for 2020 and 2050.

² See Table 2 for the number and types of Community organisations required for this purpose.

involved in setting up and running the community organisations have been listed in an annexure to the action plan.

The action programme and implementation schedule proposed by us along with this policy clarifies the practical implications of the changes proposed in the policy, suggests an approach for action and emphasises the urgency of carrying out the proposed changes³.

The organisational and institutional changes we have suggested can come about only if there is an attitudinal change among the government functionaries as well as the people with respect to de-centralisation and transferring authority and responsibility to the people at the community level. We hope that the alternative policy put forward by us will generate debate and discussion among policy makers, engineers, administrators, other professionals, NGOs and communities involved in the management of water resources. In particular, we hope that the policy and action plan put forward by us will be of some use in the formulation of the operational Action Plan by the States. We also hope that the importance of some of the elements put forward by us in this alternative policy, especially those relating to the involvement of people through community organisations, and to institutional restructuring is recognised in the long run.

We welcome comments from all concerned to make the policy and action plan even more responsive to the demands of optimum management of water resources for a prosperous and ecologically sustainable India in the twenty-first century.

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³ In two related but separate papers, namely “Institutional Structural Changes in the Water Sector” and “Community Participation in Water Resources Management: From Ad Hoc to Systemic Approaches”, the authors have discussed in greater detail the changes required at the macro and the micro level to enable the implementation of the measures suggested here.

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Water Policy and Action Plan for India 2020: An Alternative

1. Preamble

Need for an Alternative Water Policy

1.1 Water is the very basis of life and is the foundation for human survival and development. Sustainable and equitable use of water over millennia has been ensured by cultural adaptation to water availability through water conservation technologies, agricultural systems and cropping patterns adapted to different climatic zones, and conservation-based life styles. But in the last few decades the consequences of population growth, industrialisation and urbanisation, and the associated consumerist culture, have interfered with the natural hydrological cycle of rainfall, soil moisture, groundwater, surface water and storage of all sizes. This has led to **overuse, abuse and pollution of our vital water resources** and has disturbed the quality and the natural cleansing capacity of water.

Water is **one of the most crucial elements in our national developmental planning for the 21st century**. The proper management of our limited water resources will be essential to ensure food security for our growing population and to eliminate poverty. It will be essential also to avoid the growing conflicts and the possibility of social unrest in the country in future due to water scarcity.

1.2 To minimise the negative impacts of the overuse and misuse of water and to ensure that our precious water resources are used optimally in removing poverty and achieving economic and human development, it is necessary that we have **a water policy which recognises and adequately addresses the challenges we face and are going to face in the twenty-first century**. A national water policy for the twenty-first century has to recognise water as a national resource for the purpose of national development goals and planning, although the management of water has to be done in a decentralised way in partnership between local communities and the concerned state governments. The policy should provide broad guidelines, and should be flexible enough to suit the various conditions in each watershed and river basin, such as the agro-climatic zone, location of polluting and other industries, the location of towns and population density. Different regions of the country, endowed differently with water in the form of precipitation, surface flows and ground water, need their own region-specific water policy, which can be based on broad guidelines elaborated below.

The earlier National Water Policy was adopted in September 1987 and a revised policy has been adopted by the National Water Resources Council in April 2002. In the last few years **a number of problems/challenges have emerged** in the development and management of water resources. On the one hand the water crisis (of its reduced availability per head and deteriorating quality) has grown and on the other hand local initiatives in water conservation have started to respond to the challenge. Strengthening these initiatives requires the strengthening of the water rights of the community, rejuvenation of the traditional techniques in conservation and management, recognition of water as a common property resource and not

merely a commodity subject to market forces. The implications of the 73rd and 74th amendment too need to be considered. These were some of the factors that led to the revision of the National Water Policy (1987).

The Vision: Key Elements of the Alternative Policy

1.3 Centralised and distant decision-making, indifferent or poorly responsive to the ecological, socio-economic and cultural circumstances of different regions, has led to increased incapacity to deal with drought and water scarcity. **Dealing with drought and water scarcity** has therefore become an urgent policy objective, to be guided by the principles of conservation, protection of water quality, sustainability and equitable access. Dealing effectively with drought and water scarcity requires that local water resources are harnessed, conserved and used in the most optimum manner. This, in turn, requires that water users and communities themselves have a central role in the overall management of local and regional water resources, with higher levels of government playing a suitable supportive and regulatory role in providing appropriate inputs of information, technical help and financial resources.

1.4 People-centered and managed watershed development in India's rainfed areas has to be accorded the highest priority in order to contribute to the vital national goals of employment generation, food production and food security. The production of food grains has increased from around 50 million tonnes in the fifties to about 200 million tonnes by the year 2000 but this will have to be raised to around 300 million tonnes by the year 2020. Out of a total culturable area of 195 mha in the country the net area under cultivation has remained stagnant at 142 mha⁴ (irrigated area 54 mha—which may go up to a maximum of 65 mha by 2020—and the remaining 141 mha being rainfed area) for the past two decades (see **Table 1** below). Another 42 mha of potentially culturable land exists in the form of wasteland and fallow land while 11 mha of culturable land exists as orchards and tree-covered land. This 53 mha of culturable land needs urgent attention for watershed development and for the production of fuel, fodder, timber and food. Overall, a total rainfed area of 141 mha at present needs more attention for watershed development. This is expected to come down to 110 mha in 2050, as per the projections made in Table 1.

Table 1

Land Area of India by Usage (mha): Current and Projections for 2020 and 2050

Usage	Area Reported (1995-96)	Projections for 2020	Projections for 2050
Culturable area	195**	190	185
Net irrigated area	(54)	(65)	(85)
Non-irrigated/rainfed area	(130)	(110)	(80)
Area covered by trees*	(11)	(15)	(20)
Forest area	69	66	65
Non-agricultural use (urban, roads, etc.)	22	30	36
Barren	19	19	19
Total area reported	305	305	305

Source: CWC for current land area; projections by authors

* This includes orchards and areas with low tree density, which are not classified forests and which yield fruits or NTFP, primarily for local use.

⁴ This may go down to 140 mha in the future.

** Out of this, area actually under cultivation is 142 mha and this is expected to go down to 140 mha in the future.

1.5 Domestic and industrial water needs have largely been concentrated in or near the principal cities, at the cost of the basic needs of rural society. The demand of water for thermal power generation and other industrial use is also increasing substantially. Besides taking care of urban and rural needs, **maintaining the life of river systems and other water bodies** should be an important objective of planning. This includes maintaining minimum water flows, prevention of pollution from industry and agriculture and control of riverbed sand extraction to ensure the maintenance of aquatic life and other ecological factors. As a result water, a limited resource, will be under greater demand pressure in future. This underscores the need for utmost efficiency in water utilisation and public awareness of the importance of its conservation.

1.6 Water quality has to be a very important aspect of water policy. The best way to ensure water quality is the prevention of pollution of water bodies and introduction of the “polluter pays principle”. In addition, improvements in existing strategies and the innovation of new techniques resting on a strong science and technology base will be needed to eliminate the pollution of surface and ground water resources, **to improve water quality and to step up the recycling and re-use of water**. Realising the importance and the pressure of demand on fresh water, it has to be treated as an essential part of the environment for sustaining all life forms.

2. Alternative Water Policy for the India 2020

2.1 Information System and Water Resources Assessment

2.1.1 A **national information system that builds itself on micro-watershed level databases** and integrates with the state and national levels is required. This database should contain information on rainfall, ground water, surface water availability and also water use for different purposes along with its quality. Successful community action for water conservation and use as well as details of traditional water conservation and use systems should also be contained in the database, which should be constantly upgraded. The GIS format will be most appropriate for this database and for making it available in the public domain. It should be available in a user-friendly format and should be available for public access through the Internet.

2.1.2 **Uniform standards for coding, classification, processing** and methods/procedures for data should be adopted. Advances in information technology must be introduced to create a modern information system promoting free exchange of data among the various agencies like the Ministries of Water Resources (MoWR), Agriculture, Environment and Forests, Urban Development and Rural Development in GoI and similar departments at the State level. MoWR may be the nodal agency for this purpose. Similarly access to this information at district, panchayat and community levels is also important. Special efforts should be made to develop and continuously upgrade the capability to collect, process, use and disseminate reliable data in the desired time frame. At present, comprehensive data is being collected from about 2000 sites. This needs to be increased to about 30,000 in the next 5 years to coincide with the number of watersheds (average size of 10,000 ha).

Apart from data regarding water availability and its use, the system should also include comprehensive and reliable projections of future demand, availability and its quality. The depth to which groundwater extraction is advisable/allowed along with quality in each watershed area should be publicly available. Both surface water and ground water should be regularly monitored for quality. A phased programme should be undertaken for improvements in water quality. The data generated by this exercise should be available in the public domain through the Internet.

Assessment

2.1.3 It has been estimated that out of the total precipitation of around 400 million hectare metres in the country, the surface water availability is about 187 million hectare metres. Out of this, about 50 per cent can be put to consumptive beneficial use because of topographical, ecological and other constrains. In addition, there is a ground water potential of about 43 million hectare metres. The availability of water is highly uneven in both space and time. Precipitation is mainly confined to about three or four months (5 to 60 rainy days) in the year and varies from 100 mm in the western parts of Rajasthan to over 10000 mm at Cherrapunji in Meghalaya. Some parts of south India are more fortunate with the northeast monsoon in addition. Many rivers and underground aquifers often cut across state boundaries. Water as a resource is one and indivisible, as such rainfall, river waters, surface ponds and lakes and ground water are all part of one system; water is a part of a larger ecological system.

Development of ground water must take India's great hydro geological diversity into account. Great caution needs to be exercised especially in hard rock regions that constitute a major part of India's land area. There should be a reassessment every ten years on a scientific basis of all forms of water, taking into consideration the quality of the water available for various uses.

2.2 Demand Management, Conservation and Efficiency of Utilisation

The efficiency of utilisation in all the diverse uses of water should be improved and an awareness of water as a scarce resource should be fostered. Conservation Consciousness should be promoted through education, regulation, incentives and disincentives in the following ways in different sectors.

Domestic Sector

- Introduction of domestic water saving devices
- Water meters on all consumers/ groups of consumers
- Progressive water tariff structure
- Auditing of water balance on each distribution system
- Sewage and other domestic use to be piped out separately.⁵

Industrial Sector

- Progressive water tariff
- Water recycling facilities
- Treated urban sewage water for cooling and other processes

Agriculture Sector

- Water rates on volumetric basis to WUAs should be pegged at an appropriate level to yield enough revenue for maintenance costs
- Treated sewage water for non-edible crops
- Saline water for tolerant crops
- Improvement in irrigation practices and reduction of water losses
- Pressure irrigation systems to be introduced

River management for each basin

- Afforestation and soil conservation
- Livestock management
- Treatment before disposal of sewage
- Prevention of pollution from agriculture use through use of biofertilisers and biopesticides

2.3 Integrated Planning for Maximising Water Usability

2.3.1 Utilisation of water within a river basin should be planned in an integrated manner taking into account **the following types of integration:**

⁵ The domestic effluent may be segregated, so that the wastewater from the water closet and wash hand basin is conveyed to a sewage treatment plant, and the wastewater from bathing and from the kitchen is collected from relatively small settlements, treated suitably and utilised for flushing toilets in the same settlement.

- Between rainfall, surface water and ground water
- Between different sectoral uses and environmental requirements
- Between structures i.e. water harvesting structures for use of water and recharge of ground water to the high dams on the main rivers
- Between water to be supplied from the bigger structures to the smaller structures when required during drought/lean period
- Between institutions at the community level, NGOs and the government
- Between different types of land use (agriculture, forestry, wetlands, non-agricultural uses, flood buffer zone) keeping in mind the requirement of water for different uses

Besides such integrated planning, conservation through **demand management, recycling and reuse after treatment**, improving irrigation efficiency and then desalination of brackish or seawater and inter-basin transfers can be considered, among **the steps needed to increase the availability of utilisable water**.

All individual development projects and proposals should be formulated and considered within the framework of such an overall plan for a basin or a sub-basin so that the best possible combination of options can be made and sustained. There should be an integrated and multi-disciplinary approach to the planning and implementation of projects. This should inter alia include catchment area treatment and management, environmental and ecological aspects, the rehabilitation of affected people and command area development. **Co-ordinated development of surface water and ground water and their conjunctive use** should be envisaged right from the project planning stage and should form an essential part of the project. Over exploitation of ground water should be avoided near the coast to prevent ingress of sea water into sweet water aquifers.

2.3.2 At the planning stage, decisions should be taken after according opportunity to the respective Gram Sabhas to voice their concerns and if their submissions are rejected, the reasons should be duly recorded and publicised. The management of the water resources for diverse uses should be done by adopting a **participatory approach**: by involving not only the various governmental agencies but also the users and other stakeholders in an effective and decisive way in various aspects of planning, design, development and management of the water resources schemes. Necessary legal and institutional changes should be made at various levels to ensure the implementation of the above objectives. WUAs and the local bodies such as municipalities and gram panchayats should particularly be involved in the operation, maintenance and the management of water infrastructures/facilities at appropriate levels progressively with a view to **eventually transfer the management of such facilities to the user groups/local bodies**.

2.3.3 The study of the impact of a project during construction and later, on human lives, settlements, occupations, socio-economic environment and other aspects should be an essential component of project planning. All projects that seek to conserve/impound water or generate power should make **the Environmental Impact Assessment (EIA), the Social Impact Assessment (SIA) and Cost Benefit Analysis open for public scrutiny** and should examine alternate options before coming to a conclusion about the most appropriate strategy. Environmental Management Plan (EMP) and compensatory actions should also be considered and should be open to public discussion to ensure public participation in implementation and subsequent maintenance.

2.3.4 Economic development activities including agricultural, industrial and urban areas should be planned with due regard to the constraints imposed by the water availability. There should be **water zoning of the country** and the economic activities should be guided and regulated in accordance with such zoning. Relief works undertaken for providing employment to drought stricken populations should be for drought proofing like water harvesting with watershed management.

2.4 Water Allocation for Various Uses

Sectoral Allocation: The water allocation amongst the basin states should be guided by a national perspective with due regard to water resources availability and requirement within each state and the river basin. Necessary guidelines should be formulated accordingly for allocation of water amongst the basin states⁶. In planning operation systems, **water allocation priorities** should broadly be as below, but governed on the basis of local conditions and requirements:

- i) Drinking and domestic use
- ii) Sustaining livelihoods
- iii) Sustaining environment, maintaining river systems and aquatic life
- iv) Irrigation and hydro-power
- v) Thermal power and industries
- vi) Recreation and religious uses
- vii) Navigation

The first three uses have the highest priority but within these, the allocation of water should be decided by the people at the watershed level. For allocation to other uses where bulk supplies are required and where supply to the first three categories is affected, people's agreement would be necessary.

2.5 Domestic Use

Adequate drinking water facilities should be provided to the entire population both in urban and in rural areas. Irrigation and multipurpose projects should invariably include a drinking water component, but these should only supplement locally developed sources of drinking water. Drinking water needs of human beings and animals should be the first charge on any available water. The community should have the first right to use rainfall directly, store and recharge groundwater wherever possible. The rights over water should not be restricted to only those who own land. Water should be allocated on per head basis and not on the basis of land area and heavy water consuming crops should not be allowed by consensus/agreement. Some existing models are notable in this regard. For instance, Ralegaon Sidhi and the Pani Panchayat model developed by Gram Gaurav Pratishthan. In Bangladesh, the Grameen Bank gives credit for development of shallow tubewells for groundwater development to landless people, and the groundwater is then sold to landowners.

The standard with regard to water allocated per capita for domestic use should be 30 to 60 litres per day. It may vary according to rainfall zones i.e. less in Rajasthan and more in Assam,

⁶ In 1991 the annual per capita availability of water was 2731 cubic metres. In 2020 this is expected to be just over 2000 cubic metres and by 2050 1403 cubic metres (Indian Water Resources Society, *Water: Vision 2050*, 1999). The allocation of water for each hydrological zone should be based on the principle of providing at least 1000 cubic metres per capita per annum (for all uses). The surplus water over and above this amount can be allocated by mutual agreement between different hydrological zones.

but should be the same for rural and urban areas. Sanitation requirement, however, should be considered separately.

2.6 River Life, Pollution and Environment

2.6.1 A **minimum good quality water flow** should be ensured at all times as required for the life of the river and for sustaining livelihoods. This should include the allocation of water for various purposes including conserving the environment, preventing groundwater salinity and sea water intrusion, supporting livelihood based on aquatic life and other uses of water, recreation, and cultural activities like bathing and festivities. The requirement of water for these various purposes should be calculated scientifically. To begin with at least 50 per cent of the lean period flow before the structure was built (average of 1-2 months) over and above the committed use should be allowed to go downstream of all existing and new structures. Implementation of this would be possible only with the help of all communities involved with proper monitoring and also by allocating this quantity on a priority from new reservoirs.

2.6.2 In project planning, implementation and operation, **the preservation of the quality of the environment and the ecological balance** should be a primary consideration. The adverse impact, if any, on the environment should be minimised and should be off-set by adequate compensatory measures. Effluents should be treated to acceptable levels and standards before discharging them in natural streams and other water bodies. Details of all effluents generated by each industry or urban area should be available to the public. The standards of treatment and the achievement levels by each effluent discharger should also be available to the public. The responsibility of making this available to the public will be with the pollution control board and with the local government bodies.

2.6.3 Necessary legislation should be made for the preservation of the existing water bodies by preventing encroachment and deterioration of water quality. An annual list of defaulters in this regard with the extent of area under encroachment will be prepared and published by the pollution control board so that social and legal pressure can be brought to bear on the defaulters.

2.6.4 **Traditional and natural wetlands and water bodies** like tanks, *jheels*, *chors* and village ponds, etc. have been badly neglected in the last few decades. These structures should be restored, maintained and used properly and these water bodies should not be allowed to be encroached upon for any other land use.

2.7 Watershed Areas Management

2.7.1 Watershed management and minor irrigation projects would be **most suitable for drought prone, tribal and hill areas**, which should be allowed and encouraged to be developed by the local communities, with technical and financial help from the government and NGOs. Special efforts should be made to investigate and formulate projects either in, or for the benefit of, areas inhabited by tribal or other specially disadvantaged groups such as scheduled castes and scheduled tribes. A lower cost-benefit ratio should be acceptable for such areas in view of the advantages that reach such sections. The management of these projects should be with the local communities, through Watershed Management Associations/WUAs.

2.7.2 The planning of projects in hilly areas should take into account the need to provide assured drinking water, possibilities of mini hydro-power development and the proper

approach to irrigation in such areas. In the context of physical features and constraints such as steep slopes, rapid run-off, the incidence of soil erosion and the eco-fragility of the area, the benefit-cost ratio of projects in such areas should be acceptable even at a lower rate.

2.7.3 The people of these areas face a rapid decline in their standard of living as natural resource base become degraded and loses its ability to recover. Increasing number of environmental refugees migrate to other lands, which are then also endangered by over use. The programme should be such that first, they focus on the positive synergies between poverty reduction, economic efficiency, and environmental protection. Second, the projects are developed with the beneficiaries rather than for them. Third, they are based on an integrated approach to natural resource planning and management in consonance with an Environment Action Plan.

2.8 Irrigation and Hydropower

2.8.1 Irrigation planning either in an individual project or in a basin, as a whole should take into account the irrigability of land, cost effective irrigation options possible from all available sources (including traditional ones). Wherever water is scarce, if economically advantageous, deficit irrigation may be practiced. The irrigation intensity should be such as to extend the benefits of irrigation to as large a number of farm families as possible, keeping in view the need to maximise production and providing minimum sustainable income above the poverty level. Water intensive crops such as sugar cane and paddy should be strongly discouraged in the areas of water scarcity. Irrigation efficiency in irrigation projects should be improved from the present average of 35 per cent to the maximum achievable, which is approximately 60 per cent.

2.8.2 Water allocation in an irrigation system should be done with **due regard to equity and social justice**. Disparities in the availability of water between head-reach and tail-end farms and between large and small farms should be obviated by adoption of a rotational water distribution system and supply of water on a volumetric basis to WUAs subject to certain ceilings. WUAs should have an important role to play in managing distribution, maintenance and recovery of service charges.

2.8.3 Canal irrigated areas have created some **water-logged areas** which need to be drained out to make the land fit for agriculture and other purposes. First attempt should be to avoid the supply of excess water and then wherever possible, bio-drainage, and vertical drainage should be preferred rather than surface drainage. The quality of surface drainage water should be improved so as to make it reusable for various purposes. The basic idea should be to store the water after proper treatment, so that water can be reused usefully rather than flow to the sea during the monsoon without use. A combination of drainage arrangements should be adopted to use the least amount of land and which can also be properly maintained at least cost on a regular basis.

2.8.4 **Prioritisation of minor/major/medium projects:** The prioritisation of projects basin-wise and state-wise is needed. Due to the extreme paucity of funds, projects should be prioritised in such a way that those on-going projects where over 20 per cent of the project cost has already been incurred should be completed first. In basins where most water resources available have already been developed, the emphasis should be on the modernising and up-gradation of existing systems in an integrated manner. However, in basins where much development work remains, the emphasis should be on complete investigation and planning in

an integrated manner. Economic criteria should not be ignored in sanctioning projects except in some special cases where development has been poor because of paucity of water potential and there is no other alternate means of economic development.

2.8.5 Redefinition of major, medium and minor projects: So far the utilisation of potential created on an irrigation project is one of the main criteria for its performance. The potential given in the project report is based on a certain assumed cropping pattern. But in actual practice these cropping patterns keep on changing on the basis of demand and market price from year to year. The actual potential is also different at the time of completion of the project due to land availability and the soil condition at site being different from those given in the project report. **Often there is an over-estimate of potential**, so as to indicate a better B/C ratio and Rate of Return. In some cases in actual practice the use of water also shifts from agriculture to industrial or other uses. In spite of all efforts by the Planning commission and the known reduction in the actual potential of irrigation this is not reflected accurately in the figures, which gives a wrong picture of the gap between potential and utilisation. Besides, there is also the need to reduce the gap by more efficient use of and better distribution of water in the field. In agriculture the efficient use of water should also be judged through the economic value of the product per unit of water used.

The present system of categorisation is based on irrigated area, and the irrigation potential is based on an assumed cropping pattern, which keeps on changing over time. The focus, however, should be on overall water use. In certain projects, it may be power generation, drinking water or flood control, which may be the major component, rather than irrigation. Thus, instead of being based on the area irrigated or height of the dam, **projects should now be categorised on the basis of live storage capacity**. Projects above 100 MCM would be categorised as major, between 10 and 100 MCM would be medium; and those below 10 MCM would be minor. Projects smaller than 1 MCM would be categorised as micro. For run of the river schemes, the volume of water diverted in a year would determine the categorisation of the project as major, medium, minor or micro.

2.9 Industry and Thermal Power

Most of the thermal power houses and industries with heavy use of water should be located on the coast. They should be encouraged to use sea water/desalinated water, adopt processes with minimum use of water, recycle and reuse and discharge only treated and cooled water into the sea to maintain its ecology.

2.10 Navigation

In order to save energy and reduce our dependence on petroleum products, the major portion of which are imported, navigational transport in rivers is essential. This will require that minimum flow and depth in specific reaches of the river is assured.

2.11 Groundwater Management

2.11.1 The first right to groundwater should be to the concerned community and not to an individual on land-ownership basis. In areas with scarcity of water, the respective community organisations should have the right to inspect and monitor the use of groundwater by private landowners to ensure that groundwater beyond permissible limits is not being withdrawn. Diversion of groundwater to urban areas or for industrial use without consent of the gram sabha/village community should also not be permitted. In canal-irrigated areas,

groundwater planning should be integrated with the water supplied through the canal system so as to avoid water-logging and also utilise public or private funds of the community and local management talent.

2.11.2 Development of groundwater resources should be so regulated as not to exceed the recharging possibilities, as also to ensure social equity. **The detrimental environmental consequences of over-exploitation of groundwater need to be effectively prevented by legislation and its enforcement by local government bodies, RWAs and gram sabhas, who will have to play a vital role in this.** To give teeth to their actions the Central and State governments should enact suitable legislation and notify the permissible water depths to which ground water depletion will be permitted for each region/ block/ gram sabha/ watershed after identifying the special problems of each area. Groundwater recharge projects should be developed and implemented with community participation for augmenting the available supplies. There should be a reassessment of groundwater quantity and quality every 5 years.

2.11.3 The Government should transfer the authority for regulating groundwater use to the lowest level, the Gram Sabha. In this case the Government should have the responsibility of laying down the rules and regulations and then monitoring the implementation. In case of default the Gram Sabha should be penalised and would in turn would be authorised to collect it from individuals or groups as necessary.

2.11.4 In order to discourage excessive use of ground water, the electricity and diesel should be supplied at the market rate and should not be subsidised. However, it should be ensured that the electricity is supplied for 12-16 hours per day without interruption. This would also encourage use of other means of energy. In case subsidies are to be given to the marginal and poor farmers, these should be designed and targeted in such a way that the subsidies reach only the targeted beneficiaries and not the better-off farmers.

2.11.5 Over-exploitation of groundwater should be avoided near the coast to prevent ingress of sea water and also from excessive saline layers of aquifers.

2.12 Flood Management and Drainage

2.12.1 Insurance against floods and droughts requires local action as well as national coordination. It is essential to realise that **floods and their negative consequences can only be managed, they cannot be 'controlled'**. The seasonal floods in most parts of India are largely a consequence of the concentration of heavy rainfall within a period of few days/weeks during the monsoon months and low flows for most part of the year. The flood management policy should recognise this fact and should begin with the premise that people are prepared to live with the floods in ways that are least disruptive and harmful for them.

A number of systematic measures, that include the adoption of suitable policies, operational and managerial steps, disaster preparedness, flood forecasting, ecological measures and international river water sharing agreements should be taken urgently to deal with floods in such a way that their intensity is moderated and the negative consequences on flood-prone populations are minimised. The planning for flood management should be done in a holistic manner so that the needs during the non-flood season are also taken care of.

2.12.2 Measures for Flood Management

- i) There should be a **master plan for flood control and management for each flood-prone basin**. An integrated river basin water policy for states sharing a river basin should be evolved. Such groups of states should co-operate, make use of computerised information systems and undertake joint measures for information sharing, flood forecasting, management, and operation of reservoirs, etc.
- ii) In those instances where flood control is one of the key purposes of multi-purpose dams, it should be ensured that the dam intercepts significantly at least 33 percent of the catchment/drainage above the affected area. Wherever dams and reservoirs exist or contemplated for multipurpose benefits, flood management should be integrated among its purposes. **In highly flood prone areas, flood management should be given overriding consideration** in reservoir regulation policy even at the cost of sacrificing some irrigation or power benefits.
- iii) While physical flood protection works like embankments and dykes may be necessary in some areas, increased emphasis should be laid on non-physical measures such as **flood forecasting and warning, flood-plain zoning** and flood proofing, for the minimization of losses, so as to reduce the recurring expenditure on flood relief. An extensive network for flood forecasting should be established for timely warning to settlements and economic activity areas in the flood plain zones in order to keep people in a state of preparedness and to minimise the loss of life and property on account of floods. The working of the existing flood forecasting and warning network in flood prone regions should be reviewed and strengthened. Its working should be updated so as to correspond with latest technology and to render real time information/warning coupled with a decisive support system, comprising simulation models, policies of operation of structures based on historical data, to develop the likely scenario in the flood plains.
- iv) Land-use regulation should be integrated with **flood plain zoning** to avoid inappropriate land-use in flood-plains and other flood-prone areas and consequent higher damages and relief costs in the long run. Flood prone areas should be demarcated at different probability levels and appropriate development measures and economic activities should be devised for flood prone and non-flood prone areas (as recommended by the Rashtriya Barh Aayog).
- v) Unauthorised and unabated encroachment in the flood plains and riverbeds as also cultivation of riverbeds/drainage courses during the flood period should be prevented. The land, however, may be leased for agricultural purposes during the non-flood months.
- vi) Watershed management through extensive soil conservation measures, such as check dams, contour trenches etc., preservation of forests, increasing the forest cover, etc. should be promoted to reduce the intensity of floods. The **traditional flood management systems** of the area should be revitalised, maintained and suitably upgraded. The traditional method of building houses on stilts, for instance, should be revived and encouraged. Thus the government policy should build on people's resolve to live with floods and should aim at dealing with floods so as to minimise losses and hardship while obtaining certain benefits.
- vii) Construction of **embankments** should be considered only after careful detailed studies and investigations as a part of a package. Regular and adequate maintenance of embankments should be ensured with the involvement of people. Where embankments have been made, arrangements for adequate drainage of the area behind them should be made through appropriately located sluices. Development works such as roads,

railways and housing construction should take into account natural waterways and adequate natural drainage should be provided without creating an aflux upstream.

2.12.3 Drainage

Draining out of water becomes necessary for the following purposes.

- To get rid of bad quality water from sewage and industrially used water. This can be avoided by treating the water and reusing it.
- To recover land area from water logged and salinity, which can be made, fit for various uses. Wetland and other water bodies both natural and man made should be used, without reclaiming it for land use without water. These can be used for aquaculture, recharge of ground water, maintaining ecology as in mangrove or rain forests, etc.
- To get rid of excess water during monsoon season due to sudden heavy rainfall. If natural depression, wetlands, tanks, can be properly maintained and even more created to absorb water and retain it during wet season and land with water, used for various economic purpose. This way flood intensity could be moderated and water dose not flow to the sea unused.

2.13 Resettlement and Rehabilitation

Although optimal management of water is best achieved through a sound micro watershed development programme, **sometimes it would be necessary to construct large storages.** The consequent resettlement and rehabilitation of people should be governed by a national policy. Under this policy the project-affected persons (PAPs) should be entitled to rehabilitation that precedes the project completion and compensation where payable should be both for appropriation of property as well as for livelihood.

2.13.1 **Land for land** in respect of agriculturists should be the preferred option in those regions and states where land for resettlement is or can be made available. In some cases, where allotting land for land is not possible due to small holdings throughout the command, following **alternative measures** should be taken:

- Annuity for a certain number of years, where the amount of annuity and the number of years for which it is to be paid may be worked out on the basis of factors like skill level, value of loss of livelihood, and number of remaining years of active working life.
- A suitable job in the development project itself, where the skill and job profile match or person's skill can be upgraded by suitable training and only where the job is expected to be of a permanent nature, and is not merely created for the purpose of rehabilitation.

2.13.2 The compensation awarded to PAPs should match market rates, even if this means that the cost of Resettlement and Rehabilitation (R&R) as percentage of the total project cost goes up.

2.13.3 The definition of PAPs should be such as to cover all the people who are actually affected by the project⁷. The definition should include, besides the persons displaced due to the dam reservoir, borrow area or mine etc., the persons displaced due to the project colony, the canal system or any other 'development' during the project construction. Tribals or others,

⁷ According to the NWDT Award, for instance, an oustee meant "any person who, since at least one year prior to the date of publication of notification u/s 4 of the Land Acquisition Act, has been ordinarily residing or cultivating land or carrying on any trade, occupation or calling or working for gain in the area likely to be submerged permanently or temporarily."

who may not have legal titles to the land, but who are nevertheless land-owners in terms of customary laws, should also be considered as PAPs. Persons, such as downstream fisher-folk, washermen, etc. whose livelihood is affected due to a project, should be compensated suitably.

2.13.4 All water and power development projects should **ensure that benefits of the project go to the local people first**. For example, water supply and electric connections should be provided on priority to all local people who are affected.

2.13.5 **A separate R&R cell or wing** should be created within the project management structure to be staffed with social scientists (sociologists, anthropologists, economists) and extension/community workers besides engineers. This cell should focus on bringing about attitudinal change among the project managers and government officials towards the problems of the PAPs. The central or state governments or corporations which are repeatedly involved in R&R activities should set up a cadre of persons (from both engineering and social science backgrounds) trained in R&R activities.

2.13.6 The concerned government should appoint **an independent agency (outside the project implementation) to monitor the R&R activities** at regular intervals for the whole duration of the development project. Representatives of local people/reputed NGOs should be associated/CO-opted as a part of this agency to inspire confidence among the affected people. They should visit the sites/villages for redressing the grievances rather than wait for complaints.

3. Action Programme and Implementation Schedule

3.1. Partnership with Communities in Water Resources Management

3.1.1 The management of water resources for diverse uses should be done by adopting a participatory approach; by involving the user communities, through community based organisations, in the various aspects of planning, design, development and management of water resources. Necessary legal and institutional changes should be made at various levels for this purpose. Water Users Associations and local bodies such as municipalities and gram panchayats should particularly be involved progressively at appropriate levels in the operation, maintenance and the management of water infrastructures/facilities with a view to eventually transfer the management of such facilities to the community based organisations/Local bodies. The number and different types of community based organisations required in the country is given at **Table 2** below. A list of operational aspects relating to establishing and sustaining community organisations is given at **Annexure 1**.

Table 2
Number of Community Based Organisations (CBOs) for Management of Water Resources at the Local Level

Sl. No.	Type of Land Area/Population	Land Area (mha) and Corresponding Number of CBOs Required (lakhs)		
		1995-96	2020	2050
1.	Net Irrigated Area	54	65	85
2.	Number of WUAs required @ one WUA/500 ha	1.08	1.30	1.70
3.	Area that needs watershed management	141	1.25	100
4.	Number of WMAs required @ one WMA/500 ha	2.82	2.50	2.00
5.	Forest Area	69	66	65
6.	Number of JFM committees required @ one JFM committee/500 ha	1.38	1.32	1.30
7.	Urban population	350 million	500 million	700 million
8.	Number of RWAs/NUGs required @ one RWA/500 households	1.40	2.00	2.80
9.	Total number of community organisations required	6.68	7.12	7.80

It is evident from this table that nearly 6.7 lakh community level organisations are required at present and about 7.1 lakh such organisations will be required by 2020 in the country as a

whole to ensure participation of all local level communities in the management of land and water resources.

3.1.2 Since all water resources have a common property character, private participation in planning, development and management of water resource projects must be subjected to careful social scrutiny based on well-developed mechanisms of accountability and regulation. Where local communities or public utilities are neither able to invest nor able to efficiently manage water delivery systems, corporate sector participation can be invited. All agreements/contracts must be cleared by the local community, whose water resources are being tapped on the principle of prior informed consent based on recognition of water rights of local communities. Private sector participation may help in introducing innovative ideas, generating financial resources and introducing modern management practices in improving service efficiency and accountability to users. However communities need to be involved in decisions related to technology choice, and prices of services. For urban projects various combinations of private sector participation, in building, owning, operating, leasing and transferring of water resources facilities, may be considered. However at no point should water be reduced to a commodity, with access determined by purchasing power and not as a common resource to be equally shared.

3.1.3 The involvement and participation of beneficiaries and other stakeholders should be mandatory at every stage of project conception, planning, implementation, operation and maintenance. Consultations with the gram sabha should be held before projects are taken up in the area of each gram sabha. If the decision is to go against the recommendation of the gram sabha it should be mandatory for the government agency concerned to state the reasons why the recommendation is being over-ruled. This information should be available in the public domain. Formation of water users associations and other community based organisations should be mandatory as this will facilitate accountability and maintenance of the distribution system, discipline and recovery of charges.

3.2. Changes in the Institutional Structure⁸

3.2.1 Water in each river basin including rainfall, groundwater and surface water with storages in various structures, wetlands, etc. of all sizes can be used many times over for various purposes if planned, developed, operated and managed in an integrated manner. For this it is necessary to set up a water resources department in each state with wings for each river basin in the state (see attached **Chart 1** for the ministry of water resources at the centre and **Chart 3** for the state water resources department). For an inter state river these river basin organisations (RBOs) can be set up jointly by the concerned states by agreement among themselves (see **Chart 2** on RBOs). These would be advisory and could act on the authority delegated by the states. An RBO should have two wings: a River Basin Assembly (RBA) consisting of representatives from each state starting from the lowest watershed with a federated system, and another wing consisting of a multidisciplinary team of professionals taken from various departments of each state and fresh recruits in disciplines where such experts are not available from departments. The RBA representatives should represent all interests like:

- Watershed Associations

⁸ The rationale for and the nature of changes needed in the institutional structures for water resources management have been discussed by the authors in a separate paper titled "Institutional Structural Changes in the Water Sector".

- Water Users Associations in irrigated areas
- Associations of forest users and pastoral people
- Resident Welfare Association representatives as users of drinking and/or domestic water including those from urban areas
- Large industries
- Small and tiny industries
- Other users such as fishermen, washermen, potters etc.

3.2.2 Where **interstate disputes** are not resolved by themselves or by RBO, these could be **referred by states to a single or a team of arbitrators** to give the verdict, which should be accepted by all under a legal provision. This system would lead to quicker decision and help to reduce the politicisation of the issue and avoid time-consuming judicial process.

3.3 Implementation of Watershed Projects

3.3.1 A total land area of 141 mha is to be covered under this programme (see **Table 1** above). There is no precise record/information with regard to the land area taken up and completed under various watershed management schemes taken up by various agencies. However, it is estimated that about 40-50 mha has been tackled by government agencies and NGOs through outside financial help thus the balance 80-90 mha has still to be managed by various agencies. The Planning Commission has drawn up a programme of covering 63 mha in the next 25 years. There is no adequate arrangement for the maintenance and management of the watershed work already done by the government agencies, as the people were not fully involved in carrying out this work. Such works may have to be repaired or re-done through community level organisations. **Table 2** (above) gives an idea of the large number of WMAs that are needed for people-centred watershed development and management activities in the country.

3.3.2 At present various departments and ministries like rural development, forest and agriculture etc. are looking after this programme through special programmes imposed from the centre, which are not always suitable for local conditions. A nodal agency like the Rural Development ministry needs to co-ordinate and monitor the work and funds released with the freedom to choose the technology as per local conditions with full involvement of the gram sabha from the planning stage itself so that maintenance and operation can be done by them with authority and responsibility.

There are several land-based programmes being serviced by different ministries of the government of India. The important land-based programmes are: Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP), National Watershed Development Project for Rainfed Areas (NWDPA), Integrated Watershed Development Programme (IWDP), soil conservation in the catchments of river valley projects and flood prone rivers. However, despite efforts in the past, progress has not met expectations. The MoA has restructured NWDPA providing for decentralisation for procedures, flexibility in choice of technology and provision for active involvement of the watershed community in the planning, implementation and evaluation of the programme so that it becomes sustainable. The states of Karnataka, Maharashtra, Orissa and Rajasthan have already established a separate nodal department for implementing all the GOI and the state government watershed and soil conservation programmes.

3.3.3 At present not many NGOs are involved in watershed management. They should be persuaded, motivated and trained to take up this work, so that the total work can be completed in a shorter period. Adequate legal and administrative action would have to be taken to encourage Gram sabhas and NGOs to get involved in this work. Technical help can be provided by the government and also by technically competent NGOs at a reasonable cost.

3.4 Legal Changes

On a number of policy issues relating to the management of water resources, which have been suggested herein, necessary legislation should be passed by the Parliament and by state governments to enable the changes to be implemented in practice. Appropriate and enabling legislation will have to be passed particularly with respect to the following policy and operational aspects:

- a) Setting up of river boards, both within states and interstate, to plan in an integrated way for the development of water resources within a river basin. The necessary legislation should provide for the two-tier constitution of river boards, consisting of the river basin assembly and a supporting technical body. River basin organisations within states can be set up by Government Orders under existing legislation itself.
- b) Enabling full and effective participation of the farmers and rural and urban communities in the task of managing water resources. The existing legislative framework, which provides overriding control over water resources to the state, should be modified to provide usufruct rights to local communities and a pivotal role in the management of water resources at the local level. The exact modalities of how such water users associations, watershed associations and resident welfare associations in urban areas will interact with panchayats and urban local self government bodies will have to be worked out. In the southern and western states of India the panchayat system is working reasonably well, so a separate committee under the gram panchayat consisting of the actual users/beneficiaries of water could be formed to deal with watershed management and irrigation management at the minor levels. In the northern and eastern states it may be necessary to set up separate WMAs and WUAs who could cooperate with panchayats but not under them, as the latter are not functioning properly.
- c) Regulation of groundwater so as to prevent and stop the overuse and depletion of groundwater in many areas. The existing law provides for control and ownership of groundwater by the landowner. This should be modified by transferring at least the management of groundwater to the gram sabha and the RWA. The overuse of groundwater should be stopped and regulated by the respective gram sabhas / RWAs, with higher levels of government providing the necessary information, framing rules for regulation and monitoring the situation.
- d) Provision of accurate and up to date information on water resources in the public domain in a user-friendly form. This is essential for the rational and integrated planning of water resources in the country, for involving local communities in the task of management of water resources and for smooth resolution of water related conflicts between different parties. The Official Secrets Act and the attitudes and practices relating to its interpretation should be modified in order that information on water resources in the country is freely available.

3.5 Project Implementation

3.5.1 There should be a system to monitor the performance of the project and socio-economic impact of the project. Such a monitoring process should take the community into confidence by involving them at every stage. All data gathered for this should be made available in the public domain. A close monitoring of the projects to identify bottlenecks and to adopt timely measures to obviate time and cost overruns should form part of project planning and execution.

3.5.2 In the first four decades after Independence, due to the absence of expertise and the required skills not being available in the private sector, the expertise and skill for investigation, planning, feasibility reports, detailed designs, and even departmental construction were developed in the government sector. Since a number of projects were taken up in various states, most of the major states had developed this expertise along with research and model testing. Now the tempo of work has slowed down and the required expertise has also developed with the private sector, which can move from project to project in different states, or even take up projects outside India. The private sector can operate with less manpower and better utilisation of expertise. Such tasks can now be given out on contract to private sector firms (through competitive bidding) who are in a better position to keep themselves up-to-date with the latest technology and with least cost.

3.6 Financing Projects and Water Service Charges

3.6.1 Government financing of water projects is getting reduced due to other priorities and this situation is likely to continue for a long time. It has increasingly become evident that government alone cannot provide the funds needed for the financing of water projects. Local communities on the one hand and the corporate sector on the other have an important role to play in the better development and utilisation of water resources. The government should facilitate this by putting in place a suitable legal and administrative environment.

3.6.2 At present government investment is in major, medium and minor irrigation projects, besides domestic water supply, while watershed development has been done both by the government and the private sector. The capital cost is not recovered and even the operational and maintenance cost is only partially recovered for government projects. Private investment is mainly in groundwater development for irrigation and industrial purposes and the investors also fully bear the cost of operation and maintenance. However electricity to agriculture sector is highly subsidised, leading to an overuse and wastage of groundwater. This situation will have to be rectified and the subsidies reduced and, ultimately, removed to if there is to be viable investment of the private sector in groundwater development.

3.6.3 As a matter of principle in government projects the full cost of operation and maintenance along with the 50 per cent cost of the capital should be recovered. The water charges should be increased gradually to reach that level within the next 10 years. In the case of private sector investment suitable means like commercial use of land or other means can be found to compensate for less recovery in the early stages of operation of the projects. In areas where sanitation services have been provided by the government the water user charges should be substantially enhanced (to double the existing charges or so) in order to recover the capital cost and to generate the funds for maintenance, extension and modernisation of the sewage disposal system.

3.6.4 The energy pricing should be done at market rates for electricity and diesel (used for groundwater exploitation) and the surface water rates should be comparable so that it induces conservation of water and creates a sense of value of water. Recently under the Uttar Pradesh Water Sector Restructuring Project the World Bank and the Government of Uttar Pradesh have entered into an agreement to set up an autonomous regulatory body to fix service charges for all types of uses of water. This kind of regulatory body to fix tariffs for the different uses of water should be set up in all states.

3.6.5 The water may be sold on volume basis to WUAs, RWAs and other groups so that recovery points and administrative cost can be reduced. This will reduce chances of theft and better distribution by local groups and agencies. This would also require transfer of authority and responsibility to them and in some existing projects even transfer of funds.

3.6.6 Adequate emphasis needs to be given to the physical and financial sustainability of existing facilities. There is, therefore, a need to ensure that the water charges for various uses should be fixed in such a way that they cover at least the operation and maintenance charges of providing the service and a part of the capital cost. The water charges could be increased gradually. These rates should be linked directly to the quality of service provided. The subsidy on water rates to the disadvantaged and poorer sections of the society should be well targeted and transparent.

3.7 Maintenance and Modernisation

Performance Improvement

3.7.1 There is an urgent need for a paradigm shift in the management of water resources sector. From the present emphasis on the creation and expansion of water resources infrastructure for diverse uses, there is now a need to give greater emphasis to performance improvement of the existing water resource facilities. Therefore, allocation of funds under the water resources sector should be re-prioritised to ensure that the needs for development as well as operation and maintenance of the facilities are met along with the funds allocated to other activities under the sector. Structures and systems created through massive investments should be maintained in good health. Appropriate annual provisions should be made for this purpose in the budget. There should be a regular monitoring of the structures and systems and necessary rehabilitation and modernisation programmes should be undertaken.

Safety

3.7.2 There should be proper organisational arrangements at the national and state levels for ensuring the safety of storage dams and other water related structures consisting of specialists in investigation, design, construction, hydrology, geology, etc. Dam safety legislation should be enacted to ensure proper inspection, maintenance and surveillance of the existing dams and also to ensure proper planning, investigation, design, construction and safety of new dams. The guidelines on the subject should be kept under constant review and periodically updated and reformulated. There should be a system of continuous surveillance and regular visits by experts.

3.8 Action Programme and Important Implementation Aspects

The implementation of this water policy requires administrative, organisational, legal and project implementation action. Since it requires de-centralisation of authority to states, districts, blocks and gram sabha organisations and the people themselves, besides co-operation

among the various departments and ministries concerned, it should be discussed widely among water sector professionals, NGOs, community organisations and all concerned officials within the government, in the next one to two years, especially with a view to finalise the action programme.

New Organisational Structures

3.8.1 A National body of experts should be set up by the central government to midwife the process of setting up the first few RBOs (out of a total of about 20 to be set up) and to lay down the rules and regulations for their functioning. This body may be initially constituted for a period of 2-3 years during which the first five RBOs may be set up, and may suggest ways in which all the possible RBOs may be set up and made operational within a decade. The first five RBOs may be set up within states and may include at least two river basins in the North and two in the South. Subsequently, RBOs may be set up for interstate rivers and for one river basin that goes beyond National boundaries.

Once the policy measures and the action programme outlined here are agreed upon, it would be necessary to switch over to the new administrative organisations. This would have to be a gradual process so that at least by the end of 5 years all intra-state and inter-state RBOs would have been set up. A Water Resources Department should be set up in each state in 2 years along with a few intra-state RBOs. At the state level the nodal ministries/departments should be identified for water resources (MoWR), watershed development (MoRD), irrigation (Irrigation department) domestic water supply (Public Health Department), and pollution control (State Pollution control Board). Similar action should be taken at the central level.

Legal Changes

3.8.2 These have been discussed above in section 4 and should be carried out within the next five years so as to remove the hurdles for implementing the new water policy, with the involvement of NGOs and people's organisations. Groundwater regulation is another priority area that needs to be finalised within the next 5 years.

Project Implementation

3.8.3 The first task should be to set up an information organisation with the co-operation of all the departments who are already collecting information. This information collection, starting at the lowest level, should be computerised and made available to the public on the Internet, with the MoWR being the nodal agency for this purpose. This should begin at the lowest level and for this purpose the number of full-fledged information centres should be increased from about 2,000 to 30,000 in the next 5 years. Various departments at present collect limited data at many more places but not at agreed locations, which need to be consolidated. This organisation would also have to revise and update the assessment of water resources in various forms, which should be completed in first 10 years and then revised every 10 years.

The environmental and rehabilitation aspects have not been up to the mark, particularly in terms of implementation in the existing projects and those under construction. All these projects should be reviewed and action taken for completion in the next 5 to 10 years.

Domestic water supply

3.8.4 A target of providing water to everybody within next 5 years, particularly in all the rural areas and especially where the quality of water is not up to the mark, should be fixed.

However, after this, certain areas would still come up where the quality has deteriorated and as such would have to be given a new source of supply or better treatment of the water available. This, of course, would have to be a continuous process and should be monitored all the time. For sanitation in urban areas the target should be to provide it to all in the next 15 years. Wherever possible, two separate pipeline networks, one for sewage and one for kitchen and bath water should be provided so as to reduce treatment costs and to be able to recycle the water. Rooftop rainwater should also be stored separately for use or for groundwater recharge.

Watershed Areas

3.8.5 As indicated earlier, this sector requires more urgent and intensive attention, both for integrated development of land and water and for improvement in the economic condition of the population. Watershed management is required in the culturable land of about 141 mha that is rainfed at present. This has to be managed by people with the help of NGOs and the government for integrated development of land, water and biomass. Some of these areas have already been covered by watershed management or by joint forest management but these would have to be reviewed in order to achieve the above objectives. The rural development ministry at the centre and in the states should be the nodal agency for this purpose.

Pollution of Water

3.8.6 Special attention has to be paid to the water from agricultural lands, which are difficult to treat as there is no single point of pollution and as such prevention is the best answer. For this purpose bio-fertilisers, bio-pesticides and organic farming should be encouraged, in order to reduce the use of chemicals, which could be done gradually but substantially over the next two decades. Treatment of water from industries and sewage should be implemented within the next 10 years. All this water could also be reused and recycled for various purposes.

Irrigation

3.8.7 Far too many projects are under construction at the present moment and it would be necessary to provide funds on priority for those on which more than 20 per cent of expenditure or physical progress has been made for completion in the next 5-10 years with practically no new projects to be taken up during these years. Some of the existing projects would need to be modernised, which should be the next priority and completed within the next 15 years. The third priority should be to complete all hydro and irrigation project within each basin by the year 2025. An agreement with Nepal for the purposes of hydropower generation and flood moderation should be pursued vigorously for all common river basins.

Water Service Charges

3.8.8 Water charges need to be increased gradually to cover at least O&M expenditure both in irrigation and domestic water supply and subsidies should be eliminated over a period of 10 years. Transfer of management and authority to local organisations would be necessary to achieve this objective.

3.9 Research and Training

3.9.1 For effective and economical management of our water resources, the frontiers of knowledge need to be pushed forward in several directions by intensifying research efforts in various areas, including the following:

- hydro-meteorology
- assessment of water resources
- groundwater hydrology and recharge
- water quality, recycling and reuse
- prevention of salinity ingress
- prevention of water-logging and soil salinity
- water harvesting in rural areas in an integral manner
- water harvesting and groundwater recharge in urban areas
- economical and easy to operate and maintain designs for water resource projects
- seismology and seismic design, safety and longevity of structures
- sedimentation of reservoirs
- river morphology and hydraulics
- soils and materials research; construction material and technology (with particular reference to roller compacted concrete, fibre reinforced concrete, new methodologies in tunnelling technologies, instrumentation, advanced numerical analysis, etc.)
- use of remote sensing techniques
- better water management practices and improvements in operational technologies
- use of sea water resources
- risk analysis and disaster management
- crops and cropping systems
- design of less consumptive use in domestic appliances
- sewage treatment on smaller scales and reuse of water after treatment

3.9.2 Since the over all thrust of the new national water policy is towards people's participation at all stages, the highest priority should be accorded to the training of those who are to manage the water resources at all levels. The training must sensitise all partners to the demands of a people's planning approach to water resource development. Training should also ensure the technical empowerment of all local institutions and communities who are to plan for, develop and manage water resources. These include panchayats, gram sabhas, NGOs, watershed associations, WUAs, RWAs, etc. It should cover training in information systems, sectoral planning, project planning and formulation, project management, operation of projects and their physical structures and systems and the management of the water distribution systems. The training should have a strong component on attitudinal and behavioural change.

Action Programme for Establishing and Sustaining Community Based Organisations (CBOs)

* The CBOs should have a legal status and should be recognised fully by the concerned administrative authorities.

* Government officials/NGOs may help to set up Community Based Organisations but should not themselves be members of the CBO. They may advise the CBO from the outside and may even be present in their meetings, but should not have voting/decision-making rights.

* NGOs with the requisite competence should be asked to come forward, motivate and train the potential leaders and competent individuals from the community or smaller NGOs. To facilitate and support the work of the NGOs, the concerned nodal departments/ministries (Ministry of Rural Areas for WMAs, Irrigation department for WUAs, Forest department for JFM committees, Ministry of Urban Areas for RWAs/Neighbourhood User Groups) should play a suitable role.

* Since each area has its own local problems and priorities, there should be no restriction through a centralised scheme for the type of project to be prepared. Only broad guidelines should be indicated by the government within which the community based organisation can prepare the project.

* Potential leaders (5-6 candidates) in each unit should be identified and trained further for leadership roles, care being taken not to include contractors.

* Technical NGOs and government departments should help the CBOs in preparing required projects aimed at the integrated management of land, water and biomass and the provision of livelihood for all, for funding by various agencies.

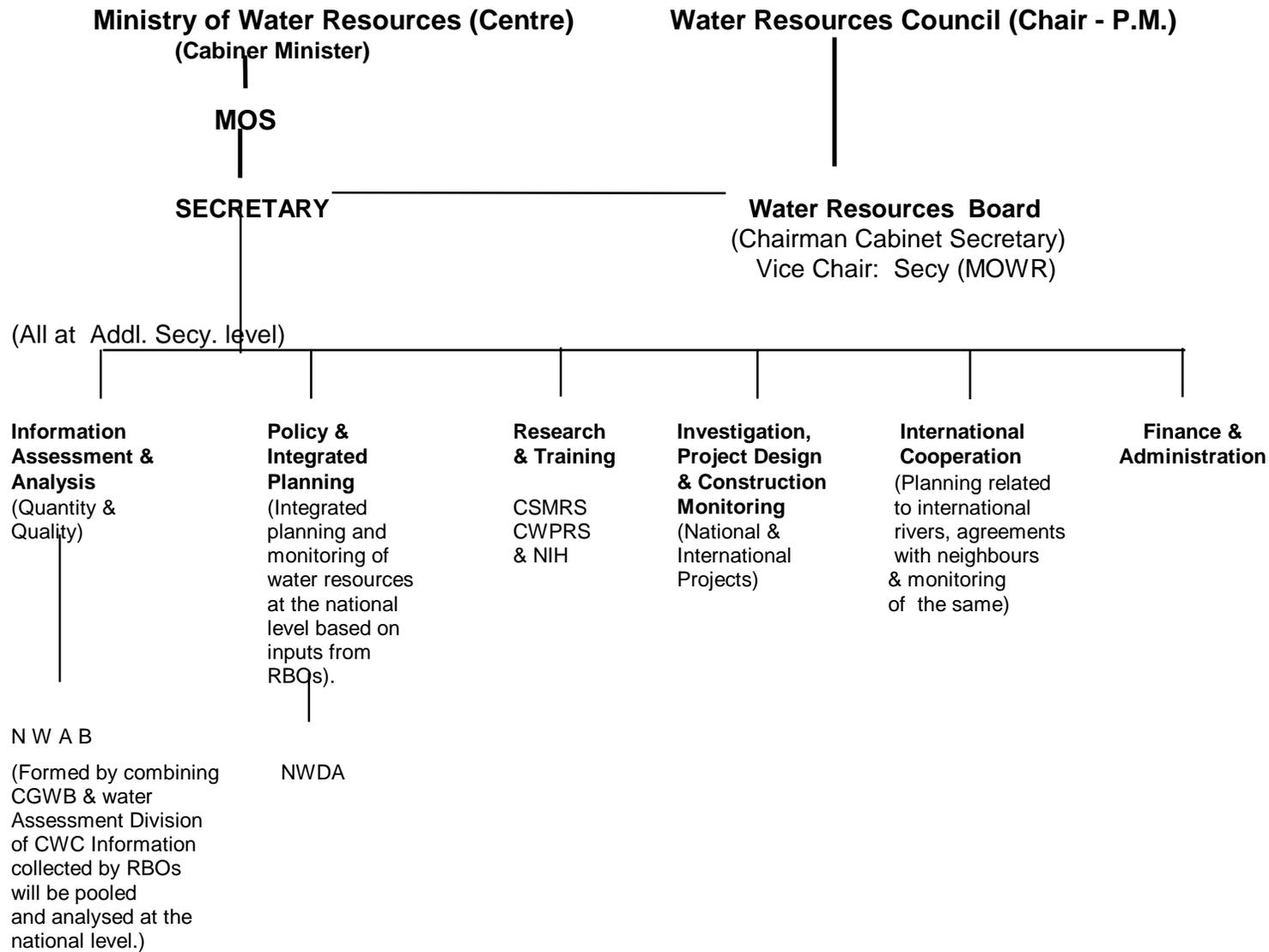
* Contribution to the creation of physical assets, in the form of labour, material or cash, should be at least 10-20% in the initial stages and should gradually, over the years, be increased to 50%.

* After project approval and funding, the work should be implemented only by the CBO. For this purpose a committee should be formed to supervise the project implementation.

* Operation, maintenance and management should be done by the CBO concerned, for which the cost should be recovered from the beneficiaries or members.

* Monitoring of works should also be done by fund providers and also by government to safeguard natural resources and ensure proper use of funds. Post-project monitoring should also be done to ensure that the project benefits reach all members of the community and are not cornered by the powerful local elite or upper classes or castes.

CHART-1



RIVER BASIN ORGANISATION

River Basin Assembly
(EXECUTIVE COMMITTEE) (Chair - of State Cabinet Minister Rank)

River Basin Organisation (RBO)
(Chair - Technical / Professional expert of Chief Secretary Rank)

Members (from different states and representative of Centre)
(Chief Engineer level from different disciplines)

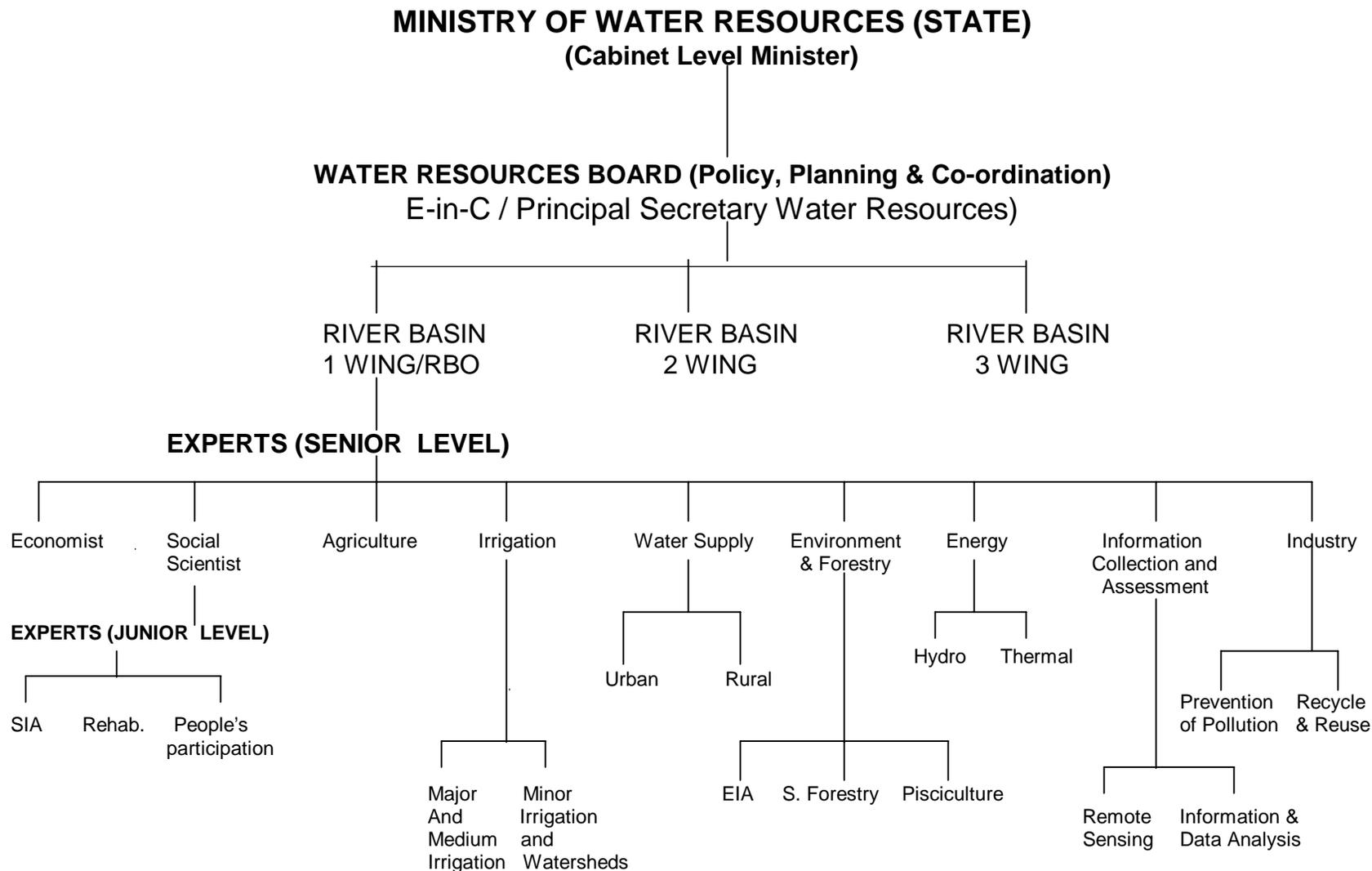
Information Collection, Assessment & Forecasting
(Quantity & Quality, rainfall, groundwater plus Surface Water)

Integrated Planning for the Basin & approval of projects

Allocation & Monitoring of Water Resource Allocations to different states/ sectors
(including environment) of development & states

River & Flood Mgmt. Drought Mgmt.
(including integrated operation of major Dams in the River Basin)

Finance & Administration



* The State will have a River Basin Wing for each of the major river basins of which the state forms a part. In case of a river basin that lies wholly within the State, there will be a R.B.O. Each River Basin Wing will have under it a range of engineers and experts from different disciplines, to deal with the different aspects of water resources management in the basin in an integrated manner.

Action Plan Schedule for Implementation of Policy Measures

