Ind. Jn. of Agri. Econ.
Vol.74, No.2, April-June 2019

DOCUMENTATION

In this section on DOCUMENTATION, it is proposed to print summaries of important reports of ad hoc committees, set up by the Central or State Government, relating to agriculture, forestry and fishery economy of Indian Union as well as the individual states. Obviously, this section will appear only when such reports are summarised. Readers are requested to bring to the notice of the Editor such reports, as and when they become available.

Report of the Committee on Re-structuring the Central Water Commission (CWC) and Central Ground Water Board (CGWB)

(Chairman: Mihir Shah), Ministry for Water Resources, River Development and Ganga Rejuvenation, Government of India, New Delhi, 2016, Pp.146. (mimeo.).

The Planning Commission of India constituted in 2015, a Committee on Re-structuring the CWC and CGWB under the Chairmanship of Dr. Mihir Shah. The Committee submitted the report to the Planning Commission in July 2016. A specially prepared summary of this report is presented below. Full text of the Report is available on http://cgwb.gov.in/INTRA-CGWB/Circulars/Report_on_Restructuring_CWC_CGWB.pdf. The Report running into 146 mimeo graphed pages includes four Chapters and 2 Annexures, some of which are reproduced in this issue. The terms of References of the Committee are the following:

1) To recommend suitable re-orientation and re-structuring of CWC and CGWB at the basin and sub-basin level.
2) To assess the capacity requirement of CWC and CGWB to discharge all functions as envisaged for integrated water resource management.
3) To prepare specific task, duties and responsibilities, to each of the two organisations so as to enable them to achieve the objectives of integrated water management, development, planning, water use efficiency and water budgeting.
4). To assess the need for specific capacity building requirement among the staff of CWC and CGWB.
5) To recommend an ideal structure at basin/sub-basin level for CWC and CGWB to discharge their duties to accomplish the above objectives.
6) To assess the financial implications to achieve the objectives.

CHAPTER 1: CHALLENGES OF WATER MANAGEMENT IN 21ST CENTURY INDIA

1.0* India faces a major crisis of water as we move into the 21st century. This crisis threatens the basic right to drinking water of our citizens; it also puts the livelihoods of millions at risk.

The demands of a rapidly industrialising economy and urbanising society come at a time when the potential for augmenting supply is limited, water tables are falling and water quality issues have increasingly come to the fore. Climate change poses fresh challenges with its impacts on the hydrologic cycle. More extreme rates of precipitation and evapo-transpiration will exacerbate impacts of floods and droughts.

Water use efficiency in agriculture, which consumes around 80 per cent of our water resources, continues to be among the lowest in the world. The relative contribution of canal irrigation has been steadily declining over time while groundwater, especially that extracted through tubewells, has rapidly grown in significance over the last 30 years.

This report outlines in brief the challenges of water management facing 21st century India, how the supply-centred approach we have followed over the past 6-7 decades has reached palpable limits and outlines the paradigm shift that India needs in water. The report argues that we need to move beyond the approach to water embodied in techno-centric supply-side interventions implemented top-down by fragmented bureaucracies, involving mostly technology, engineering, and public investment in water infrastructure, towards a more people-centred approach to water management that leads to rejuvenation of rivers and aquifers, so that we can sustainably meet the needs of water security[1] of our people and move towards comprehensive drought-proofing.

Demand and Supply of Water in India

Estimates of India's water budget, i.e., annual flow of water available for human use after allowing for evapo-transpiration and required ecological flow – vary considerably. The water budget derived from Ministry of Water Resources estimates show utilisable water of 1123 BCM against current water use of 634 BCM suggesting more than adequate availability at the aggregate level given current requirements.

The Standing Subcommittee of the Ministry of Water Resources estimates total water demand rising to 1093 BCM in 2025, thus reaffirming a comfortable scenario. However, more recent calculations based on higher estimates of the amount of water lost to the atmosphere by evapo-transpiration are less comforting. Narasimhan (2008)[2] has recalculated India's water budget, using an evapo-transpiration rate of 65 per cent, which compares with worldwide figures ranging from 60 per cent to 90 per cent instead of the 40 per cent rate assumed in the official estimates. The 2030 Water Resources Group (2009)[3] estimates that if the current pattern of demand continues, about half of the demand for water will be unmet by 2030 [1.1].

*The number denotes paragraph number in the Report

1.2 *Emerging Limits to Supply-Side Solutions*

Concern has also been expressed that "the capture of so much water within the basin and the evaporation of an additional 36 BCM of water has changed the regional climate, increasing humidity and changing temperature regimes, aggravating saline ground water intrusion, and putting at risk the delicate wetland and estuarine ecology which is important not only for aquatic habitats and fisheries, but also for preventing shore erosion". Given these constraints, the trend increasingly is to locate new projects in relatively flat topography that multiplies disproportionately the areas to be flooded and the people to be evicted. It also tends to aggravate already contentious relations between States. Water flow in the Himalayan Rivers, particularly the Ganga is, of course, far greater than in Peninsular Rivers but here there are other constraints.

There is also the problem that further up in the Himalayas we confront one of the most fragile ecosystems in the world. The Himalayas are comparatively young mountains with high rates of erosion. Their upper catchments have little vegetation to bind soil. Deforestation has aggravated the problem. Rivers descending from the Himalayas, therefore, tend to have high sediment loads. Climate change is making predictability of river flows extremely uncertain. This will rise exponentially as more and more dams are built in the region. Diverting rivers will also create large dry regions with adverse impact on local livelihoods (fisheries and agriculture). Rapid rise of the Himalayas (from 500 to 8000 metres) gives rise to an unmatched range of ecosystems, a biodiversity that is as enormous as it is fragile. Quake-induced changes in the river system can adversely impact the viability of dams as several basic parameters of the regime of rivers and the morphology and behaviour of channels may change.

The ambitious scheme for interlinking of rivers also presents major problems. Land submergence and R&R packages would be additional to this cost. There is also the problem that because of our dependence on the monsoons, the periods when rivers have "surplus" water are generally synchronous across the subcontinent. A major problem in planning inter-basin transfers is how to take into account the reasonable needs of the basin states, which will grow over time.

The presence of a low salinity layer of water with low density is a reason for maintenance of high sea surface temperatures (greater than 28 degrees C) in the Bay of Bengal, creating low pressure areas and intensification of monsoon activity. Rainfall over much of the sub-continent is controlled by this layer of low saline water. A disruption in this layer could have serious long-term consequences for climate and rainfall in the subcontinent, endangering the livelihoods of a vast population [1.2.1].

As far as the possibilities of further groundwater development are concerned, the situation is perhaps even more difficult in large parts of the country. Unfortunately the growing dependence on groundwater has taken the form of unsustainable over-extraction, which is lowering the water table and adversely impacting drinking water security.

Over the last four decades, around 84 per cent of the total addition to the net irrigated area has come from groundwater. But groundwater is being exploited beyond sustainable levels and with an estimated 30 million groundwater structures in play, India may be hurtling towards a serious crisis of groundwater over-extraction and quality deterioration.

A major contributor to this rapid depletion in water tables is the overwhelming dependence on deep drilling of groundwater through tubewells, which at over 40 per cent is today the single largest source of irrigation. Indeed, we are close to entering a vicious infinite regress scenario where an attempt to solve a problem re-introduces the same problem in the proposed solution. If one continues along the same lines, the initial problem will recur infinitely and will never be solved.

The portents have been visible for some time now. Issues related to water quality have also emerged as a major new concern over the last decade or so. Till the 1970s, quality issues were to do with biological contamination of the main surface water sources due to poor sanitation and waste disposal, leading to repeated incidence of water-borne diseases. But today this has been supplemented by the serious issue of chemical pollution of groundwater, with arsenic, fluoride, iron, nitrate and salinity as the major contaminants. This is directly connected with falling water tables and extraction of water from deeper levels. States continually report an increasing number of habitations affected with quality problems.

According to the Ministry of Drinking Water Supply and Sanitation, out of 593 districts from which data is available, we have problems from high Fluoride in 203 districts, Iron in 206 districts, Salinity in 137 districts, Nitrate in 109 districts and Arsenic in 35 districts. Biological contamination problems causing Enteretic disorders are present throughout the country and are a major concern, being linked with infant mortality, maternal health and related issues.

A recent assessment by NASA showed that during 2002 to 2008, India lost about 109 cu.km. of water, leading to a decline in water table to the extent of 3-5 cm per annum. In addition to depletion, many parts of India report severe water quality problems, causing drinking water vulnerability. *The result is that nearly 60 per cent of all districts in India have problems related to either the quantity or quality of groundwater or both* [1.2.2].

1.3 *Challenge of Demand Management and Last-Mile Delivery*

Given the emerging limits to further development in the major and medium irrigation (MMI) sector, we urgently need to move away from a narrowly engineering-construction-centric approach to a more multidisciplinary, participatory management perspective, with central emphasis on command area development and a sustained effort at improving water use efficiency, which continues to languish at a very low level. Given that nearly 80 per cent of our water resources are consumed by irrigation, an increase in water use efficiency of irrigation projects by 20 per cent will have a major impact on the overall availability of water not only for agriculture but also for other sectors of the economy.

The worst offenders are the major irrigation projects where the average cost overrun is as high as 1382 per cent. 28 out of the 151 major projects analysed witnessed cost overruns of over 1000 per cent.

The number of projects awaiting completion peaked in 1980 to 600; then there was decline till 1992 (460), after which it has again risen to 571, almost touching the 1980 figure again.

Major irrigation projects are expected to have a gestation period of 15–20 years while medium projects should take 5–10 years for completion. There is a spill over of 337 projects—154 major, 148 medium and 35 Extension, Renovation, Modernisation (ERM) projects into the Twelfth Plan from previous Plan periods.

The real difficulty is that while we have done well in creating additional irrigation capacities, their utilisation has been less than satisfactory. Improved utilisation of these capacities can dramatically add to irrigated area and also lead to a major improvement in water-use efficiency.

Another reason is that irrigation potential is defined on the basis of a certain volume of water expected in the reservoir, which is divided by a presumed depth of irrigation required for a presumed cropping pattern. However, the actual values of these variables differ from their presumed values because of a switch to water-intensive crops at the upper end of the command.

Institutional weaknesses are also important. There is lack of coordination between concerned department officials. The absence or ineffectiveness of Water Users Associations (WUAs), is also mentioned as a significant contributor to the IPC–IPU gap.

The mode of implementation of the CADP has also left much to be desired in terms of the complement of human resources provided for the programme as also an inadequate understanding of participatory and devolutionary approaches. At times the supporting legal framework in the form of Participatory Irrigation Management (PIM) Acts has been lacking.

The key bottleneck so far has been that capacities of irrigation departments in many States to deliver quality services have failed to keep up with growing MMI investments. While States compete for capital investments in new MMI projects, they are not always able to manage them effectively.

Thus, a vicious cycle is set up which results in the fact that despite creation of millions of hectares of irrigation capacity, farmers continue to be starved of water in the absence of good last-mile connectivity [1.3.1].

As for groundwater, we have a different kind of management problem. While its decentralised character enables easier last-mile connectivity, the problem arises in the inequitable distribution and unsustainable extraction of this common pool resource (CPR).While groundwater resources are perceived as a part of a specific cadastre—watersheds, landscapes, river basins, villages, blocks, districts, states—aquifers are seldom considered. Aquifers are rock formations capable of storing and transmitting groundwater. A complete understanding of groundwater resources is possible only through a proper understanding of such aquifers.

As the processes of groundwater accumulation and movement are vastly different in different geological types, the implications of any level of groundwater development (GD) will vary significantly across types of geological settings.

Participatory, sustainable groundwater management, recognising its CPR character is the need of the hour, where management strategies are duly attuned to the specific requirements of each hydrogeological setting, which need to be carefully mapped at a scale that makes possible such participatory management by the primary stakeholders. It is abundantly clear, therefore, that without a radical change in our understanding and approach to both surface and groundwater management in India, we will not be able to tackle the acute water crisis facing the nation [1.3.2].

CHAPTER 2: NEED FOR A PARADIGM SHIFT IN WATER

Ensuring Water in Commands Reaches the Farmers

The Government of India needs to both incentivise and facilitate States to ensure that they undertake reforms required to ensure that the millions of hectares of water stored in our large dam command areas actually reaches the farmers for whom it is meant. By focusing our efforts on bridging this gap we could add millions of hectares to irrigation at half the cost involved in irrigating through a new dam.

The way to do this is to move towards Participatory Irrigation Management (PIM), which has been successfully adopted in countries across the globe. This includes advanced nations such as the US, France, Germany, Japan and Australia; East and South Asian countries like China, Sri Lanka, Pakistan, Philippines, Indonesia, Vietnam and Malaysia; Uzbekistan and Kyrgyzstan in Central Asia; Turkey and Iran in the Middle East; African nations such as Mali, Niger, Tanzania and Egypt, as also Mexico, Peru, Colombia and Chile in Latin America.

What the Centre needs to do is to set up a non-lapsable fund that reimburses to State irrigation departments a matching contribution of their Irrigation Service Feed (ISF) collection from farmers on a 1:1 ratio. To encourage Participatory Irrigation Management (PIM), the Centre should provide a bonus on that portion of each State's ISF collection, which has been collected through Water User Associations (WUAs). Similarly, to encourage volumetric water deliveries, an additional bonus should be provided on that portion of a State's ISF collection, which accrues through volumetric water supply to WUAs at the outlet level.

The Centre must stipulate that all irrigation project proposals (major, medium or small) will henceforth include CAD works from the very beginning as an integral part of the project. Thus, each proposal will plan for irrigation water from the reservoir to the farm gate and not just the outlet as at present. Recognition of potential creation at the outlet of distributary must be discontinued. Potential creation will be recognised only after complete hydraulic connectivity is achieved from reservoir to farm-gate. In this manner, creation of irrigation capacities will be better matched by their utilisation, farmers will truly benefit from these investments and water use efficiency will improve [2.1].

Moving Towards Participatory Groundwater Management

We need a participatory approach to sustainable and equitable groundwater management based on a knowledge of the underlying aquifers. It is this understanding that underpins the National Aquifer Management Programme (NAQUIM) initiated recently by the Government of India. The aquifer mapping programme is not an academic exercise and must seamlessly flow into a participatory groundwater management endeavour. This demands strong partnerships among government departments, research institutes, gram panchayats/urban local bodies, industrial units, civil society organisations and the local community. The interface of civil society and research institutes with government needs to be encouraged across all aspects of the programme, ranging from mapping India's aquifers, large-scale capacity building of professionals at different levels, action-research interface with implementation programmes and development of social-regulation norms around groundwater.

The challenge of groundwater management arises from the fact that a fugitive, common pool resource is currently being extracted by individuals, millions of farmers in particular, with no effective mechanism to ensure that the rate of extraction is sustainable.

The new 6-year program that has just been initiated with World Bank assistance for Groundwater Development and Management with a total financial outlay of Rs. 6000 crore is a step in the right direction, with each of its components exactly reflecting the paradigm shift outlined by our Committee in this report.

Each component of this ambitious project requires huge enhancement of capacities in the CGWB and state boards, as also a large architecture of partnerships with other institutions across the country, with high technical and social capacities [2.2].

Rejuvenating Rivers: Focus on River Basins

The need to focus on river basins as the appropriate unit of intervention is evident in the watershed programmes initiated by the government over the last 40 years. River Basin Organisations have also been set up.

However, it remains true that progress on integrating surface and groundwater has been slow in actual work done on the ground. In recognition of this fact, the recent National Water Framework Bill (NWFB) drafted by the Ministry of Water Resources, River Development and Ganga Rejuvenation has placed special emphasis on integrated river basin development and management, as also on river rejuvenation as central pillars of national policy.

The draft bill emphasises the integral relationship between surface and groundwater.

The NWFB places central emphasis on river rejuvenation and enjoins the appropriate government to "strive towards rejuvenating river systems with community participation, ensuring: (a) 'Aviral Dhara'- continuous flow in time and space including maintenance of connectivity of flow in each river system; (b) 'Nirmal Dhara'- unpolluted flow so that the quality of river waters is not adversely affected by human activities; and (c) 'Swachh Kinara' – clean and aesthetic river banks".

The entire area from which the precipitation is directed into a river until it meets another river (and ultimately the ocean), is referred to as its basin or watershed.

It is important to note that river basins (= watersheds) do not follow human-defined administrative/political boundaries but are determined by the physical features of the land surface [2.3].

A 21st Century Approach to Flood Management

It is now understood that embankments reduce the flow carrying capacity of the channel and cause aggradation of channel bed, thereby increasing flood intensity and frequency. Creation of embankments leads to settlements and industries close to them and they result in consolidation of ground – reduction in groundwater recharge – blockage of drainage network – and pollution of both surface and groundwater. Floodplain-associated water bodies (including lakes and wetlands) should also be seen as water storages that help groundwater recharge and water quality improvement. Restoration and creation of on-floodplain storages along the rivers should be a part of water management strategies.

Many reservoirs were initially constructed without any flood cushion but with development and population growth, habitations have come up very close to the downstream of these reservoirs and operation of such reservoirs needs to be done carefully. There is urgent need for extension of CWC's flood forecasting network in consultation with the State Governments and IMD to cover cities located near rivers under the network of automatic data collection, transmission and flood information dissemination.

Moreover, a majority of the flood warning systems in India are not timely, primarily due to poor transmission. Delays cause enormous damage to property and lives every year. Models used for flood forecasting and its influence zones are not rigorous enough due to lack of integration of hydrology and the weather forecasting systems. It is possible to improve the current forecasting methods by using satellite based information for better estimates of rainfall and snowmelt.

The National Water Academy (NWA) located at Pune is presently involved in providing training to the engineers / officers of the Central / State Governments. The NWA needs to be developed as a Centre of Excellence for international training programmes on matters pertaining to flood mitigation so that up-to-date globally available know-how could be shared under such training programmes.

Digital Elevation Models (DEM) along major river systems including area falling in the flood affected zone in the range of 0.5–1 m need to be prepared for all river basins. Use of NRSC's flood hazard zonation maps, close contour information, river configuration and bank erosion studies, geo-spatial tools and flood mapping and flood damage assessment should be encouraged [2.4].

Urban and Industrial Water Management

Privately driven, individualistic pumping of groundwater in large parts of urban India has provided benefits for filling out the gaps in public water supply schemes. However, it has also led to problems of co-terminal depletion and contamination of aquifers. Sustainable management of groundwater is impossible without a much deeper understanding of the types of aquifers within which it is located.

Aquifers in large regions of India act as both sources and sinks for various loads, ranging from sullage to sewage and from industrial waste to agricultural residues like pesticide and fertiliser. Groundwater resources in growing urban centres are therefore likely to become contaminated as much by residual contaminants from erstwhile agricultural activities and poor rural sanitation as by contamination from more current haphazard waste-water disposal.

Decentralised wastewater management systems can overcome many of these problems by (1) catering to the un-served areas and minimise the pressure of transporting to a single location. (2) reducing the cost of treatment and O&M costs. (3) adopting site-specific treatment technologies based on the land use. (4) minimising land requirement for treatment.

With basic level treatment of sewage, the water can be reutilised in industries and power plants. The water sludge after treatment can also be used as manure in agriculture; this measure may result in revenue generation to ULB.

A rapidly emerging element of urban water, which requires much greater focus on recycling and reuse, is industrial water. There is huge scope for reducing the industrial water footprint and this can be done through technologies and investments, which have a very short payback period.

Coal-based thermal power plants need massive amounts of water, both for cooling and ash disposal. TERI has estimated that in 1999–2001 out of a total of about 83,000 million litres per day (MLD) of water discharged by all the industries in India, about 66,700 MLD (~80 per cent) is cooling water discharge from thermal power plants. Comprehensive water audits conducted by TERI at some of India's largest thermal power plants revealed immense scope of water savings in the cooling towers, and ash handling systems.

The first step in this direction will be to make comprehensive water audits a recurring feature of industrial activity so that we know what is being used by the industrial sector at present and so that changes can be monitored and the most cost-effective basket of water efficiency technologies and processes designed and implemented to reduce water demand and increase industrial value added per unit of water consumed.

Simultaneously, we must develop benchmarks for specific water use in different industries and would ensure their application in the grant of clearances for industrial projects [2.5].

Transparency and Accessibility of Water Data

Keeping this imperative requirement for high quality data for scientific water management, our Committee would like to highlight serious gaps and inadequacies in the scope, coverage and quality of data currently used for assessing India's potential and utilisable water resources from different sources, their actual utilisation for, and impact on, various end uses: Collection of data is fragmented between different agencies.

The data are not readily accessible even within and between Government agencies concerned with water resources development, leave aside in the public domain.

The Central Government must take the lead in creating appropriate institutional arrangements to ensure independent and professional conduct of the surveys, providing financial and technical support to the States and ensuring that all agencies follow prescribed protocols and transmit the data to the central pool [2.6].

CHAPTER 3: NEW PARADIGM WITHIN THE OLD STRUCTURE?

Present Structure and Functions of CWC

Central Water Commission (CWC) came into existence as "Central Waterways, Irrigation and Navigation Commission (CWINC)" vide Department of Labour Resolution No. DW 101(2) dated April 5, 1945. In the year 1951, it was renamed as "Central Water and Power Commission" (CW&PC) after its merger with the "Central Electricity Commission". Following the changes in the Ministry of Agriculture and Irrigation, in the year 1974, water wing of CW&PC was separated as "Central Water Commission", which continues till date. At present Central Water Commission functions as an "Attached Office" of the Ministry of Water Resources and is its main technical arm [3.1].

Functions of CWC

CWC in its annual report of 2013-14 has stated that the organisation is charged with the general responsibility of initiating, coordinating and furthering in consultation with the State Governments concerned, schemes for the control, conservation and utilisation of water resources in the respective State for the purpose of flood management, irrigation, drinking water supply and water power generation. The Commission, if so required, can undertake the construction and execution of any such scheme [3.1.1].

Organisational Structure of CWC

CWC is primarily manned by the Central Water Engineering Services (CWES) cadre, the only organised service of the Ministry of Water Resources. CWC is headed by a Chairman, with the status of Ex-Officio Secretary to the Government of India. The work of the Commission is divided among 3 wings namely, Designs and Research Wing (D&R), Water Planning and Projects Wing (WP&P) and River Management Wing (RM).

Chairman: Head of the Organisation – Responsible for overseeing the various activities related to overall planning and development of surface water resources of the country and management of the Commission as a whole.

Member (Water Planning & Projects): Responsible for overall planning and development of river basins, national perspective plan for water resources development in accordance with the National Water Policy, technoeconomic appraisal of Water Resources Projects and assistance to the States in the formulation and implementation of projects, monitoring of selected projects for identification of bottlenecks to achieve the targeted benefits, preparation of project reports for seeking international assistance, environmental aspects, issues related to construction machinery of projects, application of remote sensing technologies in water resources, etc.

Member (Designs & Research): Responsible for providing guidance and support in planning, feasibility studies, standardisation and designs of river valley projects in the country, safety aspects of major and medium dams, hydrological studies for the projects, coordination of research activities, etc.

Member (River Management): Responsible for providing technical guidance in matters relating to river morphology, flood management, techno-economic evaluation of flood management schemes, collection of hydrological and hydro-meteorological data, formulation of flood forecast on all major flood prone rivers and inflow forecasts for selected important reservoirs, investigation of irrigation / hydro-electric / multipurpose projects, monitoring of major and medium projects with regard to Command Area Development, etc. [3.1.2].

Headquarters

There are eighteen organisations, each headed by a Chief Engineer at CWC headquarters, New Delhi [3.1.3].

Regional Offices

In order to achieve better results in the Water Resources Sector and have better coordination with the State Government departments, CWC has established regional offices in the major river basins. It has 13 regional offices, each headed by a Chief Engineer [3.1.4].

Inadequacy of Human Resources in CWC

It is globally agreed that the total amount of water on the Earth has not changed over centuries and is unlikely to change. Yet, we know that lakes are drying out, rivers have ceased to flow and groundwater levels have declined.

Management of water resources, therefore, requires an integrated approach that accounts together all water moving through the soil (soil water), lithosphere (groundwater), atmosphere (Evaporation), biota (ET) and human-made systems, and integrates the requirements of all stakeholders including humans, by considering both direct and indirect benefits.

A major change is required in the management and governance of the water resources in the country. It requires an integrated holistic multidisciplinary approach.

Current functions of the CWC address only a fraction of issues of water management as several major components of the hydrological cycle and hydrological processes remain untouched. More importantly, the ecological and social impacts of engineering interventions as well as those on the hydrological cycle and water quality are not addressed [3.2].

CWC: Capacity Building

Currently, the CWC’s function is restricted to “to impart training to in service engineers” exclusively through the National Water Academy at Pune [3.3].

The Missing Elements

The current training programmes of the NWA do not address the water resources and their management in a holistic or integrated manner and cater simply to the engineering side of water resource projects. The large number of current issues of ecological, environmental, social, economic and management concern remain unattended.

Surface and groundwater should be treated together to emphasise upon the linkages in the water cycle, and the amount of water in the soil, biota and air and its role in nature.

The NWA must therefore be developed into an autonomous body with freedom to invite high quality trainers both from within the country and abroad. The NWA needs to collaborate with the RGI to ensure that the SW-GW interactions are properly taken into consideration at all levels of capacity building [3.3.1].

Specific Suggestions

The graduates entering the CWES need not only an extensive training in the latest concepts, approaches, methods and techniques in hydrological sciences but also in other related disciplines in order to be able to contribute to the goals of water resources management.

The current training programmes of the CWC and CGWB and the courses they offer need to be revised to emphasise multidisciplinary character of integrated management of water resources, and accordingly, the capabilities and capacities of the Institutions need to be upgraded and strengthened.

The NWA must develop partnerships and collaborations with a large diversity of institutions, universities, established NGOs, and involve them actively in the training programmes at all levels. These institutions and NGOs will be particularly helpful in the capacity building and awareness programmes at the community level [3.3.2].

Present Structure and Functions of CGWB

CGWB essentially deals with surveys, assessment and monitoring of groundwater to estimate (and in a limited way predict) the status of groundwater resource at the national scale.

CGWB is also engaged in answering ‘parliamentary questions’ that are raised about issues pertaining to the depletion and contamination of groundwater resources in different parts of India.

CGWB is headed by its Chairperson, who reports to a Joint Secretary (Groundwater) at Ministry of Water Resources. CGWB operates through the following 4 wings, each headed by a Member.

Given the current focus on river basins as the fundamental units for strategic planning and management of water resources, it may seem a straightforward move to relocate CGWB’s regional offices to match with major river basins [3.4].

Inadequacy of Human Resources in CGWB

The major concern, going forward, especially in terms of the reforms and restructuring, is that of decentralised human resources being limited by the increasing number of tasks that the organisation is likely to be tasked with. The other concern is the inability of CGWB to attract talented youngsters due to lack of career prospects comparable with other similar organisations.

With proposed budget increases and limited staffing the organisation thinks it will be important to develop efficient outsourcing mechanisms. Public outreach programs that do not require a high level of technical expertise, according to the CGWB, should be outsourced. This is thought to help CGWB focus their skilled manpower for delivery of the outputs of NAQUIM [3.5].

CGWB: Capacity Building

Groundwater science is becoming increasingly interdisciplinary as the challenges in managing groundwater change from those that can be addressed exclusively by the erstwhile ‘exploratory, source-based’ approach to a ‘resource management and governance’ approach. Moreover, the potential move into ‘mission mode’ on work pertaining to groundwater resource management requires significant perspective building and skill development at various levels.

Capacity building also provides the platform for the development of human resources both within and outside government.

Capacity building will need to be undertaken at different levels such as Aquifer Level, State level and National level.

The important role of collation, synthesis and management of data is the role best executed by the government, with support from various organisations. Emphasis should focus on meticulously developing the capacities of institutions and human resources within the government. CGWB and State Groundwater Boards will need to strengthen their existing capacities and develop new ones by expanding out their training mandate [3.6.].

CHAPTER 4: NATIONAL WATER COMMISSION

Why we need the National Water Commission

The challenge today is for us to restructure these agencies so that they can work on the new mandate that the nation has placed before them; in a manner that overcomes the schism between groundwater and surface water; and with greater presence on the round at the river basin level [4.1].

Strategy and Structure

CWC and CGWB have followed a somewhat similar trajectory; but GoI is less resource-constrained than state governments; therefore these have not only survived but even grown. However, they are already facing reduced budgets and today require urgent restructuring [4.1.1].

New Context, New Demands

Both the CWC as well as CGWB have useful and formidable capabilities for water resource exploration, assessment and monitoring, and planning of infrastructure projects; these must be preserved, nurtured and built upon. The need of the hour is to significantly enhance the effectiveness of assessment, monitoring and planning capabilities and their effective deployment.

There is a need to address this concern and make appraisal a demand based exercise, done through a partnership between the central and state governments.

India has embarked upon an ambitious plan of mapping aquifers with clear meaning, messages and direction to managing quantities and quality of groundwater resources across a diverse socio-ecological typology.

Doing justice to such a perspective requires interdisciplinary skills that will enable a transition from an organisation that spent much of its time in the exploration and drilling for groundwater to an organisation that has the capacity to lead and anchor a national programme on aquifer management from different parts of India. The aquifer mapping effort must also be increasingly backed by more frequent assessments in real-time – annual assessments must become available at least once every year – and based on aquifer information including groundwater levels and groundwater quality. At the same time, this information can become even more effective if data on the profiles of users and uses is also available along with information and data on economics, social indices, ecosystem and energy so that a much better understanding emerges on the nexus between groundwater, agriculture, industry and energy.

India's water strategy has so far concentrated on public investment in infrastructure. This has undoubtedly played a significant role in meeting the goal of national food security. The country can make rapid strides in water security by emphasising management improvements and institutional reforms rather than just public investment in water infrastructure. This shift of emphasis is the key challenge to be met by the National Water Commission.

In the new water resource governance scenario facing the country, we need to envisage a high level central organisation that is forward looking, strategic, agile and trans-disciplinary in its skill set. This has to be conceived of as an action organisation rather than merely an assessment and monitoring organisation, although these too will remain aspects of its mandate.

The larger water governance challenge requires a new-age, modern, agile and compact apex organisation that is untrammelled by the burden of the irksome internal management complexities of these unwieldy bureaucracies [4.1.2].

Surface and Groundwater Together

What is more, the organisation needs to view both groundwater and surface water in an integrated, holistic manner. CWC and CGWB cannot continue to work in their current independent, isolated fashion. The one issue that brings out the need to unify the two bodies more than any other is the drying up of India's rivers [4.1.3].

Accessing the Necessary Capabilities

Civil engineers (the main discipline overwhelmingly present in the CWC) and hydrogeologists (the main discipline in the CGWB) are crucial for effective water management. But alone they cannot be expected to shoulder the entire burden of the new mandate. These disciplines include, most importantly, the social sciences and
management, without which we cannot expect programmes such as Participatory Irrigation Management and Participatory Groundwater Management to succeed.

Our goal is, therefore, to make a manifold increase in the capacities of the apex bodies managing water in India. This can be done through both inhouse enhancement of capacities [4.1.4].

National Water Commission

The Committee, therefore, recommends that:

a) A brand new National Water Commission (NWC) be established as the nation's apex facilitation organisation dealing with water policy, data and governance;
b) NWC should be an adjunct office of the Ministry of Water Resources, River Development and Ganga Rejuvenation, functioning with both full autonomy and requisite accountability;
c) NWC should be headed by a Chief National Water Commissioner, a senior administrator with a stable tenure and with strong background in public and development administration, and should have full time Commissioners representing Hydrology (present Chair, CWC), Hydrogeology (present Chair, CGWB), Hydrometeorology, River Ecology, Ecological Economics, Agronomy (with focus on soil and water) and Participatory Resource Planning & Management.
d) NWC should have strong regional presence in all the major river basins of India;
e) NWC should build, institutionalise and appropriately manage an architecture of partnerships with knowledge institutions and practitioners in the water space, in areas where in-house expertise may be lacking [4.1.5].