



ATREE Submission to Committee

January 30th 2016

This note is in response to a request for input by Dr. Mihir Shah, Chair of the "Committee on Restructuring of CWC and CGWB", in a meeting held at Shram Shakthi Bhavan on January 11, 2016. This notes addresses the proposed merger of Central Ground Water Board (CGWB) and Central Water Commission (CWC).

There are a whole range of different functions that CWC and CGWB currently play. These can broadly be classified into

- A. **Information Provision:** Data collection, primary scientific research, collation of secondary data for basin/aquifer assessments.
- B. **Regulation:** Surface water project approval and design; setting limits for groundwater withdrawal.
- C. **Project Monitoring and Evaluation:** Ex-post evaluations of surface water project performance.

Ideally, these should be handled by different organizations to avoid conflicts of interest (e.g. the possibility of overestimating basin water availability based on limited or spurious data to make certain projects appear more feasible). Here, we will mainly comment on implications for reorganization with regards to the first function, information provision, and a bit on the second function, regulation. We will assume that at least for the information provision function, there will be a single integrated organization. This note deals with the modalities of such an integration.

1 The Information Provision Role:

One of the most important roles CWC and CGWB play is in collecting data on water resources in India, estimating water use and water available for future exploitation. Given the integral linkages between GW and SW, it seems imperative that an integrated monitoring agency be created.

However, mere reorganization of staff from CWC and CGWB into a single water resources organization will not facilitate in achieving scientifically based assessments. To achieve this, scientific norms that link surface and groundwater dynamically both in space and time will need to be institutionalized. Changes in the conceptual and operational approaches, organizational structure, technical capacities and partnerships will be required as the current segregated approach is flawed. This will require significant investments in training, high quality data collection, assessment protocols and instrumentation.

1.1 Scientific Approach

Create a joint Scientific Advisory Committee: Integrated monitoring is a new approach that will require a fundamental change in conceptual thinking in both organizations. Neither CWC nor CGWB currently has a culture of rigorous peer review. To integrate, it will be necessary to constitute a scientific advisory committee at the highest levels of the merged organization to inform and also continuously monitor the agency's research and its interpretations.

The Scientific Advisory Committee must address three major current problems.

1. *Double counting:* CWC estimates post-monsoon baseflows into streams at the gauging stations. These are counted as "utilizable surface water". But baseflows are also accounted for in the groundwater availability estimated by CGWB (which fixes allowable baseflow to a constant percentage of recharge). Similarly, groundwater recharged from losing streams is not accounted for as a loss from surface water, but may nevertheless be counted as available groundwater (depending on how the GEC method is applied). In fact, the quantitative relationship between groundwater recharge and baseflow is unknown for most rivers. This poses a challenge for estimating actual utilizable water resources in a basin.
2. *Changing water cycle or non-stationarity:* Neither CWC nor CGWB rarely analyze in-depth trends in the data they collect. For instance, CWC often reports estimates of "average" water resource availability or "basin yield". The tendency is to assume stationarity in conditions, when in fact the water cycle is changing for a variety of reasons: dams, diversions, land use changes, groundwater pumping, and climate change. Teasing out the effects of these changes must be a high priority for the integrated agency.
3. *Over-simplistic assessment indicators:* There needs to be a complete revision of simple heuristic measures currently used by both agencies in making policy assessments. For instance, the concepts of "basin yield" in surface water and "groundwater utilization status" do not account for the linkage between GW and SW, as well ecological and environmental flow concerns. The GEC methodology to estimate groundwater recharge, safe yield and sustainable groundwater extraction is fundamentally flawed and needs revision based on sound science. Similarly, the concept of surplus and deficit river

basins needs to be revisited in the light of long-term climate variability and trends as well emerging land-use and land cover patterns, and demands from human and ecosystems.

1.2 Operational Approach

Create basin and watershed scale budgets: Ultimately, the problem of water management is about allocating the available water endowment among all users and uses - human and ecosystem. This involves recognizing that flowing rivers provide direct and indirect benefits to humans all the way from headwaters to deltas/estuaries. Without understanding how much water is available and how much is being used and by whom, water resources allocation is a non-starter, and any such attempts will lead to unfair allocation to set of users at the cost of others. At present, comprehensive water budgets at the basin and sub-basin/watershed levels are not being done.

The only way forward is comprehensive water budgeting starting simultaneously at the scale of each watershed (bottom-up) and the basin as a whole (top-down). River basin scale budgets are necessary to account for large scale inter-basin transfers and cumulative impacts of multiple projects that may not be apparent at smaller scales. On the other hand, developing budgets at the watershed scale may create a space for corrective action at the local level. For example, there is little information on the effects of induced groundwater recharge from large scale implementation of watershed development programmes on groundwater recharge and runoff generation, critical to predicting streamflow and downstream allocations. Local watershed level assessments will also help identify and allow for special protection of ecologically sensitive areas and recharge areas (headwater catchments) such as in spring-fed rivers.

Scaling up a local-level watershed budgeting exercise to all of India, will require considerable investment on capacity building (more on this later).

1.3 Organization Structure

Leadership: To achieve parity between groundwater and surface water, perhaps the initial heads of any merged agency needs to come from outside CWC and CGWB.

Budget: The monitoring and research budget for the integrated monitoring agency would have to be much larger than the combined current spending at CWC and CGWB. To begin with, the recent cutbacks made in CGWB's budget for aquifer mapping will have to be restored. But over and above that, the monitoring budget will probably have to be increased significantly, so as to enable a much denser network, more parameters, testing of new methodologies etc.

1.4 Capacity Building:

Internal capacity building: There needs to be phase-wise training of officials at different cadres drawn from reputed academic and research institutions from within India and abroad. Training and staffing should include knowledge of ecological and environmental flow regimes; as well as socio-economic aspects of water resources management.

Staff may also be need to be retrained. Because staff from the two agencies typically have different educational backgrounds (e.g. geology versus water resources engineering) there are likely to be several blind spots. Further, many commonly used off-the-shelf modelling software packages like WEAP and SWAT are not equipped to handle the linkages between surface and groundwater. So staff may need additional training in new tools that address these inter-linkages.

State-level capacity building: Since water is a state subject, most watershed level planning will need to be coordinated by state water agencies. Currently, in most states the technical capacities and budgets for these water agencies are minimal. The proposed integrated water information agency could be tasked with training the state agencies and creating manuals to ensure accurate information is collected and watershed level budgeting processes are standardized nation-wide.

Educational institutions: In recent years, many universities have begun offering courses on Integrated Water Resources Management (IWRM). However, it is not clear that these students, though trained broadly, are able to apply their knowledge in a useful way. If basin and watershed level water budgeting are to become a reality, it will require a workforce that is trained to do this and working with educational institutions on curriculum revision to ensure graduates can meet this specific challenge is needed.

1.5 Data Collection and Presentation

Revise and expand data collection: At present, water abstraction is very poorly quantified. Unlike surface water, investments in groundwater abstraction structures are made by individuals and therefore government records on these are virtually non-existent or inaccurate. Preliminary comparisons suggest there are order-of-magnitude discrepancies in GW irrigated areas between the official data and independent estimates such as satellite imagery. Serious investments in simply quantifying abstraction (both surface and ground) are needed. In addition, we need to greatly expand the density of rain gages, stream gages and groundwater monitoring wells.

Present data as relevant to stakeholders: Much of the water data currently available is incomplete and often irrelevant to stakeholders - both lay citizens and researchers. For instance, publicly available monitoring well data often fail to report the spatial coordinates and well elevation/litholog details so contouring of GW levels to obtain spatial maps isn't

possible. A serious reassessment is needed regarding what kinds of data are collected and how the data are presented and visualized to ensure that data funded by tax payers are accessible and usable by the users of the resource.

1.6 Basin and aquifer level planning

Comprehensive "state of water resources" plans are needed, which explicate the impacts of current levels of water use and project the expected impacts of planned developments. One of the major lacunae in Indian water resources management is the artificial separation between urban water vs. irrigation, groundwater vs. surface water and the fragmented project wise appraisal with no thought to the cumulative impacts of multiple interventions at different scales and their unintended consequences (e.g. loss of return flows). A requirement for comprehensive basin plans every 3-5 years, which are open and publicly accessible could address some of the fundamental management problems.

1.7 Partnerships

NGOs and community groups: Planning at the river basin scale, must rely on data from individual watershed scale budget. Developing watershed budgets for every watershed in the country, can only be done with active partnerships with NGOs working locally to train "barefoot hydrologists".

2 The Regulation Role:

2.1 Revision of GW laws

Merger and "parity" between groundwater and surface water as regards the regulatory role is challenging for several reasons. CGWB currently has very little regulatory authority for several reasons. Water is a state subject and the central government's jurisdiction is limited to inter-state rivers. An examination of most inter-state tribunals suggests that the role groundwater generally, and CGWB specifically, is minimal. In any case, most states still subscribe to "open access laws" on groundwater. Even where groundwater regulation acts in states have been passed, the actual powers are with state groundwater authorities.

While surface water projects are proposed, planned and designed by state and central agencies, groundwater investments are typically private. Unless the legal basis of groundwater itself is changes, it is unclear that CGWB's regulatory role can be expanded even in inter-state tribunals where central agencies have jurisdiction.