Audit of Water Issues

Nameeta Prasad,
Director (Training and Research)
iCED
“Every year, more people die from the consequences of unsafe water than from all forms of violence, including war”
Plan of presentation

- Water: some facts
- Audit issues
- Audit techniques
- Case study
  - Significance of topic
  - Audit Process
    - Scope of audit
    - Audit objectives
    - Audit criteria
    - Audit sampling
  - Innovative audit methodology
  - Audit findings and recommendations
  - Audit impact and results
Water issues: some facts

• About 80% of the world’s population lives in areas with high levels of threat to water security
  – The most severe threat category encompasses 3.4 billion people, almost all in developing countries
  – The number of drought and flood disasters, total affected area, number of people affected, and damages have increased since the 1970

• Challenges to fresh and marine waters
  – Water quality: A persistent and widespread problem, specially in developing countries
  – More than 2.6 billion people still lack access to improved sanitation facilities, with poor, rural populations being most affected, especially in Africa, South Asia and the South Pacific (WHO 2011a).
  – Pathogen contamination of surface and groundwater remains a critical threat to human health in many areas, with human and animal faeces being the primary pathogenic water contamination source
  – Public heath issue
Water issues: some facts

• Contaminants continue to threaten human health and aquatic ecosystems
  – Concentrations of persistent toxic chemicals in animal tissues
  – Emerging contaminants– pharmaceuticals, nano particles which pose threat to human health

• Climate change issues
  – Traditional energy production produces increased greenhouse gas (GHG) emissions, with related climate change contributing to water scarcity, extreme climatic events, sea level rise, and loss of glaciers and Arctic sea ice
Water– audit issues

- Availability of safe drinking water
- Competing demands for limited water supplies
- Drought
- Flooding
- Quality of surface waters
- Marine environment
- Planning and financing for water infrastructure
- Implementation and enforcement of water laws
- Challenges of managing water resources shared by multiple nations
- Adequacy of water-related data
- Impacts of climate change on water resources
Availability of Drinking Water

• **Why it Matters**
  – Drinking water sources are limited and at risk for contamination
  – Ensuring the provision of safe drinking water is a critical responsibility of most governments
  – 780 million people around the world do not have access to safe sources of drinking water

• **Examples of Topics Addressed by SAIs**
  – Drinking water quality
  – Drinking water quantity
  – International aid to improve access to drinking water in developing countries
Competing Demands for Limited Water Supplies

• Why it Matters
  – Population growth and economic development have increasingly strained available water resources in many locations.
  – Use of finite water supplies must be balanced between the needs of various interests, including private consumers, industry, agriculture, energy development, and environmental protection.

• Examples of Topics Addressed by SAIs
  – Governmental efforts to allocate water between different uses
  – Water usage for energy development in arid areas
Drought

• Why it Matters
  – Severe droughts can produce wide ranging negative impacts, including economic, social, and environmental harm.
  – Drought contributes to desertification and land degradation
  – Climate change is expected to exacerbate existing drought problems in many parts of the world

• Examples of Topics Addressed by SAIs
  – Restrictions on water usage and efforts to increase water supplies during droughts
  – Financial assistance provided to assist farmers and business harmed by drought
Flooding

• Why it Matters
  – Floods threaten human life, property, and the environment
  – The frequency and severity of damaging floods has increased in many countries in recent years
  – Climate change may produce even more frequent and severe floods in the future

• Examples of Topics Addressed by SAIs
  – Effectiveness of flood prevention measures
  – Funding for flood prevention and protection
  – Multinational efforts to address flooding threats posed by rivers that span multiple countries
Quality of Rivers, Lakes and Other Surface Waters

• **Why it Matters**
  – Surface water contamination can harm human health and aquatic life, and can reduce the amount of water available for agriculture and recreation.
  – Many countries have struggled with the tradeoff between using and protecting their freshwater resources.
  – Surface water pollution comes from many sources, some of which are difficult to prevent.

• **Examples of Topics Addressed by SAIs**
  – Pollution of particular high profile waters (lakes or rivers)
  – Different types and sources of water pollution
Marine Environment

- **Why it Matters**
  - The long-term sustainability of some fish and other marine wildlife are threatened by over-fishing and pollution in the marine environment.
  - Coastal zones are also at risk from pollution in the marine environment, which can destroy coastal ecosystems and habitats.

- **Examples of Topics Addressed by SAIs**
  - Management of fish resources
  - Pollution in the marine environment (due to polluted runoff from the land or due to spills from ships at sea)
  - Coastal degradation
Planning and Financing Water Infrastructure

• Why it Matters
  – Drinking water systems and wastewater treatment facilities are critical elements of the infrastructure in most nations
  – Governments often invest large sums of money to construct and maintain these facilities
  – 2.5 billion people do not have access to adequate sanitation facilities

• Examples of Topics Addressed by SAIs
  – Results of public investments in water infrastructure
  – Performance of smaller, decentralized water and wastewater treatments systems in developing countries
Implementation and Enforcement of Water Laws

• Why it Matters
  – Laws to ensure water resources are protected and allocated fairly only work if they are properly enforced
  – Governments use various approaches to enforce water laws, including issuing fines or withholding public funds from violators
  – Corruption often limits the ability of governments to effectively implement and enforce water laws and policies

• Examples of Topics Addressed by SAIs
  – Governmental compliance with legal obligations related to the oversight of water resources
  – Enforcement of water laws that target actions of private entities
Managing Water Resources Shared by Multiple Nations

• Why it Matters
  – There are hundreds of water basins that cross the political boundaries of two or more countries
  – Waters that span national borders may produce different incentives and risks for upstream and downstream users
  – Cooperation between governments is key for effectively managing shared water resources and addressing problems

• Examples of Topics Addressed by SAIs
  – Effectiveness of multinational efforts to improve water quality and protect the environment of shared river basins
  – Implementation of projects to support people living in shared river basins
Adequacy of Water-Related Data

• Why it Matters
  – Access to reliable data on water quality and quantity is crucial for governments to make informed water policy decisions
  – Data are used to identify water issues, evaluate potential responses, and monitor the effectiveness of actions taken
  – Developing water quality monitoring programs can be expensive and resource intensive

• Examples of Topics Addressed by SAIs
  – The sufficiency of data on water usage and demand
  – The adequacy of data related to the quality and quantity of fresh water
Impacts of Climate Change on Water Resources

• Why it Matters
  – Anticipated water-related impacts of climate change are expected to be widespread and significant
  – Climate change is expected to amplify many existing water-related challenges, such as flooding and drought
  – Some countries have begun to implement adaptation measures in response to threats posed by climate change

• Examples of Topics Addressed by SAIs
  – Governmental efforts to consider climate change impacts in planning for other activities
  – Efforts to ensure water security under different climate change scenarios
Choosing audit topics

1. Identify the main threats to water and carry out their risk assessment to identify biggest threats.
2. What is government response and who are the main players.
3. What are possible audit topics and priorities.
4. Decide audit approach.
# Methods used in water audits

<table>
<thead>
<tr>
<th>Basic auditing tools</th>
<th>More specialized tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Interviews (&gt; 90%)</td>
<td>• Expert Panel (5%)</td>
</tr>
<tr>
<td>• Document Review (&gt; 95%)</td>
<td>• Focus Groups (5%)</td>
</tr>
<tr>
<td>• Site Visits (60%)</td>
<td>• Database Analyses (&gt; 30%)</td>
</tr>
<tr>
<td>• Questionnaires/Surveys (35-40%)</td>
<td>• Economic Analyses (&lt; 5%)</td>
</tr>
<tr>
<td>• Case Studies (35-40%)</td>
<td>• Scientific Analyses (5-10%)</td>
</tr>
<tr>
<td>• Expert Opinion (25%)</td>
<td>• International Benchmarking (5%)</td>
</tr>
</tbody>
</table>
Institutional measures relating to water issues

• Water Pollution
  – MoEF, MoWR

• Availability of water
  – MoWR, PHDs

• Droughts/Flooding
  – Agriculture department
INTOSAI Guidelines

- Auditing Water Issues: An Examination of SAIs’ Experiences and the Methodological Tools They Have Successfully Used
Water pollution

Case study
Significance of the topic

• Clean, safe & adequate freshwater is vital to the survival of all living organisms
  – Also vital for smooth functioning of ecosystems, communities and economies

• India’s 14 major, 55 minor and several hundred small rivers receive millions of litres of sewage, industrial & agricultural wastes
  – Issue of water pollution had been flagged by leading environmentalists in India as one of the most important environment issues facing India
Audit scope

- PA
- Main issue
  - whether various measures to control pollution of rivers, lakes and ground water in India had succeeded
- Audit at 2 levels: the central level and state level
  - At central level
    - policy/planning issues/data adequacy/monitoring
    - Ministry of Environment and Forests (MoEF) & Ministry of Water Resources (MoWR) were audited
    - Another agency at the central level, responsible for water quality assessment, called Water Quality Assessment Authority (WQAA) was also audited
Audit scope

- At the state level
  - Implementation and monitoring of programmes for the control of pollution of rivers, lakes and ground water by the designated implementing agencies
  - Also included adequacy of planning to control water pollution, existence of accurate water quality data as well as impact of pollution control measures on quality of water in rivers, ales and ground water all over India
Audit Objectives

1) Inventory of water sources has been prepared and whether the overall status of quality of water in rivers, lakes and groundwater has been adequately assessed in India;

2) Risks of polluted water to health of living organisms and the impact on environment have been adequately assessed;

3) Adequate policies, legislations and programmes have been formulated and effective institutions been put into place for pollution prevention, treatment and restoration of polluted water in rivers, lakes and groundwater;
Audit Objectives

4) Programmes for pollution prevention, treatment and restoration of polluted water in rivers, lakes and ground water have been planned, implemented and monitored efficiently and effectively;

5) Funds were utilized in an efficient and economic manner to further the aim of reduction of water pollution;

6) Programmes for the control of pollution had succeeded in reducing pollution levels in ground water and surface water and restoring water quality.
Audit criteria

- Derived from:
  - The Water (Prevention and Control of Pollution) Act, 1974
  - Guidelines for implementation and monitoring of National River Conservation Plan and National Lake Conservation Plan
  - National Water Policy, 2002
  - National Environment Policy 2006
  - Guidelines of United Nations Environment Programme (UNEP)
Audit sampling

• Audit sample selected on the basis of assessment of risks
  – expenditure, criticality of the project in pollution control and feedback received from the public to the advertisement placed in newspapers
  – Out of 1079 projects for pollution control of 24 rivers across 19 States being implemented, we audited 140 projects for 24 rivers
  – Out of projects for conservation of 58 lakes in 14 States, we studied 22 projects across 14 States
  – Out of a total of 6053 blocks across India, we examined 116 blocks for implementation and monitoring programmes relating to ground water pollution
Innovative audit methodology

• **Before commencement of audit**
  - Stakeholders’ Conference on Environment Audit
  - International Conference on Environment Audit “Concerns about Water Pollution”
  - Advertisement in newspapers

• **Audit methodology**
  - Use of detailed audit checklist
  - Use of water quality testing reports to establish quality of water
Stakeholders’ Conference on Environment Audit

• In July 2009, SAI India organised a Stakeholders’ Conference on Environment Audit
  – to flag major environmental issues in India and to identify significant areas for audit enquiry in the future

• Experts from Civil Society organisations, from Ministries of Environment & Forests and Urban Development, from the Indian Meteorology Department & representatives/ corporate bodies working in the field of environment attended the Conference
  – Identified water pollution as the most critical issue affecting India
International Conference on Environment Audit “Concerns about Water Pollution”

- 2-day International Conference on Environment Audit - Concerns about Water Pollution in March 2010
- Attended by members of various Civil Society Organisations, Government Agencies, International Agencies and Regulatory Bodies like
Heads of SAIs from Austria, Bhutan, Maldives and Bangladesh also shared their concerns about water pollution. Issues flagged include:

- Lack of coordination and ownership between the different agencies involved in implementation.
- Need for the government to reassess the low levels of budgetary priority given to environmental programmes in the country.
- Need to co-relate the reality that many citizens depend on water bodies for livelihood with the creation of conservation programmes.
The Comptroller and Auditor General of India will be conducting a Performance Audit on the subject “Pollution of ground water, lakes and rivers in India” during 2010-11. In case you want to draw attention to any specific problem/issue regarding water pollution which is affecting you or the environment around you, please get in touch with us. We would try to address these important issues in our report.

Email: cag.water@gmail.com
Postal address: Office of the Principal Director of Audit, Scientific Departments, DGACR Building, IP Estate, New Delhi 110002.
Fax No: 011-23702353
E-mail account created

• Database of e-mails created—used as input to frame audit questions
Use of detailed audit checklist

- As audit was to take place at federal level as well as simultaneously in 25 states across India, detailed questionnaires according to the agency being audited were developed
  - Enabled us to get answers to all of audit questions
  - Helped us to prepare state wise report
Use of water quality testing reports to establish quality of water

- Analysis of samples of water in rivers, lakes and groundwater sources which were in audit sample
  - Helped establish impact of water pollution measures on the quality of water in India’s rivers, lakes and groundwater sources
  - Drew attention to good and bad practices
Objective 1: Audit Findings

• **Preparation of Inventory**
  – No survey by MoEF to identify all rivers and lakes
  – only 56% states carried out district-wise assessment of ground water resources

• **Biological indicators**
  – Only a few biological indicators identified for only some rivers in India
  – Biological indicators not been identified for any lake in India by MoEF/CPCB
Objective 1: Audit Findings

- Identification/quantification of contaminants like nutrients, acids, salinity, pathogenic organisms etc., not undertaken
- Effect of human activities affecting the quality of water like agriculture, industrial activities mining, uncontrolled disposal of human waste etc., not been done for any river/lake in India
  - Incomplete assessment by states
Objective 2: audit findings

- **Identification of risks to environment**
  - wetlands associated with river/lake & risks to them due to pollution not done
  - Major aquatic species, birds, plants and animals facing risks not identified

- **Risks to human health**
  - Risks to human health from water borne diseases assessed by only 28% states
  - Risks to human health from arsenic, zinc, iron, mercury, copper, chromium, cadmium, lead, persistent organic pollutants etc assessed only partly by only 8% states
  - No assessment by MoEF
Objective 3: audit findings

• Existence of policy
  – No separate policy to tackle water pollution framed by MoEF
  – A separate policy for addressing water pollution formulated by only 4 states
  – No programmes introduced for tackling agricultural non-point pollution of rivers and lakes by measures like promoting the use of organic manure, crop rotation, banning use of synthetic pesticides and fertilizers, integrated pest management etc.

• Adequacy of institutions
  – No agency given responsibility for pollution issues for ground water
  – WQAA not working effectively
Objective 4: Audit findings

- Planning, implementation and monitoring were weak
  - Projects not completed on time and failed to meet their objectives
  - Performance of projects unsatisfactory
  - Not monitored as envisaged
  - Paucity of network for tracking pollution of rivers, lakes and ground water
  - Inadequate number of monitoring stations, no real-time monitoring of water quality was taking place and the data on water quality had not been disseminated adequately
Objective 5: Audit findings

- Funds available for control and prevention of water pollution and restoration of wholesomeness of water were not adequate
  - These were also not utilized effectively and economically
Objective 6: Audit findings

- Majority of rivers remain polluted by high levels of organic pollution, low level of oxygen availability for aquatic organisms and bacteria, protozoa and viruses which have faecal-origin and which cause illnesses.

- Most lakes are under threat from nutrient overloading which is causing their eutrophication and their eventual choking up from the weeds proliferating in the nutrient-rich water.
  - Implementation programmes for preventing pollution of rivers/lakes has had no discernible effect.
Good practices

• Gujarat
  – All the test checked projects were completed and were working as envisaged. The capacity of the STP is higher than the quantity of sewage generated. Currently, no sewage flows into the Sabarmati from the city

• Uttarakhand
  – Rejuvenation of Nainital Lake

• Karnataka
  – Kotekere lake
Recommendations

• Citizens Monitoring Committee and Local level lake monitoring committees need to be constituted to provide feedback for more effective implementation

• Monitoring network should be strengthened by converting all monitoring locations into stations and reclassifying them as baseline, trend and flux stations for achieving better quality data
  – MoEF should also start real time monitoring so that red flags are raised immediately when pollution levels rise alarmingly and remedial action can be taken in time

• The main ministry at the federal level for pollution related issues (MoEF) should take into account the basin approach while planning for reduction of pollution of all rivers and lakes in the country
Impact of audit

- Report had high impact
- At the time of the exit conference to discuss the audit report, MoEF committed to set up a committee to draw up a roadmap to implement audit recommendations in the report
  - Committee consisted of representatives of MoEF and Ministry of Water Resources, Ministry of Urban Development and a representative of CAG
Impact of audit

• Committee proposed the following high level decisions
  – Capacity building of Central and State Pollution Control Boards (PCBs)
  – Institutional reforms in Central and State PCBs
  – Environment violations need to be suitably penalized; necessary amendments to be made to Environment Protection Act
  – Policy to be framed by Ministry of Water resources for rational use of water by agriculture, industrial and domestic purposes
  – Policy to be framed by Ministry of Agriculture check pollution of surface and ground water by agricultural runoff

• 34 specific recommendations made by the Committee under these broad area
Thank you