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## THE WATER SECTOR IN YEMEN: STATUS AND OUTLOOK

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# **The Water Sector in Yemen: Status and Outlook**

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## **1.0 Introduction**

This paper outlines the major activities and developments in the water sector in Yemen over the last three years. In particular, it addresses the extent to which the various objectives of the seven freshwater program-areas of Chapter 18 (Agenda 21) were achieved. The objective is to update the reader on the activities pertaining to each area and the status of the water sector in Yemen in general.

## **2.0 Activities in the Program Areas**

For convenience, the seven program areas which were proposed for the freshwater sector in Chapter 18 of Agenda 21 are listed below:

- 1) integrated water resources development and management;
- 2) water resources assessment;
- 3) protection of water resources ;
- 4) drinking water supply and sanitation;
- 5) water and sustainable urban development;
- 6) water for sustainable food production and rural development;
- 7) impacts of climate change on water resources.

**2.1) Integrated water resources development and management:** since the early 80's, it was widely realized that water resources planning and management tasks should be separated from water development and use activities, so that the former are undertaken nationally while the latter are undertaken by sectoral entities in accordance with nationally approved plans. Consequently; a High Water Council (HWC), supported by a Technical Secretariat (TS) which was to act as the national planning and management agency, was established. However, several factors prevented this entity from functioning as planned.

Therefore; until now, water planning at the national level is not practiced. Instead; the drinking, irrigation and industrial water projects are implemented by various public and private entities, each to serve its own sectoral objectives. In other words, water development projects are driven/ motivated by sectoral demands and the resource management responsibility is fragmented among numerous use sectors/ entities instead of being consolidated into a single national management entity which integrates the development activities with socio-economic development. Under this

situation, the various users are essentially focusing on resource utilization and ignoring resource management. A situation which resulted in over-exploitation of the finite resources.

It was not until April 1995 that the idea of an independent water management entity became politically feasible when the principal line ministry (Agriculture and Water Resources, MAWR) became convinced that water planning and management must be separated from development and use. It was agreed that a National Water Resources Authority (NWRA) would form by merging the TS of the HWC with the other three water management and planning entities at the Ministries of Oil and Mineral Resources (MOMR), Agriculture (MA), and Electricity and Water (MEW).

Consequently, a team of professionals representing the four entities began drafting NWRA's mandate, organizational chart and other basic documents. In September 1995, the Cabinet approved the establishment of NWRA which is expected to be functional by early 1996. Valuable support to strengthen NWRA's capacity to manage the country's water resources will be provided through a multi-lateral project which is jointly funded by the Yemeni Government, the Dutch Government and the UNDP.

According to its mandate, NWRA's goal is to "conserve the water resources of the country, prescribe strategies, policies and plans to ensure proper management and sustainable development of these resources, within the context of socio-economic development plans." Its mandate describes it as "the sole governmental agency responsible for the formulation of water resources policies and development strategies and the study, planning and management of water resources at national level." The mandate terminates all "water resources activities presently undertaken by the MA, MOMR, MEW and other agencies which are similar to those of the Authority or impending on its functions and powers..."

To conclude, the establishment of NWRA is the main development pertaining to water resources development and management. The issuance of Water Law is the next step.

**2.2) Water resources assessment:** five objectives were targeted under this program area; namely: access to appropriate assessment technology, availability of financial resources, full utilization of information, adequate institutional arrangements and capacity building.

In view of the lack of adequate institutional arrangements for water resources management at the national level, most activities in this program area were largely at the sectoral level and only few studies were at the national level. It is hoped that the establishment of NWRA will provide the institutional framework which will enable the achievement of these objectives.

Besides the numerous local/ regional assessment studies, at least four national studies were completed during the last three years. These are:

- i) the "Water Master Plan": a ten- volume publication of the TS of the HWC that was out in June 1992 (in cooperation with the UNDP);
- ii) the "National Water Policies": a publication of the Ministry of Agriculture and Water Resources that was out in September 1992 (in cooperation with FAO);
- iii) the summary and digest report of available information on the water resources of Yemen: a one- volume publication of the Ministry of Oil and Mineral Resources that was out in March 1995 (in cooperation with the Netherlands's TNO);
- iv) the Hydrogeologic Map of Yemen: an eight-sheet map published by the Ministry of Oil and Mineral Resources that was out in July 1995 (in cooperation with a Russian consulting team);

Of the regional studies; the study of Mukalla Sandstone in wadi Masila (Hadramawt) is worth pointing out. The groundwater potential of this aquifer was discovered during the oil exploration activities. Initial findings suggests that the volume of water in this aquifer may well exceed 2,000 billion m<sup>3</sup>.

**2.3) Protection of water resources:** the overall objective in this problem area is to protect the water resources against quantity and quality degradations. Various measures/ activities to achieve this objective were outlined in Agenda 21. However, because of the tendency of sectoral entities to focus on development and use and to ignore management, the water degradation problem remained largely ignored or un-attended to.

As a result, quantity and quality degradation of groundwater resources has been on-going for years in more than one basin in Yemen. The problem of depleted groundwater aquifers is already felt in Rada, Sana'a, Sa'adah and other basins.

Similarly, serious groundwater-quality degradation problems are already of significant impact in the Sana'a Basin (where the pollution is due to untreated sewage) and in the Tihama Plain (where it is due to salt-water intrusion). Notably; however, these problems, although around since the late eighties, were overlooked due also to the inadequate institutional arrangements for water management.

The new emerging problem/ hazard (?) is that associated with the oil production in Hadramawt Governorate. There, more than 200,000 barrels of brine water are produced daily. Presently, the water is disposed by injection into underground strata at various depths. There are genuine concerns regarding the potential pollution hazards of this practice, particularly on the recently discovered reserves of groundwater in Masila.

**2.4) Drinking water supply and sanitation:** the overall situation with respect to population access to safe water supply for drinking purposes remained, more or less, unchanged. That is, about 30-40 % of the country's 16 million people receive piped water. Further, because the sewage system is under developed (only 35 % of the urban population are served and the sewage is not adequately treated), the water systems/ supplies are frequently polluted. These two problems (i.e., small percent coverage by piped water and high pollution risk), are probably the leading causes behind the high mortality rate among children under five (154 deaths per 1,000 births). Waterborne diseases are believed to cause some 70% of these deaths.

**2.5) Water and sustainable urban development:** four targets were set in Agenda 21; namely: to supply all of the urban population with at least 40 litres of water/capita/ day, to supply sanitary service (on-site or community) for at least 75 % of the urban population, to establish and apply discharge standards and to collect and safely dispose of 75 % of all the solid waste generated in urban areas.

Recent estimates for service coverage in urban areas put the water supply at 50% and sanitation at 35 %. The average per capita water rate (for the served population) is probably more than the target of 40 lpcd.

**2.6) Water for sustainable food production and rural development:** three targets were identified in this program area; namely to achieve: economic value of water, community participation in management and comprehensiveness of the management policies. Again, because the institutional framework for water resources management has been inadequate, only very little was achieved in this program area. These objectives, however, are emphasized in the mandate of NWRA.

Table (1) summarizes the main indicators in the fields of water supply and sanitation in urban and rural areas.

Table (1): Performance indicators for the water supply and sanitation (compiled from several sources)

	Problem Areas	Impacts
1	<p><b>Inadequate Urban Water Supply Service:</b> Mainly due to accelerated growth of demand as a result of rapid urban growth, depletion of aquifers and failure to forecast the demand and to undertake appropriate expansions. Poor planning and poor cost recovery (under-pricing) are among the main causes behind this failure. The problem is further complicated by growing water competition with agriculture in urban basins leading to accelerated depletion of aquifers (e.g., Sana'a basin) and unclear water rights (preventing development of alternative supplies; e.g., Taiz and Shibam-Sana'a problems).</p>	<p><b>Direct Impacts:</b> i) low percent coverage: only 50% of the estimated 3.76 million urban population ('94 data). The percent coverage is diminishing due to urban growth while the network connections are fixed, ii) low per capita rate of domestic water supply: about 50 lpcd according to '92 data. Also diminishing, <b>Indirect Impacts:</b> undermines public hygiene, the quality of urban environment/ life and increases the cost of water, especially on the poor. It is estimated that about 70 % of infant mortality is due to waterborne diseases. Thus; of the 154 deaths per 1000 life-births which occur before reaching 5 years old, some 107 deaths are probably due to waterborne diseases.</p>

Table (1): continued

2	<p><b>Inadequate Rural Water Supply Service:</b>          Problem is created/ further aggravated by: demand growth due to national population growth; inherently high capital cost of new systems due to scattered/ remote locations of settlements; unwillingness of the benefactors to bear the full cost of water production; inability of the government to continue building, and in many cases maintaining, free systems; ...</p>	<p><b>Direct Impacts:</b>          i) low percent coverage: only an estimated 40 % of the 12 M rural population ('94 data),          ii) low per capita rate of domestic water supply: about 25 lpc/d ('94 data),  <b>Indirect Impacts:</b> undermines public hygiene and the quality of life (impact on infant mortality like the urban case), leads to relatively higher domestic water cost (e.g., during droughts), encourages migration to cities, .</p>
3	<p><b>Inadequate Urban Sewerage Services:</b>          Due to rapid growth of urban centres, relative increase of per capita water consumption rate over the past 3 decades, failure of traditional (cess-pit) systems in cities or sections of cities to handle new rates and failure to forecast and implement required expansions as a result of poor institutional setup and poor cost recovery.</p>	<p><b>Direct Impacts:</b>          i) low percent coverage (only 35 % of the estimated 3.76 million urban population ('94 data),          ii) pollution (groundwater, beaches of coastal cities, and the quality of urban life in general).  <b>Indirect Impacts:</b>          i) public health hazards due to waterborne disease,          ii) economic losses (lost productivity due to waterborne disease; lost tourism revenue in coastal areas due sewage discharge to the sea; ...),</p>
4	<p><b>Inadequate Rural Sewerage Services:</b>          Due to rapid population growth (nationally), relatively higher rates of water consumption over the past 3 decades, failure of traditional (open) systems to handle the new rates and failure to introduce/ promote appropriate alternatives, ...</p>	<p><b>Direct Impacts:</b> several types of systems are used. Data on the types and percents of rural population served by each type will become available when the results of the '94 census are released.  <b>Indirect Impacts:</b> poor hygiene, low quality of rural environment/ life,</p>

**2.7) Impacts of climate change on water resources:** following the Climatic Changes Conference of Berlin, the Dutch Government committed funds to sponsor research into climatic changes in 10 countries, of which Yemen is one. In June 1995, the Environmental Protection Council (EPC) invited research proposals to address the various impacts of climatic changes; including that on water resources. Numerous proposals were presented and a workshop was held to discuss and prioritize the ones to be funded. The final decisions are expected by early 1996.

### 3.0 Relevant Activities in Other Sectors

The most significant activity of relevance to the water sector was the "Workshop on Preparation of the National Action Plan for Environment and Development (NAPED)", which was organized by the EPC in cooperation with the World Bank during the period 16-19 /9/1995. In that workshop, more than a 100 participants, who came from all regions and institutions of the country, ranked two water and sanitation-related problem areas at the top of the environmental problems. These are: (i) inadequate water supply and sanitation services and (ii) water scarcity.

As a follow-up on the findings of this workshop, policy options and implementation programs are currently being prepared and are to be included in the forthcoming Five-year Plan (1996- 2000).

#### **4.0 Conclusions**

Except for the establishment of NWRA and the expected positive role which NAPED can play in enhancing the water sector, it is obvious that not much was achieved in this sector during the last three years.

Nevertheless, the significance of these two developments shouldn't be underestimated. Most of the water sector's problems are due to fragmentation of management responsibilities, a problem which would be resolved by NWRA. On the other hand, the enthusiasm regarding NAPED stems mainly from the expectation that it will be well received by funding agencies.