

The British-Yemeni Society



Yemen's water crisis

by **CHRISTOPHER WARD**

Christopher Ward, who is Principal Operations Officer for the Middle East and North Africa in the Rural Development, Water and Environment Department of the World Bank, lectured to the Society on this subject last September. The following article draws on his lecture and on published material which he kindly made available.

Introduction

Since time immemorial, Yemenis have been adept at making the best use of scarce water through technology and careful husbandry. Their terraces, elaborate water harvesting structures, and skilful management of springs and flood flows allowed the country to support a large population and a sustainable agricultural economy. But since the creation of the modern state the country has fallen into a water crisis characterised by the very rapid mining of groundwater, extreme water supply shortages in the major cities, and limited access of the population to safe drinking water. The main causes of the crisis include rising demand for water as the population grows and market-led agriculture develops; the unregulated exploitation of groundwater resources; and policies which have promoted expansion rather than efficient use and sustainable management. These problems are by no means unique to Yemen, but in no other country in the Middle East is the rate of exhaustion of aquifers proceeding so fast; no other capital city, for example, faces the dire prospect of running out of water within the next decade.

Yemen's total annually renewable water resources are estimated at 2.5 billion cubic metres (cm). Thus, with a population of around 18 million, these amount to little more than 140 cm per person each year, compared with the Middle East and North Africa average of 1,250 cm per person. The problem in Yemen is made more acute by the fact that water resources are unevenly distributed and that 90% of the population has under 90 cm annually for domestic uses (10% below the worldwide norm). It is estimated that only 44% of the population have access to mains water supply and only 12% to safe sanitation. In general, all surface water resources are harnessed and exploited, and in most areas groundwater (which accounts for 60% of the country's renewable resources) is already being exploited beyond the level of recharge. This very rapid development has brought with it major problems. Groundwater is being mined at such a rate that parts of the rural economy could disappear within a generation. There are thought to be about 45,000 private wells in the country and about 200 drilling rigs. Areas of the country under greatest pressure are the central highlands, western escarpment and coastal plains, where most of the population is

concentrated. In the Sana'a basin, where 10% of the population live, it was estimated in the mid-1990s that water extraction (224 million cm) exceeded the level of recharge (42 million cm) by over 400%. Groundwater is expected to be pumped dry in the Sana'a basin within the next decade. In Amran water levels have dropped 60 metres during the last twenty years — 30 metres in the last five years. Meanwhile by 2005, consumer demand in the country is expected to rise to 3.42 billion cm, posing a shortfall of 920 million cm.

Causes of the Crisis

Since the 1970s, Yemen has witnessed rapid social and economic changes, often outpacing the government's ability to control or manage them. Many of these changes have had a profound effect on water use. In the last twenty years the population has doubled, and Yemen has one of the highest rates of population increase in the world (3.5%). Demographic changes have increased demand for water and for commodities whose production requires water, particularly agricultural produce. With the flow of remittances from Yemenis working in nearby oil-exporting countries, and the growth of market opportunities, agriculture developed rapidly. The advent of tractors, chemical inputs and — above all — tubewell technology weaned Yemen away from the traditional farming practices and systems of water management which had hitherto enabled the country to live in balance with its natural resources. The government has lacked the technical means, the legal instruments, and the political will to regulate the sinking of wells and groundwater extraction. At the same time it pursued policies which actively encouraged water use: low-interest loans, cheap diesel pricing, and public investment in surface or spate irrigation. As a result, over the past two decades, groundwater and surface irrigation have been priced at well below their economic cost. A government ban on the import of fruit and vegetables gave further impetus to groundwater development by making local cultivation of such produce far more profitable. Finally, the government's supportive attitude towards the booming production and use of *qat*, the country's most profitable cash crop, has accelerated trends towards overpumping: *qat* is estimated to consume 30% of all irrigation water, and its cultivation has been encouraged by a government ban on imports of cheaper Ethiopian *qat*.

Between 1970 and 1996 areas irrigated from wells expanded from 37,000 to 368,000 hectares, 32% of Yemen's farmed land. Today groundwater extraction has passed well beyond the limit of sustainability. Aquifers are being depleted throughout the country; wells are constantly being deepened; and the costs are rising while yields and quality are deteriorating. The explosion of groundwater use has often been at the expense of traditional spring-fed systems, and as the water table declines, hill springs are early casualties. On farms, low groundwater prices have encouraged waste. Meanwhile, deforestation, the abandonment of terraces and the neglect of traditional water harvesting systems (partly due to the government's policy of importing grain for distribution at heavily subsidised prices) have led to widespread soil erosion, increasing the risk of floods and reducing the recharge of aquifers. Finally, the government, in partnership with international donors and development agencies, embarked on a number of

large-scale, public sector spate irrigation schemes in the coastal plains, whose operation and maintenance it can no longer afford. Viewed internally, however, government policy can be said to have substantially modernised the agricultural sector, bringing self-sufficiency in higher-value food products such as fruit and vegetables. The resulting increase in incomes has been spread across a large segment of the rural population. Important interest groups have benefited, not least those involved in the multi-million dollar *qat* industry, and this has helped the government to consolidate its authority. However, after 20 years of holding down irrigation water prices, the government is now increasing them. Groundwater prices have been affected as the price of diesel shot up between 1996-1999 from the equivalent of \$0.02 to \$0.10 per litre; it is set to rise further by 2001 to about \$0.16 per litre. Meanwhile, the supply of cheap credit has dwindled and interest rates have increased. Controls on fruit and vegetable imports are being dismantled. All these actions will bring the price of groundwater closer to its economic cost. The government is considering involving user groups in the operation and maintenance of spate irrigation schemes with a view to ultimately handing over to users full responsibility for them.

Impact of Structural Adjustment

For 20 years, with the support of international donors, the government was able to cultivate key constituencies with the help of low-priced or free water. What has changed? First, Yemen has been grappling with a severe economic crisis. Since 1995, with the encouragement of international donors, the government has been implementing a structural adjustment programme aimed at reducing the role of the state in economic activity. As a result, the diesel and credit subsidies for groundwater irrigation, the operation and maintenance subsidy for spate irrigation, and the distribution of subsidised cereals are all being phased out. This is driving up water prices. Meanwhile, government officials have become increasingly concerned about environmental degradation, particularly groundwater depletion and damage to traditional rain-fed agriculture and terrace systems. Donors who had supported the old policies are now keen to promote sustainability, a reduced government role in the economy and more participation at the community level. They are also encouraging the use of pricing mechanisms to manage water demand. Officials recognise that the need now is for better management of existing projects. Most farmers will benefit more, or suffer less, from investment in water conservation and irrigation efficiency. But better management involves visible and unpopular changes such as price increases and regulation. And the devolution of power to user groups means that the government loses a source of patronage while running the risk of provoking social unrest and strengthening the centrifugal tendencies ever-present in Yemeni politics. In 1995 the government's announcement of a tripling of diesel prices triggered violent demonstrations. Other price increases provoked further violence in 1998.

The Challenge

Yemen cannot continue to live off its water capital. But the country's fragmented geography and hydrology, and the predominance of dispersed rural water users makes centralised control problematic. Moreover, the

mismatch between population and water resources reduces planning options; most of the population and economic activity is concentrated in the water-depleted western highlands, making it difficult to explore alternative sources of supply such as the Hadhramaut aquifer, let alone desalination. Growing water shortages have led to competition between town and country for access to dwindling resources. Since all groundwater around cities is effectively harnessed and over-exploited for agricultural use, the cost of new supplies of water for cities is likely to rise sharply as water has to be brought from further afield and from greater depth. In Sana'a, the urban utility, the National Water and Sanitation Authority (NWSA), is unable to keep pace with new housing and industrial development. Taiz faces similar problems. There the city authorities negotiated for ten years with the nearby rural area of Habir before an agreement was reached, with support from the IDA-financed Taiz Pilot Water Supply Project, whereby Taiz will be allowed to extract water from a previously untapped deep aquifer in exchange for investments in village water supply, schools and women's centres, and the joint monitoring of water extraction to ensure a sustainable flow.

Water markets are already well established in Yemen, ranging from opportunistic tanker sales by well owners to supply schemes for urban communities. Indeed, several towns (e. g. Zabid and Bajil) are wholly supplied by private sector utilities. But markets give no incentives to groundwater conservation. Steps need to be taken to promote the sustainable development of private supply with the concurrent aims of increasing mains access and reducing costs.

Conclusion

The challenge facing the government is to bring about a major adjustment in the behaviour and economy of a nation. This will require a level of national consensus and self-regulation which can only be achieved through public awareness campaigns, clear and realistic priorities, and close partnership with water users. Meanwhile, the increase in water prices resulting from the removal of diesel subsidies will encourage farmers to adopt water-efficient technologies, which will help to relieve pressure on groundwater. The transfer of responsibility to local farmers for spate irrigation systems should also provide incentives for improved husbandry and sustainability. Similarly, a policy of renewed support for traditional water control systems has the potential to increase agricultural production and boost the incomes of small farmers. Nevertheless, decentralisation and the partnership approach can only be viewed as elements of a damage limitation exercise aimed at slowing the rate of resource depletion, to allow Yemen time to develop patterns of economic activity less dependent on water mining.

July, 2001