Policy proposals for integrating forest, water and people in the Tigris and Euphrates watershed

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Integrated forest and watershed management, especially across borders, needs to centre on people.

The waters of the Tigris and Euphrates watershed have supported civilization for more than 6 000 years. Covering 76.6 million hectares, the watershed is of great importance for the water balance in Iraq, the Syrian Arab Republic and Turkey and also extends into the Islamic Republic of Iran.

More than 90 percent of the watershed is classified as arid land. Forests cover 1.2 percent of the total land area (918 800 ha), while agricultural crops cover 25.4 percent and grasslands 47.7 percent (FAO, 2005, 2007; UN ESCWA, 2002) (see Map). Forests were once more dense and widespread, but centuries of exploitation – aggravated by environmental and economic conditions and a history of conflict – have decreased their extent and affected their composition. Fifty endemic tree species are under threat of extinction.

The water resources in the watershed are often overused, wasted and polluted. Overirrigation and flooding of fields have raised water tables and contaminated soils with saline water, which can cause crop failure and reach the rivers. Heavy dependence on agriculture, especially using irrigation, fertilizers and chemicals, combined with largely sandy and gypsiferous soils, has resulted in massive leaching of chemicals into the groundwater. Subsequent overpumping of wells has exacerbated the problem.

Deforestation is also having an impact on the quality of water flowing through the watershed or stored in the water table.

Population pressure in the watershed is relatively high, with an average of 57 people per square kilometre. The area is challenged not only by rapid population growth, but also high poverty levels, increased rural-to-urban migration within the watershed, political instability, high unemployment and low economic growth, rapid industrialization without sufficient attention to the environment (resulting in water, air and soil pollution) and poor land-use planning.

The combination of increasing population and fixed water supply in the watershed has resulted in decreasing water availability per capita. The countries of the Tigris and Euphrates watershed are relatively water rich for the Near East region,

Heavy dependence on irrigated agriculture and overpumping of wells exacerbate the region's water problem (Syrian Arab Republic)

FAO/19100/R. FAIDUTTI

Deforestation and overgrazing have an impact on the quality of water flowing through the watershed or stored in the water table (Iraq)

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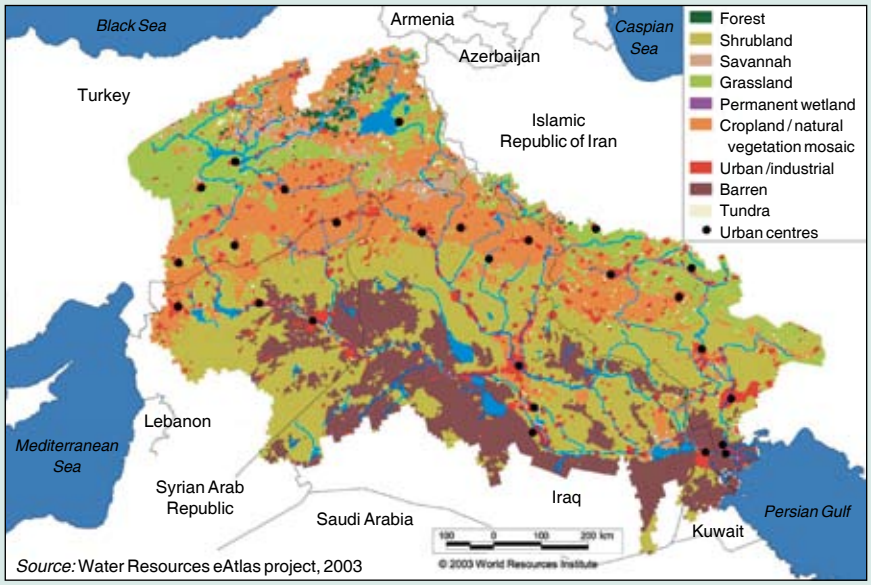
where water is scarce in most countries. However, unequal distribution of water, insufficiently planned dam construction and high rates of water withdrawal, especially for agriculture, are sources of conflict and impediments to economic development. With demand for water greater than the total volume of water in the two rivers, countries in the watershed have repeatedly wrangled – for example, when an intervention in one country has been perceived to reduce water availability in another. Many of the populations in the watershed depend on rivers that traverse an international boundary before reaching them. Some have no access to rivers and depend on diminishing wells or expensive desalinized water from the sea. With the cost of relocating water supplies and building new dams measuring tens of millions of dollars, the very future of some towns and their associated industries may be in question.

In order to propose appropriate policies for conservation and management of the forests and water, it is essential to address the ways in which forest, water and people relate to each other.



Land use in the Tigris and Euphrates watershed

Recommendations

Forest and people issues. Since forest influences water quantity and especially quality, managing the forest for water conservation is an appropriate goal. Forestry decision-makers need to promote the incorporation of forest management in national and regional strategies, plans and programmes related to river, watershed and groundwater management; and to work with international and national organizations and institutions to increase understanding of hydrological and environmental services of forests.

Priority should be given to preventing forest degradation – including by limiting grazing in forest lands – and promoting afforestation and reforestation (including trees outside forests) for environmental protection and local wood supply, especially fuelwood. Because of the critical condition of the forest and some people's dependence on it for their livelihoods, other economic functions of forest besides wood production need to be highlighted; non-wood forest products (NWFPs) and ecotourism should be promoted through appropriate policies. Devolving forest management responsibilities to the local level can give communities the rights and incentive to manage and use forest resources sustainably.

Countries should prepare source protection plans based on catchment reforestation, including measures to control potential sources of contamination such as septic systems and fuel tanks and identifying alternative drinking-water sources in the event of contamination. This would entail mapping of the recharge area of the water sources and identification of appropriate fast-growing species.

Although some of the remaining natural forests of the Tigris and Euphrates watershed are reserved in national parks, these have not been reserved, to date, for their water production values. Currently only 0.4 percent of the total area of the watershed is protected area. Conservation of the forests will be increasingly important to ensure water supply from this watershed as both resident populations and tourist numbers increase, and some parts of the forest should be set aside as protected areas where no exploitation is permitted. It would be economically prudent to "buy" these forests from the sawmill industry or pastoralists with money generated by selling water to domestic and other users. This would encourage the industry to shift its attention to younger forests, plantation timber and higher value-added sawn timber products.

Information on the effects of forests on water resources is inadequate (see Box, p. 32). Additional study is needed to establish the economic value of managing the forests to protect soil and water quality and quantity, to take full advantage of the watershed's ability to store water temporarily and prevent downstream flood damage, and to map future water supply and demand.

Water and people issues. With water shortage threatening to surpass oil as a main source of conflict in the region, an arrangement is needed to ensure that the waters of the Tigris and Euphrates watershed are used in a rational, equitable and sustainable way. Improved cooperation in water planning, beyond strictly national concerns, could help the countries involved in the watershed adapt to the rapid demographic changes and their impact on water availability.

For more permanent drinking-water protection, purchase of the source protection area is a viable but costly approach. The establishment of a drinking-water revolving fund as adopted in the United States (US EPA, 2007) might be a way to reduce the cost. The United States programme provides loans on good terms to public water systems for infrastructure improvement. Source protection funds could provide low-interest loans to help municipalities that have already developed a source protection plan purchase land or development rights.

Countries in the watershed would benefit from collaborative formulation and implemen-

tation of a plan for the basin as a whole, aimed at harmonizing seemingly conflicting demands. Such a plan might address water transfers between rivers and reservoirs, as well as interconnected water and energy systems. Joint regional research institutes, training centres and pilot farms would enable countries to exchange expertise not only of engineers and technicians but also of farmers. The Turkish experience (supported by the World Bank) of water user associations provides an interesting model for increasing water use efficiency and water revenue collection and saving water (Beaumont, 1998; Dudley and Stolton, 2003).

Water supply-enhancing techniques (e.g. water harvesting, joint use of surface and groundwater sources, water reuse and, if necessary, cloud seeding) and demand-management technologies must be part of a comprehensive solution in the Tigris and Euphrates watershed. Potential strategies include improvement of electricity distribution infrastructure to reduce losses, and construction of wind or photovoltaic power plants. The overall objective of water agreement in this watershed would be to promote sustainable utilization of the region's land and water resources for the welfare of its people.

Conclusions

Integrated watershed management planning needs to take people, forest and water into account – in fact people need to be the central pivot. Sustainable management of forest and water must go hand in hand with vigorous pursuit of population policies, improved social conditions, poverty alleviation strategies and broad-based economic growth.

All forest policies should be close to nature and multipurpose. To change the previous forest policies of this watershed, appropriate infrastructure needs to be introduced; but because of the high poverty and social instability in the watershed, changes must be made slowly and step by step.

Nature never follows the policy of any government, never listens to the politician, never recognizes political borders and never changes its way because of any religious or political belief. To protect nature we should adapt to nature.

Information needs for better management of forests and water

In addition to the need for political will, lack of reliable information is one of the main challenges to effective management of the Tigris and Euphrates watershed. Thus the first step is collecting useful and practical information in the following areas:

- ***Forest:*** **current situation, carrying capacity of forested land (in terms of all economic and environmental benefits), capacity for reforestation with native or introduced species, endemic species characteristics, land with potential for afforestation, main forest threats;**
- ***Water resources:*** **changes among seasons and years in each country, major floods in the past 100 years and the main factors involved, relation between these floods and land use changes, effects of forest on water quality and quantity;**
- ***Forest-dependent people and rural poverty:*** **primary needs, poverty levels, work opportunities, extent of dependence on forest, relations with forest, current involvement in forest management;**
- ***Demand:*** **for forest products (including wood, fuelwood, non-wood forest products and forest services) and for water, by urban, rural and forest-dependent people, agriculture, etc.;**
- ***Institutional arrangements:*** **national, regional and local institutions and administrations; governmental, private and non-governmental organizations; national and regional development plans; policies and legislation related to forests, people and water; local and traditional structures related to natural resource management;**
- ***Public opinion:*** **about forests and forest benefits, ecotourism, importance of forest conservation, substitution of wood products with other materials.**

Bibliography

Beaumont, P. 1998. Restructuring of water usage in the Tigris-Euphrates basin: the impact of modern water management policies. *In* J. Albert, M. Bernhardsson & R. Kenna, eds. *Transformations of Middle Eastern natural environments: legacies and lessons.* Bulletin Series No. 103, pp. 168–186. New Haven, Connecticut, USA, Yale School of Forestry and Environmental Studies.

Dudley, N. & Stolton, S., eds. 2003. *Running pure: the importance of forest protected areas to drinking water.* Gland, Switzerland, WWF/World Bank Alliance for Forest Conservation and Sustainable Use.

FAO. 2005. *AQUASTAT, FAO's information system on water and agriculture*. Rome. Available at: www.fao.org/nr/water/aquastat/main/index.stm

FAO. 2007. *People, forests and trees in West and Central Asia: outlook for 2020*. Main report of the Forestry Outlook Study for West and Central Asia. FAO Forestry Paper No. 152. Rome.

United Nations Economic and Social Commission for Western Asia (UN ESCWA). 2002. *Assessment of legal aspects of the management of shared water resources in the ESCWA region.* E/ESCWA/ENR/2001/3. New York. Available at: www.escwa.org.lb/information/publications/edit/upload/enr-01-3.pdf

United States Environmental Protection Agency (US EPA). 2007. *Drinking Water State Revolving Fund (DWSRF)*. Internet document, available at: www.epa.gov/safewater/dwsrf.html

Water Resources eAtlas project. 2003. *Watersheds of the World*. Washington, DC, USA, World Resources Institute (WRI). Available at: www.wri.org/publication/watersheds-world-cd