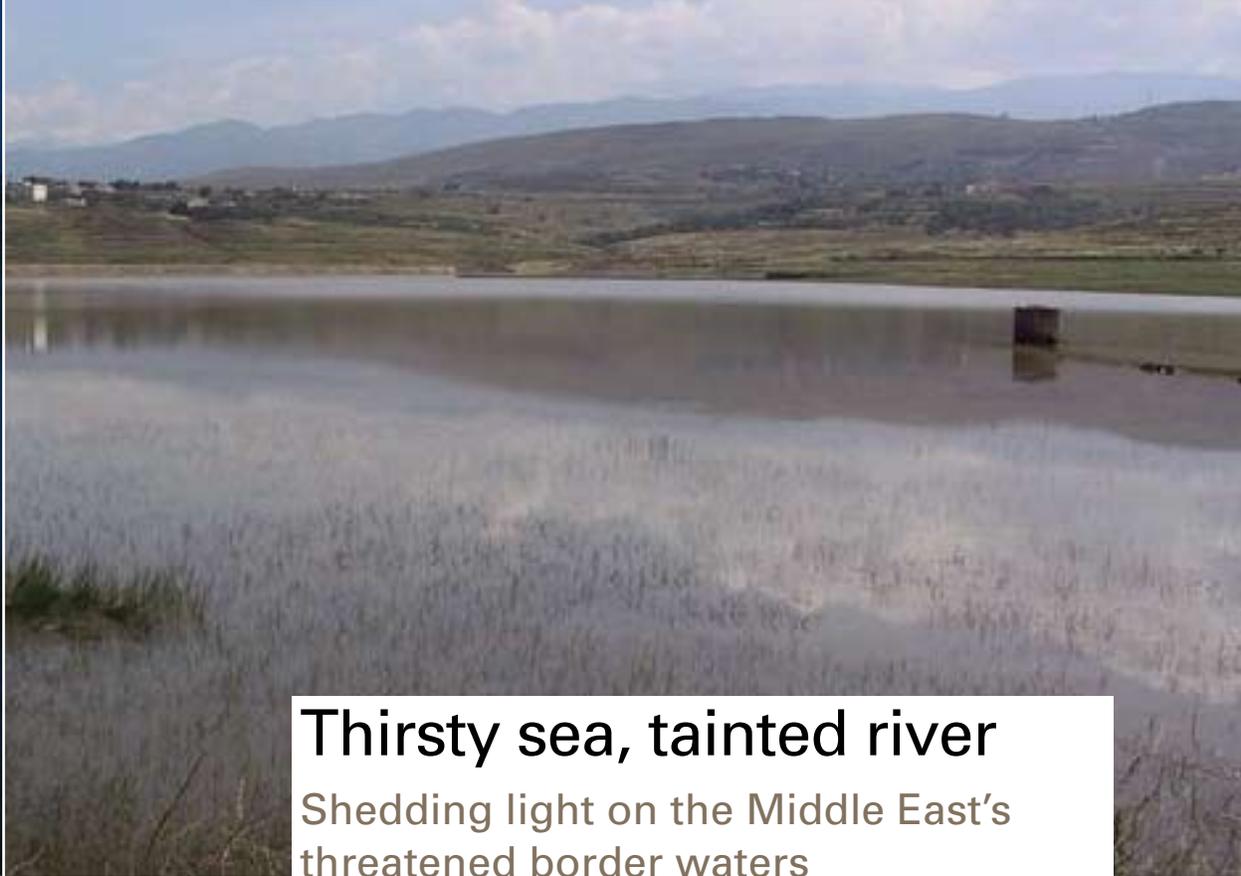


RURAL POVERTY and ENVIRONMENT



Thirsty sea, tainted river

Shedding light on the Middle East's threatened border waters

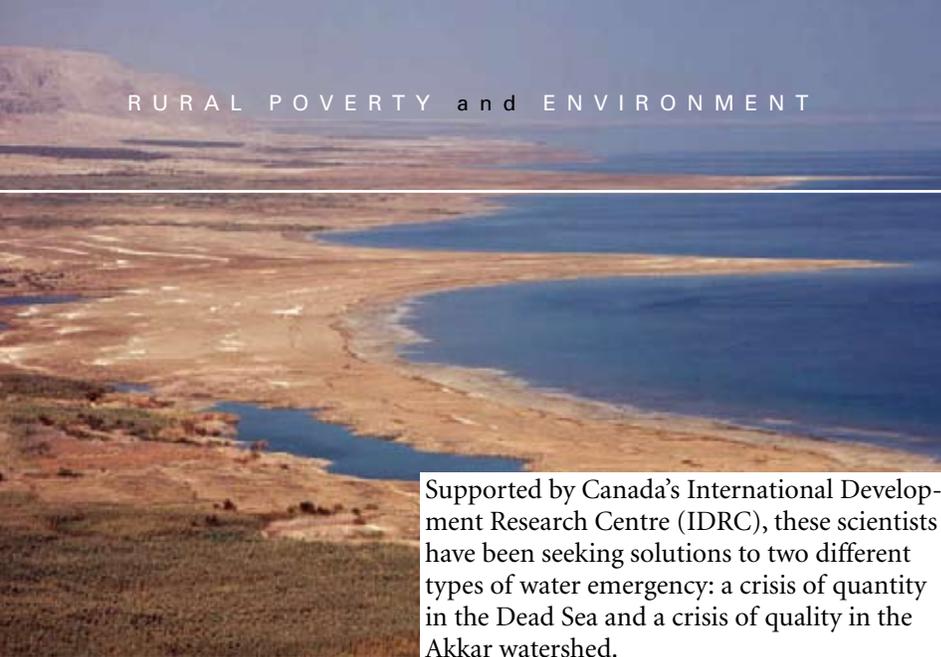
John Cadham

Seasonal water impoundments used for agriculture will be dry by summer.

The Dead Sea is shrinking and the Akkar watershed is polluted. In a region where collaboration is often in short supply, international teams of researchers — supported by Canada's International Development Research Centre — have been working together to save these endangered boundary waters.

Rivers, lakes, and oceans that demarcate or straddle international borders are called transboundary waters. Where political relations between neighbouring countries are already tense, disputes about such waters often make things worse.

The Middle East is one of the most politically sensitive regions of the world, so one might expect that its transboundary waters would be a particular problem. In fact, researchers have been working together to improve the environment — and the lives of local residents — in two ancient water basins.



FOEME; Abdel Rahman Sultan

Supported by Canada's International Development Research Centre (IDRC), these scientists have been seeking solutions to two different types of water emergency: a crisis of quantity in the Dead Sea and a crisis of quality in the Akkar watershed.

Northward view of declining Dead Sea levels.

The Dead Sea

The Dead Sea spans the borders of Jordan, Israel, and the West Bank and Gaza. At over 400 m below sea level, its immediate shoreline is the lowest exposed point of land on the earth's surface. Its famously hypersaline waters display fantastic buoyancy (and, supposedly, healing powers), but can also corrode iron and stainless steel.

Despite its name, the Dead Sea is very much alive. Its waters support a vital ecosystem, including over 600 species of plants, animals, and fish. It is also home to several nature reserves and is an important tourist destination.

Like many of the world's closed basins or salt lakes, the Dead Sea is a valuable source of minerals. Solar evaporation of brine to collect potash, magnesium, and bromide accounts for a large part of the industrial economies of Israel and Jordan, employs over 4 000 people, and earns annual revenues of about USD 650 million.

Nature out of balance

But this precious ecosystem is at risk. Between 1930 and 1997, the level of the Dead Sea fell by more than 21 m, and it continues to drop at a rate of 1 m each year. It has already lost a third of its 1930 surface area, and its northern and southern parts have become completely separated.

The reason is simple: the waters that normally replenish those lost by evaporation are being diverted. As much as 90% of the Jordan River has been redirected by Israel and Jordan, primarily for agriculture, leaving a mere trickle to reach the Dead Sea. Spring waters are

also being channeled away, depriving the thirsty sea of replenishment.

What's more, the mineral extraction industries of both Israel and Jordan have been pumping water out of the sea's northern basin into evaporation ponds in its southern basin, thereby accelerating the natural process of evaporation.

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Parched — and endangered

As the sea level falls, so does the water table. Springs and their associated habitats are drying up, threatening rare species. Estuarine ecosystems are also disappearing.

When groundwater levels drop, salts are dissolved from the soil, leaving it porous and unstable. Alarming, sinkholes up to 15 m wide occur. And the quicksand-like mudflats that form in place of the receding coastlines endanger the lives of humans, animals, and birds.

The results have been devastating. Immense damage has been done to farmlands, public infrastructure such as roads and bridges, and the tourism industry.

Counting the cost

Among the earliest to raise the alarm about these dangers was Friends of the Earth — Middle East (FoEME), a unique network that brings together Jordanian, Palestinian, and Israeli environmentalists.

In the late 1990s, FoEME approached Canada's IDRC for funding to support a key research project. The aim was simple: to focus people's minds on the crisis by putting a dollar figure on the loss of the Dead Sea.

The researchers first established a framework that emphasized the value of non-market goods, such as recreation and environmental quality, which are often ignored in policy planning. Then they asked a large sample of local residents in the three sites how much they would be willing to pay to preserve the Dead

Sea: altogether these people — many of whom are poor — pledged USD 59 million annually. Finally, the scientists estimated the long-term loss to the tourism industry if the basin continued to degrade: the cost was USD 4.2 billion over 60 years.

Tourism versus agriculture

According to the World Bank, agriculture consumes 75% of Jordan's water, yet this industry generates only 2% of the value added to the country's gross domestic product. In Israel, agriculture consumes 60% of the country's water, yet provides less than 2% of its gross national product. (In the West Bank and Gaza, the use of water in agriculture has a comparatively minor impact on the Dead Sea's balance.)

In other words, the large volumes of water being diverted from recharging the Dead Sea are providing relatively little economic return. Much of the region's farm produce is being exported. As FoEME's Abdel Rahman Sultan puts it: "Why sell our water cheap?" He argues it might be more efficient to decrease the amount of water used in agriculture and invest in tourism by conserving the Dead Sea basin.

The FoEME researchers believe their study shows that people in the region value the Dead Sea and that there are clear economic benefits to rescuing it.

From science to politics

To achieve this conservation, however, joint management of the waters is required. This is easier said than done. FoEME's Violet Qumsieh underscores the urgency of the crisis: "Political problems could take years to be solved and at that time we will find that we have lost the Dead Sea and the Jordan River forever."

But positive things have been happening as a direct result of this research project:

- Agreement has been reached on a formal relationship between the three governments and North America's International Joint Commission (IJC), with a view to drawing on the IJC's decades of experience in joint water management between the United States and Canada.

- The World Bank has been exploring the feasibility of channeling water to the Dead Sea from the Gulf of Aqaba — the so-called Red-to-Dead conduit — and now has incorporated into its terms of reference the economic benefits defined by the FoEME study.
- At FoEME's urging, Israel has brought stakeholders together in a Dead Sea inter-ministerial committee, with FoEME its nongovernmental representative.

Meanwhile, advocacy efforts continue to register the Dead Sea basin as a UNESCO Biosphere Reserve or as a World Heritage Site. Such a designation would require the three governments to work jointly for the sustainable development of the basin.

The Al-Kabir River

The Al-Kabir forms a natural boundary between northern Lebanon and Syria. Its source lies in pure springs and scenic terraced mountaintops, but as the river meanders westward — through the fertile alluvial plain of Sahel al-Beqaa, down a gorge in the basaltic plateau, and finally across the Akkar plain on the Mediterranean coast — it faces increasing stress from rampant pollution.

Meanwhile, advocacy efforts continue to register the Dead Sea basin as a UNESCO Biosphere Reserve or as a World Heritage Site.



John Cadham

Concerned local residents speaking with the field survey team on the riverbank near Raas Alnaba, Syria.



Dumping garbage into Syria's Nahr Al Arous River must be controlled.

John Cadham

Now, the governments of the two countries propose to build a dam on the middle reaches this river. This project will only increase the pressures on the ecosystem – and may have disastrous environmental and public health consequences.

The proposal for the dam stirred scientists from Lebanon's National Council for Scientific Research (NCSR) and Syria's General Organization of Remote Sensing (GORS) to join with the Canadian firm CadhamHayes Systems (now Canadian Environmental Assistance) in a research project supported by IDRC. The effort was carried out during 2001-2003.

The purpose of the study was to gather scientific data about the Al-Kabir River basin – known as the Akkar watershed – and to boost public awareness about the importance of its conservation.

A contaminated waterway

Using remote sensing and geographic information system techniques, the survey team produced maps outlining the watershed's drainage, geology, land use, soil erosion, utilities, settlements, roads, and railways. Water and sediment samples from sites on both banks of the river revealed disturbing results. Although not suffering in quantity – the researchers were surprised to find that there is ample water supply in the region – the Al-Kabir was severely suffering in quality.

Community health and agriculture are at risk from polluted waterways in Lebanon and Syria.



John Cadham

Phosphorus and ammonium nitrogen levels were found to be extremely high along the whole course, indicating sewage pollution. Bacterial coliform levels were also elevated. In addition, the flagrant disposal of solid domestic waste directly into the river, or on riverbanks and roadsides throughout the watershed, has resulted in high nitrite levels.

Agriculture has also taken its toll. Again, extreme levels of nitrates, mainly from fertilizer use, were revealed. Extensive irrigation has resulted in the early onset of salinization in the coastal agricultural plain. And the researchers found concentrations of DDT parent compound in the river sediment, indicating that this banned substance continues to be used by local farmers.

If the current situation is not soon changed, not only will the health and the agriculture of the local populations be affected, but so will the plans for constructing the dam. The waters collected in the reservoir will have even higher concentrations of pollutants than the river waters, making it unsuitable for human consumption and contact. What's more, the area may also lose its aesthetic value as a possible tourist destination.

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Pointing fingers

Up in the mountains, Fadwa, a 40-year-old mother and housewife, remembers when the waters of Al-Kabir were clear and pristine. Fadwa explains that she cannot allow her children to play in the river. “Now the river waters are so dirty that we gave up and started dumping our own garbage onto the sides of the river.”

Indeed the researchers found that public awareness of the impact of human activity is woefully lacking. Throughout the region, a combination of ignorance and poverty has resulted in patterns of behaviour that are having severely negative effects. The dumping of garbage, dead animals, and offal into streams and ravines, the discharge of raw sewage directly into rivers, the harvest of fish using poisons – these and other activities must be controlled if the watershed is to recover.

At the mouth of the river, a young Lebanese girl says: “[The government] has done nothing” – even while she dumps her pail of garbage onto the shores of the stream. Like many others living in the poorly served Akkar region, this girl believes that the government should be fixing the region’s waste problems.

It is this attitude that Dr Mohamed Khawlie, principal researcher with the NCSR, wants to change. He says: “Community solutions and small-scale, easily manageable plans for solid waste and wastewater management [are needed]. The contribution of the community should be significant.”

Some answers

The first recommendation by the researchers was an immediate clean-up of the solid and sewage waste, and the elimination of the use of DDT and other banned agrochemicals.

The second recommendation, however, had a longer-term goal – to change the attitudes of local communities toward waste disposal and the use of pesticides and fertilizers in agricul-



John Cadham

Cattle grazing near waterways contribute to polluted water in Lebanon and Syria.

ture. Even while the research project was underway, the Fares Foundation of Lebanon organized public presentations of results at well-attended workshops in both Lebanon and Syria, and publicized some of the research conclusions by way of brochures and posters. This important effort to raise public awareness continues.

The third recommendation was to develop protocols and institutional arrangements for the bi-national sustainable management of the watershed. Like so many initiatives in the Middle East, efforts toward this objective have been stalled by political events.

Next, the Litani

Regardless of the frustrations they may feel, researchers can take heart in knowing that they have paved the way for policymakers to take action both in the Dead Sea basin and the Akkar watershed. “We’ve done what researchers can do,” says Dr Khawlie. “Now we need implementation.”

Meanwhile, more experience is being amassed in watershed management by this same team in Lebanon and Canada, by way of an “action research” project – once more supported by IDRC.

The Litani river is of particular interest from a research perspective because it is the only



FOEME: Abdel Rahman Sultan

Sink Holes due to collapsed soils.

Like so many initiatives in the Middle East, efforts toward this objective have been stalled by political events.

Collecting polluted water by tank truck from a large karstic spring above Chadra, Lebanon.



John Cadham

Again, the researchers aim to assess both the scale of the environmental problem in the Litani basin and the nature of the social circumstances that contribute to that problem. In particular they will foster community involvement by raising awareness about improved river management through participatory approaches and open dialogue.

This brief, prepared by Patrick Kavanagh, is a revised and condensed version of a longer feature by Nadia El-Awady.

major stream in the Middle East and North Africa that runs entirely in a single national jurisdiction under the management of a single authority. Like the other basins, it is under stress. The need for water is great, plus pollution from industry, agriculture, and untreated sewage is causing severe environmental and public health problems.

IDRC's Rural Poverty and Environment (RPE) program is a global program launched in 2005 to support research that meets the needs of the rural poor who live in fragile or degraded ecosystems in Africa, Asia, Latin America and the Caribbean, and the Middle East. Its goal is to strengthen institutions, policies, and practices that enhance food, water, and income security.

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