



Assessing the Costs of Environmental Degradation in the Middle East and North Africa Region

Maria Sarraf

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Although environmental concerns within the Middle East and North Africa (MNA) region are becoming salient, and every MNA country now has an environment ministry or agency, many countries are still depleting their natural resources at rates well above sustainable levels. One indicator of this deterioration is adjusted net savings, which measures the true saving rate in an economy after allowing for depletion of natural resources. Adjusted net savings in MNA for 2001 is estimated at –6 percent of gross national income, compared to –1 percent in Sub-Saharan Africa, 5 percent in Latin America, 12 percent in South Asia, and 23 percent in East Asia and the Pacific.

Despite the difficulties involved in assigning monetary costs to environmental degradation, such estimates can be a powerful means of raising awareness about environmental issues and facilitating progress toward sustainable development. It is far easier for decision-makers to incorporate and prioritize environment when the issues can be cast in clear economic terms. Such assessments are particularly relevant in light of the mainstreaming effort called for by the World Bank Environment Strategy. An initiative in the MNA region, undertaken in collaboration with the Mediterranean Environmental Technical Assistance Program (METAP), is



assisting countries in assessing the costs of environmental degradation, with the aim of fostering integration of environmental issues into broader economic development agendas. Similar exercises have been undertaken in other countries with World Bank support. For instance, in Colombia, it is being undertaken as part of a country environmental analysis and is influencing priority setting for a structural adjustment loan. However, the MNA initiative is particularly interesting in being undertaken at a region-wide level.

STRUCTURE AND OBJECTIVES OF THE PROGRAM

The Cost of Environmental Degradation program, now under way in eight MNA countries, consists of a country study and a training course. The objectives of the program are to estimate the cost of degradation as a percentage of gross domestic product (GDP) at the national level; to enhance local capacity in environmental economics, in particular in the valuation of environmental degradation; and to provide an input to inter-sectoral environmental priority setting. The approach relies on existing data and analyses of environmental issues, and it applies commonly used valuation and quantitative impact assessment methodologies. Detailed cost assessments for each sector and environmental issue are beyond the scope of the program. The program has been endorsed by the environmental ministers of all the Mediterranean countries and has received wide support from donors.

FINDINGS

Costs of environmental degradation have been estimated for six categories:

- 🌿 Indoor and outdoor air pollution
- 🌿 Lack of access to water supply and sanitation services
- 🌿 Land degradation
- 🌿 Coastal zone degradation
- 🌿 Waste management
- 🌿 Global environment.

Table 1 shows average annual costs of degradation by country and category.¹ These results are underestimates: because of data limitations, they do not include damage stemming from untreated industrial, hazardous, and hospital wastes or losses of forest cover and biodiversity. Also

Table 1
Average annual damage costs of environmental degradation, from studies in MNA countries (percentage of GDP)

	Algeria	Egypt, Arab Rep.	Lebanon	Morocco	Syrian Arab Rep.	Tunisia
Air pollution	1.0	2.1	1.0	1.0	1.3	0.6
Lack of access to water supply and sanitation	0.8	1.0	1.1	1.2	0.9	0.6
Land degradation	1.2	1.2	0.6	0.4	1.0	0.5
Coastal zone degradation	0.6	0.3	0.7	0.5	0.1	0.3
Waste management	0.1	0.2	0.1	0.5	0.1	0.1
Subtotal	3.6	4.8	3.4	3.7	3.3	2.1
Global environment (CO ₂ emissions)	1.2	0.6	0.5	0.9	1.3	0.6
Total	4.8	5.4	3.9	4.6	4.6	2.7

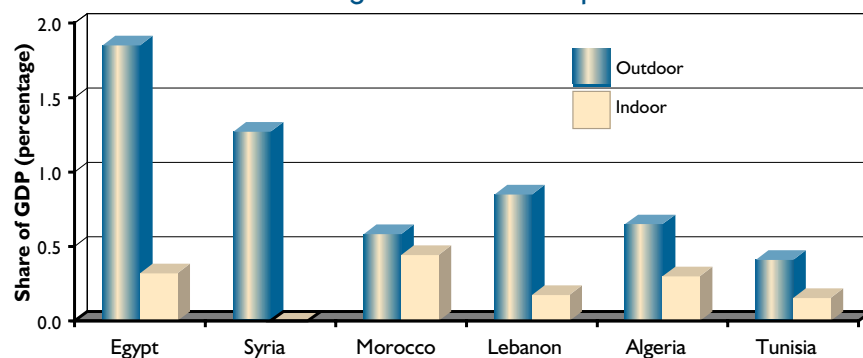
owing to data constraints, the impact of inadequate treatment of industrial and municipal wastewater is limited to coastal recreational and tourism losses. The discussion that follows is confined to the national effects of environmental degradation.

Air Pollution

Research evidence from around the world shows that indoor and outdoor air pollution has significant negative effects on public health and results in premature deaths, chronic bronchitis, respiratory disorders, and even cancer. The most significant air pollutant in terms of health impacts is particulate matter, especially fine particulates (PM10), and the studies therefore looked at PM10 levels in major polluted cities in the region. In Cairo and Alexandria, Egypt, damage from urban air pollution is estimated to cost almost 2 percent of GDP. This figure includes mortality (it is estimated that each year about 20,000 people in these cities die from air pollution-related causes), morbidity, and potential loss of tourism revenue.

The use of biomass fuel for cooking and heating can give rise to indoor air pollution that threatens health, especially that of women and young children, who spend disproportionately more time indoors than do men. The studies analyzed biomass fuel use in rural areas to assess the potential health impact of indoor air pollution and found that, on average, damage cost from this source ranges between 0.15 and 0.45 percent of GDP (figure 2). This is relatively low compared with costs in Sub-Saharan Africa, South Asia, and the East Asia and Pacific region. A probable explanation is that in MNA the proportion of rural to total population is much lower than in the other regions, and energy services (e.g., electrical grids and natural gas networks) are more geographically dispersed, hence leading to less dependence on biomass.

Figure 1
Annual damage costs from air pollution



Lack of Access to Water Supply and Sanitation

Water supply problems—substandard quality and insufficient quantities of potable water for drinking and hygiene—and inadequate sanitation facilities impose costs on society, notably in the form of waterborne illnesses and the associated mortality. Of these illnesses, the most common is diarrheal disease, which has the greatest impact on young children. In Morocco, for example, lack of access to water supply and sanitation is estimated to cost society 1.0 to 1.5 percent of GDP. This estimate takes into account child mortality from diarrhea (6,000 deaths of children under age 5 each year); diarrheal child morbidity; and the time spent by caregivers in attending to ill children. The estimates also include loss of water storage capacity due to dam silting. The overall cost is understated because it does not include damage to fisheries, ecosystems, and biodiversity as a result of water pollution.

In Lebanon, where municipal tap water is perceived to be of low quality, the population consumes about 115 liters of bottled water per capita per year. After adjusting for lifestyle and taste, the estimated expenditure on bottled water for preventive health reasons comes to 0.5 percent of GDP.

Land Degradation

In most MNA countries soil salinity, water erosion, and rangeland degradation affect agricultural productivity and the supply of livestock fodder. Although precise data are not available for each source of land degradation, orders of magnitude have been estimated to give some perspective on the economic impact of degradation (figure 3).

In Syria salinity is especially critical in the Euphrates basin, where more than 40 percent of total irrigated land is affected to varying degrees. Overall, it is estimated that 125,000 hectares suffer from high soil salinity, resulting in a 37 percent decline in yields of cotton and wheat, the main irrigated crops. The total annual loss in agricultural productivity is estimated at around US\$80 million, or 0.45 percent of GDP. In some cases other impacts on land degradation, such as

Figure 2
Annual damage costs from lack of access to water supply and sanitation

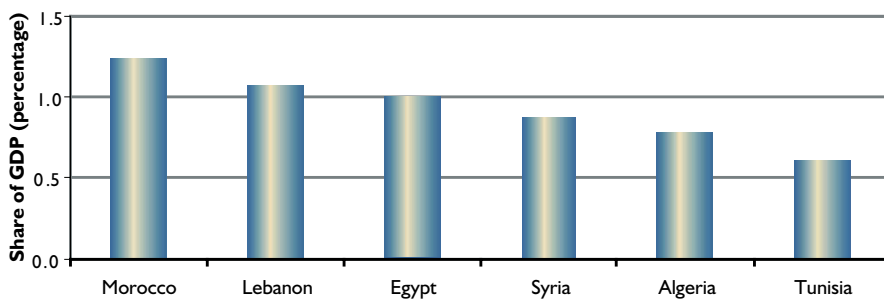
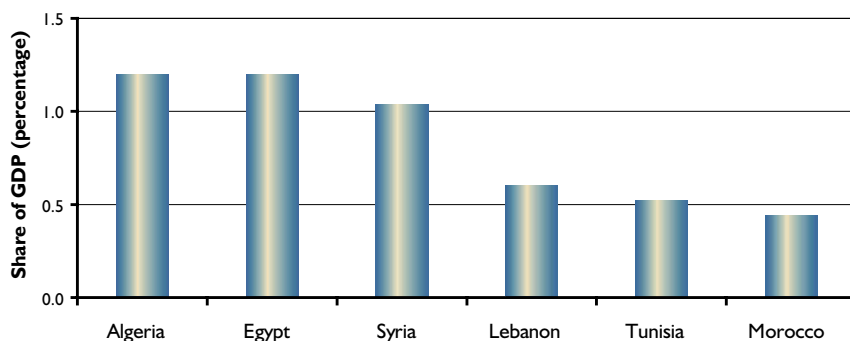


Figure 3
Annual damage costs from land degradation



quarrying activities, were assessed as well. In Lebanon uncontrolled quarrying in the past has caused major destruction of natural vegetation and habitat. A survey undertaken to assess the impact of three abandoned quarries on the surrounding environment revealed that the price of nearby land and apartments overlooking the three quarries were lower than prices for comparable properties further away from the quarries by US\$90 million. In general, land degradation estimates are understated because they do not include damage to natural habitats and ecosystems or losses in forestland and biodiversity.

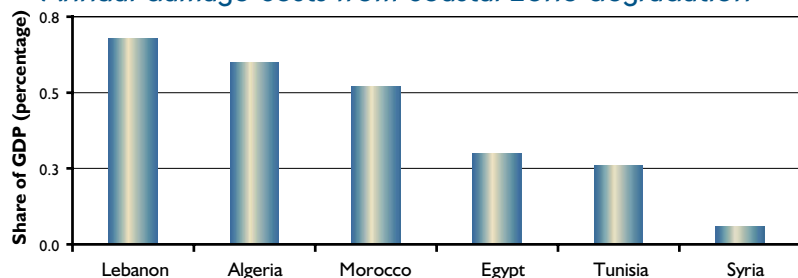
Coastal Zone Degradation

Most of the countries studied are situated on the Mediterranean Sea, and coastal resources represent an important cultural, ecological, economic, and recreational asset. But uncontrolled urban development, untreated industrial and municipal discharge, and port activities have contributed to coastal pollution. Marine ecosystems, such as the coral reefs around Hurghada, Egypt, on the Red Sea, have suffered irreversible damage.

In *Lebanon* the cost of coastal zone degradation is estimated at 0.7 percent of GDP (see figure 4); this estimate includes loss of international tourism revenues, effects on domestic tourism (see box 1), and the cost, in lost ecological and nonuse value, of sea turtle extinction. In Tunisia, where 90 percent of tourism revenue is derived from coastal zone recreation, a contingent valuation survey was undertaken to assess international tourists' willingness to pay to improve beach cleanliness and water quality and reduce overcrowding. Twelve percent of the tourists interviewed were willing to pay about Eu 20 per stay (5 percent of their average expenditure), implying a total of about US\$37 million per year.

Waste Management

Uncollected municipal and household waste attracts rodents and flies and other insects. These may carry infectious diseases that put children and individual trash pickers at risk. In most of the countries a contingent valuation method was used to assess people's willingness to pay to improve waste collection and street sweep-

Figure 4**Annual damage costs from coastal zone degradation**

ing. A 1995 survey undertaken in Rabat and Salé, Morocco, revealed an average willingness to pay of US\$4.7 per household per month. Adjusting this figure for inflation and aggregating it to other cities in Morocco yielded a nationwide urban figure of around US\$170 million, about 0.4 percent of Morocco's GDP.

Some surveys looked at the impact of unsanitary landfills on the environment. Landfills in rural or semi-rural areas had somewhat limited impacts, but the closure of the unsanitary landfill in Tunis in 1995 was found to be responsible for a rise of more than 35 percent in real estate prices in the area. In Morocco the cost associated with pollution of groundwater by leakage from unsanitary landfills was estimated at US\$25 million per year.

CONCLUSION

The cost estimates reported here are only approximations and should be interpreted as such. Nevertheless, an exercise of the kind described here has numerous benefits:

- It provides a useful mechanism for ranking the relative social costs of various forms of environmental degradation.
- It offers policymakers an instrument for integrating environment into economic development decisions.

BOX 1: LOSS IN RECREATIONAL VALUE FROM COASTAL ZONE DEGRADATION — LEBANON

Lebanon has a Mediterranean coastline of 225 kilometers. Urbanization, uncontrolled development of resorts, and the practice of dumping untreated municipal wastewater and solid waste into the sea have contributed to the degradation of the shoreline, especially around the capital, Beirut, and the Bay of Jounieh. This deterioration has forced people to travel greater distances in search of cleaner beaches.

A survey undertaken in 2002 assessed incremental travel costs in order to quantify the loss in recreational value. It showed that 415,000–580,000 day trips each year were being made from the Beirut area to five natural beaches located between 28 and 62 kilometers from Beirut. The incremental travel cost to these areas was estimated at US\$21 per day per visitor, on the basis of additional travel distance; a vehicle operating cost of US\$0.45 per kilometer; a time value of US\$3.7 per hour of travel time per person; and observed vehicle occupancy. Total incremental travel costs came to US\$10 million–US\$12 million per year.

- By expressing damage costs as a percentage of GDP, it allows their comparison with other economic indicators.
- It gives environment ministries a tool for discussing the importance of environmental protection in economic terms, in the same “language” as is used by ministries of finance or economy.

This analytical work has proved to be very effective in client countries. In Algeria the results were applied at the highest political levels in deciding on important investments in environmental protection, totaling about US\$450 million. In Egypt the study has sparked interest in further analysis of the cost of environmental degradation at the governorate level, in Damietta, Qena, and South Sinai. In Tunisia the Agence Nationale pour la Protection de l'Environnement (National Environment Protection Agency) is interested in setting up a unit of environmental economists who will be trained to undertake economic analysis of environmental projects.

Notes

- Dates of the estimates are 1999 for Algeria, Egypt, and Tunisia, 2000 for Lebanon and Morocco, and 2001 for Syria.

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