URBANIZATION AND ENVIRONMENTAL DEGRADATION IN JORDAN

David L. Higgitt
Department of Geography, National University of Singapore, Singapore

Keywords: Jordan, Amman, environmental degradation, hydropolitics, rural-urban conflict, soil and water conservation

Contents

Summary

A case study of the implications of rapid population growth and urbanization on environmental degradation in Jordan is presented. Sustained urban expansion in dryland environments provokes considerable environmental strain, particularly in relation to water resources. Annual water demand exceeds renewable resources and is set to increase. Options for efficiency gains in water distribution, legislation and pricing policy are introduced. In addition to problems of congestion and urban air pollution symptomatic of an underdeveloped infrastructure in a rapidly expanding city, there are knock-on effects in the rural hinterland. Expansion of agricultural production, fuelled by population growth and demand from the city, threatens widespread soil erosion, land degradation and groundwater pollution. Some of the ways in which traditional land management techniques, closely coupled to environmental constraints, have been replaced because of short-term comparative advantages are explored.

1. Interaction between Urbanization and Agriculture in Drylands

The dryland environments of the Mediterranean and Middle East have experienced rapid and sustained urban growth in the last few decades. The transformation of agricultural activity and rural settlement in rapidly urbanizing societies poses considerable environmental and economic strain. On one side are the problems associated with urban development, the inadequacy of planning and policy to curb growth, the impact of growth on pollution and environmental degradation and the challenge of defining and measuring urban sustainability. On the other side are the impacts of urban transformation on the agricultural hinterland and issues for environmental and socio-cultural preservation. Traditional ties between agricultural

techniques and environmental conditions are loosened by economic transformation and increasingly influenced by urban externalities. The relationship between cities and rural hinterlands is particularly sensitive in dryland environments because of the known fragility of the environment to climatic variability and the limited capacity of water resources to sustain continued economic growth. This case study focuses on the interaction between urbanization and land degradation in Jordan. The twentieth century witnessed a fundamental shift in the traditional nomadic life and economy of the desert margins to the south and east of the country, induced by the development of the nation-state, creation of international boundaries, changes in land tenure, demographic pressure and the unprecedented growth of the capital city, Amman. The paradox is that while the influence of the environment on welfare has been eased through the provisions of the nation-state, many decisions about land use and agricultural practice are made some distant away from the desert margin and ultimately threaten environmental degradation. In Jordan, and many other Middle Eastern countries, the evolving conflict between urban and rural areas augments difficulties associated with scarce water resources, contamination of groundwater, soil erosion and changing socio-cultural conditions. There has been comparatively little investigation on the relationship between urbanization and agriculture and its consequences for soil and water conservation. Reflections of the processes of confrontation between agriculture and urbanization in the zone surrounding large dryland cities are the focus of a current European Union project for which the present case study was originally prepared. The project is a Concerted Action programme titled "Agriculture and Urbanization in the Mediterranean Region: Enabling Policies for Sustainable Use of Soil and Water" and co-ordinated by Professor Dino Borri of Bari Polytechnic, Italy. The review of Jordan as an example has evolved from involvement with the Jordan Badia Research and Development Programme (BDRP), which is introduced later in the article.

Articulating a case study of a particular city and its surrounding hinterland goes some way towards addressing the interdependency of agriculture and urbanization and reflecting on urban sustainability. However, there are broader challenges for the analysis of urban sustainability. First, the scientific challenge concerns the development of models for evaluating community-environment relations and processes, and for predicting environmental impact. In the absence of much interdisciplinary work on the link between urbanization and agricultural dynamics, there is a need to identify appropriate indicators of state condition and performance. This necessitates the integration of information from different disciplines and perspectives. At the urban fringe, for example, there is a need to improve understanding on the relationship between urbanization, land use and agricultural production and the way these contribute to the unsustainable use of soil and water; to identify measurable indicators that provide information about the present condition of soil and water resources; and to instigate monitoring of soil and water quality changes.

At the broadest scale, the Ecological Footprint (EF) has been proposed as an aggregate indicator that can be used to estimate the sustainability of current resource use. Developed by Mathis Wackernagel and William Rees, it is defined as the equivalent area of productive land required to produce the resources consumed by the population and to assimilate the wastes produced by that population. Proponents of EF argue that it can be used as a guideline to achieving sustainability and demonstrate that many

countries are, at the present time, overshooting the sustainable resource base. Others argue that, while the concept has some utility in indicating global unsustainability, it is too limited to use as a guide for policy development at the national level. There are a number of difficulties in using an aggregate indicator like EF in a Jordanian context. First, the conversion of different types of consumption into equivalent land area assumes a constant conversion factor and does not take account of regional and local variations in land use over space and time. Climatic conditions in dryland environments can result in marked year-to-year variations in agricultural productivity. For the same reason, attempts to define carrying capacity of drylands, which has been popular in some parts of the desertification literature, are fraught with difficulties because of the large inter-annual variations in productivity that can be sustained. Second, and related to the difficulty of characterizing land use, the aggregate indicator is not helpful in understanding processes of land degradation, such as soil erosion. Soil erosion is a function of climatic and biological factors but also a number of inter-related economic factors including agricultural incentive and subsidy programmes, the attitude of farmers to risk, and investment in soil conservation. Decisions about land use management, with consequences for soil loss, represent a trade-off between many factors. Third, EF can be criticized on the grounds that it is implicitly anti-trade and promotes regional autarky as the most desirable solution. As such this neglects the comparative advantages of different countries relating to endowments of natural resources. In the case of Jordan, self-sufficiency in water resources is an important issue for national and environmental security but the water requirements for self-sufficient agricultural production are unsustainable. Importing some agricultural produce from more well-watered regions is one way of spreading the environmental burden of farming in a dryland environment to a less sensitive environment. The issue of water scarcity is dealt with in more detail below.

In summary, an aggregate indicator such as EF would seem to have limited application for investigating urban sustainability in a dryland environment. Multiple indicators are needed to evaluate interconnected environmental problems. The scientific challenge of devising appropriate indicators and models gives way to an organizational challenge of data collection and management, from which the policy challenge can be addressed through the development of scenario-building techniques to evaluate alternative approaches to environmental management.

2. Urban-Rural Dynamics in Jordan: Historical Context

The structure and interdependency between urbanization and agriculture in Jordan has been distinctively shaped by the political history of the region. The British Mandate of Transjordan was demarcated in 1922 following the partitioning of the Ottoman Empire (the official name of the Hashemite Kingdom of Jordan was adopted in 1949). The positioning of international boundaries was strongly influenced by the interests of the colonial powers, with Britain securing a corridor of Jordanian territory linking it with Iraq and creating the distinctive “panhandle” of Jordanian territory. Most of the territory to the east of Amman and throughout the south of the country was historically occupied by Bedouin tribes operating as pastoralists and traders. Total numbers were limited, dependence upon, and responsibility for, the environment high. The evolution of the nation state challenged both cross-border movements and traditional concepts of land

tenure. One part of the desert in the north east of the country has been the focus for the Badia Research and Development Programme (BRDP), supported by the Higher Council for Science and Technology in Jordan and the Royal Geographical Society in the UK. The study area comprises over 11000 km^2 in the western half of the "Jordanian pan-handle" (Figure 1). The research programme seeks to gain a better understanding of the natural resource base of the Badia and the traditional and evolving use of these natural resources, in order to advance recommendations for sustainable but productive use of the environment. The growing influence of relatively distant urban communities has increasingly impinged upon the desert margin and this relationship between environmental management at the desert margin and urbanization in Amman is explored.

Figure 1. Map of the Hashemite Kingdom of Jordan

At the time that Amman was chosen to become the capital of the new state in 1922, it was a small town of about 5000 inhabitants. The growth of Amman has been staggering,

particularly within the last five decades, making Jordan a classic example of primacy with an over-concentration of population, economic activity and services in the urban core. Amman has grown rapidly through a combination of natural population increase, rural-urban migration, influx of migrant labor and Palestinian settlement. Following Israeli annexation of the West Bank, many Palestinians settled east of the River Jordan, following earlier flows of refugees. Numbers were further bolstered as 300,000 people left Kuwait after the Gulf War. Remittance income from citizens working overseas had been a feature of the Jordanian economy but in recent years there has been net-return migration from the Gulf States.

The population of Jordan has risen from about 0.7 million in the 1952 census to almost 5 million (UN mid-2000 estimate), of which 38% are aged 0-14 years. The United Nations Statistics Division estimates that the urban population of Jordan is 71% of the total and is growing at a rate of 3.8% per annum. Amman is generally a low density city and its rapid growth has not only changed the balance of urban-rural population, but has consumed land capable of sustaining rain-fed agriculture, which is a rare commodity in Jordan. By 1990 the conurbation covered 50 km^2.

Speculative investment in land around the margins of the city has also proved profitable for some groups or individuals as urban sprawl raises the value of the urban fringe. Spreading over the hills that surround the city, the diameter of the built-up area is now about 20 km. Political upheaval has had significant influence on refugee flows and the consequent high rate of growth in both total population and urban dwellers. Population growth has strained the ability to develop within environmental constraints.

A high rate of national economic growth has been achieved since the 1960s, with average per capita income doubling in the 1970s. But until recently, development plans have not sought directly to influence the distribution of income and, in periods of high growth (prior to the recession of the late 1980s), disparities have widened. Nor has environmental protection been explicit in most development policies.

The 1990s have witnessed both an increase in public awareness of the environmental consequences of rapid development and in attempts to develop environmental legislation. The next section of the article considers some of the issues of environmental management that result from economic transformation and the rapid growth of Amman in particular. Issues of urban sustainability permeate three broad sets of environmental problems.

First and fundamentally, the ability to supply and manage water resources within Jordan is a national issue. Urbanization causes a number of difficulties for managing a scarce resource and encouraging reductions in demand. Second, there are a number of environmental problems that relate directly to the inability of the infrastructure of Amman to cope under conditions of rapid growth.

Third, there are numerous problems of environmental degradation in the rural hinterlands where decisions about land use management are directly or indirectly influenced by the urban transformation of the nation.

-
-
-

Bibliography

Allan, J.A. (Ed.) 1996. *Water, peace and the Middle East: Negotiating resources in the Jordan basin*. Tauris Academic Studies, London. [Focuses on the Jordan River with contributions from policy makers and academics.]

Bulloch, J. and Darwish, A. 1993. *Water wars: Coming conflicts in the Middle East*. Victor Gollanz, London. [A view, popular in the media, that water resources will precipitate military conflict.]

Constanza, R. (ed.) 2000 Forum: The Ecological Footprint. Special Issue of *Ecological Economics*, 32. [A set of short commentaries evaluating the utility of the Ecological Footprint concept.]

Dolatyar, M. and Gray, T.S. 2000. *Water politics in the Middle East: A context for conflict or co-operation?* Macmillan, London. [Evaluation of the international conflicts over water resources, which is more optimistic about the prospects of co-operation and a new paradigm of environmental security.]

Dutton, R.W., Clarke, J.I. and Battikhi, A.M. (Eds.) 1998 *Arid land resources and their management. Jordan's desert margin*. Kegan Paul International, London. [A summary of preliminary results form the BDRP study including both historical and environmental context for the study area in north east Jordan.]

Elhance, A.P. 1999. *Hydropolitics in the Third World: conflict and cooperation in international river basins*. United States Institute of Peace Press, Washington DC. [Compilation of case studies of water conflicts which, of course, includes the Jordan Basin.]

Jabbra, J.G. and Jabbra, N.W. (eds.) 1997. *Challenging environmental issues: Middle Eastern perspectives*. Brill, Leiden. [A series of case studies of emerging environmental policy in Middle Eastern countries which includes a critical review of the situation in Jordan by J.E. Jreisat.]

Millington, A.C. and Dutton, R.W. (eds.) Socio-economic change and natural resource management in a marginal environment: Jordan's Badia Research and Development Programme. Special issue of *Applied Geography*, 19 (4). [Series of papers concentrating on recent agricultural and land use transformations in north east Jordan.]

Wackernagel, M. and Rees, W.E. 1996. our ecological footprint: reducing human impact on the earth. New Society, Gabriola Island, Canada. [The text introducing the procedure for quantifying the impact of human resource use as a guide for sustainability.]

Wolf, A.T. 1995. *Hydropolitics along the Jordan River*. United Nations University Press, Tokyo. [A detailed study of water resource development and capabilities in the Jordan River.]

Biographical Sketch

David Higgitt is Associate Professor at the National University of Singapore. As a geomorphologist, his research interests center on the topic of sediment delivery—the production, detachment and transport of sediment in earth surface systems, and the attempt to identify and quantify the pathways and dynamics of sediment transfer. After receiving his PhD from the University of Exeter, he held appointments at Lancaster University and the University of Durham, before moving to Singapore in 2004. He has studied soil erosion and sedimentation in varied environments including land degradation assessment in subtropical China, arid-zone sediment dynamics, and slope processes in Jordan and the southern Mediterranean and the quantification of upland sediment budgets.

He has served on the Executive Committee of the British Geomorphological Research Group (1996-99) as editor of *Geophemera*, and is currently Joint-Chair of the BGRG Working Group on Upland Sediment Budgets. He is Co-Editor of the *Journal of Geography in Higher Education* and has written widely on innovation in fieldwork practice.