

## A GIS analysis of the impact of modern practices and policies on the urban heritage of Irbid, Jordan

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### ABSTRACT

This paper shows the results of a study carried out on the central area of Irbid, Jordan in order to assess the effect of the modern urbanization process on the degradation and loss of the city's heritage. This type of work comes as a result of the need to study the interaction between modern and heritage landscapes, which are in a direct physical contact with each other, and thus to address the problems facing sustainable development. This paper investigates a number of urban planning concerns that include: assessment of heritage/modern landscape compatibility, heritage building degradation, urban land use change and its role in the fragmentation and lack of connectivity between historic sites, visual pollution and the effectiveness of the existing urban system infrastructure. For each problem, a complete scientific analysis supported by a detailed mapping system is performed, resulting in recommendations for the necessary engineering solutions. Spatial analysis through GIS, e.g. 3D modeling, focuses on evaluating the current condition of the urban system near the heritage landscape. The paper presents important findings, such as identifying the impact of urban and infrastructural expansion, detected from historical aerial images at different epochs, on the historic center of Irbid. The study emphasizes the urgent need to solve the current problems related to the urban system, to achieve the vision of sustainability, which includes solving traffic problems for improving system accessibility, and reevaluating the policies and regulations to achieve a balanced interaction between the heritage and modern landscapes within the city.

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### Introduction

Between 1975 and 2000, the percentage of the population living in urban areas in developing countries grew from 27% to 40% (Brockerhoff, 2000). This increase in population is associated with urban and infrastructural expansion. City boundaries continue to expand, consuming more and more of rural areas, forests, heritage places and other important non-urban areas. The UN publication *World Urbanization Prospects* (United Nations, 2002) presents other facts about the severity of the challenge of international urbanization that is making urban management one of the most important challenges for the 21st century (Cohen, 2004). Understanding the change brought by urban development is critical to those who study urban dynamics and those who manage resources and provide services in these rapidly changing environments (Knox, 1993; Turner et al., 1993). The situation is more severe in developing countries where the fast pace of urbanization is mainly un-

planned and presents a real threat to different natural and cultural resources. The current urban transition in developing countries is characterized by a number of key aspects (Cohen, 2004; Brockerhoff, 2000; Hall and Pfeiffer, 2000; Sassen, 2001a; Yeung, 2000). First, the scale of change is unprecedented. Second, urbanization is occurring at a rapid-though not altogether unprecedented-pace. Third, urbanization is now occurring more rapidly in countries that have relatively lower levels of per capita income. Fourth, the nature and direction of urban change today is more dependent on the global economy than ever before. Fifth, there is an on-going convergence in urban and rural lifestyles. Finally, urbanization is occurring under a broadly different set of demographic regimes. Careful consideration of such aspects leads to a better understanding of the dynamics of urban change and its role in altering the open landscape.

Many cities in the world are distinguished by historical areas and heritage sites, some thousands of years old; these are often located near the old city center and are now surrounded by modern urban structures. Unplanned urban expansion and altering of landscape into industrial, commercial or residential land uses have a negative impact on such heritage. This impact can be either direct or indirect. Direct negative impact is represented in the destruction

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and removal of the urban heritage for the purpose of new construction. On the other side, indirect impact results as a by-product of the proximity of modern urban areas to heritage sites, which results in air pollution, fragmentation and lack of connectivity between these sites.

Urban heritage management is a necessary tool to create a balance between the preservation of the character of existing heritage and the changes brought by the urbanization process in the context of the overall city tourism planning (Nasser, 2003). Two directions of urban heritage management are clear in the literature. The first direction, as clear in the work of Arthur and Mensah (2006), focuses on the integration of tourism, socio-economic and ecological factors for sustainable development where urban management must respect and incorporate human practices and actions of the local community into its professional approach to urban development. It emphasizes the need for actions to activate stakeholder participation, urban management and good governance for sustainable heritage development (Arthur and Mensah, 2006). The second direction develops a community and culture-led agenda to achieve sustainability in the management and planning of heritage places within the urban context.

Integrating heritage management rules within the city's planning policies is a key solution toward sustainability. Such action will achieve a balance between the need for preserving the valuable heritage sites and the increasing demand on land for urban uses. For example, in the Netherlands, cultural heritage is integrated into physical planning and the development of new functions to ensure heritage-modern urban compatibility (Vervloet et al., 2003). These efforts to integrate cultural history and spatial planning have become known as 'cultural planning' (Vervloet et al., 2003; Bloemers and Van der Valk, 2004). The link between heritage management and spatial planning has been recorded in formal documents at the European and national level. The European Landscape Convention, for example, in 2000 emphasized historical values in landscape management (Bloemers and Van der Valk, 2004; Antrop, 2005).

In order to reach a satisfactory policy in such a complex urban environment, a careful process of decision-making is required, which usually takes time and can be costly (Ackoff, 1981; Banister, 1997; Mintzberg, 1979; and Simon, 1960). A key issue that needs

to be taken into consideration in urbanization centers containing heritage districts is the importance of including such heritage sites in the Master Plan of the city. This will ensure that any development near such sites is under control and will minimize the negative impact of modern urban structures. In this way, a balanced landscape system can be obtained that provides a better integration between heritage and modern parts of the city.

A number of methodologies are proposed in the literature to protect the urban heritage within the scope of the city Master Plan. Kozłowski and Vass-Bowen1 (1997) recommend the adaptation of the buffer zone planning (BZP) technique for urban heritage protection. In this approach, it is suggested that a technique applied in natural heritage protection to 'buffer' national parks from external threats occurring outside the legal bounds of protected places can be adapted to the urban environment in the protection of cultural heritage. This approach is very beneficial in the planning phase of the city. However, practical problems may appear when applying such approach to heavily developed urban areas, where having an empty buffer space becomes a real challenge. Nijkamp et al. (1998) reviews six assessment methods, such as benchmarking; spider model; the meta-regression analysis; regime analysis; the flag model and rough set analysis, which may be applicable to a wide range of urban planning problems. The flexible scope of these methods renders them also appropriate for sustainability issues in the context of the management of urban cultural heritage. Xie et al. (2007) use the mid-section of the ancient Silk Road – He-Xi Corridor as a case study to examine the challenges of urban development in West China and to propose suggestions for future development, from the perspective of comprehensive planning, taking into account the issue of heritage sustainability.

New analytical tools and concepts are required which would enrich and expand the conventional methods utilized and which would ensure sustainability of cultural heritage in any urban setting. Among these are Geographic Information Systems (GIS), digital mapping systems that link spatial and non-spatial data of landscape features, which are of great help in documenting different urban features beside their role in modeling the urban process and its effect on heritage sites. Some Spatial Decision Support Systems (SDSS) are currently being developed (Jankowski et al., 1997) that integrate the usage of GIS and other tools such as Multicriteria

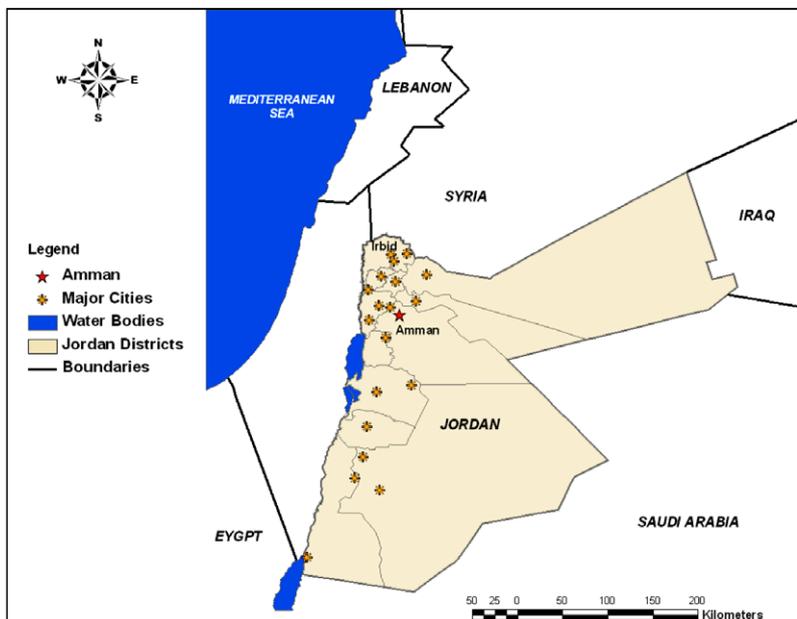


Fig. 1. Irbid location (left) and recent aerial image with the shaded study area (right).

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