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Landscape ecology as a foundation for landscape architecture: application in Malta

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Abstract

Landscape ecology has the potential to contribute towards a holistic approach in landscape architecture. Such an approach can simultaneously inform, guide and inspire designers towards landscapes that are environmentally sustainable as well as being culturally and aesthetically appropriate. This paper reviews two possible ways in which landscape ecology can advance landscape architecture: (a) by providing a holistic and dynamic framework that contributes towards an alternative landscape design (e.g. ecological landscape design); and (b) by establishing the scientific knowledge (e.g. landscape heterogeneity, biological and ecological diversity and ecological networks) that can inform the design process at the local and regional levels.

Both contributions were tested at the Bahrija Project in Malta. The methodology of ecological design is applied, initially to allow for a comprehensive understanding of the local landscape, and subsequently to assist in the formulation of a preliminary landscape master plan. The paper argues that conservation policies should necessarily be complemented with a proactive approach, which can accommodate the needs of contemporary development while ensuring the protection of natural and cultural resources. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction: landscape ecology and landscape architecture

Ecology, in the 100 years since its inception, has increasingly provided the scientific foundation for understanding natural processes, managing environmental resources and achieving sustainable development. By the 1960s, ecology's association with the environmental movement popularised the science and introduced it to the design professions (e.g. landscape architecture, urban design and architecture). Landscape ecology's interface with these professions, however, is more recent even though its potential contribution can be just as significant for several reasons. Firstly, unlike the abstract ecosystem concept in ecology, landscape ecology embraces the 'landscape' as a concrete and tangible entity. Secondly,

landscape ecology's holistic view reflects a basic philosophy in which landscape is perceived in its totality and cannot be studied by analysing its components as separate units (Zonneveld and Forman, 1990). This holistic view differs fundamentally from the fragmented and compartmentalised approach that often prevails in the design professions. Thirdly, landscape ecology's integrative perspective allows it to accommodate not only the bio-ecological sciences, but also to embrace the realm of human-centred fields of sociology, economics and the cultural sciences, all of which are connected with modern land uses (Naveh and Lieberman, 1990). As a consequence, interdisciplinary collaboration between landscape ecologists, landscape designers and planners is facilitated.

Landscape ecology has indeed contributed successfully to methods of landscape assessment and evalua-

tion, and towards systems thinking in landscape planning (Hills, 1974; Giliomee, 1977; Steiner, 1991). In landscape architecture, however, its potential contribution towards a holistic design approach is still limited (Cook and Hirschman, 1991). This is partly the outcome of landscape architecture's close professional association with architecture, which commonly gives priority to the stylistic and formal aspects of the landscape. It is also the result of a landscape design methodology that is static, fragmentary and compartmentalised, and as such, ill-suited to the dynamic attributes of living systems (Makhzoumi, 1995). In contrast, landscape ecology's holistic approach has the potential of contributing to the search for an alternative design method in landscape architecture (McHarg, 1967; Lyle, 1985; Thompson and Steiner, 1997; Makhzoumi and Pungetti, 1999). This paper reviews this alternative approach, arguing the necessity for ecological landscape design and planning in the context of the semi-arid Mediterranean.

2. Ecological landscape design: an alternative methodological approach

Ecological landscape design integrates input from landscape ecology and design, both of which are seen as providing parallel and complementary, albeit different methodological approaches (Makhzoumi and Pungetti, 1999). The analytic and descriptive nature of landscape ecology, the science, provides for a holistic understanding of existing landscapes, while the intuitive and creative problem-solving capabilities of design prescribe alternative courses for future landscape development.

Ecological landscape design is based on a holistic understanding of landscape, which encourages a dynamic and responsive approach. It is holistic because it simultaneously considers past and present as well as local and regional landscape patterns and processes. It is responsive because it develops from a realisation of the constraints and opportunities of context whether natural, cultural or a combination of both. Ecological landscape design is guided by three fundamental, mutually inclusive objectives: the maintenance of landscape integrity; promoting landscape sustainability; and reinforcing the natural and cultural spirit of place (Makhzoumi and Pungetti,

1999, p. 207). The methodology of Ecological Landscape Association has been developed to achieve these objectives. It is at once 'a framework for understanding the landscape and a tool for designing it' (Makhzoumi and Pungetti, 1999, p. 211). As an interaction framework it allows the designer a holistic comprehension of landscape by investigating processes that bind one or more landscape components (e.g. abiotic, biotic and/or man-made) into associations (e.g. topography/flora, soil/geology). The framework induces a deliberate interplay across the different levels of the spatial hierarchy and along a landscape's historical development, thereby testing the validity of these associations (Fig. 1). Once validated, the association forms the building blocks of the landscape design. The process of searching for the associations not only allows a holistic, dynamic understanding of landscape, but just as significantly, allows the designer to integrate this understanding into the design process. The simplicity and spontaneity of the methodological framework encourages the intuitive and creative problem-solving potential of the landscape designer while prioritising the maintenance of landscape integrity and long-term environmental sustainability. In this paper Ecological Landscape Association refers to the methodology, while its abbreviated form (ELA) refers to an actual association that has been discerned.

3. Malta: defining the context

Malta, with an area of 290 km² is the largest of the three islands that comprise the Maltese archipelago (Fig. 2). With an estimated 350,000 inhabitants, Malta has the second highest population density in the world. The economy is heavily reliant on tourism, a trend that is set to increase as tourism is predicted to make an even larger contribution to GDP and foreign exchange earnings by the end of the century (Lockhart, 1997).

Increased population growth, suburban development and, to a lesser extent, tourism is fragmenting and gradually destroying the island's traditional Mediterranean landscape, which is a rich combination of semi-natural and cultural ecosystems. The consequences are environmental, ecological, cultural and aesthetic. Environmentally, contemporary development increases the consumption of natural resources, mainly water and land, both of which are in short

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