

Urban Ecosystems: Understanding the Human Environment, Robert Francis and Michael Chadwick, 2013, Routledge, 232 pages, ISBN: 978-0-415-69803-0, £29.99 (paperback)

Urban Ecosystems is a well-written textbook that is accessible to several audiences. The authors have aimed it at readers with a background in one of ecology, geography or environmental sciences in general. It can accompany a lecture series, act as additional reading material or serve as an introduction to the broad and novel topics it encompasses.

The book is divided into nine chapters which can be read in succession as well as individually, although reading all chapters certainly paints a more complete picture of the authors' message. Reading along topics is facilitated by cross-references to other chapters throughout. The book contains helpful figures and boxes for special topics. The discussion questions at the end of each chapter are designed to facilitate deeper engagement of e.g. groups of students.

The introduction chapter covers definitions of urban, urban ecology and ecosystems as well as some history on urbanisation. The book then moves on to discuss spatial organization and temporal scales. Chapters 3, 4 and 5 cover urban ecosystems, green space and the built environment, while 6 and 7 discuss species and conservation. The second to last chapter is devoted to urban planning. Chapter 9 ends the book with a look to the future with challenges, trends and issues worth exploring further.

The remit of *Urban Ecosystems – Understanding the Human Environment* is very broad, and the authors acknowledge this at various points in the text. Urban ecology as a field of study combines knowledge from a wide range of disciplines including biological, physical and social sciences and mixtures of those, such as the built environment, architecture, urban studies and planning. On its own, it is a field in its infancy, having its origins in the late 60s (according to a search for “urban ecology” at www.scopus.com). The authors suggest that the concept of urban ecology as we know it started to develop quickly in the 1970. Currently, urban ecology seems to be a fast-growing field of investigation. In Scopus, the major peaks for numbers of publications are in the years 2006 and 2011. The field incorporates ideas from an increasing subset of sciences.

The study of urban ecosystems starts with the notion of the urban, and hence the human influence, or human ecological footprint (page 11). The human influence began a long time ago with cultivation of land and the subsequent growth of population settlements. Later, massive growth in population density was fuelled by the industrial revolution, while the still on-going information revolution has had the opposite effect (page 13). The spectrum of urban regions has therefore diversified immensely in the course of history. The

authors wish to address the full range, from dense urban cores to suburbs, and satellites in various international settings.

The strong theme throughout the book is the combination of the natural with the human element. Socio-economic patterns may influence species distribution and conservation engagement (page 45). Successful environmental stewardship therefore requires inclusivity and environmental equality (page 159). Economic cycles affect the landscape level through infrastructure development, technological advancement and political investment (page 46). A systems thinking approach may be helpful in linking urban ecosystem analysis with other related systems (page 51).

Specialist topics such as urban metabolism (consumption and waste), urban climate (heat island effect), the urbanisation trend, and population growth are present throughout the book. The one topic missing, but equally interesting and internationally important, is the topic of declining cities. What happens when an urban environment turns into a major brownfield site with decreasing population density? Not least through planning, such situations could potentially be transformed into testing grounds for ecological restoration, rehabilitation or reconciliation. Brownfield sites in general are addressed in the book, as places of ecological importance.

The concept of ecological engineering comes up in several parts of the book. One of the suggested forms is through modification of the composition of construction materials (e.g. pH and organic content, page 97). Other forms include the construction of living roofs and the development of sustainable urban drainage systems (page 168). Many other planning approaches could involve engineering in one way or another, and be facilitated by approaches such as systems thinking (the emergent qualities of the whole as opposed to its parts). The use of ecological engineering could also be more firmly linked to the concept of urban ecological sustainability, defined as the maintenance or improvement of ecological quality.

Building on the challenges of incorporating the built environment and population dynamics with ecosystems on various scales, the authors present the case of pre-urban and colonising species, some of which are non-native or even invasive (page 111-113). Invasive species may have (negative) health impacts particularly in urban regions of high population density and exposure. An interesting example is the London underground mosquito that could serve as a disease vector.

Urbanisation, and the movement of people in general, exacerbates not only the distribution of species to foreign locations but also the rate of global species extinctions. While urbanisation poses clear ecological challenges, dense settlements may also be beneficial through less fragmentation of the (remaining) habitat.

Urban population growth is touched upon in slightly more detail in Chapter 9. The connection between ecological demise and consumption is made in relation to the need to limit per capita ecological footprints. This may be

achievable through reduced consumption but also improved technology (efficiency). Ecological engineering may be something to consider in this space.

A major difficulty for research in urban ecology is the fact that datasets for urban species diversity are temporally limited and impractical (or impossible) to reconstruct, rendering the baseline for most analyses to be present day. Another one is the challenge of navigating the different scales of ecosystems and urban geographies, and finding suitable indices and tools to investigate the phenomena and create comparisons. An added difficulty is the inherent cross-disciplinary nature of the topic, calling for holistic measures to engage inter-dependent socio-economic systems. Approaches from different fields such as systems thinking may aid these developments. In addition, the authors call for more comparative quantitative research to emerge.

In the broad sense, the authors do succeed in their goal, which is to inform a wide audience about the novelty and challenges in urban ecology. Both urbanisation and ecological awareness have increased which should fuel the field and the imagination of researchers working in it. What is most promising for the emerging work, and laudable in the book, is the interwoven assembly of the natural, social and technological systems. It is understood that just as all these areas influence one another in real life, so they should in research design, and implementation in practice. In the long run, urban ecological sustainability can only work alongside economic and social development: the key remains in influencing attitudes towards understanding the value of nature in our urban, human environments.

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