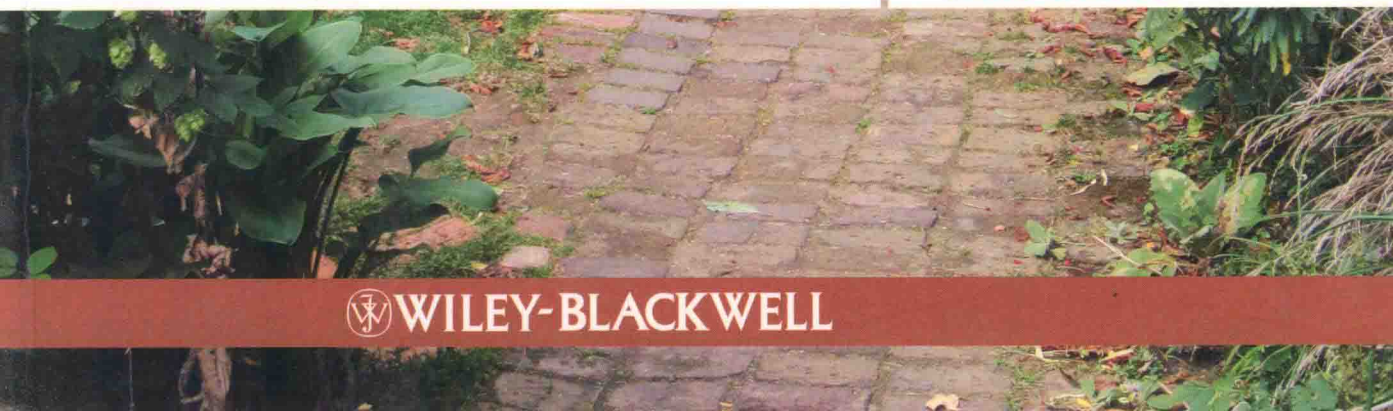
ECOSYSTEM SERVICES COME TO TOWN

GREENING CITIES BY WORKING WITH NATURE

GARY GRANT



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About the Author

Gary Grant is a Chartered Environmentalist, Member of the Institute of Ecology and Environmental Management, an Academician at the Academy of Urbanism, Member of the All Party Parliamentary Committee on Biodiversity, thesis supervisor at the Bartlett Faculty of the Built Environment, University College London, Chair of the Judges of the Integrated Habitats Design Competition and Director of the Green Roof Consultancy Ltd. After graduating from Nottingham University in 1980 with a degree in Biology, he worked for the London Wildlife Trust (LWT), campaigning for and managing urban wildspace. He conceived the London Wildlife Garden Centre which won a RIBA/ Times Award. Later he led the Wildlife in Docklands Project, a joint venture between the Wildfowl and Wetland Trust and LWT, which promoted nature as part of the redevelopment of London's Docklands. In the early 1990s, he participated in the Royal Fine Art Commission's River Thames Study and worked on the Natural History Museum's Wildlife Garden. Since the early 1990s he has designed green roofs, including the CUE Building at the Horniman Museum. Based in Hong Kong for the much of the 1990s, he worked on housing, tourism and infrastructure projects. In 2003, Gary wrote English Nature's Research Report on green roofs and followed that in 2006 with *Green Roofs and Facades* published by BRE Press. From 2006 to 2009 he was a Director of EDAW and then AECOM Design + Planning, where he worked on large-scale planning projects including the London 2012 Olympic Park, the Bedford Valley River Park, the Whitehill-Bordon Eco Town, Education City, Qatar and Saadiyat Island, Abu Dhabi.

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Contents

1. Introduction

I have an affection for a great city. I feel safe in the neighbourhood of man, and enjoy the sweet security of the streets

– Henry Wadsworth Longfellow

Modern Cities and the Disconnected

It may be unthinkable to many city dwellers, whether or not they enjoy the material abundance and culture or merely endure the pollution and stress, but life can go on without cities. Cities only became a reality, more than 6000 years ago, once agriculture had reached a stage where it produced enough surpluses to feed the required specialist workers, soldiers and bureaucrats. Until relatively recently in human history, before the rapid expansion in human population began after the Industrial Revolution, cities were relatively small, few in number and their impact on the natural world was limited. There had been human-induced extinctions of wildlife caused as hunter-gatherers mastered fire and spread into new continents, and early civilisations like that of Ancient Rome had caused widespread deforestation, but most of the natural world was still intact. People probably intuitively understood that they relied on the natural world, but seem to have always assumed that nature's apparently limitless bounty would be undiminished despite ever more exploitation. Much more recently, in the twentieth century, as the oil began to flow and populations grew

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more rapidly, city people became increasingly disconnected from nature, so that nowadays many of us no longer understand how we are still ultimately reliant on the natural world for the goods and services that it provides. We have billions of environmentally illiterate people in our towns and cities who have little experience or knowledge of nature and have little appreciation or interest in what powers their lives, where their food or water originates or how their shelter, transportation or entertainment is provided and maintained. Some people I have encountered appear surprised, bemused or irritated when informed that their existence depends on the natural world. Notice how the mainstream television newsreader or newspaper journalist makes observations on nature, characterising it as little more than an amusing side issue, before returning to what are considered to be more serious matters of finance and politics. I appreciate that finance, politics and other cultural phenomena may shape the interrelationships between people but nature provides all the energy and the materials required for life. We must remind ourselves of this as we shape and manage our cities.

Population Spike

The relatively modest population growth (compared with that which followed) that was spurred by the early industrial revolution did not go unnoticed. Malthus published his *Essay on the Principle of Population* in 1798 in which he noted that the rise in population could lead to an increase in poverty and to food shortages.[1] Malthus published six editions of this work, and his ideas on population later influenced Charles Darwin's thinking on natural selection. As the number of cities grew and as those cities increased in size, forests were cleared and agriculture increased. Then at the beginning of the twentieth century, the oil age began. Fossil fuels (first coal and then oil) had freed people from a total reliance on energy provided by contemporary photosynthesis and allowed people to tap the energy trapped by photosynthesis and preserved in rocks through eons. With the new injection of energy and the food that came from this, city civilisation continued to flourish and even world wars did not bring any significant halt to growth. The population of the world grew from 1 billion in 1800 to 4 billion in 1970. It has now reached 7 billion and is predicted to peak somewhere around 9 billion later this century.[2] At the time of writing, global population is growing at 200,000 people per day – equivalent to another Reno, Nevada or Padua, Italy every day. Already more than half of the world's population lives in cities and it is highly likely that most people will continue to live in cities. We therefore need to consider how we can make life in those cities as efficient, comfortable and fulfilling as we can without continuing to rely on the unsustainable exploitation of natural resources.

It will not be straightforward and there will probably be no single solution, but the future will surely involve city greening. This book is intended to describe some of those difficulties and various ways that city greening can occur – not only for adornment and liveability, but also to make cities function in harmony with natural processes.

Limits to Growth

In 1972, the Club of Rome, an international think-tank concerned with a perceived lack of long-term thinking at the time, commissioned systems scientists at the Massachusetts Institute of Technology to undertake a study entitled *The Limits to Growth*.[3,4] This seminal work questioned the long-term viability of modern civilisation and identified some of the problems associated with exponential growth. It used a computer model to chart the interactions of five global factors: population, food production, industrial production, pollution and consumption of non-renewable natural resources. It was widely dismissed by contemporary commentators as an unsubstantiated doomsday prophecy, but along with an oil crisis, which followed in 1973, the report stimulated much thought and encouraged many activists and thinkers to found many of the conservation and environmental groups that emerged during that period.[5] During the 1960s, geologist M. King Hubbert had already explained that oil is a finite resource and described how production would peak – the so-called Peak Oil theory. This theory was also widely dismissed, even though production of oil had already peaked in the United States by 1970. However, the Peak Oil theory is now becoming respectable, with the International Energy Agency declaring in 2010, that production of global conventional crude oil had already peaked in 2006.[6] Some economists are now suggesting that the oil price rises of 2008 triggered the global financial crisis of that year and that the resource scarcity levels that cause the global economy to stutter – as predicted by the Club of Rome – are finally with us. Now some of the world's leading asset managers, led by Jeremy Grantham, are arguing that the growth in population coupled with increasing scarcity, means that the days of falling commodity prices are over.[7] This will eventually force the economists and politicians to face up to the likelihood that strong and continuous economic growth may never return and that a period of painful adjustment is upon us.

Global Threats

Even without the concerns over the depletion of oil, the acknowledgement (marked by the establishment of the Intergovernmental Panel on Climate Change in 1988) that the burning of fossil fuels has

released greenhouse gases that are changing the global climate, began to change the way many people thought about our relationship with the environment.[8] A consensus emerged that environmental problems weren't just questions of localised and therefore avoidable degradation – they had become global. In parallel with concerns about fossil fuels and energy security, the second half of the twentieth century also saw a growing realisation that catastrophic losses in biodiversity were underway, with causes described by Edward O. Wilson and others as habitat destruction, invasive species, pollution and overharvesting – all exacerbated by population growth.[9] Although it is still not widely understood and appreciated by society at large, losses in biodiversity cause ecosystem collapse and reduce the capacity of the natural environment to provide the goods and services, including clean air and water and food, that we rely on. The United Nations Convention on Biodiversity, signed in 1992, marked the point where civilisation's dependence on biodiversity was, after years of campaigning on the part of scientists, officially acknowledged by our political leaders.[10]

Ecosystem Services and Stewardship

Now that there is an acknowledgement that our society, our civilisation and our cities are reliant on the goods and services supplied free of charge by the natural world – so-called ecosystem services – people are beginning to look differently at the way our towns and cities are designed, built and operated. This new approach goes beyond the necessary reduction in energy and water use and the mitigation of impacts to the wider environment. How mean-spirited it is to limit our ambitions to reducing negative environmental impacts! This new approach recognises that restoration of the natural environment will be necessary and that this can and should happen everywhere, in the forests, fields, wetlands, rivers and seas, but also in the urban environment. A substantial number of inspirational examples demonstrate that towns and cities do not need to be barren, hot and dry, they can be green and pleasant, with created habitats providing ecosystem services on and around the buildings where people live and work. This means that landscapes on and around our buildings and infrastructure can be more than an optional ornamental extra but a multi-functional layer of soil and vegetation that controls surface water, provides food and wildlife habitat and keeps us cool, fit and sane. To make this transformation from grey to green will require panoramic, trans-disciplinary thinking and coordinated action. We will need to move away from our over-specialisation and the widespread and common feeling that dealing with the conservation of nature is either irrelevant or in some cases,

nice, but 'someone else's department'. We will need to think in longer timescales, in terms of ecosystems and networks, bio-geochemical cycles and chains of cause and effect rather than our nineteenth century, over-simplistic, reductionist and failing 'solve one pressing problem at a time' approach.

Greening Cities is Necessary

Cities occupy around 2% of the surface of the earth but now house more than 50% of the world's people. So to begin with, the greening of cities is important to those people. Cities are supported by farms, forests and oceans and the people who live and work in those places. Farms currently occupy around 40% of the surface of the land. Therefore the greening of cities is important to all those people too and has an impact on most of the land and the oceans. Of course, the greening of cities alone will not solve all of the world's ills; new approaches to agriculture, energy production, industry and natural resource management will be necessary, but in concert with all these changes, there must be a fundamental shift in the way we design and manage the built environment. This book outlines the beginning of civilisations and cities, because we need to understand how the process of urbanisation began and how it progressed in order to understand the present. There is an examination of the problems associated with urbanisation and the realisation, especially during the nineteenth and twentieth centuries, that these problems would require a coordinated response by state and local governments. There is also a look at the promulgation of planning and environmental laws and regulations and the development of policies, a process that became an international effort following World War II. The critically important issues of access and movement, energy and climate change and the natural environment, especially, water, soil, biodiversity and food are also briefly examined.

Hope

This book concludes with a hopeful look at how an understanding of ecology will change our approach to planning, architecture and landscape architecture, emphasising stewardship and restoration and working with the grain of nature, in contrast to the conventional approach which could be characterised as narrow, exploitative, destructive, dry, barren, grey and ultimately, doomed. Each city should be considered in terms of geological, climatological, hydrological processes and the biological region in which it sits. The intention is to

be brief, informative, inspirational and practical. And optimistic – there is no benefit in being anything else. There is much more to learn than can be described in a few brief chapters, but there are plenty of references and links to help the reader to continue on the journey towards the greener city. Better cities will come with a new philosophy, which understands our place as part of nature, not as deluded creatures pretending to operate outside of it.

2. Origins of Cities

When tillage begins, other arts will follow. The farmers, therefore, are the founders of civilisation

– Daniel Webster

Why Look Back?

This book is primarily concerned with what I predict and hope will be a greener future for cities. It also describes some of the major problems and threats that modern city dwellers continue to face (see Chapter 4); however, like any phenomenon, cities cannot be fully appreciated without some understanding of their origins and growth. The purpose of this chapter is to give some insight into how towns and cities arose. It is useful to remind ourselves that city-centred civilisation is a recent phenomenon, that it is reliant on water, agriculture and transportation, is vulnerable to climate change, could be improved in terms of comfort and functionality and must be made compatible with the natural world. Civilisation is relatively new and we have much to learn and act upon if it is to persist.

Emergence of the Human Species

You are a human, a member of a species that has spent most of its 200,000 year history as a hunter-gatherer, living in simple shelters made from plants – a lifestyle that leaves relatively few traces, except

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