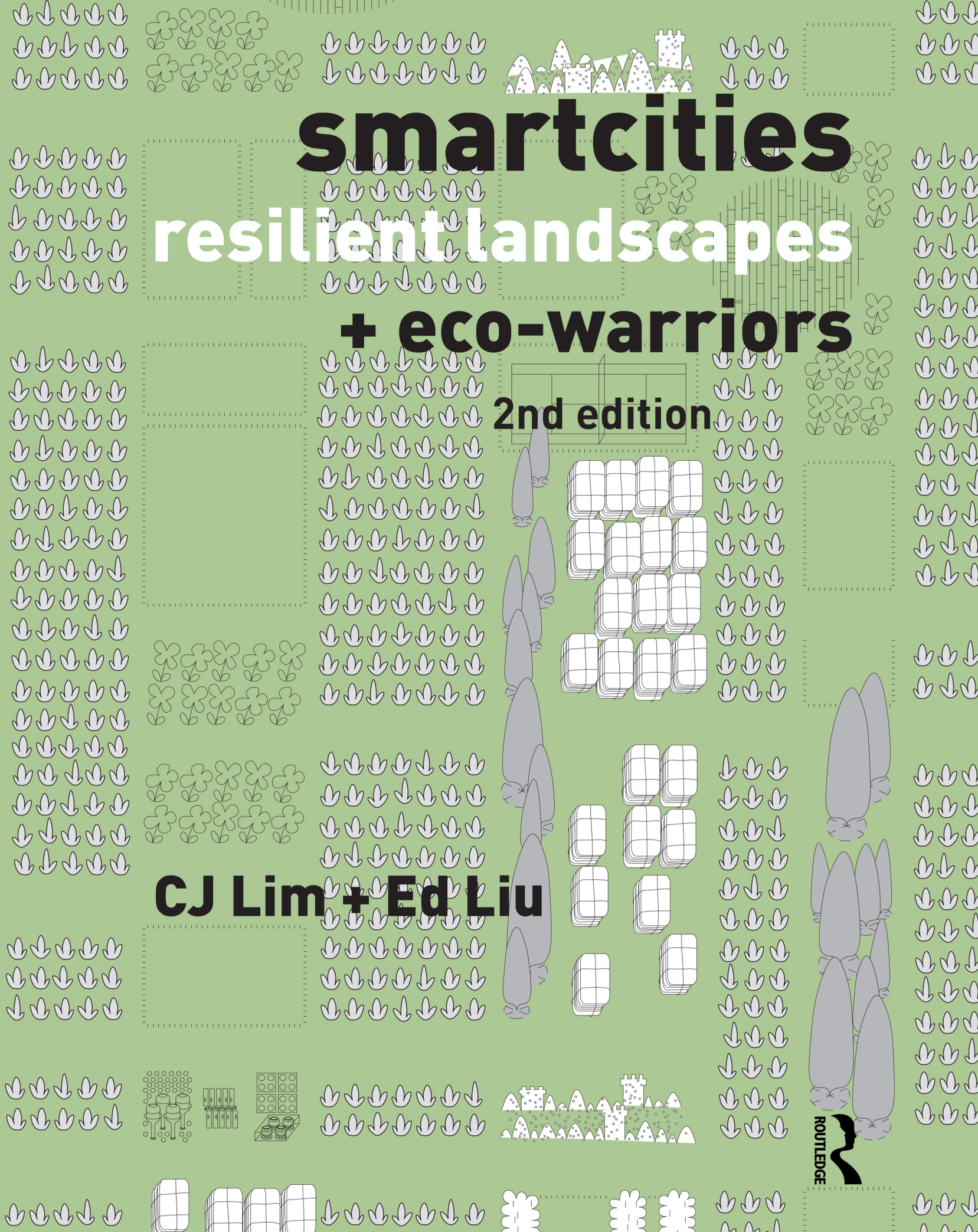
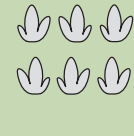
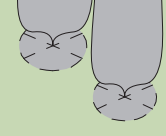
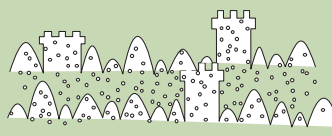
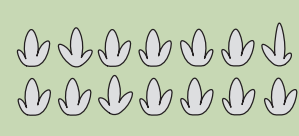
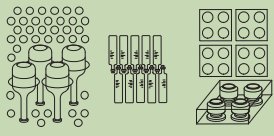
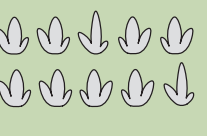
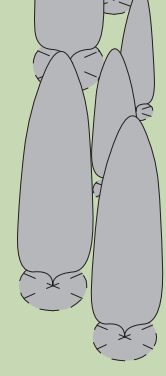
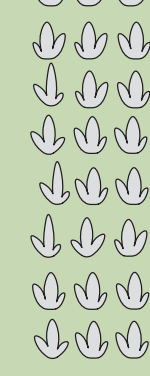
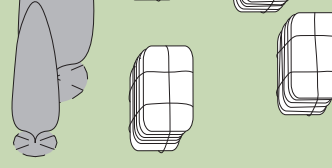
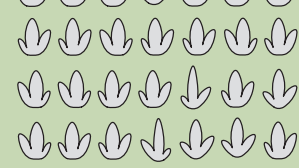
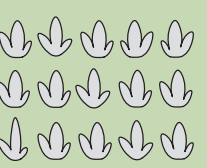
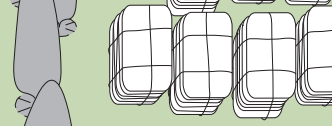
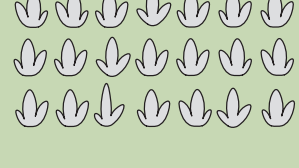
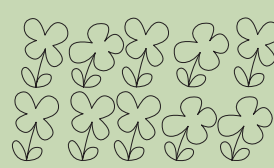
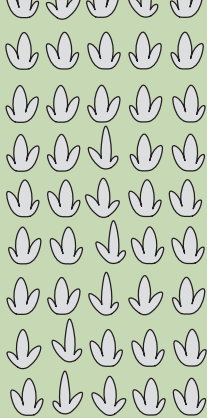
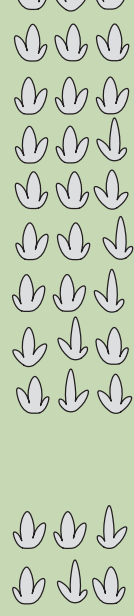
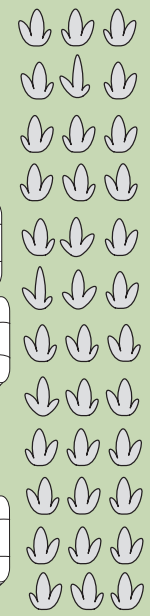
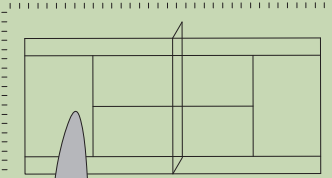
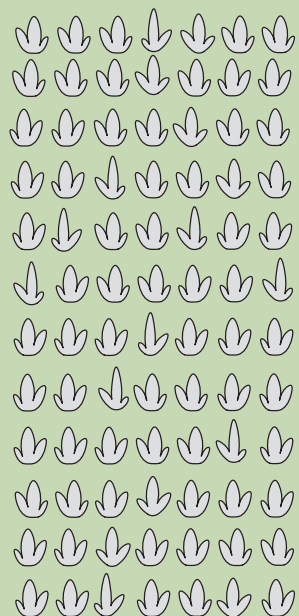
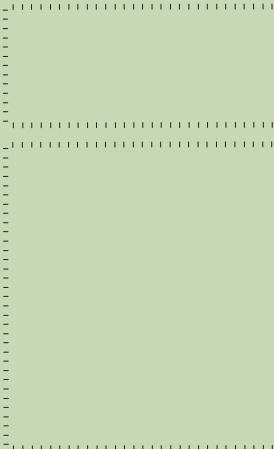
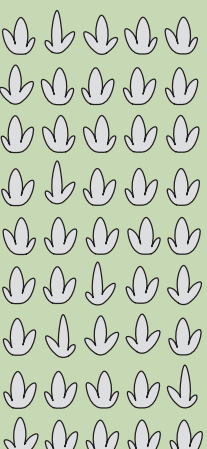
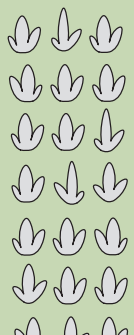
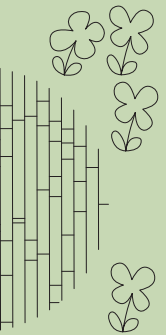
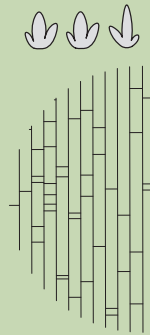
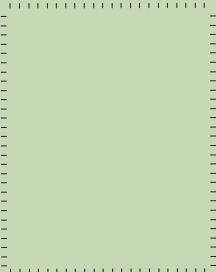
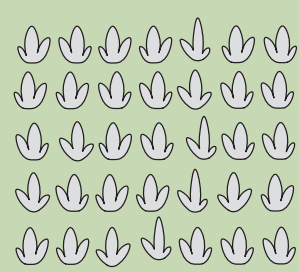
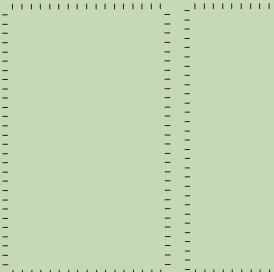
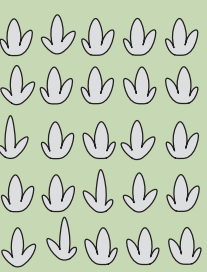
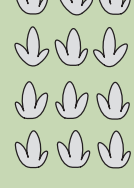
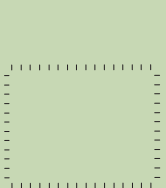
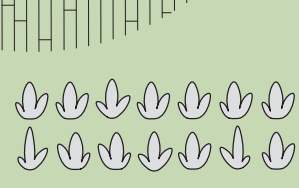
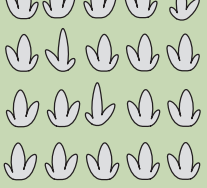


smartcities resilient landscapes + eco-warriors

2nd edition

CJ Lim + Ed Liu





Smartcities, Resilient Landscapes + Eco-warriors

Dedicated to Matthew Wells, Andy Ford, and Colin Hayward

Second edition published 2019
by Routledge
2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

and by Routledge
52 Vanderbilt Avenue, New York, NY 10017

Routledge is an imprint of the Taylor & Francis Group, an informa business

© 2019 CJ Lim / Studio 8 Architects

The right of CJ Lim / Studio 8 Architects to be identified as authors of this work has been asserted by them in accordance with sections 77 and 78 of the Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this book may be reprinted or reproduced or utilised in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

Trademark notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

First edition published by Routledge 2010

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data
Names: Lim, C. J., author.
Title: Smartcities, resilient landscapes and eco-warriors / CJ Lim and Ed Liu.
Description: Second Edition. | New York : Routledge, 2019. | Previous editon: 2010. | Includes bibliographical references and index.
Identifiers: LCCN 2018056687 | ISBN 9780815363248 (Hardback) | ISBN 9780815363255 (Paperback) | ISBN 9781351110037 (eBook)
Subjects: LCSH: Urbanization--Environmental aspects--Case studies.
Classification: LCC HT361 .L56 2019 | DDC 307.76--dc23
LC record available at <https://lccn.loc.gov/2018056687>

ISBN: 9780815363248 (hbk)
ISBN: 9780815363255 (pbk)
ISBN: 9781351110037 (ebk)

Typeset in DIN
by Studio 8 Architects

CJ Lim + Ed Liu

smartcities
resilient landscapes
+ eco-warriors

2nd edition

 **Routledge**
Taylor & Francis Group
LONDON AND NEW YORK

Contents

	Preface	7
	Urban Utopias + the Smartcity	9
manifesto for the smartcity (i)	From Soil to Table	15
manifesto for the smartcity (ii)	The Perpetual Motion Machine	19
manifesto for the smartcity (iii)	The American Dream Redux	23
manifesto for the smartcity (iv)	Rise of the Eco-warrior	27
manifesto for the smartcity (v)	Scenic Positions	31
manifesto for the smartcity (vi)	Cultivating Community	35
	a pictorial essay: Resilient Landscapes	40
	A Lexicon for the Smartcity	50
case study 1	awareness: Guangming Smartcity China	58
case study 2	awareness: DuSable Park USA	92
case study 3	awareness: Tangshan Earthquake Memorial Park China	96
case study 4	awareness: Remembering the Great American Plains USA	104
case study 5	diversity: Nordhavnen Smartcity Denmark	114
case study 6	diversity: Daejeon Urban Renaissance South Korea	128
case study 7	diversity: The Tomato Exchange UK	134

case study 8	integration: Central Open Space: MAC South Korea	142
case study 9	integration: The Linear Park China	162
case study 10	integration: A Workplace in a Garden Ireland	172
case study 11	self-regulate: Guangming Energy Park China	178
case study 12	self-regulate: Newark Gateway Project USA	186
case study 13	self-regulate: The City of a Thousand Lakes China	194
case study 14	self-regulate: Rifle Range Regeneration Malaysia	208
case study 15	adaptiveness: Dongyi Wan East Waterfront China	216
case study 16	adaptiveness: Brockholes Wetland + Woodland Reserve UK	224
case study 17	adaptiveness: The Green Pension Plan UK	228
case study 18	adaptiveness: Wanmu Orchard Wetland China	238
divergent positions	Romance + Resilience: Landscapes of the imagination	283
divergent positions	anna andronova: The Grand Paris of Niger: Landscape of hope	287
divergent positions	carolyn steel: Sitopia – The urban future	293
	Project + Reproduction Credits	298
	Index	300

note: new chapters and case studies have green entries in the contents table



Preface

What is a Smartcity? 'Smartcity' is a vision. A vision of how the city of the 21st century might appear if we are serious about living sustainably and wish to be resilient. The Rockefeller Foundation '100 Resilient Cities' defines resilience as 'the capacity to bounce back from a crisis, learn from it, and achieve revitalisation. Communities need awareness, diversity, integration, the capacity for self-regulation, and adaptiveness to be resilient.' Cities are vulnerable and will increasingly be affected by anomalous climate change, natural catastrophe and urban stresses including chronic food and water shortages, pollution, a growing ageing population, and migration. Instead of a reactive approach to the manifold problems that contemporary life has thrown up, the Smartcity examines how we might live from first principles, taking the key component of any city – its people – as its starting point and *raison d'être*.

7

Following on from the success of the first edition, 'Smartcities + Eco-Warriors' (2010), this second edition reflects CJ Lim and Studio 8 Architects' latest research on resilience, ecology and urban sustainability, and has an additional nine case studies (these chapters have green backgrounds and green entries in the contents table). The explorations and critical thinking that began nearly two decades ago with proposals to cultivate awareness in the community landscapes of Chicago's DuSable Park and in Guangming Smartcity, have been adapted to achieve ecological self-regulation and environmental transformations in the Green Pension Plan in the UK, the City of a Thousand Lakes in Gaochun and Wanmu Orchard Wetland in Guangzhou.

The notion of the Smartcity is developed through a series of international case studies, some commissioned by government organisations, others speculative and polemic – visions of an urban future from a landscape perspective as opposed to a planning, environmental engineering or socio-economic one. A recurring feature of all the projects is the application of ecological sustainability, exploring potential opportunities to improve the ecological function of existing habitats or creating new landscapes which are considered beneficial to the local ecology and socio-economic values.

The central component of a Smartcity is the establishment of an ecological symbiosis between nature and built form to create diverse forms of resilient landscapes including and beyond urban agriculture. Reframing the way people think about the urban green revolution, the Smartcity explores the potential hybrid typologies of ecological programmes and landscape interventions that address the opportunities of the movement, and the role that nature and we as citizens play in the production of urban resilience. Trees, for example, have enabled communities to rehabilitate both their habitat and themselves from climatic and political catastrophe, while cultivating diverse and romantic imaginations of resilient landscapes.

Finally, the Smartcity is a manifesto and provocation. It should not be seen as an exercise in design monomania, but an invitation to planners, politicians, scientists, geographers and engineers to further a holistic dialogue and to stimulate activity in sustainability. The book therefore concludes with essays by hydro-environmental designer Anna Andronova, and food urbanist Carolyn Steel, representing diverging positions on the subject of resilient landscapes.



Urban Utopias + the Smartcity

UTOPIA

(noun) An imagined place or state of things in which everything is perfect. The word was first used in the book 'Utopia' (1516) by Sir Thomas More. The opposite of dystopia.¹

At the time of writing, more than half of mankind, some 4.2 billion people, are living in urban areas. Asia is home to 54 per cent of the world's urban population, followed by Europe and Africa.² By 2050, the world's population is expected to grow to almost ten billion.³ We are simultaneously experiencing a global food crisis resulting from low productivity, government policies diverting food crops to the creation of biofuels, climate change, and intensifying demands from an exponentially expanding population. 'The world is heading for a drop in agricultural production of 20–40 per cent, depending on the severity and length of the current global droughts. Food producing nations are imposing food export restrictions. Food prices will soar and, in poor countries with food deficits, millions will starve.'⁴

In November 1992, 1700 of the world's leading scientists issued a warning to humanity, urging a response to the unsustainably high consumption levels of finite energy resources, the reckless creation of deleterious effluent and the generation of greenhouse gases causing irreparable damage to vital planetary systems.⁵ The 2005 Kyoto Protocol and the 2009 Copenhagen Summit have failed to deliver on their commitments to prevent detrimental anthropogenic effects on climate change. In the period from 1990 to 2008, the total carbon footprint savings by Europe was one percent but the developed world as a whole had its emissions rise by seven percent.⁶ In 2015, at the Paris climate conference (COP21), 195 countries adopted a new global climate strategy – voluntary cooperation, self-regulation and political persuasion might achieve what previous quests for binding treaties failed to do. The Paris Agreement aimed to enhance the implementation of the United Nations Framework Convention on Climate Change (UNFCCC), which included 'increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production'.⁷ Despite the countless global initiatives, James Lovelock, author of 'The Revenge of Gaia' and 'The Vanishing Face of Gaia', foresees an unavoidable and radical climatic shift resulting in an environment less suitable for human habitation. In the absence of humanity mounting a massive 'sustainable retreat', he postulates 'a global decline into a chaotic world ruled by brutal warlords on a devastated earth'.⁸

At the same time, the world's economic order, premised on capital accumulation with scant regard to social wellbeing, employment and nature, is leading inexorably to extreme socio-economic differentiation

facing page: NASA Earth Observatory photograph of fields in Kansas: corn, sorghum and wheat crops using pivot irrigation.

1. 'Oxford Pocket Dictionary of Current English', Oxford University Press, USA, 2009

2. Population Division of the Department of Economics & Social Affairs (UN DESA), 'The 2018 Revision of the World Urbanization Prospects', The United Nations, New York 2018 [<https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html>], retrieved 18 May 2018

3. Food and Agriculture Organisation (FAO), 'The Future of Food and Agriculture: Trends and challenges', The United Nations, Rome 2017

4. E deCarbonnel, 'Catastrophic Fall in 2009 Global Food Production', Global Research [www.globalresearch.ca/index.php?context=va&aid=12252], retrieved 10 May 2018

and a fractured society of the privileged and the dispossessed. The vast populations that make up modern cities result at best in weak social ties, at worst in mass control with concomitant violence and repression. As Lefebvre wrote in 'La Révolution Urbaine' in 1970, the big city sanctifies inequality, and is the most favourable milieu for the establishment of authoritarian power, pressing the countryside into servitude.⁹ Long before the telematic assault of the virtual world, the Situationists described the alienating nature of the city as a strange hybrid of crowd and solitude. The advent of the internet and online transactions has formed a society of now faceless, as well as nameless, strangers with an attendant diminution in social constraints motivated by anonymity.

Global famine. A poisoned earth. Societal collapse. Civilisation, it appears, is leading us down a path of ruin and steering us towards dystopia rather than utopia. Lovelock, in particular, portends an apocalyptic future one might expect from a science fiction author or religious prophet rather than a respected environmental scientist. In actuality, the complexity of weather systems and the factors that affect climate are still not well understood. However, deforestation and the burning of fossil fuels are leading to irreversible environmental damage, widely believed to be the greatest challenge facing mankind. Meanwhile, evidence of the current and escalating global deficiency in food security is uncontested but has only recently received media coverage or impetus to drive political action. The Paris Agreement and the 2030 Agenda for Sustainable Development have acknowledged the link between hunger and climate change. With the inevitable exponential growth of the urban environment, future cities incorporating mechanisms for food production, responsible energy use and social unity must be reassessed along with our visions for utopia.

By definition an unreachable destination, broadsides on utopia have been launched since its very inception. The word 'utopian' is more often than not used in the pejorative, pertaining to proposals featuring alternate realities rather than dealing with society's real and pressing ills. Such criticism misses the point and dismisses the potency of the utopic vision. Plato's 'Republic' (400 BC), Thomas More's 'Utopia' (1516) and Francis Bacon's 'New Atlantis' (1627) were intended as neither fantasies nor blueprints for reification, but reflections on the societies in which they were written. More significantly, they provided a stalking horse for the development and evolution of new communities that would improve on the status quo. Ebenezer Howard's garden city, for example, was inspired by the utopian tract, 'Looking Backward: 2000-1887', by the American lawyer Edward Bellamy. The third highest selling book of all time when published in 1888, Bellamy's novel immediately spawned a political mass movement and several communities living according to its ideals. Letchworth Garden City and Welwyn Garden City in the UK are founded on Howard's concentric plan of open space, parkland and radial boulevards. Housing, agriculture and industry are carefully integrated, and the developments remain two of the few recognised realisations of utopia in existence. There are valid concerns, however, that the tradition of utopian town planning as advocated by the Congress for the New Urbanism (CNU) and developments such as the Duchy of Cornwall-owned Poundbury, are elitist and non-inclusive. The cost of utopia is what lies outside utopia, the forgotten communities and infrastructure required to support it, a counterpoint that is sharply observed in the Peter Weir film 'The Truman Show', depicting the New Urbanist town of Seaside in Florida.

The 21st century has witnessed a phenomenal escalation in urban construction; entire cities are emerging fully formed in India and China rather than slowly evolving and accreting, made possible by the availability of affordable yet skilled labour, land and an uncompromising autocratic vision. Without invoking the term utopia, the aspiration and inspiration of nascent cities such as Dongtan in China and Masdar in the United Arab Emirates, both heralded as the first model eco-city, are both clear and vital. A model for how we should be living with improved modes of transportation, hydrological

control systems, streamlined energy and supply programmes, and agencies for societal cohesion must surely be planned, albeit in forms protean enough to deal with the vicissitudes of urban living.

Sustainable design of the built environment has largely focused on discrete buildings, and we have become relatively adept at incorporating insulation, cooling, natural ventilation, solar control, greywater recycling, green roofs and renewable energy collection into architecture. Cities, though, are infinitely more complex than buildings, and the shift in scale to sustainable city design calls for a radically different approach to take advantage of the synergistic human-made and natural systems available. A conglomeration of buildings offers thermal efficiencies that are unachievable with smaller detached structures. The compact city, as championed by Richard Rogers, makes communal transport truly viable over the private car. During his address at the Reith Lectures of 1995, 'Cities for a Small Planet', Rogers presented a series of startling statistics demonstrating how the automobile has shaped the city. 'An efficient parking standard requires twenty square metres for a single car. Even supposing that only one in five inhabitants owns a car, then, a city of ten million (roughly that of London) needs an area about ten times the size of the City of London ('the square mile'), just to park cars.'¹⁰ 'As transport by car becomes integral to city planning, the street corners and the shapes and surfaces of public spaces are all determined for the benefit of the motorist. Eventually the entire city, from its overall shape and spacing of new buildings to the design of its curbs, lamp posts and railings, is designed according to this one criterion.'¹¹ Now imagine a city with no cars – the possibilities are legion.

A sustainable high-density mixed-use city also allows waste products to be shared and recycled, land-use to be zoned vertically as well as horizontally, and the implementation of resilient landscapes that include urban agriculture and energy generation at a meaningful scale. In addition to environmental benefits, public and private space can be configured to promote social inclusion and economic growth. In short, the future of sustainable city design cannot be limited to sustainable buildings set within the outdated model of a European masterplan. Currently, the first phase of Masdar City, built by the Abu Dhabi Future Company and designed by Foster + Partners, has entirely replaced cars with an on-demand network of Personal Rapid Transit (PRT) systems.¹² The battery-powered and computer-navigated pods have covered a distance nearing 9000 kilometres on their transit route over six years, and have displaced CO2 emissions equivalent to running 53 cars for a whole year. Significantly, the length of streets has been determined by wind fluid dynamics for urban cooling rather than vehicular traffic efficiency.

Traditionally, there has been a division of disciplines between architectural and urban planning. City design, a more inclusive term than urban planning, needs to embrace a number of disciplines that extend beyond land-use zoning and plot ratios – we need to engage agronomists, hydrologists, geographers, economists, transportation engineers, social scientists and politicians in addition to urban planners, landscape designers and architects. An urban infrastructure freed from the hegemony of the motorcar could and should manifest in a spatial manner radically different from the contemporary metropolis. Furthermore, existing car-based infrastructure – parking lots, motorways, service stations, driveways and garages – will require imaginative overhaul and programmatic adaptation.

5. 'World scientist's warning to humanity', authored by Henry Kendall, former chair of the Union of Concerned Scientists and endorsed by the majority of Nobel laureates in the sciences.

6. D Clark, 'Has the Kyoto Protocol Made Any Difference to Carbon Emissions?' The Guardian: Environment, 26 November 2012

7. The United Nations, 'Paris Agreement 2015', Article 2: 1b, p.3

8. J Lovelock, 'The Revenge of Gaia: Why the Earth is Fighting Back and How We Can Still Save Humanity', Allen Lane, London, 2006, p.154

9. H Lefebvre, 'La Révolution Urbaine', Gallimard, Paris, 1970

10+11. R Rogers, 'Cities for A Small Planet: Reith Lectures', Faber & Faber, London, 1997, p.36

12. 'Masdar City's PRT System Celebrates Milestone with 2 Millionth Passenger', [www.masdar.ae \[https://masdar.ae/en/media/detail/masdar-citys-prt-system-celebrates-milestone-with-2-millionth-passenger\]](https://masdar.ae/en/media/detail/masdar-citys-prt-system-celebrates-milestone-with-2-millionth-passenger), retrieved 10 June 2018

'The world is sick. A readjustment has become necessary. Readjustment? No, that is too tame. It is the possibility of a great adventure that lies before mankind: the building of a whole new world ... because there is no time to be lost. And we must not waste time on those who laugh or smile, on those who give us ironical little answers and treat us as mystic madmen. We have to look ahead, at what must be built.'¹³ Le Corbusier's commentary from 1967 might appear prescient, but could have been written at any time in the history of the city. The urban condition raises recurring as well as fresh challenges for every generation. In the past, architects have not been slow to offer their vision of utopia or ideal city, ranging from the polemic (Ron Herron's 'Walking City', 1964) to the serious (Le Corbusier's 'Radiant City', 1935), the futuristic (Paolo Soleri's arcologies) to the arcadian (Frank Lloyd Wright's 'Broadacre City', 1932). Tellingly, the architect's ideal city is frequently characterised by an immediately comprehensible visual order, whether as a grid or radial system. The meme of the concentric-ringed plan, for example, has been proposed by Filarete in the imaginary city of Sforzinda in 1465, John Claudius Loudon whose 1829 plan for London predated Howard's Garden City green belts by 69 years, and Claude Nicolas Ledoux in his proposal for the city of Chaux that centred around his half-completed Royal Saltworks at Arc-et-Senans. Konstantinos Doxiadis, on the other hand, is a celebrated exponent of the grid city, establishing a flexible plan for Islamabad that allows for gradual low-cost expansion. Other recurring motifs of the ideal city include a coalition between the countryside and the city, the orientation of buildings to a heliothermic axis to maximise daylight, and the liberation of the ground plane for public occupation.

Henri Lefebvre, the French sociologist and author of the seminal neo-Marxist works 'Critique of Everyday Life' and 'The Production of Space', argued that every society produces its own spatial practice and that without a distinctive space to mould it, a drive for societal change will never escape from its ideological beginnings. He ascribed the failure of the Soviet Constructivists of the 1920s and 1930s to them uncritically recycling the modern urban masterplan rather than inventing an appropriate new space to shape and be shaped by new social relations.¹⁴ Planners, landscape designers and architects, then, have a crucial role as the agents of social change, and certainly the authors of the ideal city in their various incarnations saw themselves as such. At this critical juncture, the shape of the space that will help us contest climate change, social deprivation, and deficiencies in food, water and energy has to be re-imagined and re-produced.

As producers of space, architects represent a tiny minority of the rest of society who must in turn modify and refine the blueprint that has been mapped in front of them. They are well placed, however, to understand and design space that is of a human scale and more comprehensible to the general populace than large-scale zoning development maps. What will a city draped in a resilient landscape or an array of gasification plants look, feel, smell and sound like? As urban real estate becomes increasingly scarce, can we cross-programme public buildings and time-share streets with productive landscapes? These are questions that require a holistic understanding of socio-economic, political and ecological practice to answer. Fortunately, advances in visualisation graphics and computer rendering have made it far easier for designers to describe spatial propositions and as a consequence attract the necessary private and public sector investment to back them. Circumspection is necessary, however, to avoid the prevalence of visual information at the expense of less visceral information, and to ensure that the resulting built environment delivers more than a fleeting resemblance to its conceptual origins.

The central thesis of this book is the re-establishment of closed cyclical systems within urban and peri-urban areas and how they will manifest into resilient landscapes of a notional 'Smartcity'. The Smartcity differentiates itself from the 'Eco-city' by embracing new paradigms of sociological programme, environmental-driven form and ecological

interaction. The Smartcity's principal concern is not to overcome nature, nor to strive to preserve the natural environment in its original state, but to harmoniously integrate built form with nature. It is neither a fixed place or a singular approach but rather a manifesto for the production of resilient spaces relevant for the 21st century in the face of climate change.

The Smartcity is not a creation from a blank slate, but an evolution of long-standing sustainable principles that intertwine nature with contemporary desires for a healthier physical, mental and social existence in an increasingly alienating world. It aims to preserve and enhance natural and cultural resources, expand the range of eco-transportation, employment and housing choice and values long-term regional sustainability over short-term focus. The currency of an 'eco-' prefix has become devalued through overuse and abuse, and 'sustainability' is a blanket expression – clearly, some aspects of our lifestyle are worth sustaining and others are not. Deciding and acting on which category they fall into, however, is not as straightforward as it appears. Conservation of energy and the environment are key priorities, but so too is the conservation of heritage, tradition and human interaction. Each generation is the proprietor of its own values, and the current zeitgeist has reacted against the mass-produced and anodyne, whether in the guise of housing, jobs and clothing or fruit and vegetables. Without ignoring technological advances, the Smartcity embraces leanness and the low-tech by adopting an operating system that filters out excess and reboots our social space. Smartcity living does not ask for 'more' but determines how to use less in the creation of a healthier mental and physical existence.

At the forefront of the Smartcity manifesto and its diverse forms of resilient landscapes is urban agriculture. The hybridisation of agriculture and urban fabric can lead to an association that is symbiotic rather than parasitic, reducing carbon emissions and food shortages in addition to providing less tangible but equally significant environmental and social benefits. Food in most cultures is the glue that binds families and communities, and the restoration of the primal link between town-dwellers and their sustenance would constitute an important foundation to an increasingly ungrounded universe. The Smartcity manifesto reinstates food to the core of its governance.¹⁵

In this technologically advanced age we live in, there are shortages of food, shortages of basic living standards, and shortages of education and literacy. There should be no shortages of jobs. As a result of its resilient landscapes, the Smartcity programme comes with a host of fresh employment opportunities that are cross-sector and require a range of skills in the renewable energy, recycling, agriculture, and green construction industries. The business case for 'greening' the economy is robust. The potential for improving labour markets is greatest in developing nations, where over 40 per cent of the global workforce and their dependants are condemned to a life in poverty and insecurity.¹⁶

Smartcity strategies are inclusive, engaging all age groups, cultures and ethnicities. The Smartcity is an integrated holistic vision, not an appendix or a collection of unrelated ideas. The Smartcity calls for the renaissance of a manual universe in which we do things – grow food, play, travel, and design – from first principles again. It is a mindset questioning the way we live, driven by its inhabitants and prioritising human sustainability above all else. The rest will follow.

13. Le Corbusier, 'The Radiant City: Elements of a doctrine of urbanism to be used as the basis of our machine-age civilisation', Faber & Faber, London, 1967, p.92

14. H Lefebvre, 'The Production of Space', DN Smith (trans.), Blackwell Publishing, Oxford, 1991, p.59

15. CJ Lim, 'Food City', Routledge, New York, 2014, pp.185–187

16. M Renner, S Sweeney & J Kubit, 'Green jobs – towards decent work in a sustainable, low-carbon world', United Nations Environment Programme Report, September 2008, pp.5 + 73 [http://www.ilo.org/global/topics/green-jobs/publications/WCMS_158727/lang--en/index.htm], retrieved 18 June 2018



From Soil to Table

'And the LORD God made all kinds of trees grow out of the ground – trees that were pleasing to the eye and good for food.' – Genesis 2:9

'And the LORD God commanded the man, "You are free to eat from any tree in the garden ..."'
– Genesis 2:16

15

Prior to their fall from grace for eating from the tree of knowledge, the fruit from the Garden of Eden provided Adam and Eve with food aplenty without having to toil for their sustenance. Since humanity's earliest days, we have yearned for immediate access to fresh healthy food. Refrigeration and rapid transport systems have, to a certain extent, made time and distance an irrelevance. In the United States, however, processing, packaging, transportation and storage of food account for ten percent of the total national energy budget,¹ with fresh produce travelling an average of 1500 miles from farmer to consumer.²

It is estimated that an acre of farmland is lost to urbanisation and highway production for every added person. It has been projected that by 2025, all food grown in the United States – the largest exporter of food worldwide – will be used for domestic purposes. Economically, this will result in an annual \$40 billion loss of income.³ When compounded by the reality that verdant fertile industrialised nations such as the UK have abandoned the objective of self-sufficiency and are hugely dependent on imported food, and that food security is indefensibly lacking for the billions, the need for increased food production and its equitable distribution is clear; a rapprochement needs to be reached between the praxis of urban living and food production.

The modern food industry epitomises the Marxist theory of alienation perhaps better than any other labour activity.⁴ Unlike other trades and crafts that have followed esoteric and non-essential vectors, procurement of basic sustenance has always been a universal and innate occupation – foraging, hunting, husbandry and harvesting are straightforward exchanges of human capital in the form of energy expended and nutritional recompense. The abstraction of food from its origins through processing, portioning and packaging constructs a disassociation between the food producer and product, and between urban consumer and rural supplier. The consequence of this disassociation is that we, as consumers, are not seeing the clear effects of climate change and energy shortage on food production. Food supplied through the supermarket monopolies is still highly affordable despite the rising prices of the fuel essential for modern agriculture, but the cost of food we do not see takes into account the expense of environmental damage. Excess nitrogen runoff from fertilisers causes eutrophication of our

1. ME Webber, 'How to Make the Food System More Energy Efficient', *Scientific American*, 29 December 2011 [<http://www.scientificamerican.com/article.cfm?id=more-food-less-energy>], retrieved 20 May 2018

2. RS Pirog et al., 'Food, Fuel, and Freeways: An Iowa perspective on how far food travels, fuel usage, and greenhouse gas emissions', *Leopold Center for Sustainable Agriculture Pubs & Papers*, June 2001 [https://lib.dr.iastate.edu/leopold_pubs/paper/3/], retrieved 20 May 2018

3. D Pimentel & M Giampietro, 'Food, Land, Population and the US Economy', *Carrying Capacity Network (CCN)*, 21 November 1994 [<http://www.carryingcapacity.org/resources.html>], retrieved 20 May 2018

4. K Marx, 'Economic and Philosophical Manuscripts of 1844' (The Paris Manuscripts), M Mulligan (trans.), *Progress Publishers*, Moscow, 1959

lakes and rivers, resulting in contaminated water and the destruction of aquatic ecosystems. Land-based ecologies are not spared either, despoiled by pesticides and herbicides. It is important to note that these are not simply costs to the environment, but fiscal costs to the general public in the form of subsidies, clean-up costs, and health treatment for poor nutrition, obesity, contaminated food and disease.

16

We, as city dwellers, need to re-engage with the roots of our sustenance in a way that does not involve abstract extruded vacuum-sealed meals if we are to alleviate the burdens of food production on the planet. The implementation of urban agriculture – the cultivation, processing and distribution of food within the city – would have the two-fold effect of making these processes transparent and offering a means for the re-establishment of food and its production as a social relationship rather than commodity. It would mean an end to a nonsensical boomerang trade that sees the UK importing 22 000 tonnes of potatoes from Egypt and exporting 27 000 tonnes in the other direction.⁵ Resilient landscapes of urban agriculture would result in food immediacy within cities, providing nutrition and health benefits. It would create job opportunities, generate income for urban poverty groups and provide a social safety net. Urban organic waste would be turned into an agricultural resource. Social inclusion of disadvantaged groups and community development would be facilitated, and the city would benefit from urban greening and the maintenance of green open spaces. Bringing living food back to where we live would not re-establish the Garden of Eden, but there would be no second, third and fourth parties responsible for the commodification of produce, giving a new meaning to hand to mouth existence.

Urban agriculture is not a new phenomenon; its popularity and adoption has waxed and waned over the millennia, from the recycling of urban wastes and qanat tunnel irrigation networks in Ancient Persia for agriculture, to the stepped cities and farming terraces of Machu Picchu that can be considered as a precursor to hydroponics. In more recent times, victory gardens during the two world wars were employed to alleviate food shortages with rooftops, balconies, pontoons



and public parks appropriated for food production. In a remarkably ambitious programme, gardening classes, literature, seeds, fertiliser and committees were organised, yielding over half a billion dollars worth of war-garden crops at the end of the First World War in America alone.⁶

Today, the enduring arcadian dream of green space and growing food for oneself can be found in the allotment, a land reform system that has taken the form of the American community garden, the Russian dacha, the French jardin familial, the Dutch Volkstuin and the Danish Kolonihave. Growing one's own food in Russia is a long-established tradition, among the affluent and underprivileged alike. In Germany, according to the concept of granting, there is the kleingärten, the schrebergärten, kolonie, parzelle, armengärten, sozialgärten, arbeitergärten, rotkreuzgärten and eisenbahngärten. Perhaps most noteworthy of these resilient landscapes is the intercultural garden, a project of the German Association of International Gardens that aims to improve racial integration and promote intercultural interaction.

The positioning of farming within the city also addresses water management considerations. Conventional agriculture is hugely dependent on water resources, leading a UN world development report to declare water as mankind's most serious challenge of the 21st century. Vandana Shiva, environmental activist and author of 'Water Wars', estimates that the food intake per person in the developed world uses approximately 3000 litres of foreign water every day. She pointedly describes this trade as the import of virtual water to the rich and the export of drought to food producing nations in the developing world.

Within our cities, the materials that comprise the urban fabric – roads, roofs and concrete landscape – constitute flood risks due to their inability to attenuate surface water. Vegetation, edible or otherwise, is a ready-made natural sustainable drainage system, harvesting rainfall and mediating extremes of temperature as well as being the most efficient photovoltaic cell currently available to us by virtue of chlorophyll's photosynthetic properties.

While city farms go some way to redressing the disjunction of food production between the city and the countryside, farming practices outside urban areas also need to be reappraised and it is worth looking at how these have changed. The classic cyclical system of crop sequencing has been used since antiquity, with farmers rotating crops and introducing fallow periods so that nutrients in the soil can be replenished naturally by plants that have differing requirements, and which can release by-products that are beneficial to the crops that supplant them. The build-up of pathogens and pests is curbed and soil structure improved. Combined with moisture trapping and terracing, crop sequencing even renders agriculture in semi-arid environments possible, a process known as dryland farming. By the early 20th century, the practice of crop rotation had largely been discontinued, contributing to the dust bowl of the Great Plains that dramatically worsened the impact of the US depression of the 1930s. The resulting Soil Conservation and Domestic Allotment Act of 1935 corrected earlier government policy in the United States that had allowed agricultural land to become vulnerable to wind erosion. The mass planting of trees, reintroduction of native grass and an educational programme of non-destructive farming techniques paid rapid dividends.

facing page: Imagining Recovery
– Ready access to nutrition and
reduction in food-miles.

5. A Simms, V Johnson, J Smith & S Mitchell, 'The Consumption Explosion: the Third UK Interdependence Day Report', NEF, London, 2009, p.4

6. CL Pack, 'The War Garden Victorious', Press of J B Lippincott Co., Philadelphia, 2009

7. R Heinberg speaking at the 'Soil Association One Planet Agriculture Conference', January 2007, cited in C Steel, 'Hungry City', Vintage Books, London, 2009, p.50

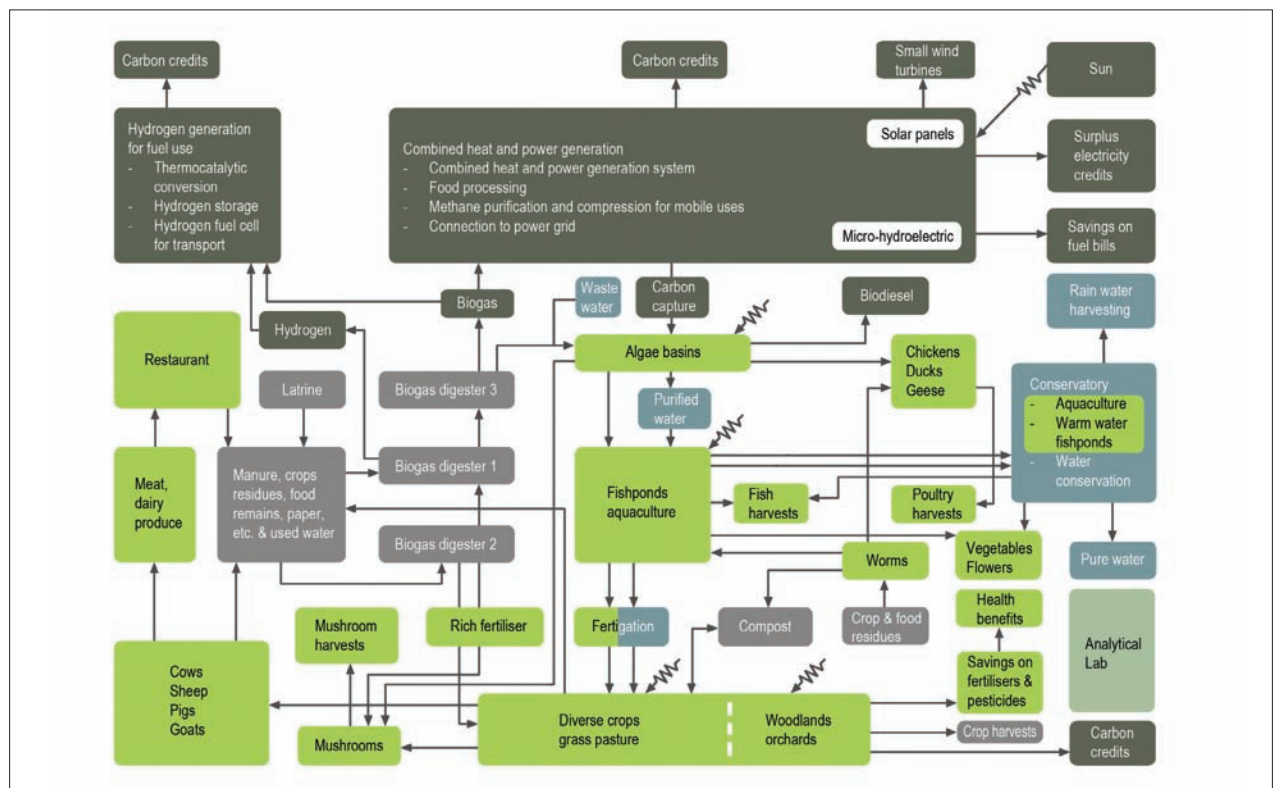
8. RR Pinderhughes, 'Urban Agriculture in Havana, Cuba', San Francisco State University, 2000

The advent of synthetic fertilisers has meant that monocultures have become once again dominant, causing new problems relating to contamination of watercourses and immense energy expenditure. As Carolyn Steel, author of 'Hungry City', points out, there is no such thing as 'cheap food' – for every calorie of food modern agribusiness produces, it is burning an estimated ten in the form of fossil fuels.⁷ The cost of high yields from specifically chosen cultivars is borne by the soil, and monocultures have become so successful that worldwide surpluses have depressed the crop prices that farmers receive, threatening their livelihoods. Cash crops are currently plentiful to feed the planet's population, but distribution to markets is driven by economics leading to the paradox of wasted food and hungry millions.

18

Is there a way back? James Lovelock believes that we will need to resort to genetically modified crops on a global scale in order to stave off catastrophe and has advocated the synthesis of fermented food from air, water and trace chemicals as the future. If we are to avoid wholly synthetic foods that will definitively sever all connection between our sustenance and us, we may have to re-employ cyclical farming systems and self-sustaining permacultures.

Increasing the efficiency of our food system requires collaborative efforts by governments, businesses and consumers. The farming revolution in Cuba may be seen as a historic microcosm of the problems we are now facing and offers a model for adoption in appropriate environments. Following the collapse of the Soviet Bloc in 1989, from which it imported most of its food, Cuba developed the world's first and only state-supported urban agriculture infrastructure.⁸ In response, the inhabitants of Havana, Cuba's capital, took over every available surface in the city for growing food and rearing livestock in a collective effort redolent of the world war victory gardens. The Cuban government retrospectively sanctioned this impromptu occupation by declaring public land usufruct, granting free right to cultivate the land in perpetuity.



The Perpetual Motion Machine

'Mulberry trees are grown to feed silkworms and the silkworm waste is fed to the fish in ponds. The fish also feed on waste from other animals, such as pigs, poultry, and buffalo. The animals in turn are given crops that have been fertilised by mud from the ponds. This is a sophisticated system as a continuous cycle of water, waste and food ... with man built into the picture.'

– Jennifer Pepall, 'New Challenges for China's Urban Farms', IRDC, 1997

19

The Chinese mulberry dyke fishpond system, first introduced during the dying days of the Ming dynasty (16th century) in the northern part of the Pearl River Delta, is a striking model of a closed sustainable ecosystem deployed by mankind to provide food and clothing. The benefits of each link in the system had been known to the farmers of the area for many years, as reflected in the folk saying that 'the more luxuriant the mulberry trees, the stronger the silkworms and the fatter the fish; the richer the pond, the more fertile the dyke and the more numerous the cocoons'.¹

facing page: Dream Farm 2 Systems Diagram; Dr Mae-Wan Ho (ISIS).

Elegant forms of such closed systems in farming have fallen victim to new technologies, in particular the Haber Bosch Process to synthesise ammonium nitrate. The agricultural revolution enabled the evolution of an urban lifestyle, dramatically reducing the agricultural labour force and freeing the populace for other pursuits. Ironically, the unchecked growth of an urban lifestyle at the expense of agricultural land is now threatening the production of food that made the city's existence initially possible.

Urban agriculture provides an overdue mediation between the countryside and city, making possible a circular economy that has the same seductive clarity and well-tempered logic as the mulberry dyke fishpond system – the solid organic waste of city dwellers can be alchemically transformed via anaerobic digestion into gaseous energy and fertilising digestate; greywater and blackwater from showers, sinks and gutters can be treated and rechannelled to irrigate our crops provided they are in close enough proximity. With the added ingredient of sunlight, we have food from a living grocery store to propel another cycle of the human perpetual motion machine.

Since the 1920s, when Chinese exports of raw silk were at their peak, the mulberry dyke fishpond system has seen a sad decline after having evolved for over two millennia, the Chinese orthodoxy of a circular economy implacably usurped by urbanisation and industry. In recent years, however, cyclical systems founded on mulberry dyke farming have seen resurgence in academic circles as an alternative to unsustainable agriculture and have credible potential for real world application.

1. Asia-Pacific Environmental Innovation Strategies (APEIS); Research on Innovative and Strategic Policy Options (RISPO).

Dr Mae-Wan Ho, geneticist and director of the Institute of Science in Society (ISIS), has been developing the 'Dream Farm 2', a model of an integrated, zero-emission, zero-waste farm that maximises the use of renewable energies and turns waste into food and energy resources. An implementation and extension of George Chan's Integrated Food and Waste Management System (IFWMS), Ho likens the farm to an organism, ready to grow and develop, to build up structures in a balanced way and perpetuate them. The closed cycle creates a stable, autonomous structure that is self-maintaining, self-renewing and self-sufficient.²

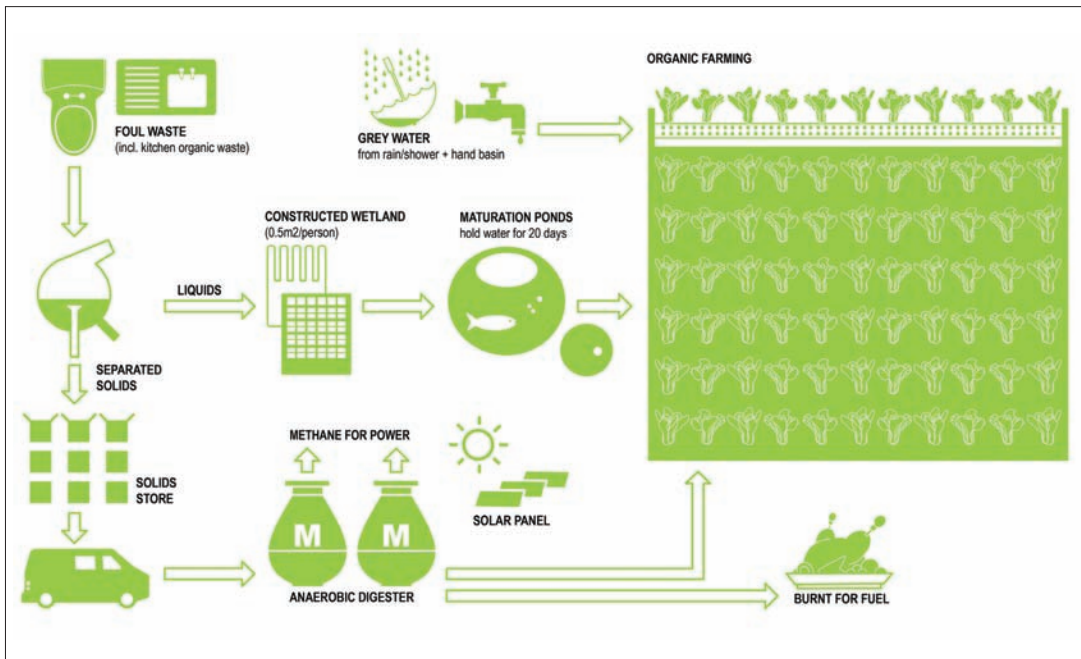
20 Key to the process is a zero-entropy or zero-waste directive that must be adhered to as far as possible. The human body tends towards this ideal, explaining why we age relatively slowly and do not spontaneously decompose. The Dream Farm becomes more productive as more life cycles are incorporated, with increasing amounts of energy and standing biomass stored within the system. Echoing the lessons of crop rotation, academic researchers have rediscovered that productivity and biodiversity are happy bedfellows in a sustainable system, with different life cycles reciprocally retaining and circulating energy for the whole system.

Circular economies are not restricted to agriculture. The reduction of energy demand through inter-seasonal heat transfer (IHT) is the perfect example of a Smartcity cyclical system. Excess heat during the summer can be collected in a thermal store and retained until wintertime, when it is redistributed through pipework to provide thermal comfort (usually with the assistance of heat pump technology), all the while building up a store of chilled water or chilled ground stores which will be used for cooling during the summer. At the scale of a city, the potential for reduction in energy demand is immense, making our current scattering of energy-autarkic houses pale into insignificance. Coupled with waste recycling and renewable offsets, a citywide net zero carbon lifestyle could actually be possible.

Harvard-based sustainability expert Nader Ardalan maintains that reduction of carbon emissions in the Middle East is possible purely by creating 'intelligent buildings that are inspired by the wisdom of the ancestors, who worked with nature to adapt to the demanding desert climate'.³ The largest opportunity for cutting demand lies in the employment of holistic design and the configuration of buildings to passively heat and cool our environments for thermal comfort. As in the case of agriculture, antiquity provides us with lessons in our age of technological marvels. We need to look back to the Ancient Greeks, who reorientated entire city grids to increase southern exposure for passive solar heating in the winter months. We need to recycle the wisdom of cavemen who somehow knew that annualised thermal stasis is achieved at a depth of six metres below ground level and took advantage of the land's ability to mediate extremes of temperature. We need to duplicate the extensive underground labyrinths of the ancient Persians that were used to cool their buildings over 5000 years ago.

Shifting scale from seasons to days, temperature changes of the diurnal cycle can also be manipulated by using exposed heavyweight construction materials that retain daytime heat in their thermal mass to be released during the night. Cooling strategies in tropical climates utilise the water cycle, reducing temperature by releasing latent heat of evaporation. Here we can refer to the baud geer wind towers and cisterns of traditional oriental architecture, or the fountains and reflection pools of Moroccan courtyard riads.

The vast majority of discourse on energy conservation focuses on the shift from fossil fuels to renewable energies in the form of wind turbines, hydro-electric plants, combined heat and power (CHP), photovoltaics and ground source heat



left: Imagining Recovery – The perpetual motion machine channels urban waste back into farming.

pumps. With ongoing concerns regarding the safety of nuclear power, such technologies serve a vital purpose, and in urban areas offer the only viable solutions. As an alternative to burning fossil fuels and releasing radioactive materials, heavy metals, volatile organic compounds, greenhouse gases and acids into the atmosphere, 'renewable' energy generation can only be welcomed. The idea that such energy is 'clean', however, is fundamentally flawed – biomass crops require food, water and energy for growth and transportation while photovoltaics and wind turbines require maintenance, replacement and significant energy resources in their production. In order to amplify the benefits of cleaner energy supplies, however, the reduction of energy consumption from the outset must be considered. Our first question should not be 'How do we generate more energy to feed our destructive lifestyles?' but rather 'How do we minimise our need?'

A second alternative to the generation of new energy is to share and recycle it. With hydro-electric, fossil fuel and wind plants situated in locations remote from cities, there are huge losses in efficiency and little potential for heat capture that could be used for district heating. Cogeneration fuel cells, now compact enough to be installed in an urban basement, provide one solution. The Industrial Symbiosis at Kalundborg in Denmark is a commercial-scale example of an energy-sharing cooperative often cited by industrial ecologists. Seventy-five miles west of Copenhagen on the coast of Denmark, this industrial eco-system is characterised by a network of trading companies in a closed cycle, where the waste or energy from one neighbour becomes a resource for another. 'From sharing one resource: waste water, in the 1970s, today eight companies are sharing 25 different resources, from fresh water and biogas to gypsum. This is reducing the CO2 emissions by over 635 000 tonnes per year and creating annual savings of DKK182 million for the enterprises cooperation and DKK106 million in socio-economic values.'⁴ The partnership was awarded the 'Win-Win Gothenburg Sustainability Award' in 2018.

2. MW Ho, 'Dream Farm 2 – Story so far', Science in Society Archive, 24 July 2006 [http://www.i-sis.org.uk/DreamFarm2.php], retrieved 16 March 2009

3. R Staley, 'The Architecture of Human Survival', yourmiddleeast.com, 20 June 2013 [https://yourmiddleeast.com/2013/06/20/the-architecture-of-human-survival/], retrieved 20 October 2017

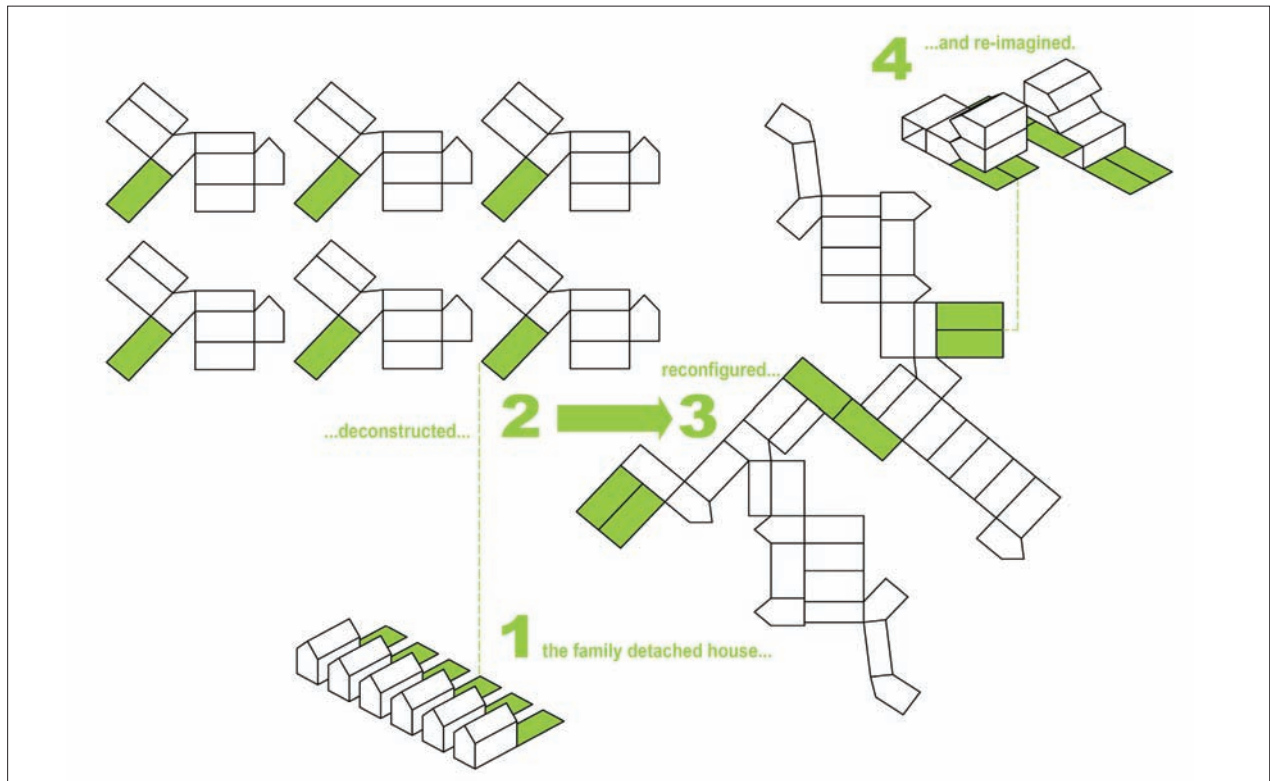
4. The Jury Motivation, 'Kalundborg Symbiosis', Win-Win Gothenburg Sustainability Award 2018, 19 June 2018 [http://winwingothenburgaward.com/item/2018-kalundborg-symbiosis/], retrieved 27 August 2018

5. C Weetman, 'A Circular Economy Handbook for Business and Supply Chains: Repair, remake, redesign, rethink', Kogan Page Limited, London, 2017, p.105

6. SE Haggard, 'Sustainable Industrial Design and Waste Management: Cradle-to-cradle', Elsevier Academic Press, Burlington, 2007, p.57

In the early 1970s the Statoil refinery agreed to provide waste gas as a fuel source to Gyproc that the latter was able to use as a low-cost fuel source. Treated wastewater was and is still sold to the nearby Asnæs fossil fuel power station which, losing 60 per cent of its energy through heat, began to temper thermal inefficiencies by providing heating to 3500 homes and selling process steam to the refinery and the pharmaceutical company, Novo Nordisk, for sterilisation purposes. The cooling water is also passed on to a fish farm, resulting in improved breeding conditions and growth in the warmer water. The 30 tonnes of annual ash by-product are recycled in the cement industry, and sulphur dioxide from flue gases are sold to Gyproc for gypsum production.⁵Wastes from all the symbiosis companies in the municipality are collected by Kara/Noveren I/S to produce electricity. Enzyme production at Novozymes A/S creates over 150 000 cubic metres of solid biomass as part of the fermentation process, which is exported as fertiliser, and yeast slurry from insulin production at Novo Nordisk, which is used in the pig-farming industry.⁶This circular economy, mirroring the symbiotic farming systems of the Dream Farm 2, has resulted in a considerable reduction in water, air and ground pollution whilst conserving natural resources. It is noteworthy that these environmental benefits are themselves by-products of profit-making commercial decisions.

Urban growth can no longer continue through synthetic linear processes that are colossally wasteful, discharging contaminants into the air, ground and water. Circular organic systems are in comparison regenerative, and it makes sense to ride the wave of these natural systems, harvesting the fruits of a harnessed ecology and feeding the process as necessary to reap disproportionate benefits from minimal investment. Natural systems of resilient landscapes are self-perpetuating and symbiotic. And it is high time that mankind rejoined these systems as a constructive rather than destructive force.



The American Dream Redux

The American Dream is ‘that dream of a land in which life should be better and richer and fuller for everyone, with opportunity for each according to ability or achievement. It is a difficult dream for the European upper classes to interpret adequately, and too many of us ourselves have grown weary and mistrustful of it. It is not a dream of motor cars and high wages merely, but a dream of social order in which each man and each woman shall be able to attain to the fullest stature of which they are innately capable, and be recognised by others for what they are, regardless of the fortuitous circumstances of birth or position.’

– James Truslow Adams, ‘The Epic of America’, 1931

The Dream that James Truslow Adams captured for the American people in ‘The Epic of America’ was one based on social and ethical principles, reflecting a country putatively unencumbered by religious, class and racial boundaries with life prospects based on talent and determination rather than wealth and political connections. Successive generations have seen recalibrations of the Dream and somewhere down the line, it became synonymous with home and automobile ownership as a symbol of affluence, precisely what Adams declared the Dream was not.

Broadacre City, Frank Lloyd Wright’s conception of the utopian city, reinforces this aspiration. A decentralised democracy, Broadacre City, or ‘Free City’ as Wright sometimes called it, was agrarian in nature, with a community built upon the transfer of a one-acre plot per citizen from federal land. In his own words, ‘when every man, woman, and child may be born to put his feet on his own acres and every unborn child finds his acre waiting for him when he is born – then democracy will have been realised’.¹ Every family would own their own home in the form of the ‘Usonian House’ that would come in different-sized variants depending on need. The sizeable distances between individual dwellings and educational, religious and leisure establishments would lend primacy to the motorcar, with the larger Usonian houses incorporating five-car garages and pedestrian safety guaranteed only within the one-acre plots.

As a model for new social space arising out of the Great Depression and advancing technologies in telecommunications and the automobile industry, Wright’s vision was every bit as revolutionary as, but divergent from, Le Corbusier’s Radiant City, revealed three years later in 1935 and extolling the virtues of stacked high-density mixed-use living.²

In the light of today’s world population growth and sustainability concerns, the Radiant City appears to be the more relevant model for city design. The ideal of the single-family detached house and

facing page: Imagining Recovery – The deep-rooted American ideal of the single-family detached house and automobile requires re-evaluation in order to effect change.

1. MB Lapping, ‘Toward A Social Theory of the Built Environment: Frank Lloyd Wright and Broadacre City’, *Environmental Review*, vol.3, no.3, Spring 1979, Oxford University Press, p.14

2. Le Corbusier, ‘The Radiant City’, Faber & Faber, London, 1967

automobile that has permeated the developing world is deep rooted but requires re-evaluation in order to effect change. The white picket-fenced suburban utopia of Wisteria Lane needs to be supplanted by a dream that is both leaner and more expansive, comforting but challenging.

24

The unattainable nature of utopia is less to do with an unreachable goal than the shifting of goalposts, what Gregg Easterbrook terms the Progress Paradox in his book of the same name. We have never been wealthier, lived longer and amidst less crime. The environment has also, with notable exceptions, become cleaner. However, there has been no commensurate increase in happiness, a contradiction that Easterbrook attributes to 'choice anxiety' and 'abundance denial'.³ Similarly, the Easterlin paradox of 1974 posits that unlimited economic growth is not necessarily beneficial to contentment, correlating the 'happiness' index of countries at various levels of development; Easterlin showed that the inhabitants of low-income countries were not proportionally less happy than those of higher income nations.⁴

Nevertheless, the influence of the American Dream as a driving force for individual improvement in the 21st century cannot be underestimated; studies have shown that it is only following the 'Great Recession' of 2008 to 2009 with its home foreclosures, burgeoning unemployment and increasing energy costs that national attitudes to the Dream have soured. The global recession may be seen, though, as an opportunity as well as a catastrophe, enabling society at large to realign itself with a grounded value system that eschews rampant consumerism and exploitation.

Similarly, it is time for designers to reassess the values of their profession. In order to regain public and political confidence, design needs to offer intelligent solutions that focus on need and demonstrate added value. Beauty will not be judged purely through the lens aesthetic but through the elegance of efficient arrangements and systems. Modesty rather than narcissism will be the acceptable face of sustainable design. On the one hand, the currency of architectural design is severely devalued when it comes to economic renewal, even in the spheres of housing and commercial developments that it is associated with. Spaces can be designed to be functional, flexible, to have green credentials and, even to be beautiful. Design can improve quality of life and contribute towards the wider society; on the other hand, the contribution of construction professionals is for the most part guided or stymied by government policy and developing agencies. The real influence of the designer, whether of food packaging or a city master plan, lies in the visualisation of an alternative reality, a reality that is demonstrably better but conceivable only through the designer's shared vision. Too often, this alternate reality is seductive but bogus, used to market banal consumer products. As imagineers, however, designers are in a position to cajole the general public to embrace positive and profound change so that progress is not hampered by cultural bias and financial conservatism.

The compact city, which offers so many beneficial synergies, is at odds with the outdated American Dream. Change has to be gradual, and will be abetted by a modal shift in transportation such as that implemented in Curitiba, capital city of the Brazilian state Paraná, that will support physical interaction and societal cohesion. The resilient landscape of the Smartcity needs to demonstrate that shared experience and pooled resources can offer an improved and viable model to individual advancement. The simple notion that public space in the shape of a favourite table at a café, a park bench or a painting hanging in the permanent collection of a gallery can be sequestered into a shared but personal ownership is nonetheless a powerful one.

There are also encouraging signs that America's love affair with the automobile is in decline. 'Walkability' has become a buzzword amongst American estate agents, who have reported that housing values have shown a significant increase where schools and public transport facilities are within walking distance compared to the past. The expense of maintaining an additional dependency that provides only sporadic benefit coupled with vehicular congestion, competition for parking spaces, increasing fuel costs and pollution are slowly making the car a convenience that does not always justify the expense. There is also a growing sense that the vibrancy of dense mixed-use neighbourhoods is more appealing than the bland suburbia of Levittown shaped by streets and cars. The post-war mass-produced homes were built on a seven-square-mile tract of Long Island's potato and onion fields, and still stand as a harrowing indictment of America's 'general lust for conformity', and 'blind, desperate clinging to safety and security at any price'.⁵

Linked to the new American Dream must come a recalibration of the perception of beauty. The mowing of the front lawn in suburban America has become bizarrely ritualised, the beautiful manicured lawn a point of pride signalling conformity to a suburban code of conduct. The Canadian cultural critic and self-styled 'horticultural philosopher' Robert Fulford sees the lawn as an instrument for public shaming and social control: 'As the death of a canary announces the presence of gas in a mine, so a dandelion's appearance on a lawn indicates that Sloth has taken up residence in paradise and is about to spread evil in every direction. Pretty as they might look to some, dandelions demonstrate a weakness of the soul. They announce that the owner of the house refuses to respect the neighbourhood's right to peace, order, good government.'⁶ Hyperbole aside, the manicured lawn is an unfathomable oddity to countries where the front yard is not central to their culture, rendered all the more contentious in the wider context of sustainability and food security. Scaled up, the great American lawn covers over 50 million acres of the country – more land area than is used for the growth of wheat or corn – and consumes vast water and energy resources for its maintenance. Perversely, it offers no spatial function; it is effectively wasted space despite the 'beauty' it proffers. Corraling this land resource for the production of food would result in a different kind of beauty that is neither skin-deep nor associated with the vanity of status. Resilient urbanism is characterised not only through the production of new social space, but also the creation of a new social aesthetic, and it is not inconceivable that this cultural anachronism, imported from England over a quarter of a millennium ago, will become a symbol of vulgar ostentation rather than good taste.

In addition to defining the American Dream, Adams is also remembered for his essay 'To "Be" or to "Do": A Note on American Education',⁷ in which he declares 'there are obviously two educations. One should teach us how to make a living and the other how to live.' The relevance of his ideas remains undiminished.

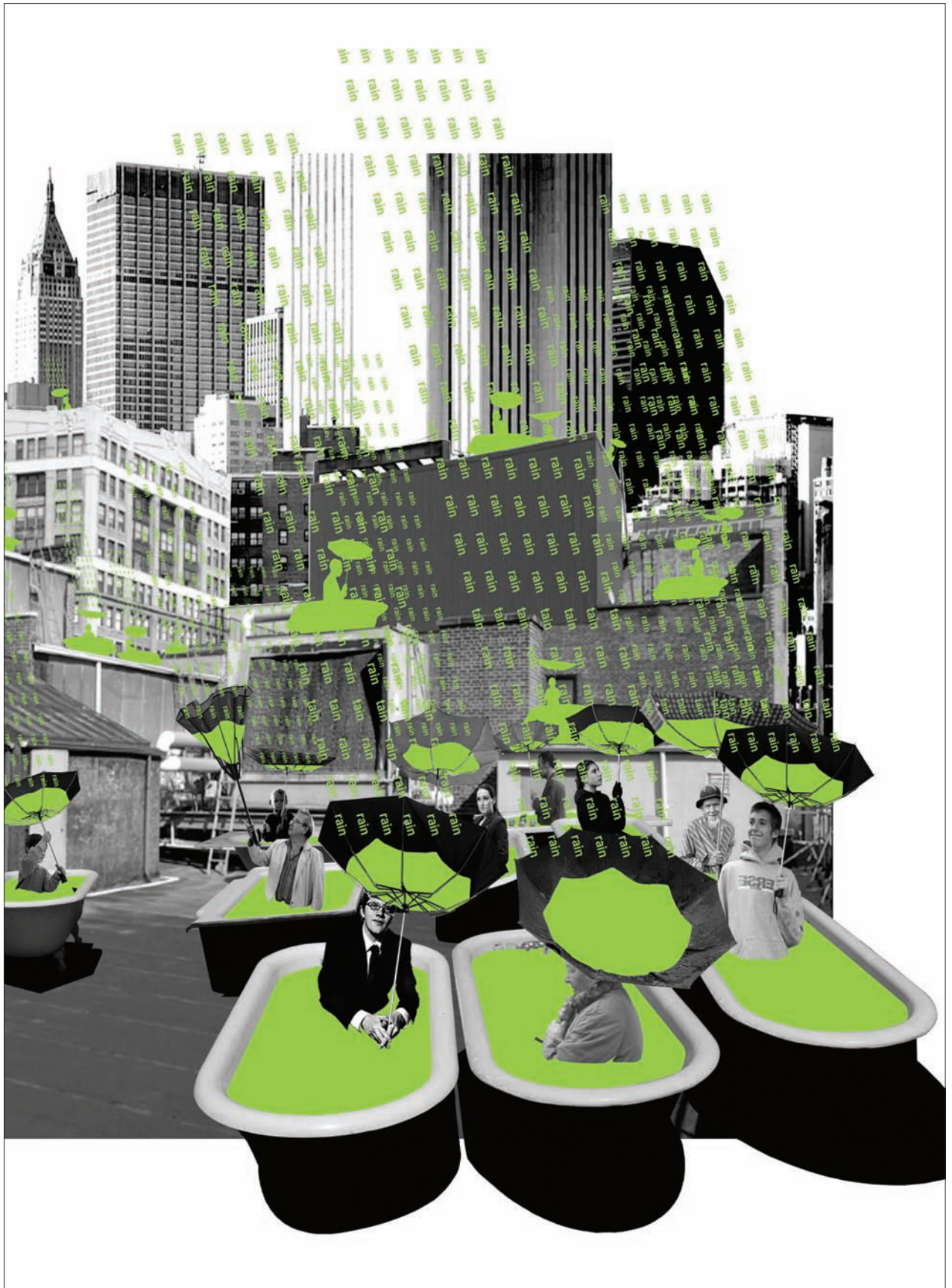
3. G Easterbrook, 'The Progress Paradox: How life gets better while people feel worse', Introduction, Random House, New York, 2003

4. R Easterlin, 'Does Economic Growth Improve the Human Lot? Some Empirical Evidence', in 'Nations and Households in Economic Growth: Essays in honour of Moses Abramovitz', PA David & MW Reder (eds.), Academic Press, New York, 1974, pp.89–125

5. C Marshall, 'Levittown, The Prototypical American Suburb', The Guardian: Cities, 28 April 2015

6. R Fulford, 'The Lawn: North America's Magnificent Obsession', Azure magazine, July-August, 1998, pp.34–41

7. JT Adams, 'To "Be" or to "Do": A note on American education', Forum magazine, HG Leach (ed.), vol. LXXXI, no.6, New York, June 1929, pp.321–327



Rise of the Eco-warrior

**William Sweet • Fernando Pereira • Chico Mendes • Mike Hill • Karel Van Noppen • Kenule Saro-Wiwa
• Jill Phipps • David Chain • Bartolomeu Morais da Silva • Fernando Sarmiento • Celso Pojas • Danny
Qualbar • Rolando Antolihao • Vicente Paglinawan • Isabelino Celing • Dorothy Stang • Sombath
Somphone • Francisco Canayong • Jose Ribeiro da Silva • Maria do Espirito • Hernán Bedoya**

27

In the developed world, the eco-warrior is a figure of ridicule, bringing to mind tree-huggers, hippies and holier-than-thou evangelists. The roll call of names above comprises just a few of the environmental activists who have been killed defending habitats and causes counter to the interests of powerful economic groups, sometimes with governmental ties. Many of those habitats are also home to, or represent the livelihoods of, impoverished indigenous communities. The atrocities included the murder in 1995 of Kenule Saro-Wiwa, who dared to speak out against the environmental damage to his homeland, Ogoniland, following decades of oil waste dumping by multi-national corporations, by the Nigerian military; Francisco Canayong, the president of a Philippine farmers' association, stabbed to death for rallying villagers to block a China-bound shipment of chromite ore from an illegal mine that was poisoning local water sources; Sombath Somphone's disappearance in 2012, which came after he spoke up for victims of a land-grab scheme that saw village rice fields bulldozed to make way for foreign-owned rubber plantations;¹ and Hernán Bedoya in Colombia, shot 14 times by a paramilitary group for protesting against palm oil and banana plantations on land stolen from his community in 2017. One of the most celebrated environmental martyrs is Chico Mendes, the rubber tapper whose murder in 1988 ignited international awareness of and support for the preservation of the Amazon rainforest against logging and ranching activities. In 2017 alone, the annual figures of international NGO Global Witness showed at least 207 land and environmental activists were killed across 22 countries, almost four a week.² The term 'warrior' is neither hyperbole nor ironic.

Today's eco-warriors include scientists, politicians, entrepreneurs, journalists, designers and farmers among their number, involving every age, ethnicity and gender. 'Women produce up to three-quarters of the food crops grown in West and Central Africa, and participate in agroforestry, tree nursery establishment and management, and community forestry action.'³ Cécile Njebet, president of the African Women's Network for Community Management of Forests underlines that the empowerment of women farmers not only improves their lives but also the resilience of communities in the fight against poverty and climate change. The United Nations envisages if women had the same access to agricultural resources as men, they would be able to increase output on their farms by 20 to 30 per cent, raising total agricultural production by up to four per cent worldwide and reducing the number of hungry people

facing page: Imagining Recovery
– greywater recycling and the
experience of recovery.

1. Scott Wallace, 'Why Do Environmentalists Keep Getting Killed Around the World?', *Smithsonian Magazine*, February 2014, pp.64–69

2. B Kyte, B Leather & H Iqbal, 'Deadliest Year on Record for Land and Environmental Defenders, as Agribusiness is Shown to be the Industry Most Linked to Killings', *Global Witness: Press Release*, 24 July 2018 [<https://www.globalwitness.org/en/press-releases/deadliest-year-record-land-and-environmental-defenders-agribusiness-shown-be-industry-most-linked-killings/>], retrieved 2 June 2018

3. D Ouya, 'Positive Action on Gender Supports Sustainable Development', *World Agroforestry Centre*, 12 September 2014 [<http://blog.worldagroforestry.org/index.php/2014/09/12/action-on-gender-can-support-sustainable-development/>], retrieved 3 June 2018

by up to 17 per cent.⁴ Njebet is now leading the fight for the rights of women, the politically oppressed and the natural environment instigated by Wangari Maathai – the environmental and political activist, who founded the Green Belt Movement in Africa, and with the help of women, planted over 30 million ‘trees of peace’ to conserve the environment.⁵

28

In India, food sovereignty advocate Vandana Shiva describes the fight against agricultural biotechnology as ‘a global war against a few giant seed companies on behalf of the billions of farmers who depend on what they themselves grow to survive’. After a lifetime rallying against food totalitarianism, she dismisses the American scientific organisations responsible for regulating genetically modified products, including the Food and Drug Administration, the Environmental Protection Agency, and the United States Department of Agriculture, as tools of the international seed conglomerates.⁶ At the same time, Kehkashan Basu of the United Emirates, the 2016 Children’s Peace Prize recipient, founded Green Hope UAE at the age of 12 to mobilise children and youth in the movement for a sustainable and green future. As the eco-warrior spirit has percolated down over the years from persecuted prophets to everyday members of society, there are two groups of unlikely players in the war to secure resilience for humanity and nature – storytellers and farmers.

There has been a tidal shift in public awareness of unsustainable environmental practices, and this can be partly attributed to storytellers in the mass media. Science has provided us with the statistical proof that humanity is both perpetrator and victim of widespread environmental damage, but facts and figures are poor vehicles for galvanising the electorate and grass roots action. At the end of the last decade, the film world saw a glut of movies with green agendas, most notably Davis Guggenheim’s ‘An Inconvenient Truth’ (2006) and Robert Kenner’s ‘Food Inc.’ (2009). The former documented Al Gore’s commitment to exposing the ‘planetary emergency’ that global warming represents, the latter the detrimental effect the food industry is having on health, farmers’ livelihoods, and the environment. Both documentaries were produced by Participant Productions, a company with a mission to raise awareness of world problems in the public consciousness through compelling narrative. Correspondingly, ‘This Changes Everything’ (2015) by Avi Lewis and Naomi Klein and ‘Seed: The untold story’ (2016) by Taggart Siegel and Jon Betz narrate similar David and Goliath battles to defend the future of our food. When even Bond movies tap into the zeitgeist – the villain in the ‘Quantum of Solace’ (2008), whose name is Greene, is not bent on world domination but on the monopoly of water supplies in Bolivia under the guise of a bogus environmental organisation – the critical mass necessary to effect change cannot be far away.

The second group of pivotal players are farmers, the individuals we have delegated to put food on our tables whilst we engage in more rarefied pursuits. In the Smartcity, with urban agriculture at the forefront, empowered farmers will take on a new instructional role, advising communities on how to best cultivate their crops. In a list of 50 people who could save the planet chosen by an expert panel assembled by the Guardian newspaper,⁷ five are farmers or have had farming experience, including Al Gore who worked on his family’s small holding as a boy. Also, recognised is Bija Devi who has been a farmer in the foothills of the Himalayas since the age of seven. She now spearheads an international movement to conserve cereal, pulse, fruit and vegetable strains that are at risk of extinction from modern agricultural practices. Having established an extensive bank of indigenous seeds, Devi travels around India disseminating endangered crops and the ancestral knowledge to cultivate them, simultaneously insuring against climate change, soil infertility and disease, and preserving a rapidly disappearing cultural tradition.

Outside of the Smartcity, the remit of farmers will become broader. Trained and reinstated as custodians of the land, a new breed of professional farmer will husband energy, natural ecosystems and forestry, arbitrating between the need

for carbon sequestration, wildlife habitats, raw timber material and biomass. Provenance will enter the public lexicon in relation to energy and manufactured materials as well as food. Many farmers are working to create ecological resilience to sequester carbon dioxide and reduce agriculture's greenhouse gas emissions and their impact on the environment. Smallholder farmers in rural areas are vital to domestic food security. To reduce the risk of crop failure due to the impacts of climate change, farmers have made themselves more resilient by planting diverse traditional varieties, liberating themselves from commercial seed breeders and not using expensive modern hybrid seeds. A strong rural economy can reduce inequality, migration to urban areas, and sustain a balanced growth and flow of resources between rural and urban areas. Small farms are common in Japan, Norway and Switzerland, and account for 80 percent of the cultivated land in sub-Saharan Africa and South East Asia.⁸ Farmers in Niger, over the last few decades, have managed the natural regrowth of native *Faidherbia* trees across five million hectares. According to the World Resource Institute, 'the *Faidherbia* fixes nitrogen in the soil, adapts the fields from wind and water erosion and contributes organic matter to soils with its fallen leaves. Compared to conventional farms, yields of maize in these agroforestry systems can be doubled and farmers in Ethiopia, Kenya, and Zambia are taking note.'⁹ The Smartcity situates its sustainable vision for creating economic, environmental and social capital by restoring nature.

Smallholder farmers in low- and middle-income countries invest more than US\$170 billion every year on their farms, making them collectively the single biggest investors in agriculture.¹⁰ They are looking to strengthen their risk-coping capacities, secure tenure to the land they farm, and gain access to water and fair financial services to help build a resilient landscape. Sustainable development of food systems depends not only on public and external investments, but just as much on the policies and regulatory frameworks that uphold the autonomy and sovereignty of farmers and governments receiving aid. The resilience of farming communities is strengthened, above all, by sharing knowledge on developments of sustainable farming techniques and crop management. Bustani ya Tushikamane (ByT) is a farmer training centre for sustainable agriculture based in Morogoro, Tanzania managed by Sustainable Agriculture Tanzania and Janet Maro, an agronomist. In 2013 the initiative supported 2700 farmers through training, 46 percent of whom were female, and a further 833 farmers through the information centre.¹¹ Digital technology, for example mobile phone apps, which has improved access to quality data, including changing weather patterns and daily market conditions, is essential for empowering farmers, especially those in developing countries.

Sustainability must be accessible to everyone and resilience actions must be applicable to the practice of everyday life. Consumers respond poorly to browbeating activism and need fiscal incentives to use less, and to be given greater control over the energy they use. Lower-carbon products and services need to become desirable, which is where the aesthetic aspects of design need to be employed. We are often told that we are the last generation able to make any effective change in the future of our planet. The day that the eco-warrior dies is a day to look forward to, for it will mean that there are no more unconverted to preach to, that sustainable living has become normative rather than alternative. That day has not yet arrived. There are still battles to be fought and won.

4. Food & Agriculture Organisation of the United Nations, 'The State of Food and Agriculture, 2010-2011', www.fao.org, 2011, p.vi [http://www.fao.org/docrep/013/i2050e/i2050e.pdf], retrieved 2 June 2018

5. J Gettleman, 'Wangari Maathai, Nobel Peace Prize Laureate, Dies at 71', The New York Times: Africa, 26 September 2011

6. M Specter, 'Seeds of Doubt', The New Yorker: Annals of Science, 25 August 2014 [https://www.newyorker.com/magazine/2014/08/25/seeds-of-doubt], retrieved 1 June 2018

7. J Vidal, D Adam, A Ghosh et al., '50 people who could save the planet', The Guardian: Environment, 5 January 2008

8. KF Nwanze, 'Food Sustainability and the Role of Smallholder Farmers', The Economist: Intelligent Unit, 1 July 2014 [http://foodsustainability.eiu.com/food-sustainability-and-the-role-of-smallholder-farmers], retrieved 1 June 2018

9. H Gould, '10 Things You Need to Know About Sustainable Agriculture', The Guardian: Environment, 1 July 2014

10. I Fitzpatrick, 'From the Roots Up: How agroecology can feed Africa', Global Justice Now, February 2015, p.53

11. I Fitzpatrick, 'From the Roots Up: How agroecology can feed Africa', Global Justice Now, February 2015, p.38

