Special Issue on Urban and Regional Ecology and Resilience
features

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‘sustainable city-regions’ and beyond –
towards urban synergy and social intelligence

Guest Editor Joe Ravetz introduces the Special Issue on Urban and Regional Ecology and Resilience

Picture a child born today, as an adult in the 2030s, somewhere in middle England. ‘She shares a cramped flat with four young people, quite a way from the nearest town, but with the rising costs of housing and the dangerous decline of urban areas it is as good as could be expected. Through the window, the view is brown and dusty, as climate change has already begun to lead to the desertification of the countryside. The nearest hypermall is 20 miles along the toll road, but most shopping is done through online 24-hour delivery. With food price inflation at 10%, wastage is rare.’

Similar dark visions come up regularly in scenarios and urban outlooks. Even now, the shortages of housing, jobs, water and energy are forcing key questions upon us. What are towns and cities for? Whose countryside is it? And who should decide?

Today, there are crucial choices to made, with profound impacts on our future. The UK has thrown itself into a radical reshaping of most forms of spatial planning, urban development, and environmental policy. This brings both opportunities and threats. In particular, there are questions on goals and aspirations – climate adaptation and resilience, sustainable consumption and production, and so on – and widening gaps with reality and current trends.

CURE (the Centre for Urban and Regional Ecology), at the University of Manchester, was set up in 2001 to work on ‘sustainable city-regions’, as promoted by the TCPA and explored in the large-scale case study City-Region 2020. Since then, models for urban planning and environmental policy have come and gone; but the state of the art in knowledge has (we think) shown some progress. This Special Issue on Urban and Regional Ecology and Resilience, featuring research conducted at CURE, reviews the state of the art and prospects for the future.

First, this introduction looks at concepts of urban ecology and resilience; and then looks beyond the ‘sustainable’ to the ‘synergistic’ city-region, based on synergy and shared intelligence. Subsequent articles each highlight a topical research/policy theme, offering outlooks on the challenges and opportunities ahead. As the CURE mission continues to evolve, from ‘urban ecology’ towards a wider ‘urban resilience’, we need to keep looking several steps in front.

Context

For the first time in history, homo sapiens is about to destabilise its entire habitat, with a temperature rise of 2-4°C expected to cross tipping points for irreversible change. But climate change is only part of the picture: there are other global limits, such as in water, food, soil, biodiversity, forests and other essentials of life. At the centre of this picture are cities (‘settlements’, ‘city-regions’, ‘functional...
urban regions’, and other definitions). On current trends the global urban population may double to 6 billion by 2050, of which the majority are likely to live in ‘informal settlements’. As cities are the engines of growth and development, they tend to concentrate economic development and material throughput. At the same time, they have the greatest potential to become more efficient, with low-/zero-carbon systems, local food and resource cycles, and creative spaces for social enterprise.

All this raises questions on the meaning of a ‘sustainable city-region’ – arguably the most suitable scale for integrated planning with social, economic and environmental goals. Are we talking about local or national self-containment? Local ‘greening’ while the UK (and similar nations) continues to import its materials from other countries with cheaper labour and lower standards? Or a city-regional contribution to global sustainability, where different goals may be in conflict – environmental stability, social equity, or economic development? Such questions will run and run.

The city-region 2013

At its launch in 2000, the City-Region 2020 work was billed as the ‘world’s largest feasibility study’, exploring the principles and practice of full-on sustainable development in the ‘living laboratory’ of Greater Manchester. It aimed to show how real progress depends on links between different sectors, at various spatial scales, between upstream causes and downstream effects, between ‘hard’ technology and ‘soft’ human factors, and between social ‘demand’ and economic ‘supply’.

Over a decade on, we can now check some outcomes in Greater Manchester. There is some noticeable change in recycling, green infrastructure, renewable energy, light rail, and cycle routes. There is more modest progress in other public transport and energy efficiency strands. In contrast, the embedded carbon footprint of mass consumption continues to rise – as witnessed by regular traffic jams around major shopping malls. Also rising are the impacts of air travel, marine transport, and road freight, together with new forms of energy demand such as patio heaters, wide screens, and online shopping deliveries.

Many creative initiatives on climate change are now being undermined by austerity cuts and policy ‘mission creep’. The Green Deal for home energy efficiency has so far been a non-starter; and the regional clusters and centres of excellence in sustainable technologies have been scattered in the Coalition Government’s hasty (and arguably reckless) removal of strategic governance. Greater Manchester is one of the best-organised city-regions in the UK, and its Local Enterprise Partnership is in better shape than most; but there is continuing upheaval of structures and a dire lack of funding. The Greater Manchester Low Carbon Hub has four core staff, but could do with 400, and renowned institutes such as Envirolink have disappeared in the ‘bonfire of the quangos’. However, the Greater Manchester Climate Change Strategy does show some green shoots, with a ‘triple helix’ combination of university expertise, business innovation, and strategic governance. With electric vehicle charging posts now on the streets, solar panels on many roofs, and a strategic cycling network taking shape, the 2020 goal of a 48% carbon reduction seems not so impossible...

‘As cities are the engines of growth and development, they tend to concentrate economic development and material throughput. At the same time, they have the greatest potential to become more efficient, with low-/zero-carbon systems, local food and resource cycles, and creative spaces for social enterprise’

The emerging agenda – research approaches

The sustainable city-region concept is based on ecological principles, applied to the complex tangle of human and natural systems which self-organise and evolve. In this way, urban/regional ecology shows at least three distinct levels:

- ecology in the city-region – ecosystems, habitats, biodiversity within cities and urbanised areas;
- ecology of the physical urban system – flows of energy and materials through the city-region, and/or patterns of land and landscape change; and
- human ecology of a whole urban system – wider cross-cutting human-environmental interactions, such as political ecology, industrial ecology, social ecology, ecological design, ecosystem services, eco-psychology, and so on.

This approach was then applied by CURE to a wide spectrum: climate change mitigation and adaptation, resource flows, peri-urban development, landscape planning and assessment, green economics, ecological democracy, and cultural capital. Working this through, some fundamental themes began to emerge, in particular the themes of ‘resilience’ and ‘transition’ – wherever ecological systems meet human systems. For example, if a community is vulnerable to flooding (as many are),
we need to analyse the problem in terms of water, ecosystems, land use, climate change, policies, etc. And then the agenda shifts to the question of ‘so what then?’ We need to think about improvements to the community’s technical resilience to extreme water hazards, its social resilience for working together in emergencies, and its economic resilience for investment before/after the event. Then we find that many communities in this age of austerity are vulnerable not only to flooding, but to a whole combination of physical, social, cultural, economic health, and demographic problems. So we have to look not just at problems and solutions one by one, but at broader system-wide risks and vulnerabilities, and the response in resilience of various kinds. Then we can look at the potential for system-wide changes through transitions, at the scale of city-regions or other viable social, economic, or ecological units.

The emerging agenda – research themes in this issue

So what do we now know about urban ecology and urban resilience, and what is the outlook for the next generation of research? This Special Issue presents an overview of key themes. Addressing the overarching challenge of climate change, Seb Carney writes on participative climate scenario modelling, enabling urban-regional climate policy via the capacity-building of stakeholders. The other side of the climate coin comes from Jeremy Carter and Aleksandra Kazmierczak – as climate change now appears more or less inevitable, adaptation and resilience planning is then a prime shaper of the built environment and green infrastructure. Ian Douglas looks at a lesser-known but crucial climate change impact – ground stability and its policy regime (not visible in the current National Planning Policy Framework).

All this sets new agendas for the city-region in transition. One is urban ecology itself: Aleksandra Kazmierczak and John Handley review the agenda for multi-functional ‘green infrastructure’. The story of infrastructure planning is told by Iain White, for water supply and demand, and the extremes of floods and droughts. A wider view of the urban throughput or metabolism, with the principle of ‘cradle-to-cradle’ production and consumption and the transition towards a circular urban economy, is presented by Ian Douglas, Nigel Lawson and Joe Ravetz.

The question is then how policy and governance can respond. One agenda is the distribution of costs and benefits (always controversial and political), as in Graeme Sherriff’s story of the Greater Manchester congestion charge – a sign of the challenges ahead in sustainable transport. Clive George reviews the many branches of impact assessment, and the potential for a more effective and intelligent form of policy evaluation. Meanwhile, integrated planning clearly needs proactive public participation, and despite many hurdles there are ways forward, as set out by Joanne Tippett, creator of the ‘Ketso’ participation toolkit. To round off, Joe Ravetz flags up new methods for future studies, with an example of a ‘knowledge outlook’ for UK city-regions.

Ways forward

There are now libraries full of research on climate change, environmental science, resource/waste flows, sustainable consumption, landscape, and ecological design... all of which are interconnected parts of a larger whole. But to understand and work with this ‘whole’ seems to go against the grain of ‘silo’ governance, ‘winner-takes-all’ business, and the ‘disciplinary excellence’ of academics. The emerging policy/research programme at CURE on the ‘shared intelligence’ of city-regions and communities at every scale is one response.6

The overall notion of ‘sustainable development’ is often measured through indicators and checklists, which (arguably) hide the internal contradictions and (at least some) self-delusion, at least for those in the developed world. We plan for ‘sustainable communities’ while extracting energy and materials from others; climate scientists, like others, take frequent long-haul flights; and the nice-sounding ‘localism’ idea may only widen the rich-poor divide. Many such contradictions were embedded in the ‘sustainable city-region’ programme... so what have we learned? Perhaps something about how social, cultural and governance systems manage their internal contradictions (for example the politician who opens a climate conference in the morning and an airport runway in the afternoon). But more positively, we have learned something about how to mobilise opportunities which bring together contradictory social values, business models or policy agendas, with the outcome of a wider transition.

To frame this new thinking, the ‘synergistic’ city-region focuses on a more dynamic angle to the sustainability concept: focusing on the capacity for thinking ahead, creative innovation, responsive adaptation, value creation, and turning problems into opportunities. In the face of the global challenges set out above, there is urgent need for cities to be more adaptive and innovative, but much of the reality is rigid and short-sighted. For example, there is a current spotlight on technological ‘smart’ cities; but it is clear that ‘smart’ means little if the underlying governance and market systems are effectively ‘stupid’. So the emerging agenda focuses on the crucial qualities of resilience, and how to build it through shared intelligence – a combination of social learning, deliberation, evaluation, innovating, collaborating, and strategic decision-making. The contrast between the ‘sustainable’ city-region and the emerging ‘synergistic’ way of thinking can be visualised as in Fig. 1 – a very rough
‘unlocking local potential’ merges seamlessly into ‘freeing the market’, and then into ‘rewarding investors’.

So the concept of the ‘sustainable city-region’ and its follow-on is now called to address a rather different situation from before. Above the policy detail, and many unresolved questions as of 2013, three key themes each raise questions:

- **Localisation:**
  - When the ‘localism’ agenda first emerged, it seemed that subsidiarity was being pushed to new frontiers; now, neighbourhood planning seems more about shaping market expectations for development. In this situation, could ‘local intelligence’, potentially aided by new social media, be a catalyst to enable communities to self-organise and mobilise?

**UK state and outlook**

How to apply such ideas in practice? Many in planning and regeneration have been confused since 2010, when Coalition policy brought not only radical changes in structures, but a different mindset. The shift from ‘top-down targets’ to ‘bottom-up free market’ has come alongside the abolition of regional strategy, massive cuts to local government, and what is arguably a wholesale attack on the principles of the welfare state. The previous assumptions that sound evidence would feed in an orderly stream into ‘robust planning’ have shifted to a more entrepreneurial approach, in which...
Functions and values: The ‘ecosystem services’ approach to identifying functions is part of a logical chain: it then leads to valuing those functions, and then to exchanging values on the open market. Whether through taxes, subsidies, property rights, tradeable quotas, or other exchange systems, there is a fundamental shift from the ‘social justice’ choice to the ‘economic optimum’ choice. Can we fit the ‘system level’ concepts of resilience and transitions to the otherwise ‘linear’ concept of ecosystem services and their itemised values?

Marketisation: The interchange of financial incentives with planning permissions is a challenge to the social contract of planning – but some argue that trading of values should lead to ‘optimal’ solutions. The danger in practice is that money values are more tangible and thereby more powerful than other kinds of values, and there is also the unfortunate tendency of monetary systems to increase the gap between rich and poor. Can we envision a system of ‘urban intelligence’ and exchange which enables social/ecological entrepreneurs, and which recirculates investment in common resources, for the benefit of the whole community rather than for the winners who take all?

‘There has never been a more crucial time, not only to demonstrate the risks of winner-takes-all economics, but to provide positive visions and pathways for resilient and synergistic pathways for cities and regions’

Next steps
The UK planning system is not alone in facing crucial questions: all over the developed world, governments that have been wrong-footed and undermined by global casino finance are swinging to the right, and the ‘great British planning experiment’ is being watched closely. Europe itself is seeking an urban and territorial focus for its big-spending Cohesion Funds, but is caught between the principles of social-ecological justice and free-market enterprise. It also sees cities as the hubs for low-carbon ‘smart’ approaches to energy, transport, and waste, with information technology as the catalyst for change, and highly dependent on innovation in policy and business. There has never been a more crucial time, not only to demonstrate the risks of winner-takes-all economics, but to provide positive visions and pathways for resilient and synergistic pathways for cities and regions.

This is the guiding principle for the next generation of CURE research-policy activity, now relaunched as a ‘Centre for Urban Resilience and Energy’. We see resilience as ‘ecology in motion’, and energy-climate as the fulcrum point for human-environment relations (not excluding many others). We see research not only as a matter for internal academic disciplines, but also as a wider ‘co-production’ and ‘co-evolution’ of multi-lateral shared intelligence. All this aims towards a more synergistic kind of governance and enterprise, fit for a turbulent century. The child of today and adult of 2030 deserves at least this much.

Joe Ravetz is Co-Director of CURE, at the University of Manchester, and is Guest Editor for this Special Issue. The views expressed are personal.

Notes
2 A. Blowers (Ed.): Planning for a Sustainable Environment. TCPA. Earthscan, 1993
5 See the Greater Manchester Low Carbon Hub website, at www.agma.gov.uk/low_carbon_hub
6 J. Ravetz: Urban 3.0: Creative Synergy and Shared Intelligence for the One Planet Century. Earthscan, 2014 (forthcoming)
10 See, for example, the Smart Cities Stakeholder Platform website, at http://eu-smartcities.eu/
11 Details are available from the interim website, at www.urban-energy.org
‘80% or bust’ – local climate strategy and global futures

Seb Carney describes how ‘participative scenario modelling’, in which stakeholders design realistic climate strategies for real-world actions, can be used to help cities and regions gear up for rapid climate emissions cuts.

Cities are on the frontline of the battle to stabilise the climate: as intensive users of energy and materials, they should, in principle, be able to co-ordinate, invest in and provide the infrastructure to help meet global climate emissions targets. But the reality is often very different – funding deficits, skills gaps, fragmented governance, policy inertia, competing objectives, resource limitations, technology lock-in, and consumer indifference are just some of the barriers (see Fig. 1). Behind the green rhetoric, only a few cities have started on a few ‘best practices’. A potential first step is to provide local and city-regional policy-makers with the tools to design energy and climate strategies which work for them – custom-made to local concerns and opportunities.

This article outlines a ‘participative scenario modelling process’ for urban climate mitigation policy, drawing on experience from 15 countries. The process delivers not only results on energy technology, but a new kind of ‘co-produced’ knowledge, shared between research and other stakeholders, which can overcome deep-rooted barriers to effective climate policy.

A participative modelling system

CURE (the Centre for Urban and Regional Ecology) has worked with planners and other stakeholders at the city, regional and national level in Europe and the USA, to help them gauge their carbon dioxide (CO₂) and other greenhouse gas emissions, and to explore options for reducing them. The resulting energy/ climate scenarios often show a substantial shortfall against targets. This suggests a pressing need for training or capacity-building, so that near-term policy can be developed which better fits with longer-term energy and climate objectives. This is particularly true in the UK, where the objectives of national bodies such as the Committee on Climate Change are often disconnected from the local bodies that have to realise them.

In undertaking such work, CURE has used the GRIP (Greenhouse Gas Regional Inventory Protocol), a participative modelling, data management,
learning and awareness-raising approach developed at Manchester University. The RTPI (Royal Town Planning Institute) has recommended the use of GRIP to its members, following an award given for ‘outstanding performance in development plans’ in Glasgow and the Clyde Valley. GRIP enables cities and regions to:

- set an energy/emissions inventory and current baseline;
- use this baseline as a platform for forming energy/emissions reduction scenarios; and
- use the results to implement policy change.

At its core, GRIP is about providing support to cities and regions to set up and strengthen their own network of stakeholders who can facilitate emissions reductions. It enables stakeholders from differing sectors to communicate their ideas and options for emissions reduction, through changes in energy demand and supply over a strategic timescale. Such discussions often happen for the very first time in the participative workshops which use GRIP as a catalyst.

It is interesting to note that despite several decades of policy on energy and climate emissions, the majority of areas involved are forming a locally specific greenhouse gas emissions inventory for the first time.

A key component of the research has been training on how to form and interpret an emissions inventory, so that planners can help to compile further, more detailed inventories for their own regions. Furthermore, producing and understanding the inventory generally results in a greater ownership of the work, and a greater capacity and desire to communicate the results to other stakeholders within the region.

Findings and experiences

The results of a selection of inventories are presented in Fig. 2. In this and similar charts, three colours are usually used to represent different levels of data quality and uncertainty: in Fig. 2 blue-green areas (usually green – level 1) are more certain than yellow areas (orange – level 2), which are more certain than gray areas (red – level 3). This sort of grading is essential because, although energy and other data for an accurate emissions inventory are often not readily available below national level, it is important to make a start and at least identify the gaps in data, which the grading scheme enables. This structure facilitates comparisons between the emissions inventories of differing areas with varying data quality, without the necessity for stakeholders to read and digest technical reports.

The results from the inventory are used to inform the GRIP scenario process, which has been used in more than 70 one-day scenario workshops, to form energy emissions scenarios which lead towards the generally accepted 80% reduction target in CO₂ emissions by 2050. In the majority of the scenarios, despite lengthy debate and testing of options, the resulting reductions fell short of the emissions target, sometimes by a long way. The effects of each scenario on changes from the baseline are shown in Fig. 3, and the emissions reductions in tonnes per capita are shown in Fig. 4.

One of the key aspects of the GRIP process is its explicit intention to work outside of conventional ‘silos’, so that each of the key sectors (residential, services, industry, transport, generation) are included within each scenario session. This was a matter that caused some resistance, requiring gentle persuasion, as some cities and regions were initially uneasy.
sessions took a more ‘non-interventionist’ approach that focused on related energy security, poverty, self-sufficiency and efficiency goals which also had the additional benefit of emissions reductions. Such goals are of course interlinked, but it is important to note that the discussions focused less on the CO₂ reduction and more on these latter points.

In the event, a key piece of feedback was that the cross-sector approach produced new thinking and new forms of collaboration.

The main aim of the scenario process was to design an energy future associated with an 80% reduction in CO₂ emissions — a so-called ‘interventionist approach to mitigation’. However, discussions in the sessions took a more ‘non-interventionist’ approach that focused on related energy security, poverty, self-sufficiency and efficiency goals which also had the additional benefit of emissions reductions. Such goals are of course interlinked, but it is important to note that the discussions focused less on the CO₂ reduction and more on these latter points.

In the event, a key piece of feedback was that the cross-sector approach produced new thinking and new forms of collaboration.
Another finding was a disparity between shorter-term emissions reductions and their context in long-term policy goals. The 2050 annual emissions target is in many ways a ‘red herring’, as the real issue is the atmospheric concentration of greenhouse gases, which is determined by cumulative emissions released over time, rather than the emissions in 2050. Moreover, the target of 80% in the UK and Europe does not necessarily mean an 80% reduction in each city or region. As national projections are downscaled, if each region or city is to play its part in meeting a national target there will be differences in the contribution to overall emissions reduction depending on its economic profile, social mix and local infrastructure.

Exploring the aspiration-reality gap
The gap between national aspirations and local realities may be due to the steep learning and collaboration curves, or to sheer lack of evidence on what works and what the costs or benefits are. Results from the scenario exercises indicated that efforts on crime, health and short-term economic prosperity are valued more highly than attempts to reduce emissions and the impacts of climatic change. There is a clear and pressing need for continuous professional development in this field.

‘There is a clear and practical need for planners and other stakeholders to improve their understanding of how emissions may be reduced... But such clear and practical knowledge needs to be founded on more than the disjointed bits of information currently available’

There is also a need to treat flagship projects with caution, as often they do not recognise the disparity between short-term objectives and the long-term goals required by the scientific advice on avoiding ‘dangerous’ climate change (in the absence of geo-engineering – which is another area of huge debate). Unfortunately, at present there is a lack of top-down and bottom-up cohesion, made worse by the UK Coalition Government’s removal of the regional level of governance, but more generally reflective of the complexity of the climate change agenda.

Furthermore, there is a pressing need to distinguish between ‘figurehead’ projects that can help facilitate real action, and the self-publicity or ‘greenwash’ of individuals and organisations. The participative scenario modelling approach shows how short-term marginal adjustments are entangled with debates on the paradigm shifts needed in economy and society. And distributional differences between impacts, costs and benefits may widen the inequalities between those who cause climate change and the victims of its impacts. Meanwhile, schemes making great promises, such as the UK’s Green Deal, arouse great scepticism over the likely results.

Outlook – knowledge co-production for a climate-stressed future
There is a clear and practical need for planners and other stakeholders to improve their understanding of how emissions may be reduced, the costs and benefits of the various reduction options, and links to other agendas such as housing, transport and economic development. But such clear and practical knowledge needs to be founded on more than the disjointed bits of information currently available: it requires social learning, capacity-building and a process of creative collaboration. This points towards emerging knowledge approaches which may be more effective for such a huge challenge.

One is the Government Office for Science’s Foresight approach to combining future studies with creative capacity-building and strategy development – practiced at the EU and UK national level, but to date not often at city or city-region level. Another approach is a deeper view on how governance works (or not) with the combined complexities of social, cultural, psychological and institutional factors. Also very topical is the interface between policy and research, where much can be lost in translation, but with new possibilities in the ‘co-production’ of knowledge by both sides. In Greater Manchester, for example, there is a long-running collaboration between local authorities and universities, through projects such as EcoCities, PEPESEC, and Research-Policy Exchange. Overall, initiatives such as the GRIP participative modelling process open the door to the much wider knowledge landscape which is urgently needed.

Dr Seb Carney is leader of mitigation research at CURE, at the University of Manchester. The views expressed are personal.

Notes
1 See the GRIP website, at http://getagriponemissions.com
3 See the Foresight website, at www.bis.gov.uk/foresight
4 See the ‘Four Degrees of Preparation’ website, presenting the outcomes of the EcoCities project, at www.adaptingmanchester.co.uk; the PEPESEC project legacy website, at www.pepesec.eu/; and the Research-Policy Exchange Programme website, at www.manchester.ac.uk/policy-exchange
progressing the adaptation agenda

Jeremy Carter and Aleksandra Kazmierczak discuss the role of research in increasing capacity to build resilience to climate change, and look at prospects for the near future

The current rapid rate of ‘carbonisation’ of the atmosphere shows little sign of abating in the short term. Climate change projections are being updated to take into account the escalating rate of emissions growth; current knowledge suggests that globally there is a threat of average surface temperatures rising to 4°C above pre-industrial levels by the end of the century, perhaps even by as soon as the 2070s.1 Meanwhile, scientists are beginning to link climate change to recent extreme weather events, such as the UK floods in 2000 and 2007.2 There is a clear need to build resilience to current extremes, as well as encourage long-term planning for greater risks in the future.

The Adaptation Sub-Committee’s national-level assessment of the UK’s progress in preparing for climate change concluded that there is little evidence of tangible and systematic adaptation responses on the ground.3 Issues included the extent of progress to date and details of further necessary actions, many of which are transferable across sectors and scales. Similarly, a Green Alliance study4 has demonstrated that, across a sample of 126 UK local authorities, 65% are either de-prioritising climate change or narrowing their ambitions in this field. So, at the point at which the scientific community is issuing increasingly stark warnings on our climate future,5 it appears that the adaptation response in the UK is lacking.

Researching the adaptation agenda

Academic research has an important role to play in addressing the apparent ‘capacity deficit’ of responses to the adaptation imperative. Indeed, collaboration with universities has been found to boost the adaptive capacity of cities.6 Research can support the assessment of climate risks by bringing together information on the intensity and spatial distribution of hazards (such as floods, heatwaves, etc.), the receptors that are particularly vulnerable to weather and climate damage, and insights into their capacity to adapt to the changing climate. Research can also identify ‘win-win’ or ‘low-regret’ adaptation measures. Finally, researchers can analyse adaptation planning and practice, enabling practitioners to learn from the efforts of others. Recent studies at CURE (the Centre for Urban and Regional Ecology) have advanced our understanding of climate change, its impacts on the urban environment, and the required adaptation responses; some key findings are highlighted below.

We first need to understand current climate impacts. The EcoCities project investigated records of past extreme weather events in Greater Manchester, and identified flooding as the main source of damage to infrastructure, and storms (including high winds) as the most significant risk to human health.7 Place-specific climate change knowledge can support adaptation planning, allowing targeted responses to prevalent events to be developed.

EcoCities research also downscaled climate projections to more local levels, identifying three distinct climate zones in Greater Manchester, characterised by different levels of projected changes in temperature and precipitation.8 The tools available from UKCP09 (UK Climate Projections 2009), such as the ‘Weather Generator’,9 allow modelling of future changes for areas as small as 5 square kilometres. Results obtained in this manner are powerful tools for raising awareness of the need for adaptation among local stakeholders.10
Urban adaptation planning is complicated by the spatial diversity of the impacts of weather and climate resulting from issues such as the variety of land uses and social disparities in urban regions. In response, Lindley et al.11 developed a framework for understanding spatial patterns of risks linked to changing temperature and rainfall patterns in urban conurbations.

This work was progressed within the SCORCHIO project (Sustainable Cities: Options for Responding to Climate Change Impacts and Outcomes), in which Smith et al.12 analysed the qualities of the urban environment that give rise to the urban heat island effect, which further increases temperatures in cities relative to their hinterlands. Linking the technical to the social, analysis of social vulnerability to climate impacts in Greater Manchester within the EcoCities project found that poorer and more diverse communities are more likely to be affected by surface water flooding. In addition, Joseph Rowntree Foundation research on vulnerability assessment looked at the ability to prepare for, respond to and recover after extreme weather events, and produced a UK-wide index of socio-spatial vulnerability.

Having identified climate impacts, the next step is to spatialise, using state-of-the-art GIS techniques: the GRaBS project (Green and Blue Space Adaptation for Urban Areas and Eco Towns, led by the TCPA13) brought together many layers of spatial data (see Fig. 1), allowing local and regional partners to see the risks and tailor adaptation actions to their particular areas.14 The EcoCities project developed this approach to create a ‘spatial portal’ to support adaptation planning in Greater Manchester.15

All this points to governance: while there are many ‘win-win’ or ‘low-regret’ adaptation responses with additional benefits beyond adaptation, the reality is high uncertainty and a low priority given to adaptation in policy hierarchies.

A good example of multiple benefits is provided by green and blue infrastructure, which helps to lower temperatures in cities and contributes to surface water run-off management, while also improving the public realm and human wellbeing (see the article by Kazmierczak and Handley in this issue16). The ASCCUE project (Adaptation Strategies for Climate Change in the Urban Environment) found that a 10% increase in the amount of vegetation in dense urban areas can maintain current surface temperatures by the end of the 21st century, even under a high-emissions climate change scenario.17 Urban greening as an adaptation measure has been explored in a GRaBS project database of case studies from cities in Europe, North America and Japan6 – showing the importance of continuing stakeholder engagement, cross-departmental collaboration, and multi-level governance of adaptive actions to support effective implementation.
Climate change adaptation – emerging issues

There is a wider context to adaptation: a step-change in scientific understanding on the causes and impacts of climate change, the exposure of the economic development paradigm based on debt-fuelled growth and a disregard for ecological limits, and awareness that the impacts of climate change will fall disproportionately on vulnerable individuals and communities. Several emerging issues stand out that can support future research, policy and action.

Broadening the adaptation agenda

Adaptation has generally been understood as a linear exercise of developing responses to the direct impacts of climate change (such as flooding or heat stress) on a specific sector, community or infrastructure. However, there are broader connections. For example, we need to recognise that cities can be affected by climate change impacts originating in their hinterlands (for example in the context of flooding). We should therefore consider responses at a wide range of interconnected spatial scales. We also need to look beyond the direct and local implications of climate change to encompass indirect impacts globally, such as those affecting global logistics, agricultural markets, and intercontinental migration. These international effects of climate change may be more immediately pressing, and ultimately more significant, than direct impacts experienced in a mild-climate country such as the UK.

Adaptation in a stagnating economy

The spirit of our times frames any agenda. Foremost among contemporary issues are the ongoing implications of the 2008 financial crisis. In the UK, this has contributed to a process of deregulation that seems to have changed inter-governmental relations. There are clear implications for the adaptation agenda. A scaling back of central government policy and strategy in this area, such as removal of the National Indicator Set, has eliminated a key incentive for cities and urban areas to develop adaptation responses. Furthermore, austerity measures have also hit local authority budgets hard. Adaptation is not a priority issue in our town halls, and the risk of cutbacks in this area is high, as evidenced by recent research carried out by the Green Alliance.

The planning profession should consider how adaptation fits into the broader context of the future of cities and regions in the coming decades. Key to making progress is connecting adaptation to headline socio-economic goals, from economic competitiveness and inward investment to health and social justice – issues that sit at the heart of visions for prosperous and liveable cities and urban areas.

Collaborative responses

Broadening our understanding of the economic and political context implies that new approaches are needed to address the adaptation imperative. We need to explore how different stakeholder groups perceive adaptation, strengthening communication channels across the research-policy-practice interface; increase cross-departmental working; and learn from people and communities dealing with present-day weather and climate extremes. With their influence over the long-term development and use of land, planners have a key role to play in collaborative adaptation responses. This involves cross-sectoral and inter-disciplinary knowledge generation, to produce more innovative outcomes that capture greater synergies and wider benefits for a broader range of interests and communities. Using the knowledge produced by research institutions and working in collaboration with them can make the task less daunting.

‘Key to making progress is connecting adaptation to headline socio-economic goals, from economic competitiveness and inward investment to health and social justice’

Outlook – emerging knowledge and practice

Overall, it seems that the knowledge and research required for climate adaptation will centre on possibilities in the future and tangibles in the present. Adaptation, in common with other cross-cutting priorities, is influenced by huge uncertainties and ambiguities; the technical agenda has to link to wider social/economic/cultural/political agendas; and underpinning themes such as ‘resilience’ and ‘vulnerability’ are complex and far from resolved.

Research, ideally co-produced with policy-makers and practitioners, can help to respond to these issues. While impacts in the UK may be manageable in the near future, transformative actions to address longer-term risks need to be considered now. Many other countries already face an immediate existential crisis. We can anticipate that the emerging knowledge practice on adaptation will be put to some stringent testing over the coming decades.

Dr Jeremy Carter and Dr Aleksandra Kazmierczak are Research Fellows at CURE, at the University of Manchester. The views expressed are personal.

Notes


9 See http://ukclimateprojections.defra.gov.uk/23261


13 See the GRaBS project website, at www.grabs-eu.org/


15 The EcoCities ‘spatial portal’ can be accessed at www.adaptingmanchester.co.uk


Urban developments need to be planned and designed for future climate conditions. The future climate of the UK is likely to involve wetter winters with sudden downpours, summers that are warmer but feature increasingly intense thunderstorms, and probably greater variability between years. The climatic conditions of the past can no longer be used to predict how we should design drains to carry excess rain away, road cuttings and embankments that will remain stable, foundations to withstand clay shrinkage, and flood protection works. In coastal regions, both rising sea levels and higher storm surges may leave existing structures inadequately equipped to provide protection against the occurrences for which they were designed.

Earth scientists have long argued for closer examination of the nature of the terrain and ground conditions on which new developments are located. The recent emphasis on redeveloping brownfield sites has led to much greater consideration of the varied sequences of past urban deposits created by centuries of human activity, now talked of geologically as the Anthropocene. Detailed mapping and advice is now available from the British Geological Survey (BGS) on urban substrates, and our knowledge of the present nature of the ground we build on is better than ever before.

However, our ability to plan and design to make urban structures that will be safe in the future is now constrained by uncertainty over what climate change and the ground we build on

Ian Douglas examines the under-appreciated problem of the impacts of climate change on ground stability, and outlines some possible responses and implications for knowledge and practice.
change means for the stability of the ground surface, particularly where there are already tendencies for the ground to move, and where there is political pressure to speed up planning applications and inquiries.

**Climate change will increase ground instability**

Three forms of instability are common in the UK:
- shrink-swell clay phenomena (cracking clays), which occur predominantly, but not exclusively, in the lowlands of the East and South;
- mass movements (landslides and soil slippage), which occur predominantly, but not exclusively, in the higher ground of the North and West; and
- subsidence, which can occur naturally over areas of soluble rocks; where former quarries in soluble rocks (such as the chalk of South East England) have been filled and then built over; and over former mine workings and areas of filled ground or former landfill waste disposal sites.

**Shrink-swell clays and climate change**

Many urban areas of the UK, particularly in Southern England, are built on clay materials, which may occur as shallow surface layers or as deeper geological formations many tens of metres thick. Many clay soils swell in volume when they get wet and reduce in volume as they dry. ‘Shrink-swell’, as this phenomenon is known, tends to occur near the ground surface and rarely at more than 5 metres deep. Historic buildings are particularly susceptible to problems associated with seasonal movement because they were often built with shallow foundations which do not extend below the affected clay layers. The degree of shrinkage varies with the presence of trees.

Under a grass cover, drying at the surface reduces the water content from around 50% by volume in spring time to 35% in late summer. The rooting depth of grass means that the drying is usually limited to no more than 1 metre below ground level. However, under a large tree drying can occur down to a depth of 3 metres or more, at which damage to foundations may occur as cracks form.

**Landslides and climate change**

Globally, 39 cities with populations greater than 100,000 are situated within 100 kilometres of a volcano that has collapsed in the past and which may, particularly with higher, more intense rainfalls under climate change, be capable of collapsing in the future. Regions where glaciers are in recession are particularly prone to instability – catastrophic rockfalls, debris flows, and glacial lake flash floods are potential major hazards. The melting of highland glaciers is beginning to trigger more huge landslides, including in the Alps in Europe, which may threaten urban settlements. In regions where economic activity depends on the natural resources of glacial areas, or is concentrated in valleys between glaciated ranges, landscape instability is a growing issue.

The Lloyds 360 Risk Project paper *Climate Change: Adapt or Bust* directs insurers to the increasing earth surface instability risks, pointing out that the potential increase in landslide frequency varies both with rainfall duration and the level of total annual precipitation.

The UK has had many landslides, large and small, in areas which have moved in the past but seldom move today. Climate change could induce their reactivation. Landslides that formed under colder peri-glacial conditions at the end of the last ice age are abundant in areas such as the Pennines. In Greater Manchester, ice age legacies cause active minor slope instability at sites like The Cliff in Salford, where a main road slipped away leaving tram tracks in the air, and Ewood Bridge, where slope movements caused houses to crack. Fortunately, the BGS now has a national landslide database and digital maps for known landslides, allowing the risk for any development to be checked.

However, it is important to note that warmer summers will produce higher evapotranspiration rates, reducing the amount of water in the soil. Climate change may be unlikely to have dramatic consequences for the frequency of large landslides, but small changes in the distribution of water table depths may significantly increase the risks of small-scale instability. Factors such as land use change may well have a greater impact on landslide frequency than climate change over the next 80 years. Nevertheless, what is critical for landslides and soil mass movement generally is the amount of water that gets into the soil and subsurface materials in a very short space of time (measured in hours rather than days). Events such as the 1956 Aberfan disaster in Wales, and the 2005 landslides in Scotland on the A85 and A9, were the results of high-intensity rainfall events.

**Subsidence and climate change**

Subsidence has various causes, but usually is triggered by extreme drought or extreme rainfall conditions. In limestone and chalk terrain, creation of voids by solution leads to sudden surface collapse in the form of sinkholes, well known in Florida but also significant in Britain, particularly around Ripon in North Yorkshire. The collapse of sewers and mine workings is a major hazard. Pumping of groundwater has caused subsidence in many places, from Phoenix, Arizona to Venice in Italy.

Drainage of peat causes shrinkage, and dry weather can further increase shrinkage and induce subsidence. Increased groundwater demands and the drying out of soils, including peat, in prolonged dry weather are responses to climate change that are likely to induce subsidence, about which
insurance companies are already issuing warnings. According to insurer Swiss Re, claims related to subsidence in France have increased by 50% since 1990. Specialist loss adjuster QuestGates has warned of increased risk of subsidence in the UK during drought conditions. Southern England, France, Spain, Italy and much of Eastern Europe will all see their risk of subsidence-related claims rise by a further 50% between 2021 and 2040 as climate change worsens, according to Swiss Re, which has concluded that insurance remains the most cost-effective option.

The Farnworth sewer collapse in 1963, when stormwater broke an old brick sewer and the surrounding fluvioglacial sand and clay liquefied, creating a void into which part of the street above collapsed (see Fig. 1), is an example of what may occur again with climate change, despite great sewer renewal activity since 1965.

Changes in water volumes, especially in groundwater levels

Beneath major cities, hydro-geological conditions have been changing significantly since 1970. Water levels have rebounded as industrial pumping has declined, and there is now a problem of rising water tables, for example in Trafford Park, Manchester and below Trafalgar Square, London (see Fig. 2). Levels are now within a few tens of metres of the surface, well within the range of foundation depths and underground assets such as sewers, power cables, underground railways, and road tunnels.

There are now serious risks of flooding of subsurface infrastructure, including deep tunnels and the basements of tall buildings, and of changes in geotechnical properties that could result in settlement of deeply founded structures such as tall buildings and underground escalators. In London, abstraction of an extra 50 million litres of groundwater per day to augment public water supplies has succeeded in stabilising groundwater levels, thus reducing the risks to infrastructure, but the whole issue of changes in groundwater conditions needs to be given greater attention.

Conclusion

Until 2012, Planning Policy Guidance Note 14 (PPG14) and its two annexes provided much valuable information to enable planners to deal with landslides, subsidence and other forms of unstable land. However, with the introduction of the National Planning Policy Framework (NPPF), this guidance has been withdrawn (the Technical Guidance to the National Planning Policy Framework issued in March 2012 covers flooding and mineral workings, but not the areas covered by PPG 14).

But even PPG14 did not contain information on how new developments should be planned to allow for climate change impacts on the stability of the ground they are built upon. Clearly, the insurance industry is ahead of central government in thinking about what to do. But as the industry believes it offers the preferred solution for householders, questions have to be asked: whether household insurance policies are adequate, whether all householders are adequately covered, whether the compensation offered and subsequent premium increases instigated by different insurance companies are equitable and fair, and whether developments should be allowed to go ahead if there is a high risk of ground instability which might cause high premium costs for unsuspecting households.

A policy that relies on insurance is likely to introduce inequity, not merely in terms of who has and who does not have appropriate insurance, but also in the levels of compensation paid by different insurance companies. Health and safety considerations suggest that evolving risks from environmental hazards associated with climate change should be public knowledge made available by responsible governments.

The hazard maps produced by the BGS and others have a key role in informing people of the risks affecting particular sites. While details are readily available, most of those buying property know nothing of them and do not think of asking. Developers may ignore them: so surely planners should be leading in bringing such information to the attention of the public? The issue of adapting to climate change is basically one of asking the appropriate questions and then applying the necessary available knowledge.

Implications for research

Ground stability is a highly technical field which also involves a wider landscape – spatial planning, finance and insurance, infrastructure providers, and

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**Fig. 2:** Groundwater levels in the Trafalgar Square borehole, London, 1900-2010 (after ‘Rising groundwater in central London’)

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general social/cultural issues. Behind this there are knotty questions of future risks and uncertainties, social time preference rates, the optimal distribution of risks, costs and benefits, and others. At present, the private insurance firms seem to be leading the response on these issues, and this presents an interesting new light on public research for what should be public benefit. While the UK is relatively low risk compared with some countries, the increasing disruption expected from climate change will put this to the test.

● Ian Douglas is Emeritus Professor in the School of Environment, Education and Development, University of Manchester. The views expressed are personal.

Notes
2 Climate Change: Adapt or Bust. 360 Risk Project. Lloyds, 2006. www.lloyds.com/~/media/3be75eab0ef24a5184d0814c32161c2d.ashx
6 See the BGS National Landslide Database, at www.bgs.ac.uk/landslides/nld.html
12 See the BGS ‘Hazard potential mapping’ webpages, at www.bgs.ac.uk/science/landUseAndDevelopment/shallow_geohazards/hazardPotentialMapping.html
Urban green spaces, or areas predominantly covered by grass, shrubs or trees, form a vital part of the urban realm: for example, over two-thirds of the Greater Manchester conurbation is green. However, it is only recently that this impressive resource has been recognised as a vital life-supporting system. This article follows the journey to the current perspective, explores the contribution made by researchers from the CURE (the Centre for Urban and Regional Ecology), and reviews the prospects for research and policy that are needed to ensure that green spaces contribute to liveable and prosperous cities.

The history of green space planning in British cities provides a fascinating insight into the changing perspectives on the roles and provision of green space. The first public parks were established during the Industrial Revolution, to provide recreational space for a working class separated from the countryside, in a budding recognition of the contribution of green spaces to quality of life.

Planning for individual green spaces evolved into more holistic approaches in the 20th century. Initiating the Garden Cities movement, Ebenezer Howard sought to enrich urban life by combining the economic vitality of the town with the health-giving benefits of the tranquility, open space and clean air to be found in the countryside. Thus, in the Garden Cities generous provision of green spaces was seen...
as essential for providing appropriate living conditions and supporting social activities. In the Modernism movement, green spaces were omnipresent, seen as contributing to hygienic and healthy lifestyles. Similarly, the post-war New Towns sought to attract residents away from crowded cities by offering low-density housing submerged in vegetation.

From the 1970s, this extensive legacy of green spaces started to deteriorate, as maintenance by a skilled and dedicated workforce was increasingly replaced by the ubiquitous gang-mower, and links were made between a deterioration in urban parks and a wider decline in the quality of public spaces. This subsequently spurred an interest in new approaches to land reclamation and restoration. The revitalisation of neglected parklands was seen as a key component of the ‘urban renaissance’ that aimed to improve the public realm, and a new agency, CABE Space, was established to champion green spaces within the Commission for Architecture and the Built Environment.

In the last decade, the pursuit of more intensive urban development has been somewhat tempered by evidence of the wider benefits of natural areas.

The recognition of ‘multi-functional’ green space networks owes much to the work of the late Alan Barber, who systematised his thinking about multi-functionality in the CLERE model: this incorporates the functions of green spaces in community development and education; for landscape conservation; as an ecosystem; as a recreational resource; and as a contributor to the local economy (‘community-landscape-ecosystem-recreation-economy’ – CLERE).

In parallel, the United Nations Millennium Ecosystem Assessment confirmed the notion of multi-functionality in terms of the services provided to humanity by the ‘natural environment’ – classified into productive, regulatory and cultural categories, and underpinned by fundamental supporting services, such as nutrient cycling.

The concept of green infrastructure (GI) is based on a multi-functional network of all green spaces, ranging in scale from street trees to regional parks, as a counterpoint to ‘grey’ infrastructure such as transport or water supply networks. It builds on the concept of ecological networks and wildlife corridors that enable species to move through hostile environments.

The GI concept has been embraced in the UK, first at regional and sub-regional level in the form of non-statutory guides, such as the North West Green Infrastructure Guide, and then in statutory documents, such as the former Regional Spatial Strategy for the North West, and also in national planning policy (for example in the now withdrawn Planning Policy Statement 12: Local Spatial Planning). Its importance is currently recognised in the National Planning Policy Framework, mainly in relation to climate change adaptation and the protection of valued landscapes. However, the potential vulnerability of green space in the face of economic development imperatives is as yet unresolved.

Three key themes stand out, and in each there is a contribution from CURE research.

Brownfields – the unofficial countryside in and around cities

The unique character of brownfields, developed through the cycle of disturbance, abandonment and colonisation, offers a valuable addition to GI. By contrast with often impoverished parkland landscapes, biodiversity and recreational opportunity could often be greater in the ‘unofficial countryside’ of the industrial brownfields. A national status report to the Groundwork Foundation highlighted the importance of restored and appropriately maintained brownfield land for local communities. In recognition of the limited funding for the care of such under-used land, the report recommended setting up a trust, which would acquire such land at the end of its economic life. Eight years later, the
Land Restoration Trust (now the Land Trust) was established, offering restoration and long-term stewardship of restored brownfield land and other open spaces for significant community benefit. The multi-functionality theme was taken forward by Ling et al.,9 who argued for a new approach to brownfield reclamation which optimises regeneration by marrying economic development with ecological, social, cultural and aesthetic benefits.

Accessible, natural green space for all
A key theme in green space planning has been the importance for human wellbeing of contact with nature. This is reflected in the ‘ANGSt’ (Accessible Natural Greenspace Standard) planning model, developed by the UK UNESCO Urban Forum and adopted by English Nature. The model recommended provision at all spatial scales, from pocket parks providing daily contact with nature, to large regional parks offering escape into the natural world. CURE developed a decision-support framework for implementing the ANGSt model.10 This work was continued in a toolkit developed for the Countryside Council for Wales11 which helps to quantify current levels of provision and suggests how deficiencies in natural green space could be rectified.

The role of green spaces in climate change adaptation
The ASCCUE project (Adaptation Strategies for Climate Change in the Urban Environment), chaired by the TCRA, explored climate change impacts in the urban environment. First, the amount of GI in Greater Manchester was estimated through land cover analysis. The subsequent modelling of surface temperatures and surface water run-off firmly established the importance of GI in climate adaptation: for example, increasing green cover by 10% in city centres would help to maintain the current maximum surface temperatures under a changing climate up to the 2080s.12

The ASCCUE results underpinned the TCPA handbook Adaptation by Design13 and the TCRA-led INTERREG IVC project ‘Green and Blue Space Adaptation for Urban Areas and Eco Towns’ (GRaBS). This produced a database of GI case studies and a Vulnerability Assessment Tool,14 allowing partner cities to plan the distribution of green spaces as adaptation responses in relation to particular climate hazards.

It has also been recognised that it is not only humans that need to adapt to climate change, and that other species may need a helping hand. For example, Gilchrist15 analysed the movement of selected butterfly species through the Mersey Belt. This helped to identify south-north migration routes which would help the butterflies, and by implication other species, to achieve range expansion under climate change. The subsequent Natural Environment White Paper, The Natural Choice: Securing the Value of Nature,16 recommends the creation of a ‘resilient ecological network’ across England, supporting the migration of species.

The agenda for the future
GI can be seen as the pinnacle of green space planning, with a broad agenda for green space provision, connectivity and multi-functionality. However, one area of GI research remains undeveloped: its economic value. An initiative led by Natural England (‘Natural Economy North West’) has explored the economic benefits of GI. The quantification of green space economic benefits,
pioneered in the North West of England, is now being taken up by English Nature in association with The Economics of Ecosystems and Biodiversity (TEEB) study and the National Ecosystem Assessment. The robust economic evaluation of GI, including the costs and benefits of maintenance (critical for sustaining function), is an important research agenda in the current age of austerity.

However, this pursuit of ‘valuation’ raises more fundamental questions which CURE aims to address in the longer term. How to measure ecological resources which are complex and interdependent? Or the social or cultural assets which are mainly intangible, in situations which are fast changing? And then, as the debate on renewable wind energy shows, how to make trade-offs between conflicting objectives and value systems?

One way forward is to focus on close collaboration with users and stakeholders: for example, much of the CURE research uses Greater Manchester as a ‘living laboratory’. This has helped to ensure that the knowledge is ‘co-produced’ in dialogue with practitioners, and then transferred into policy and practice. However, despite considerable interest in GI, there is still an absence of worked examples on how to implement multi-functionality and secure its long-term management. This calls for an even closer collaboration between researchers and policy-makers: a good example here is the Memorandum of Understanding between the University of Manchester and Manchester City Council.

Co-production of knowledge is especially topical given the current changes in the planning system. While the National Planning Policy Framework promotes general GI principles, in the absence of a regional tier GI planning is left largely to local authorities and neighbourhood plans. The GI Framework for Greater Manchester provides one example of how to bridge the gap between national and local planning, by sustaining functionality across different scales within the changed institutional framework. Such collaborative ‘knowledge-into-action’ research, coupled with multi-level partnership governance at the conurbation scale and beyond, would contribute to the aim of the Natural Environment White Paper® of strengthening connections between people and nature, to the benefit of both.

*Dr Aleksandra Kazmierczak* is a Research Fellow at CURE and *Professor John Handley* is Director of CURE, at the University of Manchester. The views expressed are personal.

**Notes**

Water has been critical to where cities originate, their development, and the standard of living of their inhabitants. However, the relationship is complex, and in advanced nations it is easy to forget how vital effective management of the resource is. We need both continual availability and protection from its potential impacts: too much or too little water can have devastating consequences.

The major floods of recent years have reminded us of the implications of this delicate balancing act. Parallel droughts and floods have tested the understanding of many and have led to some of the more predictable news headlines concerning the ‘wettest drought ever’, neatly encapsulating the tenor of the water debate (see Fig. 1) – how, if it is raining, can there be a hosepipe ban?

To most planners this viewpoint may seem simplistic, failing to appreciate the institutional complexities and practical constraints of water management, but the recognition of the interconnectedness of supply and demand may not be well reflected in either policy or practice.

With regard to strategies for securing a constant supply and defence against precipitation extremes, the onus has been on the role of science and the effectiveness of governance frameworks. Given significant advances in these fields, one could be forgiven for assuming that flooding and drought should be lessening, their risks increasingly understood, and the threats better managed. This view is, however, far removed from reality.

Although the methods used to control water in developed countries have gained in sophistication, perhaps incongruously the experience of water-related problems is commonplace. As the frequency, scale and impacts of detrimental events challenge the way that water has been traditionally managed, the debate has become more inclusive and gradually turned to people and places – key tenets of spatial planning. Indeed, floods and droughts cannot be disassociated from the socio-economic context within which they occur, being directly related to how we live, where we live, and how we govern.

This article briefly summarises some of the issues explored in more depth in my recent book Water and the City. It investigates the historical legacy that embeds vulnerability in many cities, and how strategic spatial planning could help to improve the relationship between the preferred habitat of humanity and its most precious resource. Finally, there are implications for knowledge – how to manage urban water in the water-sensitive times to come.
Untangling a historical legacy

There is an old joke concerning a city dweller who is lost while travelling in the countryside and asks a local for directions, only to be given the answer: ‘If I were you, I wouldn’t start from here’. This advice provides an analogy for the way that the historical relationship between cities and water may appear almost to have been designed to maximise the risk of flooding and scarcity. If that seems an exaggerated statement, take a moment to consider how, in the perverse situation of having to design a city to increase these risks, one would achieve the task.

As an initial measure, housing, industry and critical infrastructure would all be placed in areas at risk from flooding. Strategies to increase the threat would be pursued by maximising the use of hard surfaces that generate run-off and by the development of a drainage system designed to move precipitation quickly into the nearest watercourse. Opportunities for infiltration, interception or evaporation would be minimised, perhaps by increasing the density of the built environment. Equally green space would be narrowly considered as mainly concerning amenity or as a tool to combat sprawl. The city would be designed to limit groundwater recharge, while industries and agriculture would be allowed to abstract vast quantities of water for cheap export goods. Furthermore, a demand-led culture of seeing water as a ubiquitous resource would be fostered, with the agency benefiting most from water consumption also charged with reducing usage.

Although this is an illustrative view, it is clear that cities and citizens have a historical legacy that may have paid little regard to possible future water risks.

While development facilitated by a new defence or an expanded drainage network provides service to some sectors, the implications for the city and its water environment may not be so simple. The rapid emergence of surface water flooding as the most widespread and difficult-to-manage source of flood risk provides evidence of this situation, as climate change and urbanisation have combined to provide uncertain driving forces. In practice, risk management has focused on transferring risk spatially and deferring it temporally. In reality, a focus on growth and the application of mainly technologically driven solutions may embed both direct utility and indirect jeopardy in the city. For example, a common problem with policies to hold back water is that they increase risk via the ‘escalator effect’, or that they give rise to the ‘safe development paradox’, whereby the provision of flood defences makes vulnerable land more attractive for development.

Equally, a process of urban intensification can bring supply problems, as is now evident in the South East of England. Although the UK as a whole is relatively rainy, rainfall is not evenly distributed and the impracticalities of transporting water between regions are now being experienced.

The main point to consider is that cities are constrained by existing historical issues such as urban form, property rights, institutions, governance frameworks, and cultural attitudes. Moreover, any strategies must be embedded within, and tailored to, the local environment; and it is here that strategic spatial planning can prove effective.

Planning for a sustainable future

Although ‘where to start’ may be a difficult proposition, projecting ‘where to end’ may be more straightforward, especially when considered from a land use perspective. Fig. 2, overleaf, provides an overview of how a city-region more resilient to water risks may be influenced by spatial planning. These differing measures can assist in re-engaging the city with its local environment to manage water more effectively.

Within this notional representation of an urban area, a strategic approach can help in envisaging a direction of travel and can aid long-term decision-making for water resilience. When considering flooding, upstream storage can compensate for downstream densification, vulnerable sectors can be identified, and green space and soil compositions...
can be merged with local hydrology. Where risks are hard to quantify accurately, there could be a move towards multi-functional and resilient land use designed to cope with water, such as new ‘green and blue infrastructure’. Furthermore, development in areas subject to surface water flooding could be limited where it is uneconomic to expand sewer capacity; and urban infill could be more tightly controlled in areas with sandy soils which provide valuable drainage functions.

However, the focus would not all be on the restriction of the built environment; lower-quality green space could be released for development, particularly if it may not allow for effective water storage or infiltration. An additional aspect would concentrate on influencing the resilience of vulnerable communities and infrastructure.

On the water supply side, many of these measures would also help to alleviate problems of scarcity. For example, allowing water to infiltrate will increase resources, while pursuing options such as metering and new technology can help to reduce demand. Employing more decentralised strategies to capture, retain and re-use water can also help to lessen overall demand and reduce the spatial disparity in supply. As a final illustration, the identification of those aspects of agriculture and industry particularly reliant upon the cheap availability of water could enable a gradual shift in practices or increased security of supplies.
However, implementing such a vision may not be compatible with current administrative or managerial aims. Why should urban areas on the fringe of the city forego additional investment or regeneration in order to enable development within affluent areas in the centre? Equally, should already highly urbanised areas suffer a lack of green space due to their underlying soil composition? The potential difficulty in applying this risk-based approach emphasises the possible tension between functional and administrative areas – for example with regard to catchment or local authority boundaries – and emphasises the need for partnership approaches between public and private stakeholders.

‘If we want to minimise risk we may need to reconsider both the relationship between the built environment and its geo-climatic surroundings and the mono-functional approach to water management’

In practice, risk management does not operate in a vacuum – it competes with other priorities such as growth and regeneration – but planners, with a remit to influence land use for the longer term, can be critical agents for change. Although water is not their only agenda, recent changes outlined in the EU Water Framework and Flood Directives, and in the 2010 Flood and Water Management Act, have transferred more powers and responsibilities to the local level. Moreover, traditional ‘top-down’ water infrastructure solutions delivered by the Environment Agency or water companies are hard to realise in an age of scarce financial resources and five-yearly price agreements.

The requirement to protect urban areas from emerging water risks argues for the adoption of a more integrated, long-term outlook in which urban form is adapted to be more resilient. In short, if we want to minimise risk we may need to reconsider both the relationship between the built environment and its geo-climatic surroundings and the mono-functional approach to water management.

This article also underlines that the current vulnerability to water risks is partly a legacy of previous decisions – and, similarly, that we need to acknowledge that the future legacy stems from the present. This situation is summed up in Giuseppi Tomasi’s novel The Leopard, set in the privileged aristocratic environment of Sicily in the 1860s. Under threat from Garibaldi’s impending revolution Tancredi argues to his high-born uncle that: ‘If we want things to stay as they are, things will have to change.’ The implicit message for water and the city is that powerful social, economic and climatic drivers will bring negative effects, and societies may need to consider significant managerial changes in order to protect current lifestyles. So although a re-examination of the strategic relationship between cities and water may seem radical, the motives are essentially conservative and at the core of spatial planning: the need to protect people and places from risk.

Building knowledge for sustainable water management

Overall, the water agenda runs, like a river, through any research approach to city-regions – as ecological systems, as metabolic flows, as spatial pattern-making, and as socio-political learning. This is very topical in the light of new scientific directions. The urban water research agenda has to work with the future as much as the present, mediating high levels of uncertainty and controversy between different groups. Water engineers have to find ways of collaborating with consumer groups; and financiers with neighbourhood planners. There are displacements in space and time to consider – for example, where imports of fresh flowers can seriously damage the water resources of distant countries, or the risk that climate change in arid zones could generate a world food crisis. Meanwhile, new research brings new concepts such as ‘resilience’ and ‘adaptive capacity’, which are far from simple.

All these factors and more point towards the need for new kinds of interdisciplinary knowledge, and for a more interconnected approach to what may be currently perceived as silo-based challenges.

Notes
3. I. White: ‘The more we know, the more we don’t know: reflections on a decade of planning, flood risk management and false precision’. Planning Theory & Practice, 2013, Vol. 14 (1), 106-14
Every city survives on a massive daily throughput of food and drink, mineral and forest products, manufactures and consumer products. In turn it generates waste, emissions, ‘consumables’, ‘durables’, and fixed assets (see Fig. 1 and Box 1). Such materials are increasingly globalised in origin and destination, as part of a highly interconnected global economy. Meanwhile, there are also counter-trends towards ‘localisation’, mainly for very practical reasons: cost, environmental standards, healthy lifestyles, ethical and social concerns, food quality, and – just possibly – new paradigms for how cities and city-regions could or should operate.

All of this is highly topical for planners and other policy-makers who could, in principle, steer our cities and towns in the direction of ‘sustainable consumption and production’. But as yet there are huge gaps in the necessary knowledge and its applications.

The notion of urban metabolism and ‘resource flow analysis’ has been around since the 1970s:1 with the sustainability aspirations of the 1990s and with new data and methods, it expanded rapidly. One major UK programme was the ‘Biffaward Mass Balance’ series of regional and sectoral studies (conducted with the aid of the Landfill Tax Credit Scheme).2 The REWARD (Regional Waste and Resource for Development) programme used regional econometric models,3 and the Resource and Energy Analysis Programme (REAP) used an ‘input-output’ interactive model to explore the production and consumption impacts of policy options.4 Armed with technical reports and participation methods, the ‘One Planet’ programme went around UK cities and regions with the aim of reducing climate change emissions, resource depletion and the indirect ‘footprint’ of consumption by a factor of four.5,6 The general goal was to find ways to live sustainably and equitably on ‘One
Planet’, and the time seemed right for major changes in the socio-economic and urban system.

Such aspirations were soon to be sidelined by the crisis of 2008 (followed by the abolition of UK strategic planning structures in 2010). It became even more clear than before that research or technical advice has strong competition – from market forces, corporate capture, political pressures, technology lock-in, and consumer psychology. Overarching this is the wider debate, still very much in progress, on alternatives to growth and the meaning of prosperity.7

This article sketches some examples of an ‘urban metabolism approach’ and its implications for planning. Then comes the question – where next? What kinds of knowledge can be most useful in helping the UK (or any other nation) to live sustainably and equitably on the resources of one planet?

An overview of urban metabolism
Urban areas import materials, water and energy to build and maintain the hardware of the city, to feed the people and other organisms in the city, and to provide goods and services for the industries and activities of the city. Much of the input is added to the stock of the city, but both manufactured products and used materials are exported from the city. Used water is returned to aquatic systems, gases are released into the atmosphere, and some rainwater and used water carries contaminants into the ground, which also receives waste dumped in landfill. Quantifying this urban metabolism is a key yardstick for assessing the sustainability of cities or city-regions, and for assessing the balance between localism and globalism in the flows that sustain urban areas.

As a general rule, wherever resources are ‘externalised’, i.e. imported or exported, there is a likelihood of impacts on vulnerable populations – from mineral extraction, climate emissions, groundwater depletion, air pollution, waste generation, and the many impacts of international shipping and air freight. There is thus a general imperative to ‘internalise’ or ‘re-localise’ the material flows of cities and city-regions, which have been increasingly globalised. This is not only a technical challenge for waste management, but aims to shift the ‘slash-and-burn’ economy towards a more ‘circular economy’, where most of if not all resources are locally produced, re-used, re-manufactured and recycled.

Local circular economy – food
The local dimension of urban metabolism can be seen in many places. There is increased interest in local intra-urban and peri-urban food production, both in individual gardens and allotments, and in the growth of farmers’ markets that bring peri-urban and regional produce into towns and cities. The local dimension is also seen in the return to urban-rural recycling of organic matter and nitrogen through the collection of food and garden waste, composting, and the return of sewage sludge to the land. Recycling of construction and demolition waste, increasingly on the same site, but also within a few kilometres of the source, adds to this local pattern of re-use and recycling.

Box 1
Materials metabolism of the UK

In a typical region of the UK:
● Primary industries such as agriculture, fishing, forestry and mining bring into the ‘urban system’ 5.3 tonnes of material per person per year.
● Imports from overseas bring another 2.2 tonnes of material per person per year, and half of that tonnage is then exported.

Materials are circulated within the economy from one sector to another, until they reach the point of sale to households (i.e. the point of ‘final demand’). Households purchase directly nearly 1.9 tonnes of food and other products per person per year, and capital investment in the agri-food sector accounts for another 0.3 tonnes per person per year. Waste accounts for over half the material flow at 4.2 tonnes per person per year.

The average home in the UK:
● is occupied by 2.35 people, 0.4 cats and 0.3 dogs;
● consumes over 9,000 kilowatt-hours of energy, producing over 5 tonnes of carbon dioxide per year;
● weighs about 150 tonnes, with another 140 tonnes for the foundations; and
● requires an average 0.5 tonnes of materials each year for maintenance and repair.

Source: 2010 figures, based on the REAP model (see www.sei-international.org/reap), as reported in Counting Consumption (WWF-UK – see assets.wwf.org.uk/downloads/countingconsumption.pdf) and the Eco-Region NW resource base, at http://hosting.creativeconcern.com/ecoregion/index_intro.php
In 2012, just over half the UK’s food (by weight) was supplied domestically. The leading suppliers of the remainder were neighbouring European countries: the Netherlands (6.2%), Spain (5.1%), France (3.5%), Germany (2.7%), and Ireland (2.5%). The UK’s food ‘self-sufficiency’ reached a peak at the height of the application of subsidies through the Common Agricultural Policy in the 1980s. ‘Self-sufficiency’ ran at levels of 59% in all food and 72% in indigenous types of food in 2009.

However, localisation of food production has re-emerged, with increasing demand for allotments and farmers’ markets – just under 300,000 tonnes per year could be produced from allotments alone. This would be a small but valuable contribution to the 8.2 million tonnes of fresh produce consumed annually in the UK. Regional examples of local food production include the ‘Incredible Edible Todmorden’ project, which aims to make the town self-sufficient in vegetables by 2018: under-used land and much ornamental planting in local parks, planters and flower beds have been planted with vegetables, herbs and fruit. Another is the Manchester Joint Health Unit food strategy, which aims to double the food produced within the city and greatly increase local composting, and thus establish a more closed-loop urban metabolic system. Local food production options are set out in Box 2.

Local circular economy – waste
The UK produces some 1.4 million tonnes of sewage sludge annually, around 0.9 million tonnes of which is disposed of on farmland. Much of the remaining sludge is incinerated, producing electricity used to power machinery at treatment works or

Box 2
Local food production options
- **Individuals and households:** Growing food in window boxes, planters and balconies and on green roofs. Increased use of gardens and allotments.
- **Communities:** Collective shared gardens on estates and near religious buildings and schools.
- **Municipalities:** Policies favouring urban agriculture; preserving grade 1 agricultural land for food production through the planning system; supporting farmers’ markets; increasing municipal composting and the use of sewage sludge as a fertiliser; setting targets for increasing the amount of food consumed that is grown locally; and growing food on public-building green roofs.
Box 3 Remanufacturing from used products

Remanufacturing recaptures the value added to the product when it was first manufactured. The remanufacturing of motor vehicle components preserves approximately 85% of the energy expended in the manufacture of the original product within the remanufactured product. Remanufacturing computer printer cartridges, for example, has a carbon footprint of 2,380 grammes of carbon dioxide, compared with 4,399 grammes for a new cartridge.

However, while taking an item apart and re-using its component materials, such as plastics, steel and glass, is good recycling practice, it can lose the economic added value, which may be 80-90% of its original cost.

Implications – urban policy and planning

While there are many community-based schemes to improve urban food production, there is as yet little sign of spatial planning for future local food production at the city-region level. In addition to the many calls to use vacant land for temporary allotments, a long-term plan for localising urban food supplies, together with the return of nutrients through composting with minimal transport costs, would bring huge benefits for nutrition, healthy lifestyles and the local environment.

Similar joined-up and long-term thinking is required to localise use of the byproducts of urban metabolism for energy supplies. For instance, sewage works water flows can be used to generate electricity, as Yorkshire Water does near Bradford, as well as using sewage sludge methane to generate electricity. Biomass power plants can already use waste and recycled wood that is not returned for re-use in construction. In Sweden most heating comes through district heating using biomass or from electric heat pumps. We in the UK have a long way to go.

Providing opportunities for this type of small-scale re-use of materials and localised food production requires a vision of a city-region that embraces the use of resources and land within the city, on the urban fringe and beyond, to contribute to meeting the needs of that city. ‘The Urbal Fix’ is one approach to getting community initiatives to come together, using roofs, window boxes and other temporal or permanent vacant urban spaces for the production of local produce. The Transition Town approach makes community plans for ‘energy descent’, while ‘guerrilla gardening’ seeks to make use of all under-used land in a neighbourhood.

At the moment much of this community-based local metabolism takes place at the edges of the
mainstream market system, where multi-functional food or recycling has social, cultural and ecological benefits as well as financial advantages. But economic logic is likely to increase the re-use of materials as the global stock of minerals becomes scarcer and therefore more costly. There will inevitably be a need to close metabolic cycles, and to gain the advantages of industrial symbiosis. However, while wage rate differentials remain high, much international distribution of manufacturing or re-manufacturing will reflect international inequities. Sustainability cannot be divorced from social justice. The poorest communities are often the best at recycling and at urban food production, and the rest of society has much to learn from their frugality.

Implications – a knowledge agenda for circular economies

In some EU countries, resource flow analysis is far beyond UK practice. There are many applications: whole-economy studies with input-output analysis of production and consumption; sectoral or product chain studies with life-cycle analysis; and technology road-mapping and risk assessment. The linkages with energy systems and climate change show up everywhere, as do the land use implications of agriculture, forestry and carbon cycles. The most intensive industrial sectors are water, energy, waste and construction, with its massive material stocks and flows. But there is also a huge diversity of small- and medium-sized enterprises (SMEs) responsible for the majority of flows and impacts; and here we have to look beyond technical analysis, towards wider issues – new business models, ethical finance, skills and education, public health, and fashion and culture.

A new research agenda for the 21st century urban metabolism thus starts to take shape: integrated socio-technical business models and industrial ecology models on the production side; organisational learning models on the policy side; and creative socio-cultural models on the consumption side. All these and more contribute to the innovation pathways which are urgently needed for the transition to a dematerialised economy and society. This sounds grand, and it is. How can spatial planners be involved, and how can research help them? We need better technical information on sectoral flows and impacts, and we also need cross-cutting knowledge between technical, economic and social issues. We then need to link back to urban neighbourhoods and rural districts, city-regions and metropolitan areas, functional urban areas, and ecological bio-regions. Each of these units is relevant in some way to the management of scarce resources, vulnerable assets, over-arching goals for climate and resource efficiency, and creative social communities. Overall, we need to find ways to think outside the ‘silos’ and into circular systems, with joined-up social-ecological-business value models. Is this too ambitious for the hard-pressed urban planners of 2013, or 2033?

Notes

1 I. Douglas: The Urban Environment. Edward Arnold, 1983
2 See the Mass Balance UK project website, at www.massbalance.org
4 See the Resources and Energy Analysis Programme website, at www.sei-international.org/reap
6 Examples include the One Planet Wales study (see http://wales.will.org.uk/what_we_do/changing_the_way_we_live/one_planet_wales/) and the EU One Planet Economy (see www.oneplaneteconomynetwork.org)
8 J. Ravetz: Urban 3.0: Creative Synergy and Shared Intelligence for the One Planet Century. Earthscan, 2014 (forthcoming)
In September 2000, there were blockades at refineries and oil depots, long queues and short fuel supplies, and the city of Manchester was miraculously car-free. Eight years later, the public voted to reject a package of measures known as the Transport Innovation Fund (TIF), which included wide-ranging public transport improvements and a congestion charge system. These are two occasions during which the dominance of the car in cities was highlighted and questioned. This article reflects on the latter, looking at the plans and surrounding debates, the implications for sustainable transport policy, and the possibilities for new types of knowledge to be more effective for such policy. First, it is useful to outline the sustainable transport challenge.

The challenge

A ‘sustainable city-region’ cannot have an unsustainable transport system. Transport often has a negative press as ‘the problem’, and ‘transport policy’ is frequently presented as attempts to neutralise the ways in which the transport system impacts upon people through the environment – seeking to reduce greenhouse gas emissions, clean up local particulate and nitrogen oxide emissions, and reduce the incidence of casualties on the roads. Transport planners face particular challenges. These include the current level of dependency on fossil fuels, the dispersed nature of transport systems, high levels of ownership of private vehicles, and the public’s emotional attachment to the car. The interconnectedness of districts, cities and regions means that transport decisions in one area will almost certainly have repercussions elsewhere in the network, making consideration of cross-boundary effects particularly important.

Transport is rarely provided for its own sake, even though it is often said that Britons love their cars and governments can appear obsessed with large infrastructure projects: this is known as ‘derived demand’, directed at wider societal objectives. It therefore makes little sense to see transport in isolation: it both influences and is contingent upon other spheres of activity. Transport planning should begin with ‘What sort of region do we want to live in?’, not just ‘How to get from A to B?’

While we appear as a society to become more mobile through our car use, we also experience the other side of this coin: car dependency, as more and more activities are perceived to require a car. The term was coined by Newman, who observed that cities demonstrate varying degrees of car dependency and that it should not be seen as inevitable, but rather as a result of planning decisions. Banister paints a picture of a ‘fragmented city [that] becomes hostile and can force even reluctant users into their cars, thus exacerbating the problem of uneven distribution even further’.

The sustainable transport policy mix is quite familiar – shift to public modes; raise occupancies all round; use more efficient cars and electric vehicles; travel less and walk/cycle more. All this adds up to a socio-technical challenge, in which engineering,
economic and behavioural approaches play out in a process of co-evolution. But given the stubborn resistance of citizens and policy-makers, the processes of change must be negotiated through a complex political ecology. The contours of this challenge will reflect power relations, values and expectations, and its dimensions are shaped not only by the transport geographies of the city-region but also by its governance structures, psychologies and cultures.

Greater Manchester’s ‘TIF’
This combination of approaches is commonly referred to as carrot and stick (incentives and disincentives). The Greater Manchester Transport Innovation Fund (TIF) package provided an example of one such approach (see Box 1).

The most prominent part of the package was a weekday, peak-time-only congestion charge, operating in the direction of peak-time traffic. The congestion charge would, via a loan and matching government grant, have part-funded a wider package of transport measures, as set out in Box 1. It was claimed in the consultation documents that the package would bring about a 6% reduction in carbon dioxide emissions and a 10% reduction in local air pollutants (compared with business as usual), and that there would be faster journeys, cost-savings for businesses, and a more socially-inclusive public transport network. For the two years in which the TIF package was developed, debated and voted on, Greater Manchester was a laboratory for sustainable transport decision-making.

Box 1
The Greater Manchester Transport Innovation Fund package
Key elements of Greater Manchester’s TIF bid included:
- a peak-time-only congestion charge, operating in the direction of peak-time traffic and chargeable on crossing one or both of two cordons (an outer and an inner ring);
- an expanded Metrolink network and new trams;
- an expanded cycle lane network;
- additional yellow school buses;
- new train rolling stock and improved interchanges;
- improved integration of the bus network, rapid transit priority lanes, and a guided busway;
- park-and-ride sites;
- Oyster-card-style smart ticketing; and
- personalised journey planning and smarter choices packages.

Auto identity
One issue evidenced in this process was the extent to which we tend to identify with the car, manifest in the conceptualisation of ‘the motorist’ and substantiating observations of other authors of our high level of attachment to the car. The ‘no’ campaign in response to the TIF proposals made frequent references to the ‘driver’ or ‘motorist’, and the media also tended to use this vocabulary of the ‘war on the motorist’ and similar constructions.

An early local press front page featured an image of a crowded tram and the headline ‘Is THIS really an option for drivers?’, with the implication that although these people were on public transport they still somehow retained their ‘driver’ identity – somehow different from public transport users. After the Manchester Evening News (MEN) launched a survey to let ‘drivers’ report problems with congestion, some environmental groups made the counter-argument, signing a letter that argued ‘No one is simply a motorist – we all have a range of transport modes available to use, depending on the journey we are making’.

Furthermore, media coverage illustrated the extent to which personal auto-mobility is linked with freedom. The MEN coverage (on 25 June 2007) of the claim put forward by MART (Manchester Against Road Tolls) that the charging rings would be equivalent to the Berlin Wall provided an extreme example: ‘Congestion charging will create an electronic Berlin Wall around Manchester and the M60 will become a barrier that will keep people in and money out.’

A more sustainable approach to transport planning would see modal choice and identity disentangled, and journeys made by the most appropriate mode. Yet ‘cars – far more than bicycles and other modes of transport – form part of the identities of individuals, organisations and indeed the wider culture’. To Clean Air Now, a pro-TIF coalition, reducing traffic growth and encouraging cycling would have been positive for health and environmental reasons, whereas advertising by MART implied a view that expecting people to cycle instead of driving would be seen as an insult (see Fig. 1).

Social inclusion versus social exclusion
This correlation of the car, mobility and freedom is useful in understanding recurring concerns about social inclusion. Concerns were expressed that the congestion charge would disproportionately affect drivers in low-income communities. There are clearly grounds for concern: the benefits of paying the congestion charge for less congested roads would be likely to impact more lightly on the wallet of wealthier drivers – resulting in low elasticity – whereas the opposite is likely to be true at the lower end of the income spectrum, with the increases in cost likely to deter people from travelling or reduce the ability to travel. Particularly at
risk, then, are those on low incomes with no realistic alternative to making essential journeys by car. However, the counter-argument is that low-income households with cars spend a disproportionate amount of their income on motoring and would therefore benefit the most from other modes being improved. If public transport were to be improved such that car ownership is not (or is less) necessary, it would be lower-income communities that gained the most from being able to sell their cars. Furthermore, many people are too young, old, poor or otherwise unable to drive, and would benefit from improved public transport, as would those who live in a one-car household but do not have regular access to the car – for example if it is being used by one person for work each day. A child’s freedom to get a bus to school or cycle to a friend’s house is different from the freedom to negotiate a lift from an adult.

The approaches of the ‘yes’ and ‘no’ campaigns illustrate the two sides of this argument, with those in favour tending to emphasise the investment in public transport and those against tending to highlight the potential burden of the charges on lower-income motorists (see Fig. 2). Shifting the balance from private cars to car-sharing, public transport, walking and cycling can reduce the burden of car ownership and make transport an asset for all, but entails a conceptual ‘delinking’ of freedom and accessibility from private car ownership. Rajé proposes an equity audit to identify potential issues and hone plans. The TIF experience indicates that this could enhance the public acceptability of controversial plans.
Reportage and referendum

In the debate in the media, the TIF debate was primarily referred to as the ‘congestion charge’ referendum, rather than, say, the ‘public transport referendum’ – highlighting, not surprisingly, the most controversial element. Public transport improvements were mentioned, but rarely in the first few paragraphs of reports, and they tended to be presented as something that compensated for the congestion charge, rather than being part of an overall package – for example ‘The government is offering Greater Manchester up to £3 billion for public transport improvements in return for the peak hour-only charge of up to £10’ (MEN, 25 July 2008).

There were also examples of misrepresentation of information, whether wilful or not. On 21 March 2007 MEN ran the front page headline ‘Congestion charging: You say NO’, reporting that ‘two out of three reject plans for pay-as-you-drive’ but ‘59% back move – if it brings cash for Metrolink’. Since the plans did include extension of the Metrolink, the headline should have been ‘You say YES’.

This casts doubt on whether the media space that opened up around the TIF package was able to communicate the complexity of the issues. Furthermore, the binary referendum vote can be seen as a ‘simplistic representation of what was a complex and controversial techno-political decision’, and did not encourage the public to engage in deliberation of the finer details, advantages, and disadvantages.

Strategic governance gaps

This situation was compounded by the governance context. The Association of Greater Manchester Authorities, the organisation proposing the TIF package, maintained that it should take a neutral approach, therefore restricting itself to relatively dispassionate, factual accounts of the proposals. The ten boroughs of Greater Manchester could not present a united front – until the day of the vote, some local authorities were speaking out against the proposals. At the time, Greater Manchester stood in a stark contrast to London, where the elected Mayor had been able to direct the unified transport organisation Transport for London to implement the congestion charge. ‘If the [Greater Manchester] public gives the proposals the thumbs up’, ran an argument in Transport Times, ‘then the victory will have been achieved in spite of, rather than because of, the conurbation’s local governance structure.’

Since then, the ten boroughs have established the Greater Manchester Combined Authority, and the newly formed Transport for Greater Manchester has responsibility for the delivery of transport across the city-region – time will tell if this will enable bolder decisions to be made on the city-region’s transport future.

Conclusions – emerging knowledge to bridge the gaps

The TIF debate suggests that tackling our dependence on private car use is a formidable challenge. It shows the limitations of our media, governance systems and democracy to effectively communicate complex issues, accommodate the range of viewpoints expressed, and produce strategic plans to develop sustainable transport systems.

The question here is: can new kinds of knowledge help? On the informatics side there is a new world of social media, locational information, ‘big data’, and computational power – it should be easier than ever to analyse and manage travel demand and match destinations to available travel modes. On the technology side there is an agenda for rapid innovation on low-zero carbon vehicles, and for their integration with a city-wide smart grid. Meanwhile, we can explore the human side – where understanding the social and cultural dynamics of lifestyles, leisure, and personal networks might bring better appreciation of interconnected problems and more effective policy responses.

This again suggests a vital zone on the policy-research interface, where the goals of sustainable city-regions depend on a more effective and responsive style of governance, together with the knowledge and social learning that supports it.

Dr Graeme Sherriff is a Research Fellow in the Salford Housing and Urban Studies Unit, Salford University, and was previously a Research Associate at CURE, at the University of Manchester. The views expressed are personal.

Notes

1 D. Banister: Unsustainable Transport: City Transport in the New Century. Routledge, 2005
3 R. Brand: Synchronizing Science and Technology with Human Behaviour. Earthscan, 2005
10 A. Forster: ‘They’ve made their cases, now it’s up to the public to decide’. Local Transport Today, 11 Dec. 2008, p.3
planning with ‘eyes open’ – impact assessment and evaluation

With policy assessment and evaluation as much a political art form as a matter of scientific analysis, Clive George reviews the many branches of impact assessment, and its prospects in a complex and turbulent world

Since the mid-1980s impact assessment (IA) has become a routine component of policy-making and planning. Some common varieties include Environmental Impact Assessment (EIA) of proposed development projects; Sustainability Appraisal or Strategic Environmental Assessment (SEA) of development plans; and more general ex ante (i.e. in advance) impact assessment of government legislation and policy (often referred to as Regulatory Impact Assessment, or RIA) (see Fig. 1, overleaf). Most of these are rolled together in Sustainability Appraisal (SA), offering fertile ground for consultants and academics. Some development actions may also be subject to ex post impact assessment or evaluation after implementation.

Each of these forms of impact assessment aims to give decision-makers better evidence on the actual or probable impacts of development interventions, either directly at the level of an individual site or city-region, or indirectly through policies at other levels – national, supra-national, and international. This article looks at how far impact assessment has influenced decision-making, and offers an outlook for future research.

The University of Manchester has been at the forefront of impact assessment research since the mid-1970s, when Norman Lee and Christopher Wood were asked by the European Commission to examine the prospects for a Europe-wide system for EIA, similar to that of the USA.¹ When the EU’s EIA Directive was issued in 1985 the Commission funded the Manchester EIA Centre to undertake research on its implementation in all Member States. Subsequent work on impact assessment by CURE (the Centre for Urban and Regional Ecology) and associated centres has expanded to include each of the above, working towards the goal of an ‘integrated assessment’ (IA) of all economic, social and environmental impacts.² ³ All of this work has continued to be strongly international, covering the rest of Europe as well as the UK, and extending to developing countries and the transitional countries of Central and Eastern Europe.⁴

The influence of impact assessment on development decisions

Much research shows that the influence of impact assessment on policy-making and spatial planning has been relatively limited. At the project level some improvement in the quality of decisions can be attributed to EIA, but the approach still falls short of its full potential.⁵ For development plans and programmes, the use of SA to implement the EU’s SEA Directive has raised concerns that it is easily manipulated in favour of ‘non-sustainable’ development objectives.⁶ At the level of government legislation and policy it seems that impact assessment has informed policy design only at the margins, and that the structure and outcome of decision processes are dominated by the political context.⁷
Such limits suggest that the rational, evidence-based model of decision-making that impact assessment aims to support is a poor reflection of political realities.

Policy-making and planning are essentially political processes, involving trade-offs between competing interests. The distribution of benefits and costs between diverse social groups may be affected by their relative economic strength and political influence. Further, the objectivity of an impact assessment study may be constrained by the political process it aims to influence, particularly when the assessment is conducted by or on behalf of the decision-making body itself.

Viewed from this perspective, impact assessment may be regarded less as a tool for improving the quality of decision-making outcomes, and more as an instrument for achieving broader governance objectives, such as engagement with civil society through transparent and accountable processes.

**Economic issues and integrated assessment**

Impact assessment in the UK has tended to be more rigorous than elsewhere, with a particularly strong focus on economic issues. This was in line with the free-market approach of the UK and USA, where RIA was originally introduced in support of deregulation initiatives. Most other OECD countries have subsequently followed their lead, and RIA systems have been strongly promoted internationally through development aid programmes. RIA procedures require all government departments to undertake *ex ante* impact assessments of proposed new legislation and policy, with a scope that is typically defined to focus on key national goals.

Efforts to reduce the extent of government regulation had limited success, and the goal of...
demand more transparent evidence and robust analysis at every level. Meanwhile, the pressures for public participation in complex multi-level governance make this task more challenging.

In response, there are technical developments such as social media, online databases, systems models, remote sensing, and GIS tools. There are also many experiments in procedural methods and approaches, to foster policy integration, community participation, social inclusion, organisational learning, and so on. While at the moment the UK seems to be steering away from strategic, integrated, evidence-based policy and planning, when the dust settles on the new regime, many of these wider experiences of evaluation will find a place in future practice.

Lessons from Sustainability Impact Assessment

Many lessons on integration and policy-embedding have been learned through the Manchester team’s work on Sustainability Impact Assessment (SIA) of EU trade policy.8 First, it was found that although conventional economic CBA can play an important role in impact assessment, it is sorely inadequate for the long-term dynamic effects associated with sustainable development. For many strategic-level actions, the social and environmental impacts are often a direct or indirect consequence of economic effects, and themselves have a strong feedback to long-term economic performance. Hence a reliable impact assessment needs to take full account of both the strengths and weaknesses of conventional economic analysis, together with other qualitative methods more suited to long-term dynamic effects.

Secondly, the level of uncertainty is often much higher than assumed, and this is a problem for the balance of rational evidence and political judgement. Thirdly, any influence which impact assessment has had on policy has tended to come through its use by particular stakeholder groups in their advocacy role, rather than through any direct influence on policy formulation.

Research policy outlook

If impact assessment and evaluation are to make a greater contribution to achieving sustainable development, whether at the level of an individual city-region, for the UK as a whole, or in overarching EU legislation and policy, they need to reflect political realities. Where impact assessment has influenced decisions, this is due less to an idealised model of evidence-based decision-making, and more to its contribution to advocacy and public understanding of the issues and of the political process.

For individual development projects this implies a focus on maintaining and if possible strengthening the level of environmental protection afforded by EIA.
At the strategic level of development plans, programmes, policies and legislation, it implies efforts to strengthen the non-economic components of integrated approaches to assessment, which are likely to be the norm for the foreseeable future. In *ex post* impact assessment and evaluation, it implies a stronger focus on processes of debate and shared learning.

Longer-term research agendas supporting this shift of emphasis might include the following:

- **Project level EIA** was originally introduced to strengthen the environmental component of development decision-making. What has been/would be the influence of actual/planned changes to EIA screening or scoping requirements on particular environmental qualities?

### ‘Research on this area is challenging, as so much is complex and intangible, but it is all the more topical and urgent if we are to achieve our policy aspirations for sustainable development’

- The quality of analysis in an integrated assessment is often at least as important as its coverage. How thoroughly have particular social or environmental issues been assessed in IAs? How robust are the approaches used in IAs for assessing economic impacts? How thoroughly have long-term dynamic economic effects and their relationships with social and environmental effects been analysed in IAs?

- Strategic-level assessment generally entails higher levels of uncertainty than decision-makers would like. What techniques can be used for helping them deal with uncertainty, such as, for example, simplified methods of probability or risk analysis?

- Economic valuation of environmental and social impacts is strongly promoted in integrated assessments. For what types of environmental and social impact is it appropriate to use these techniques, and when should such impacts be taken into account separately from the net economic effect of a proposal?

Generally, IA often raises many diverse issues of concern to a wide range of stakeholders with competing interests. What new approaches to stakeholder participation or engagement may be needed, such that impact assessment can retain its usefulness as an advocacy or mediation tool?

Evaluation compares the effects of policies or plans with their objectives – but, as these are often complex and many-layered, evaluation shifts towards a process of debate and shared learning, which can enable organisational change. It then has parallels with other policy processes and techniques, such as Foresight, ‘Outlooks’ and ‘Forward Looking Activities’ in EU terminology. Research on this area is challenging, as so much is complex and intangible, but it is all the more topical and urgent if we are to achieve our policy aspirations for sustainable development.

**Clive George** is a Visiting Professor at the College of Europe, Bruges, and a Visiting Senior Fellow at the School of Environment, Education and Development, University of Manchester. The views expressed are personal.

### Notes

There is now little debate as to whether participation in planning is important. From the 1960s and the Skeffington Report onwards, we have seen many initiatives to increase participation and civic engagement, which in turn have led to an interest in ‘co-production’ of service delivery. The Coalition Government’s current emphasis on localism in planning and public services is based not only on the case for efficiency, but also on effectiveness and social justice.

Joanne Tippett surveys the state of the art and prospects for community participation in the light of recent experience with the development and use of a hands-on toolkit for engagement.
The last decade of research at CURE (the Centre for Urban and Regional Ecology) has explored ways to improve the quality and effectiveness of participation. ‘Real’ participation needs to involve as broad a range of stakeholders as possible, and should take place early in the decision-making process so that ideas actually can be taken on board (and so that people feel they can have a real influence on outcomes).

The nature of the participatory process itself has a great impact on whether community members and participants from different sectors and areas of technical expertise are able to learn from each other and efficiently develop ideas together. In particular, it helps to have a way to blend ideas together, where everyone is able to make an input and see their ideas develop into a larger picture. It is important to allow space for non-experts to explore their own understanding, and to see how this fits with other people’s knowledge and perceptions, including differences of opinion. For instance, residents in a flood risk area might have very different perceptions of risk than those of water engineers, and effective solutions need to take these into account.

We have learned a lot about making participatory processes more effective. Unfortunately, however, the participation often still does not ‘add up’. Efforts rarely build on earlier work. People get frustrated when they feel they are being asked again about the same issues that they have already talked about, leading to consultation fatigue. Engagement is still often carried out in silos, with little attempt to ‘join up’ ideas and actions between sectors. Participation is not only about technical details, but also about building ‘adaptive capacity’ – an essential component of resilience in the face of change. Participation also needs to be seen as part of a larger process, which seeks to address inequalities and the influence of vested power and wealth.

Effecting these changes is not simple, and current policy dilemmas such as the ‘fracking’ debate are highlighting the gaps and barriers in the system. However, there are over 40 years of experience that we can learn from, in both urban and rural planning, and from high-level strategies to local projects.

**Research focus and results**

During the last decade, the research focus has moved from ‘Why engage?’ to ‘How to make engagement really effective?’, and in particular to a more critical view of power, recognising that community engagement can often be manipulated or misused, or can even deepen existing inequalities. Doubts that any change will result from engagement are heightened by worries that participatory processes can be abused and manipulated by vocal or politically savvy stakeholders and lobbyists. We need to develop new tools and approaches that mitigate these tendencies.

In response, CURE researchers are engaging with Greater Manchester as a ‘living laboratory’ for
This has led to novel findings and insights. An action research project into community engagement in ecological planning, undertaken as an ESRC-funded PhD with the Mersey Basin Campaign and the Irk Valley Project in Manchester, showed that the form of participation had an important influence on both the results and the perceived value of the participation to stakeholders.5 A striking finding was the value of starting with the positive, and asking people ‘What works?’ and ‘What do you like in your area?’, rather than ‘What are the problems?’. This leads to an atmosphere more conducive to creative thinking, and it also shifts the dynamics of power. Instead of the planner or facilitator being the ‘expert’ who is there to solve the community’s problems, everyone is engaged in working out how to make the most of what the community has. This research led to the development of a new, hands-on tool for engaging with community members and citizens, which has since launched as the social business Ketso (see Box 1).

| Box 1 | KETSO – an award-winning, hands-on kit for creative engagement |

Each component of the Ketso toolkit is designed to embody a key principle of community engagement or creative thinking, identified through action research with 51 stakeholders and residents.1 Uniquely, the form of the toolkit guides the facilitator through the process. For instance, in recognition of the value of metaphors in encouraging different ways of thinking, and of starting with the positive rather than problems, different-coloured ‘leaves’ embody these metaphors visually.

Ketso is now used in community and environmental planning at all levels, from parish councils to national government, in workshops with over 8,000 people in 27 countries. Further research into co-production of knowledge (in Peru) has demonstrated that the physicality of Ketso helps to give everyone a voice.1 It allows blending of technical and lay information, which generates innovation and knowledge that ‘sticks’. In 2011, Ketso was the main engagement tool for over 450 people in Renfrewshire’s Annual Community Planning Conference, and is now used in engagement and strategy meetings across Renfrewshire Council. In 2013 Ketso was awarded a commendation for its ‘contribution towards positive community engagement’ by the Royal Town Planning Institute North West.

It has to be remembered that Ketso is just a tool, and does not replace the need to plan a broader engagement strategy in order to get a wide range of people involved. What it does allow, however, is a creative and non-threatening exploration of ideas and insights that might not otherwise be heard. A 2013 public sector and NGO workshop produced a shared agreement that Ketso is unique in its ability to ‘not only surface new thoughts but also to provide a credible and traceable evidence base for recommendations that emerge from consultation’. This led to Ketso being used as the key tool for engagement in the Refugees in Scotland’s Communities project, looking at integration across the public sector.

Further information is available from the Ketso website, at www.ketso.com


CURE conducts research in a collaborative fashion, with researchers working in partnership with stakeholders to ask fundamental questions. This has led to novel findings and insights. An action research project into community engagement in ecological planning, undertaken as an ESRC-funded PhD with the Mersey Basin Campaign and the Irk Valley Project in Manchester, showed that the form of participation had an important influence on both the results and the perceived value of the participation to stakeholders.5 A striking finding was the value of starting with the positive, and asking people ‘What works?’ and ‘What do you like in your area?’, rather than ‘What are the problems?’: This leads to an atmosphere more conducive to creative thinking, and it also shifts the dynamics of power. Instead of the planner or facilitator being the ‘expert’ who is there to solve the community’s problems, everyone is engaged in working out how to make the most of what the community has.

This research led to the development of a new, hands-on tool for engaging with community members and citizens, which has since launched as the social business Ketso (see Box 1). This new form of community engagement is a physical product to complement the online innovations represented by the GRaBS and Synergy Forum online tools, discussed...
elsewhere in this issue. In this hands-on way, CURE research has contributed to shifts in our understanding of community and stakeholder engagement.

Prospects

Despite the progress outlined above, we often lack the means to learn from participation, both over time and between different types of consultation (neighbourhood planning, health and environment, for example). There is also a lack of integration – between local and larger levels of scale, across sectors, across geographical areas, and among different types of professionals. The barriers to effective engagement, as discussed earlier, are very real, and are being exacerbated by ‘austerity’ cuts. In response, the next frontier of research is likely to involve more joined-up models of participation, to develop synergistic solutions that cross traditional boundaries. We urgently need to understand how best to learn from participatory processes not just as one-off events, but over time, building a dynamic repository of knowledge, in at least three interlocking dimensions:

- knowledge about place – outcomes from participation in local planning and service delivery should be built into a learning resource, which in principle should cover every neighbourhood in the land, available to professionals and the public;
- knowledge about innovations and solutions – across geographical areas and sectors (this suggests a social media type of ‘good practice database’, linked to the contextual factors that need to be taken into account for successful adaptation); and
- knowledge about participatory processes – developing knowledge and skills about effective and equitable processes for engaging with communities and stakeholders.

We need to explore the interaction of face-to-face communication (enabled by physical toolkits such as Ketso) with online tools and resources, particularly social media. Such research would help us better understand the dynamics of turning participatory data (often qualitative, subjective, and even contradictory) into trustworthy knowledge that can promote action.

The next great challenge is to get this learning more widely incorporated into planning procedures at every level.

Conclusions

Given the challenges facing public services in an era of austerity, and the need to enhance resilience in the face of climate change, economic austerity and social tensions, we need to apply what we have learned over the last few decades and continue developing new approaches to participation.

New participatory approaches could help break down the ‘silo’ mentality currently holding back integration of local planning, environment, health, social services, education, energy, the economy, housing and transport. Meanwhile, with current social trends, we cannot assume that a ‘local community’ is a coherent body with clear views – many urban neighbourhoods, and some rural, are more like crossroads of overlapping social/cultural groups and networks, and this can only increase the challenge of effective participation. The next decades of research and innovation in participation and engagement give us a chance to reconsider approaches to social learning and community resilience, to develop both new ideas for the future and practical actions to achieve them.

Dr Joanne Tippett is a Lecturer in Spatial Planning at the School of Environment, Education and Development, University of Manchester, and is the Managing Director and Founder of Ketso. The views expressed are personal.

Notes

4. I. White, P. O’Hare, N. Lawson, S. Garvin and A. Connelly: Six Steps to Flood Resilience: Guidance for Local Authorities and Professionals. SMARTeST project report. University of Manchester/BRE/Manchester Metropolitan University, 2103. www.bre.co.uk/page.jsp?id=3187
urban futures – what will we need to know?

Joe Ravetz outlines a 20-year prospect produced by the ‘City-Region Game’, and considers the ‘knowledge outlook’ for planning – what will we need to know, and how?

Cities, city-regions and urban systems around the world are changing fast, with new pressures and opportunities all around. But in contrast many kinds of development seem quite fixed: we build houses or roads on a semi-permanent basis. For such fixed assets, spatial planning would seem to need a long-term view, with detailed projections and modelling – but often the reality is a few housing numbers, anything more being too complex. Seen from one angle urban change is smooth and predictable; from another, urban change happens through ‘surprises’ and ‘transitions’ – one example being the ‘Facebook’-style transformation of social and economic life in just a decade. Is it possible and/or desirable for spatial planning to anticipate this kind of change?

The role of future studies in urban governance is an issue for European policy, which looks for ways to improve urban governance for cross-cutting challenges. One approach is scenario planning, which systematically explores uncertainties and alternative futures, and follows the implications back to present-day decisions. A wider scientific scope is seen within ‘Foresight’, promoted by the UK Government Office for Science, with a ‘Future of Cities’ programme just starting. At CURE (the Centre for Urban and Regional Ecology) we took a further step with ‘Synergy Foresight’: this uses a mapping method for complex interconnected problems; engages a wider network of stakeholders through multi-channel media; and looks for creative collaborations and ‘synergies’ to enable ‘pathways through the jungle of uncertainty’.

An urban-scale Synergy Foresight sees cities/city-regions as interconnected communities, shaped by multiple forces – social, technological, economic, environmental, political, cultural, etc. – where change can ‘emerge’ through major transitions as well as gradual trends. The role of city-region policy is then more about enabling and guiding such emergent change, rather than command and control. For example, urban decline and deprivation are seen not as simple ‘cause and effect’, but as a cumulative causation of economic, social, and physical factors – where effective regeneration cannot be imposed by diktat, but comes through the creative self-organisation of communities.

A similar perspective on the problems of interconnected and emergent cities is found in parallel ‘foresight’ and ‘outlook’ type studies at EU and international level. This suggests that urban foresight is not only about projection and forecasting, but more about anticipation and envisioning – building on creative synergies, but also facing more problematic ‘wild cards’ and dark forces.

The ‘City-Region Game’

The ‘City-Region Game’ was developed as an application of Synergy Foresight, in conjunction with the International Futures Forum’s ‘World Game’. A game/role-play format can make it easier for participants to think creatively and ‘out of the box’ and immerse themselves in ‘the future’ and a space of possibilities.

The game starts with three simple questions presented to each player: ‘Which department/industry would you like to run (as CEO or Secretary of State)?’; ‘Who are three others you most work with/have a problem with?’; and ‘Which three uncertainties could most change what you do?’ The responses can very quickly build up a complex ‘landscape mapping’ of stakeholders and issues (‘actors and factors’). The game can be run in two
hours, two days or even two months, depending on time and resources and the level of detail required. It can be run as a one-off snapshot or as part of a full programme – working systematically with complex issues, alternative scenarios, risks and opportunities, and strategies and policies.\(^9\)

Fig. 1 shows a typical summary game output, from the CURE workshop series on ‘Knowledge outlooks’ – exploring the question ‘What kind of knowledge will we need for the forthcoming challenges and opportunities in UK city-regions?’

This summary ‘outlook’ is arranged in four corners, each one a stage in the Synergy Foresight method. This begins with a ‘landscape mapping’ of interconnections between ‘actors’ (stakeholders), or ‘factors’ (issues or themes). Secondly, the ‘change mapping’ corner shows critical change drivers and uncertainties in the general form of ‘problems versus opportunities’, leading to different scenarios (this kind of mapping of interconnections is very helpful compared with using a list or matrix). Third, the ‘synergy mapping’ corner overlays new potential opportunities on the previous landscape. Lastly, the ‘road mapping’ corner sketches the pathways, objectives and actions needed to realise the desired opportunities. Experience so far shows that this is a practical format for combining complex issue analysis with creative joined-up thinking.

In the example shown in Fig. 1, the ‘landscape mapping’ shows a deeply problematic situation. Deregulation of housing, health, education and other services continues; and austerity increases social stress, with pockets of ‘breakdown and crackdown’. The globalisation and financialisation of the economy widens the North-South gap and disparities with Scotland, Wales, and Northern Ireland; and the whole
UK looks increasingly vulnerable in the global market. The urban built environment struggles, particularly in cities outside London – as jobs and incomes dry up, large areas crumble from lack of investment and social infrastructure. The housing shortage continues, but, without consensus on locations and development patterns, we may see worse conditions in declining neighbourhoods, with fewer services at higher prices which more vulnerable residents can hardly afford, and with diminishing safety nets.

The future prospects in the ‘change mapping’ show climate change as a destructive force, but one that might also lead to new kinds of ecological resilience and social co-operation. Conflict between global supply chains and local economies seems inevitable, but likewise could bring new opportunities. Information and communications technology has immense power to change economic and social systems, but also opens up new possibilities. Demographic trends are not just about ageing, but about ‘third-ageing’, with people of 70 years of age or older playing a very active role in society.

Following up these opportunities, the ‘synergy mapping’ shows new ‘value-added’ connections – not only financial, but social, cultural and ecological. We could link urban regeneration with local economy and social enterprise; or housing with urban food, health and renewable energies; or green infrastructure with regeneration and climate resilience. Overall, there is huge potential in linking education, research and knowledge with ‘social governance’: this emerges as a counterpart to the ‘social economy’, with a wider set of groups and networks, enabled by new social media and with new forms of participation and social innovation.

What will we need to know, and how?

This question is addressed in the ‘road-mapping’, with a sketch of pathways in the knowledge domain linking ‘objectives’ to ‘actions’, to enable the opportunities above to be realised. First, there may be ‘big data’ on a scale hard to imagine: artificial learning, wearable ubiquitous computing, and an internet of things, digital speech and body language – and perhaps thought itself. Such data would be increasingly valuable, protected and sensitive – and also the target of surveillance, profiteering, theft or sabotage. The data ocean generates a whole new industry, turning information into ‘intelligence’ – a more human-scale process, partly dependent on physical proximity. We can imagine a near-future data-driven urban planning, with detailed overlays and analyses of places and spaces, activities and connections, demand and supply, all the way to experiences and aspirations. This could be framed as a ‘smart city’ knowledge outlook.

Secondly, there is a ‘social knowledge’ agenda, for a fully participative governance system, with evidence and evaluation which is ‘multi-valent’, i.e. bringing together economic, social, cultural, ecological and other values. This is not so much about data, but more about the processes of deliberation and elicitation, with creative content, role-plays, ‘edutainment’ and social media.

Thirdly, there is an ‘integrated knowledge’ agenda which links the social, economic, ecological and other activity systems. At present we can track supply chains, travel patterns, housing markets, and so on; but as yet there is little capacity to see the interconnections and to respond to system-wide problems such as exclusion, unemployment or climate change. This could be the ‘integral city’ knowledge outlook.

All this points towards a longer-term goal of enhanced global-local ‘urban intelligence’ – a city-region with built-in capacity for social learning, thinking, deliberating, collaborating, innovating and decision-making.

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thinking, deliberating, collaborating, innovating and decision-making. The implications for research and knowledge systems are way beyond today’s textbooks on economics or land use: we need to think in terms of complex systems, multi-cultural networks, and creative co-production of shared resources. This could be a next-generation ‘intelligent city’ knowledge outlook.

How to put all this together? An urban planner of the 2030s can be envisioned as a knowledge-based social/built environment entrepreneur – a creative hub for ideas, visions, needs and resources, from citizens and organisations at every level. She/he will facilitate social learning and community enterprise, online and in real time; assess values and priorities – social/economic/ecological; address systemic qualities such as resilience, social capital and learning capacity; and enable forward thinking and creative collaboration. Planning for urban energy/climate resilience, for example, is a highly interconnected kind of problem (including social, economic, built environment and governance issues). As a research strand in response – to be followed up – we can envision a highly interconnected kind of planning which links energy systems, building design, housing finance, community enterprise, social care, urban food and green infrastructure.

‘Overall, the current hiatus and confusion in UK planning might just bring longer-term opportunities to rethink the role of planning and its knowledge base... There are no blueprints for how this will all work; but we are indeed lucky to live in such interesting times’

Overall, the current hiatus and confusion in UK planning might just bring longer-term opportunities to rethink the role of planning and its knowledge base. Synergy Foresight and similar methods offer new tools which might be more suitable for more interconnected and anticipatory ways of thinking about cities and city-regions. The research and knowledge base, too, is shifting towards a more multi-valent, interconnected, creative-collaborative approach to social learning and urban intelligence. There are no blueprints for how this will all work; but we are indeed lucky to live in such interesting times.

Joe Ravetz is Co-Director of CURE, at the University of Manchester, and is Guest Editor for this Special Issue. The views expressed are personal.

Notes


2 G. Ringland: Scenarios in Public Policy. Wiley, 2002

3 See the Foresight website, at www.bis.gov.uk/foresight; and details of the new programme on ‘Future of Cities’ at www.bis.gov.uk/foresight/our-work/projects/current-projects/future-of-cities


10 CURE is developing two ICT prototypes, aimed at assisting the planners of the future. The ‘Synergy Forum’ simulates a roundtable discussion on complex issues – a working prototype is available at http://synergy-demo.hedtek.com. The ‘Local Forum’ enables ‘spatially explicit’ participation with interactive discussions at neighbourhood level – an early demonstration is available at http://www.ppgis.manchester.ac.uk/projects