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Scenarios – crystal balls for the urban fringe

Scenarios as »stories of the future« can help in dealing with rapid and unpredictable change in urbanising societies. The PLUREL project applies four different scenario storylines to explore the possible futures for Europe's urban and peri-urban areas.

Managing change and uncertainty

In 2007 the urban dwellers of the world became the majority of the population, for the first time in history. But there are new questions about the nature of cities, in the face of increasingly rapid and unpredictable change:

- Are traditional cities spreading further

and wider into peri-urban areas?

- Are large parts of the countryside being transformed into metropolitan extensions, by global communications and economic restructuring?
- In the Europe of 2050, will the peri-urban be an area of wealth and diversity, or decline and fragmentation?

For such questions there are no fixed or right answers. Instead, exploring future scenarios can be more useful – a way of imagining future possibilities, analysing the consequences, and constructing practical responses.

Scenarios are »stories of the future« – providing a tool for the investigation of possible future conditions and trends, risks and opportunities. As in the first cartoon, they can take different forms:

- Stories (which can be more fictional, or more realistic).
- Models (technical and quantitative: or, more conceptual and qualitative).
- Images (visual or narrative).
- Visions (positive hopes or negative fears).

Above all, scenarios call on creativity and imagination. The predictions of science fiction writers are often more accurate than those of engineers or economists, shown by examples such as Web 2.0, the new generation of the Internet, geo-stationary satellites and derivative trading.

The scenario framework

Scenarios are best organised in a framework which provides a clear logic and structure for comparing different possibilities. Module 1 of the PLUREL project, aimed at building visions of the future of rural-urban regions, developed such a framework based on the global scenarios of the IPCC (Intergovernmental Panel on Climate Change), known as SRES (Special Report on Emissions Scenarios). These scenarios were then adapted to the PLUREL agenda:

- Applying the global scenarios to the EU space, up to the years 2025 and 2050.
- Developing a series of possible and plausible »shocks«, i.e. rapid and important changes in particular sectors or themes.
- Focusing on the implications of each scenario for urbanisation and peri-urban land use change.

The result is shown as a 2 x 2 framework as in the overview diagram, with code letters borrowed from the IPCC scheme. The vertical axis is concerned with globalised and top-down dynamics, versus localised and bottom-up dynamics. The horizontal axis focuses on public and collective values, versus private enterprise values. The results of the shocks with implications for urbanisation can be summarised:

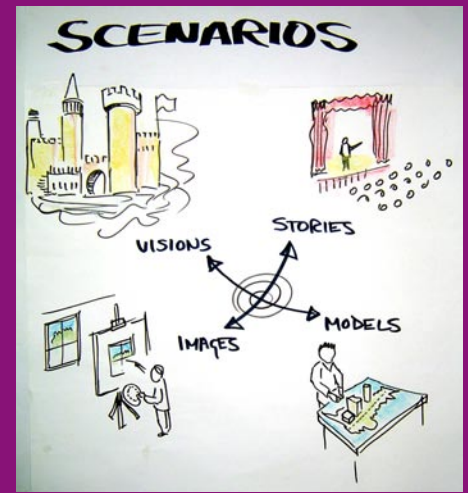
- *A1 – high growth*: rapid development in information and communication technology (ICT): rapid counter-urbanisation.
- *A2 – self-reliance*: rapid climate change and water crisis: defence of the cities.
- *B1 – sustainability? energy price shock*: localisation of activity.
- *B2 – fragmentation*: pandemic disease: polarisation of cities.

In the scenario narratives shown on the next page, the main titles show the general direction of the scenario, while the titles in brackets show a more colourful interpretation of the »shock« variation.

Implications and next steps

The four narrative storylines are being used in the PLUREL project as the basis of »top-down« modelling work on economic, demographic, environmental and land use changes. The scenarios are then extended with more spatial and geographical details to examine the effects on different urban types. This needs more than technical calculations – for instance, does the »peak oil« scenario mean that people will cluster in large cities, or decentralise to a wired-up countryside? So much depends on lifestyles, values, policies and cultures.

Elsewhere in the PLUREL project, the »top-down« scenarios are the starting point for the exploration of regional »bottom up« scenarios within each of the case studies, which take on board the



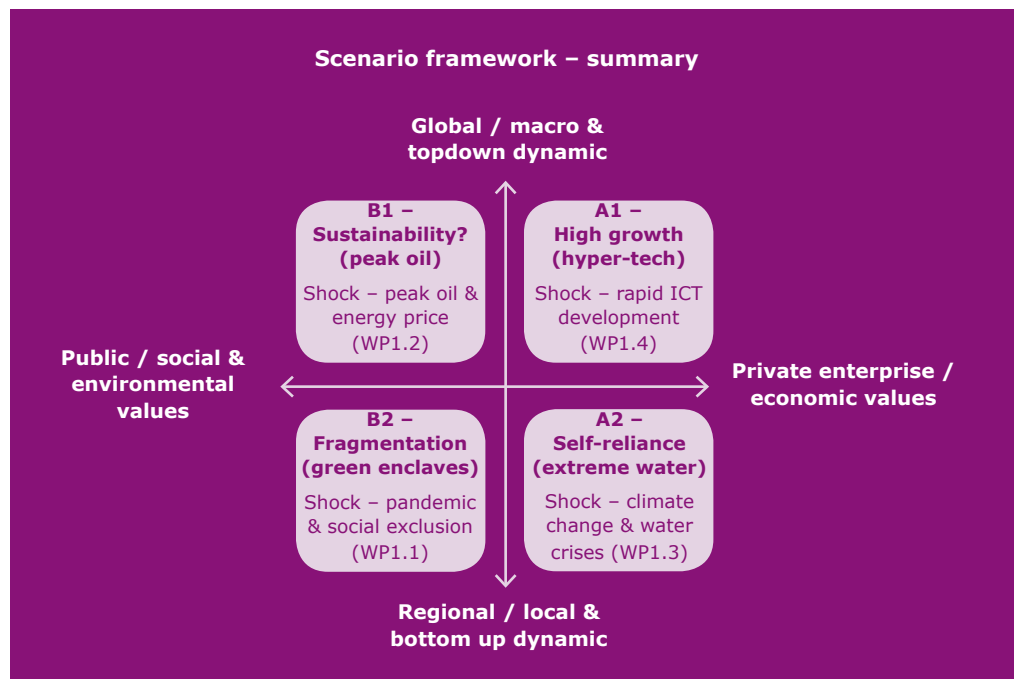
As illustrated here, scenarios can take the form of stories, models, images or visions.

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most topical issues and responses in each location. Other components of the project will also draw on the scenario resource, with both technical and non-technical material.

So, the PLUREL scenarios provide a starting point to explore the possible futures for Europe's urban and peri-urban areas. They shine a light into four »cloudy crystal balls«, not with the aim of forecasting the future, but in helping to understand and work with it.

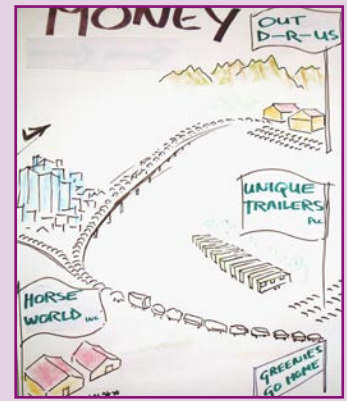
Joe Ravetz, University of Manchester, and Mark Rounsevell, University of Edinburgh



A1 – high growth scenario (hyper-tech)

This describes a future world of rapid economic growth, global population that peaks in mid-century, and the rapid spread of more efficient technologies. Investment in research and development is high and nations share knowledge and pool resources in a global research market place. Energy prices decline because supply is driven by new developments in renewable energy production and nuclear fission. The shock concerns the rapid acceleration of ICT which transforms home and work as never before.

For peri-urban areas in Europe, this scenario is likely to see small »polycentric« towns and cities become even more popular. New transport technologies lead to more rapid journeys and the expansion of the commuting distances around towns and cities. This leads to peri-urbanisation and »metropolitanisation« of rural areas on a massive scale.



A2 – self-reliance scenario (extreme water)

This describes a more heterogeneous world of self reliance and preservation of local identities. While the population increases, economic development is primarily regionally-oriented, and per capita economic growth and technological change are more fragmented and slower than in the other storylines. The shock here is subtitled »extreme water«, and this sees rapid increase in flooding, drought and sea level rise. A year does not go by without a major event, and in some cities and regions development is seriously constrained.

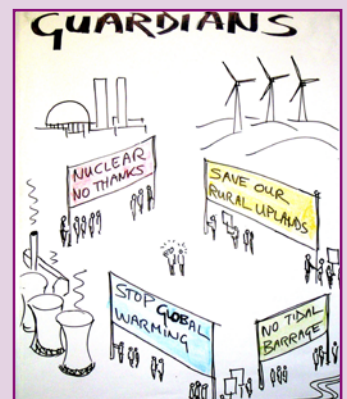
Peri-urban areas are strongly affected; affluent yet vulnerable city-regions such as London or the Dutch Randstad spend huge sums of money on defence and adaptation strategies. Population growth due to climate-induced migration puts more pressure on urban infrastructure and services.



B1 – sustainability? scenario (peak oil)

This describes a future of environmental and social consciousness – a global approach to sustainable development, involving governments, businesses, media and households. Economic development is more balanced with rapid investment in resource efficiency, social equity and environmental protection. The »shock« in this scenario is driven by the real possibility of »peak oil«, that is, a decline in global oil production after reaching maximum production, leading to rapid rises in energy prices, with many social and economic effects.

For peri-urban areas, high energy prices have an enormous effect on location choices as transport costs limit commuting distances. Although tele-working is encouraged, most people attempt to return to larger cities and towns, and more remote rural areas decline.



B2 – fragmentation scenario (walls and enclaves)

Europe sees a fragmentation of society, in terms of age, ethnicity and international distrust. The voter-strong elderly population becomes increasingly dependent on the younger generation, but the working-age population is disinclined to transfer their resources, with growing intergenerational conflicts.

Here the shock is caused by a human pandemic, possibly transmitted by animals or birds, which spreads rapidly and leads to severe restrictions on the movement of people and trade. The ethnic division of cities is driven by the increased in-migration of the working-age population from outside and within the European Union. Cities become more dispersed as younger migrants dominate city centres and older natives populate the outskirts and enclaves outside the cities – so that peri-urban areas become peri-society areas.



Climate change: a rural-urban region perspective



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Climate change is an all-encompassing process, and will be a significant driver of change in rural-urban regions. These regions also have an important role to play in reducing the threat of climate change through lowering their greenhouse gas emissions. PLUREL looks at the crucial role of rural-urban regions in climate change mitigation and adaptation.

Impacts of climate change

The evidence for global climate change and the central role that humans play in driving this process is now overwhelming. The reduction in the extent of the polar ice sheets, retreating glaciers, increasing temperatures and rising sea levels all provide visible evidence of the impacts of a changing climate. Scenarios such as those developed by the Intergovernmental Panel on Climate Change (IPCC) provide a means of visualising what the future might look like as climate change takes a firmer hold. In Europe, figures for annual precipitation change show a stark north/south divide. Southern Europe could potentially receive 20-30% less rainfall by the 2080s, whilst Northern Europe could receive 20-40% more. Concerning

temperature change, the picture is more consistent with all of Europe projected to become warmer. Some regional variation can nevertheless be expected with annual temperatures projected to rise by up to 5 °C in Northern Europe by the 2080s, and up to 3.5 °C in parts of Southern Europe.

Impacts on rural-urban regions

The scope of the climate change challenge is all-encompassing. However, PLUREL's focus on rural-urban regions provides the boundary for this discussion. The impacts of climate change in rural-urban regions fall into several separate yet interlinked categories. These include biophysical impacts (e.g., loss of biodiversity, increase in forest fires, droughts and flooding), social/cultural impacts (e.g., impacts on human health and well-being, lifestyle changes), economic impacts (e.g., financial cost of flooding, development of new energy markets and technologies) and political impacts (e.g., development of new legislation and policies).

The variation in climate change projections across Europe indicates that the nature and extent of these impacts will differ according to geographical location.

Mitigation and adaptation strategies

Rural-urban regions are drivers of climate change through the release of greenhouse gas emissions, yet they are also impacted on by its effects. This reveals the two core elements of the climate change agenda; mitigation and adaptation. Rural-urban regions have a crucial role to play in addressing both issues. Mitigation concerns reducing greenhouse gas emissions. Issues such as urban form, transport, energy generation and housing provision are central to emissions reduction, and are also crucial in the context of the development and future evolution of rural-urban regions. Adaptation concerns reducing vulnerability and increasing resilience to climate change impacts.

Considering the form and function of rural-urban regions is vital to developing effective adaptation strategies. Research undertaken by the Centre for Urban and Regional Ecology (University of Manchester) has highlighted the significant role that green space can play in helping to adapt urban areas to climate change impacts such as flooding and heat stress. Further, design of development can help to adapt to flooding through, for example,

raising floor heights, using water resistant plaster and locating electric cables above projected flood levels. Despite the extent of new development and urban sprawl across Europe, the turnover of building stocks is relatively slow. This increases the importance of retrofitting for both mitigation and adaptation, which refers to the modification of existing development to meet climate change challenges, for example through improving insulation or opening up green spaces around buildings.

Mitigation-adaptation conflicts

During the implementation of such strategies, potential conflicts between mitigation and adaptation responses must be considered. This is an area for further consideration in planning and design. A good example of a potential mitigation/adaptation conflict concerns the issue of density in urban areas. Classically, increasing density is seen as a way of reducing energy use (and hence greenhouse gas emissions) by, for example, lowering travel demand and space heating requirements. However, by increasing density in urban areas green space resources may come under threat, leading to the loss of a vital adaptation resource. Clearly there is a sensitive balance to strike when thinking about the best ways to address the causes and threats of climate change in rural-urban regions. Careful long term planning and strategy making is vital.

Dealing with the climate change challenge

There is a huge challenge to be faced to keep climate change from reaching the point where catastrophic chains of positive feedback lead to impacts that would be very difficult to manage. The EU aims to keep temperature rise to 2 °C above pre-industrial levels, the point at which it is thought that »runaway« climate change will become difficult to prevent. This in itself will take an incredible effort from all sectors of society as current atmospheric concentrations of CO₂ are already at or close to the level that will commit the globe to a 2 °C rise. Exploring the contribution of rural-urban regions to climate change mitigation and adaptation has never seemed more relevant and urgent.

Jeremy Carter, University of Manchester

End users have their say in the PLUREL Board of Stakeholders

As described in the previous issue of the PLUREL Newsletter, stakeholder involvement is a key element of the project. A Board of Stakeholders has now started its important advisory work.

One stakeholder for each case study region

During PLUREL's project meeting in Leipzig (October 2007), a formal Board of Stakeholders was established. It comprises one stakeholder from each of the project's seven case study regions. Most of the members of the Board work for regional authorities, except for Mr. Houtzager, who is a politician, and Mr. Medved, who is a representative from a national NGO. The Board will attend the PLUREL project meetings, during which their participation in the research discussion is actively promoted and facilitated. It will support the project with advice and by reviewing research outcomes. In between the project meetings, stakeholders will be kept up-to-date on PLUREL's progress with targeted e-mail newsflashes.

What stakeholders ask

The Board has already stated that PLUREL can help practitioners to understand current urbanisation trends in Europe and their consequences. PLUREL can provide tools to guide effective development processes, and achieve an appropriate balance between urban and rural areas and interests. This could concern, for example, the growth of quality green spaces and corridors stretching from inner cities to the urban fringe, but also sustainably managed land from the city periphery through to more rural areas. Practical tools are needed for evaluation, forecasting, planning and implementation of strategies. Research on functional relationships between Drivers, Pressures, Status, Impacts and Responses (DPSIR)

Members of PLUREL's Board of Stakeholders:

- J. Paul Gambier, Montpellier, France
- Dietmar Rohl, Leipzig, Germany
- Tomasz Slawinski, Warsaw, Poland
- Andrej Medved, Koper, Slovenia
- Marcel Houtzager, Haaglanden, Netherlands
- Pam Warhurst, Greater Manchester, UK
- Fu Lihuan, Hangzhou, China

in urban-rural land use is a crucial part in preparation of these tools.

Key issues and research advice

From the stakeholders' perspective, the following key issues covered by PLUREL can have an important impact on the practice of planning and governance:

1. Translation of driving forces and trends into demands on land use and resources.
2. Identification of strengths and weaknesses in development strategies.
3. Identification and analysis of governance and management practices.
4. Preparation of scenarios and evaluation of potential consequences of different strategies.
5. Modelling of multifunctional relationships between rural, peri-urban and urban land use.

The Board is ready to provide advice on how research should meet the concrete needs of practitioners in Europe. It will support researchers in their efforts to obtain results that are valuable both from a scientific and a policy-making perspective. Moreover, the Board will support PLUREL Project Management in highlighting policy relevant results and in ensuring adequate dissemination of key findings.

Marion Bogers and Carmen Aalbers, Alterra

The challenges of ageing

Ageing is an inevitable process which poses a challenge to policy makers across the world. Greater understanding of trends and regional differences, for example between urban and rural areas, will assist in the development of strategies to deal with the ageing challenge.

Inevitable ageing

Population ageing is universal and inevitable. It is the outcome of changes which have been aspired to through large parts of human history: mortality decline and individual childbearing choices. The United Nations 60th World Economic and Social Survey (2007) concluded that *»a substantial degree of population ageing is expected over the next few decades in all regions of the world ... [It is] unlikely that policy interventions intended to encourage childbearing in low-fertility countries could substantially alter this expectation. ... [N]o plausible assumption about international migration levels would have more than a moderate impact on the expected degree of population ageing that will be experienced in future decades by countries all over the world.«*

Ageing in Europe and Asia

Although Europe is one of the first world regions to experience population ageing, a large part of Asia (including China) is projected to undergo rapid ageing as well. Fears exist in Asia that, unlike Europe, the region will “grow old before it grows rich”, suffering larger challenges to old age social security. The decline in mortality and fertility has occurred over a longer time period in Europe than in most other world regions. In several European countries, a sustained mortality decline started as early as the 18th century, i.e., much earlier than in the rest of the world. The fertility decline, which brought the average number of children towards replacement fertility levels and below, has been ongoing for more than a century in several European countries. In some Asian countries, including China, this transition has taken only three to four decades. Thus European governments have had longer to adapt compared to most other ageing



PHOTO: THOMAS SICK NIELSEN

regions in the world. Nevertheless, several governments disregarded foreseeable demographic changes and only initiated required policy responses, such as the need to extend the working life, at an unnecessarily late point in time.

Dealing with ageing

The age structure of a population can be projected with a substantial degree of accuracy. Although uncertainties in migration, fertility and mortality will have some impact, ex-post analyses of past projections have shown that age composition has been predicted relatively well. In particular, the age structure and numbers of individuals above the age of 50 half a century into the future can be predicted with a relatively low degree of uncertainty, as these individuals are already born. Policies intended to increase fertility will not halt population ageing, but they could

slow it down. This would be in accordance with European women’s fertility preferences which tend to be higher than realised fertility levels. In other words: European women would like to have more children than they end up having. The largest potential could be people with a higher education for whom the gap between desired and actual fertility is the highest. Reforms in education systems could narrow this gap, for example by providing better financial support to those who choose to combine childbearing with a period of study. Also, introducing more efficient schooling systems, allowing people to graduate from university and other tertiary education at a younger age, could decrease the trade-off between education and fertility.

Regional and economic impacts

Ageing tends to follow a distinct spa-

PLUREL People



Interview with Mark Rounsevell, University of Edinburgh

tial pattern, where the impact is more pronounced in rural than in urban areas. Densely populated urban areas will tend to experience much less ageing or declines in population size, particularly due to strong urbanisation trends for the youth. Some rural areas of Europe, including parts of Germany and Sweden, are projected to experience both ageing and population decline, which poses challenges to local economies, health and elderly care provision.

An increase in retirement age could imply for several countries that the economically active/inactive ratio remains constant, or decreases only moderately, in spite of ageing. Male effective retirement age varies substantially across Europe. Between 2000 and 2005, the French retired at 59, the Icelanders at 69, while other Europeans retired at ages in between. Improvements in health and education levels of current and future older age groups imply that the productivity potential amongst the elderly is increasing over time. This suggests that there is potential for extending the working life in many countries, given appropriate changes in pension systems, seniority-based earnings systems, age-discriminatory practices and norms for when one should retire.

Positive effects of ageing

Population ageing and lower population growth could also have positive effects. Although other factors can be more important (e.g., consumption patterns, heating needs, urbanisation, living arrangements, productivity levels), a smaller population size can lead to a lower use of resources and reduced climate change. Ageing per se can also provide environmental gains to the extent that older individuals commute and consume less than younger individuals. In addition, the distinct income and savings patterns of older individuals can have indirect implications for demand that result in lower environmental emissions.

Vegard Skirbekk, IIASA

What is your role in PLUREL?

I have a number of different roles. I co-lead Module 1, which is building visions of the future of urban and peri-urban areas. This has involved the development of a new scenario framework and specifically I'm working on the development of scenarios of future technological change. On top of this, I also have a role in the Agent-Based Modelling (ABM) work in Module 4. ABM is a fantastic new tool to analyse how people and institutions interact, make decisions and change the world around us. I think this approach has tremendous potential to create a step-change in how we understand social systems.

How will PLUREL benefit from your specific expertise?

I have built scenarios in several European Union funded projects over a number of years. Consequently I have contributed as a scenario expert to the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment report, which was a great opportunity to work with some of the world's foremost scenario experts. I hope that some of this experience has rubbed off on the PLUREL project.

What will be PLUREL's most important results?

Probably too many to talk about here, but don't underestimate that one of the most important outcomes is the development of a research community. I'm sure that there will be many spin-offs from this project, and many new relationships built that will benefit European research as a service to society for years to come.

Which challenges can stand in the way of PLUREL's success?

Nothing but ourselves! As a project team we have a great opportunity to show what the research community can achieve in exploring questions that are important to society. We have the resources and we have the expertise. We just have to make sure that we exchange ideas and work together with an open spirit and in good humour to find answers to difficult research questions.

Why should policy makers be interested in PLUREL?

Everyone should be interested in PLUREL, not just policy-makers. This is about the future of Europe and how and where people live within it. This affects everyone. Of course policy makers have the means to really make a difference, and I hope that we can demonstrate the value to them of using the outputs from the PLUREL project.



PHOTO: FABRIZIO UNGARO

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PLUREL Partners

- University of Copenhagen, Denmark
- Helmholtz Zentrum für Umweltforschung, UFZ, Germany
- Leibniz Centre for Agricultural Landscape Research, Germany
- Alterra Green World Research, The Netherlands
- IIASA, International Institute for Applied Systems Analysis, Austria
- ARC systems research GmbH, Austria
- Institute for Local Government Studies, Denmark
- The Finnish Environment Institute, Finland
- University of Paris I & COE/CCIP, France
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- The Chinese Academy of Forestry, China
- Alfred Peter Paysagiste, France
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Peri-urban Land Use Relationships

Strategies and Sustainability Assessment Tools for Urban-rural Linkages

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