

Kjell Nilsson · Stephan Pauleit  
Simon Bell · Carmen Aalbers  
Thomas Sick Nielsen *Editors*

# Peri-urban futures: Scenarios and models for land use change in Europe

 Springer

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*Editors*

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# Preface

The PLUREL project (2007–2011) envisaged research on urban, peri-urban and rural interaction and strategies focusing on sustainable land use changes such as the preservation of green open areas, agricultural lands and other unbuilt areas under urbanization pressures. The research was done through close cooperation with the stakeholders from the case-study regions. For the purpose of better cooperation, a Board of Stakeholders was formed—to follow the research closely and recommend improvements in the way of communication between research and policy.

The research addressed important issues for all the regions with urban cores, peri-urban edges and rural hinterlands. The stakeholders, representing planners, local politicians, NGOs, nature protection organizations or networks of relevant actors, took an active role in the discussions, analysis and choices on the way to the end results.

The expectations were high on both sides. The stakeholders expected user-friendly recommendations, models, scenarios and interactive tools. The amount of work delivered in the end was impressive. The experience, through the interaction between researchers and policy makers, was highly valuable. The two worlds with different languages and perceptions came closer to each other. Ideas were freely exchanged and common strategies worked out.

PLUREL offers a wide range of products which will indisputably have impact on policies. These products include analysis and recommendation on governance and sustainable peri-urban land use, planning and financial instruments in peri-urban areas that will enhance sustainable land use, strategies for growth management, urban containment by conservation and densification, development of consistent blue and green infrastructure, promotion of local production and short transport circles, development of eco-services, and ways of assessing impacts on quality of life. All these are numerous examples of successfully worked out recommendations for preserving and developing the peri-urban areas as open, green and vital areas.

Three European regions from Western Europe, three from the former Eastern Europe and one from China—all with different traditions in planning and land use—learned a lot from each other in the process. The regions which are traditionally strong in planning—Montpellier, The Hague and Manchester could offer their

planning schemes and governance strategies as guides in the search for better balance in land use. The regions of Warsaw, Koper and Leipzig could offer their tradition in more social cohesive strategies. China offered decisive measures for vital green spaces and for containment of urban sprawl.

The whole process of attaining the research goals together—researchers and practitioners—seems to offer a good model for success.

The representative of the political post holders on behalf of the case-study regions in the Board of Stakeholders, Marcel Houtzager, portfolio holder ‘Green, recreation and tourism’ in The Hague Region, actively participated in the whole process. He is satisfied with the good communication between research and practice and with the overall results of the project. ‘I was confident when we started the process in PLUREL and I was confident when we finished it. Now we have excellent end-products, ready to use. PLUREL was a very complex project about a complex problem—the interaction between urban, urban-peri and rural areas and the preservation of landscape identities, balancing environmental and social values with economic interests. The results as we see them presented in this book show how successful researchers and practitioners have been in analyzing the problems, communicating well to all the parties involved, and recommending ways to solve those problems.

I strongly hope that this book will help in the search of effective methods for preserving open green space and improving the balance between urban and peri urban areas. This is needed for our quality of life, the climate change challenges and the economic viability of our regions. We live in demanding times and this book offers some of the recipes to find a way between economic prosperity and environmental healthy attitudes.’

The Hague  
March 2012

Marcel Houtzager

# Acknowledgements

The book would not have been possible without the commitment of all of its authors and more widely the entire team of researchers involved in the Plurel project. It was not possible to include the large number of researchers that participated in the project in the writing of this book, nor can we name them all, but they all deserve to be acknowledged and thanked for their valuable contribution to the project.

The Board of Stakeholders should be particularly highlighted for its enthusiastic support of the project, especially in providing feedback to the project's output from the practitioners' perspectives. It was appointed from policy makers at the EU level, professional organizations, NGO's and/or representatives from the case-study regions. Members of the Board were Tomasz Sławiński, Head of Office for Regional Planning, Mazovian Province; Marcel Houtzager, Regional Portfolio Holder on Finance, The Hague Region; Pam Warhurst, CBE, Chair of Forestry Commission; Jean-Paul Gambier, Chef du Service Foncier, Montpellier Agglomeration; Andrej Medved, Director of Birdlife Slovenia. Equally, the members of the project's Scientific Advisory Board played an important role by their constructive advice throughout the project and in particular at critical times. The Board members were: Prof. Hilda Blanco, University of Washington; Prof. Christer Bengs, Swedish University of Agricultural Sciences; Dr. Kai Böhme, SWECO EUROFUTURES AB.

We also would like to thank the internal and external reviewers that helped to greatly improve the chapters of this book, these were: Prof. Hilda Blanco, University of Washington; Prof. Adrienne Grêt-Regamey, ETH Zurich; Dr. Erik Koolman, University of Delft; Prof. Andrzej Lisowski, University of Warsaw; Prof. Steve Littlewood, Leeds Metropolitan University; Prof. Iris Reuther, University of Kassel; Dr. Emmanuel Negrier, Research Director, CNRS; Prof. Hojca Golobic, University of Ljubljana; Prof. Zhiyong Li, Chinese Academy of Forestry; Prof. Bob Evans, University of Newcastle; and Prof. Christer Bengs, Swedish University of Agricultural Sciences.

Finally, we wish to express our gratitude to the programme officers at the European Commission Karen Fabbri, Julia Acevedo-Bueno and Astrid Kaemena; the reviewers Ole Damsgaard, Michèle Sanglier, Bob Evans, Peter Nowicki and Marion Potschin; and to the publisher for their support in the production process.





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# Chapter 1

## Introduction

**Kjell Nilsson, Stephan Pauleit, Simon Bell, Carmen Aalbers,  
and Thomas S. Nielsen**

### 1.1 A Dream that Became a Nightmare

A spectre is haunting Europe. The name of the spectre is not communism (Engels and Marx 1848) but urban sprawl, a phenomenon which has nothing to do with communism, but the metaphor of describing urban sprawl as a spectre is not new, especially in the United States where sprawl is endemic and there is a widespread concern over its environmental and public impact (Schmidt 1998). Urban sprawl can be defined as the low-density expansion or leapfrog development of large urban areas into the surrounding rural land. Several definitions also include the fact that the development takes place without systematic regional land use planning and control (e.g. EEA 2006; Reckien and Karecha 2007).

The origin of urban sprawl is the so-called American Dream. The term was first used by James Truslow Adams in his book *The Epic of America* (1931). Although

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Adams himself argued that the American Dream “. . . is not a dream of motor cars and high wages merely, but a dream of a social order in which each man and each woman shall be able to attain to the fullest stature of which they are innately capable, and be recognized by others for what they are, regardless of the fortuitous circumstances of birth or position.” (Adams 1931, p. 404), no American Dream has broader appeal than home ownership (Cullen 2003).

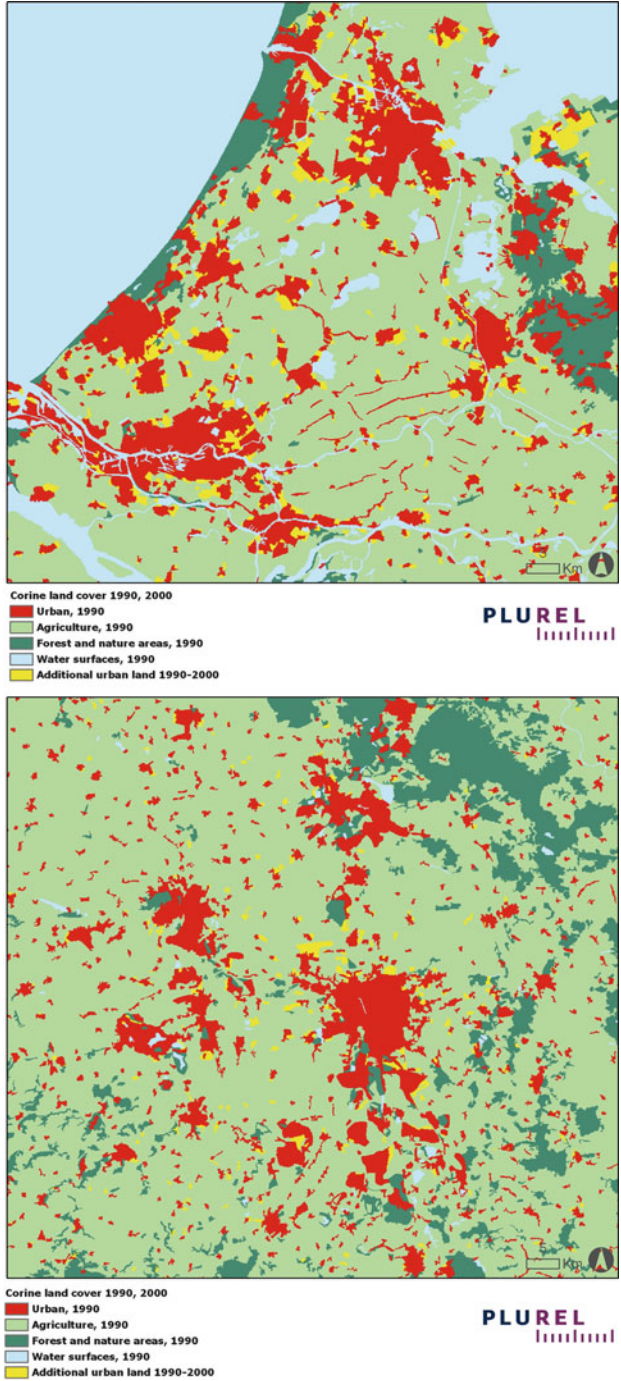
Today we see the consequences of a dream that might turn into a nightmare. Under the Clinton Administration, US former vice president and Nobel prize winner Al Gore led the campaign against urban sprawl. He even predicted that if steps were not taken to curb sprawl, urbanization will consume so much farmland that the United States may run out of enough agricultural land to feed itself in the twenty-first century and, for the first time in the nation’s history, become a net importer of food (Carlisle 1999).

During the 10 year period 1990–2000 the growth of urban areas and associated infrastructure throughout Europe consumed more than 8,000 km<sup>2</sup>, equivalent to 0.25 % of the combined area of agriculture, forest and nature land (EEA 2006). A quarter of 1 % may not seem to be worth worrying about. However, we are talking about an almost irreversible process. Less than 10 % goes the opposite way, i.e. is transferred from urban land into brownfields and only a minor part of these are reclaimed to arable land or nature.

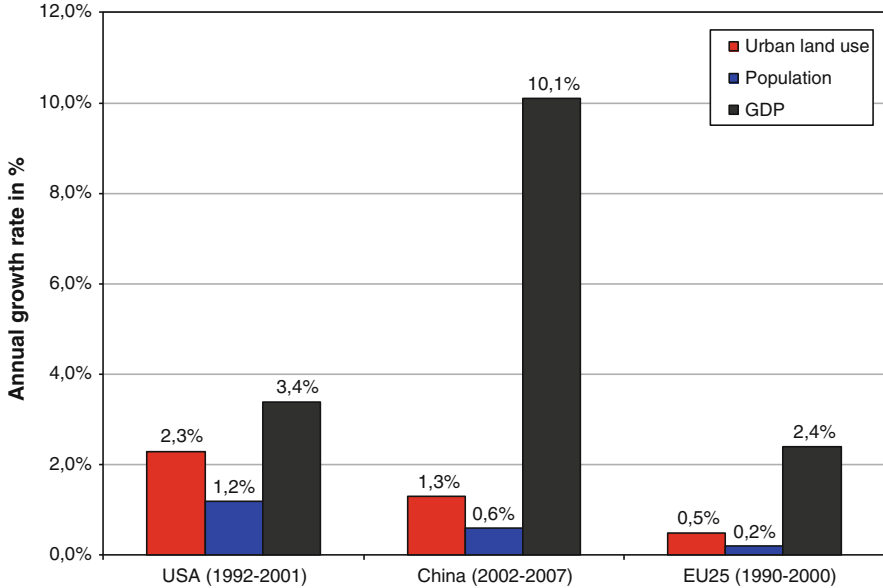
More than 20 years ago, Newman and Kenworthy (1989) studied the relationship between energy consumption and the population density of cities around the world. They showed that resource consumption increased the less densely the city was populated. Low density American and Australian cities with high per-capita energy consumption were at one extreme end of the spectrum while dense Asian cities, with low per-capita energy consumption were at the other end. One main reason for this is that the demand for individual, car-based transport increases in low-density cities. Urban sprawl in combination with increasing levels of per-capita energy consumption leads to an ever increasing urban ecological footprint. For London, it has been estimated that a hypothetical area of more than the size of the entire United Kingdom is needed to keep this megacity alive (Girardet 2004). Clearly, this consumption pattern is unsustainable.

An important driving force behind urban expansion is, of course, the growth of the urban population. However, when talking about Europe, this is not a sufficient explanation. Since the mid-1950s European cities have expanded in size on average by 78 %, whereas the population has grown only by 33 % (EEA 2006). This is not a surprise in densely populated regions like the Randstad in the Netherlands, but even in regions where the population is decreasing, urban areas are still growing, notably in Spain, Portugal and Italy and in eastern Germany. Leipzig-Halle is an example of a region which suffers from both the problems of a shrinking city and urban sprawl (Fig. 1.1). The same trend—that urban areas expand approximately twice as quickly the population—can be seen in the United States and China (Fig. 1.2).

As a consequence of these processes, large urban regions have developed which are continuously spreading outwards along major transport routes, connecting major urban centres with smaller settlements and commercial sites as well as recreational areas. Urban development does not happen in neatly delineated



**Fig. 1.1** Urban expansion on the edges of existing agglomeration in the Randstad, Netherlands (above), and the Leipzig-Halle region, Germany (below) (Source: Corine Land Cover Databases 1990 and 2000)



**Fig. 1.2** Growth rates for urban land use, population and GDP in EU, United States and China (Sources: Zhu et al. 2004; The Ministry of Land and Resources P.R.C. 2007; U.S. Department of Agriculture 2003; European Environment Agency 2005; United Nations databases 2009)

concentric rings around the urban core, as depicted in some theoretical models, but in rather complex and diffuse patterns where scattered built up areas of various forms and functions, connected by extensive transport infrastructures, intermix with farmland, horticultural areas, recreational parks, forests and nature areas. These *Rural–urban regions* consist of urban core areas, larger zones of peri-urban areas but also remoter rural areas which provide, for instance, food, recreational spaces and water for the urban areas. Rural–urban regions of this kind have little in common with the notion of well-ordered city regions that Ebenezer Howard introduced over 100 years ago (Howard 1902), even though many of his far-sighted ideas and suggestions for development of city regions may be still worthy of discussion. Instead, the two cases of The Hague and Leipzig-Halle noted above highlight the need for development of planning approaches that respond to the specific needs of the respective rural–urban regions. We do not need one model that fits all but a tool of strategies that can be flexibly combined to suit the particular situation. That is what this book and the PLUREL project set out to achieve.

## 1.2 The PLUREL Project

The focus of the PLUREL project was the sustainable development of land use systems. It tried to answer, at least in part, the question: can resilient land use systems be developed for rural–urban regions that successfully combine compact

and resource efficient settlement structures with a multifunctional green infrastructure that provides ecosystem services critical to the quality of life of their inhabitants and which enable them to adapt to various technological, economic, social and environmental changes?

Challenges for the planning of sustainable land use systems in rural–urban regions are particularly pronounced in peri-urban areas where urban and rural land uses closely blend and form a new type of landscape which is neither rural nor urban. Land use dynamics are also highest in these peri-urban areas. While land use change, mainly from rural to urban types, tend to increase the pressure on the environment, e.g. by destruction and fragmentation of natural habitats as well as the loss of valuable agricultural soils, it can also provide the opportunity for establishing new, mutually beneficial relationships between neighbouring land uses, e.g. by providing new sources of income for farmers through production of food, water, energy and recreational spaces for city dwellers. Planning has an important role in enabling such relationships to develop. Therefore, these peri-urban areas have been at the centre of the PLUREL project.

PLUREL was an Integrated Project funded within the Sixth Research Framework Programme of the European Union. Thirty six partners from 14 European countries and China participated in the project which was coordinated by the University of Copenhagen. The project started in 2007 and finished in 2011. It aimed to achieve a deeper understanding of the changing relationships between urban and rural land use with an emphasis on the most dynamic portion, that of peri-urban areas. The project:

- Developed methods and tools to assess the environmental, social and economic impacts of land use changes in rural–urban regions.
- Identified and assessed potential strategies and good practice examples in order to promote the sustainable development of land use systems in rural–urban regions, especially the peri-urban.

The project was interdisciplinary and used multiple methods. Quantitative modelling was based on qualitative land use scenarios and used to develop sustainability impact assessment tools in support of qualitative analysis and assessment of land use strategies. A two-level approach was adopted, that of the pan-EU/national level where broader issues and patterns were evaluated and that of the regional level where real situations of land use change, governance, ecosystem services and quality of life were tested with the participation of local actors and stakeholders.

The project synthesis report *Peri-urbanization in Europe: Towards European Policies to Sustain Urban–Rural Futures* (Piorr et al. 2011) emphasized the pan-European dimension. It concludes with an outline of EU policy options for the integrated development of rural–urban regions. While the European Union has an increasing influence on territorial development, the most important decisions are still made at the local level. In this book, therefore, we offer a complementary perspective by exploring in more detail the land use dynamics within rural–urban regions and the strategies that can be applied to promote their sustainable



development. Six European case studies and one reference study in China were selected to explore in depth the land use relationships between rural and urban areas. The case study regions were Warsaw (PL), Leipzig-Halle (DE), The Hague Region (NL), Greater Manchester (UK), Montpellier (FR), Koper (SL), and Hangzhou (CN).

While not statistically representative of all possible models of rural-urban region, the case studies nevertheless reflect the variability of geographic, economic and social conditions prevailing in Europe and are also characterized by different cultures of government and governance. Population trends differ widely between the case study regions and range from growing areas (poly-centric The Hague Region and Montpellier, mono-centric Warsaw) to a region with significant and ongoing shrinkage in population and in city fabric, leading to land use perforation (Leipzig-Halle). The general trends are translated in different ways into rural-urban development patterns within each of the study regions. The Hangzhou reference study explores a very different case: it is a very rapidly urbanizing area of 6.6 million inhabitants in Asia within a top-down political and planning system.

### 1.3 The Structure of the Book

The book is comprised of three parts. The first part introduces the dynamics of peri-urbanization and the theoretical foundations of the project, in particular the concept of *rural-urban regions*. Chapter 2 introduces the definitions of rural urban regions and especially the peri-urban, it identifies the main dynamics found there and introduces the scenarios upon which the modelling of lands use change at a European level was based. It provides the basic context for the later examination of the case studies. Chapter 3 focuses on the breakdown of Europe into different classes of rural-urban regions, presenting a statistical method and the results of the analysis. This further sets the context for the case studies which can be seen as belonging to different classifications, thus enabling the broad sweep of the PLUREL research to be appreciated. Chapter 4 describes the main methods used in the research presented within the individual case study chapters so that readers can focus on the results of each and if they want to find out how the work was done they know where to look.

The second part of the book presents the seven case studies. They follow a common approach to analysis but nevertheless they represent seven individual stories of local trends of peri-urbanisation and response strategies. This part also contains a short introduction so no more will be said about Part 2 at this point, except that it is where the main results of the PLUREL project at the city region level can be found.

The final part of the book then provides a synthesis of the results of the case study work arising out of the PLUREL project. In chapter 13 a comparative analysis of the planning strategies selected and analysed in each case study region is carried out and, while it is not possible to offer solutions which can be applied generally

across the whole of Europe, nevertheless a number of lessons can be learnt from this and it is hoped that the results of the PLUREL work will be put to good use by planners and policy makers who read about them in this volume. Chapter 14 examines the government/governance issues in more detail, also making interesting and revealing comparisons of the systems found in each case study. Chapter 15 concludes with an overview and assessment of the achievements of the PLUREL project and the challenges still facing rural–urban regions and the peri-urban landscape.

Coming back to the key question of how to manage urban growth a set of policies for the development of sustainable land use systems in Europe’s rural–urban regions is proposed by the PLUREL project as a whole. These aim at better coordination between transport, land use and open space planning, policy integration, containment of urban development by promoting dense cities which, however, also require a green infrastructure that provides essential ecosystem services and improves quality of life in the city. Overall, the need to develop integrated, territorial policies is emphasized which acknowledge the reality of *rural–urban regions* instead of devising segregated urban and rural policies. This also applies to European policies such as the Common Agricultural Policy which does not recognize the specific challenges of peri-urban agriculture. Important directions for future research to support policy making for sustainable rural–urban regions are outlined.

With the publication of this book, the PLUREL project has finally come to an end. It has been a very challenging project, not only because of the theme of this research, but also through the task of integrating 36 partner organisations and many more researchers as well as practitioners very different backgrounds, interests and personalities. It has been an intellectually intriguing and rewarding project for us. We gained new insights into the complexities of rural–urban development. We identified strategies that are applied in rural–urban regions across Europe to steer this development but we also learned about the current barriers and failures to develop more sustainable land use systems in peri-urban areas. Importantly, the concept of the *rural–urban region* has been coined and it has proven in the PLUREL project to be a very useful unit for analysis. Moreover, the methodology applied in this project may be considered to be innovative in linking qualitative work—on scenarios and policy analysis—with quantitative modelling of various types and working across scales and levels of decision-making. By this, we hope that the book can provide insights, tools and inspiration for tackling the daunting challenges of sustainable development in Europe’s rural–urban regions.

## 1.4 Other PLUREL Outputs

In addition to this book and a large number of publications in various academic and practice orientated journals, further results from the project can be accessed via the project’s website: [www.plurel.net](http://www.plurel.net). These include in particular:

- Peri-urbanisation in Europe. Towards European Policies to Sustain Urban–Rural Futures. Synthesis Report (Piorr A., Ravetz J., Tosics I, eds.), and a series of newsletters.
- PLUREL XPLOERER: a web-based information platform that condenses and presents the knowledge and various products of PLUREL into a form that supports planning and policy discussions on rural–urban land use interactions at a European and regional level. It provides information for planners, practitioners and professionals on processes, problems and places of peri-urbanisation in Europe and its regions.
- IIAT—Integrated Impact Analysis Tool is an internet-accessible tool enables an easy and holistic perception of changes in sustainability indicators, as positive or negative trends according to different scenarios in form of “spidergrams”.
- QoLSim, a simulator tool that enables the effects of land use change on residents’ perceived quality of life and residential choice decisions to be tested.
- MOLAND-Light—a simplified version of the MOLAND land use modelling software. It can be used to easily and quickly set up a simulation for a region in Europe.

## 1.5 Who Is this Book For?

At the outset of the PLUREL project we kept asking ourselves the question: who is it for? Is it for a handful of European policy wonks? Is it aimed at policy-makers and planners at national, regional or local government level? Does it offer insights of use to developers, infrastructure providers, NGOs or even interested individual residents concerned about where they live? We concluded that at the pan-European level—the level for which the Synthesis Report is aimed—is an important but relatively small target audience in Brussels and in national governmental ministries for spatial planning or environment, for example. The main readership of this book we feel will be the planners and policy makers at the different regional and local levels who are daily faced with complex problems and for whom the time to take a longer strategic view is often a luxury. Finding out what strategies and policies work and which do not is time consuming and often fruitless so that the material offered in this book arising out of the case studies should provide a lot of inspiration as well as practical tools. The fact that the research was carried out with not only the help but also the active participation of local actors and stakeholders should, we feel, give it an added level of credibility among our target readership.

Of course there is also the educational market to be considered and for the students of urban planning, government and governance, land use planning and policy, urban geography, landscape planning, urban ecology and many other fields, the research presented here as well as the academic papers which have also been published should provide valuable theoretical and empirical material of great value not only in Europe but beyond, since, as we have seen, urban sprawl and the peri-urban are in many ways far more pressing problems in city regions outside the borders of the EU.

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# **Part I**

## **Concepts**

# Chapter 2

## The Dynamics of Peri-Urbanization

Joe Ravetz, Christian Fertner, and Thomas Sick Nielsen

### 2.1 Introduction

The peri-urban (sometimes also called the urban fringe) may be the dominant urban form and spatial planning challenge of the twenty-first century. In older industrial or post-industrial countries the peri-urban is a zone of social and economic change and spatial restructuring, while in newer industrializing countries, and most of the developing world, the peri-urban is often a zone of chaotic urbanization leading to sprawl. In both cases the peri-urban can be seen as not just a fringe in-between city and countryside, a zone of transition, rather it is a new kind of multi-functional territory. While it resists simple definitions, there are common features wherever such areas are found, such as a relatively low population density by urban standards, scattered settlements, high dependence on transport for commuting, fragmented communities and lack of spatial governance. Many global challenges arise from the ways that cities grow and change, especially the emerging mega-cities in developing countries where massive social and environmental problems can be found in their peri-urban hinterlands.

This chapter is a broad review of the peri-urbanization phenomenon, in its global and European context. We explore physical, socio-economic and political dynamics of change and we set out a framework for understanding different

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levels of change in the peri-urban system. We outline the methods and results of the European scenario and modelling work from PLUREL, and draw out the implications for the rest of this book.

### **2.1.1 Global Context**

The peri-urban zone may become the most common type of living and working situation in the world in the twenty-first century. In some parts of the world it is characterised by affluence and conspicuous consumption. In others it is where poverty and social displacement are more common, a front line between the problems of the city and the countryside. Underlying this is the changing nature of the city itself – as well as the physical expansion of urban or suburban form, there are wider economic, social and cultural dynamics of change. Therefore, we need to look beyond the conventional divide between ‘urban’ and ‘rural’, to a new kind of territory where the ‘peri-urban’ is the central feature – one which is not fixed, rather being in continuous flux and transition. The peri-urban is where the urban structure transitions into the rural landscape so that it can be a significant territory in area terms that must be looked at in the context of the wider transitioning between dense urban cores and rural hinterland – to examine it in the context of the wider city or rural–urban region. The peri-urban acts as a litmus test of change and transition, not just locally at the interface of urban and rural, but in the shape of the whole city-region, or as described below, the ‘rural–urban-region’.

Over-shadowing the European peri-urban agenda is the challenge of the global urban system. In one 2005 World Bank study, cities in developing countries were found to have three times the population density of cities in industrialized countries (Angel et al. 2005). However, the current trend is for density to reduce by 1.7% per year; so if this trend continues to 2030, the built-up area of these cities will triple to more than 600,000 km<sup>2</sup>, while their population doubles. A global remote monitoring study found that there are four main types of urban growth: low-growth cities with modest rates of infilling; high-growth cities with rapid, fragmented development; expansive-growth cities with extensive dispersion at low population densities (generally North American); and ‘frantic-growth’ cities with very high land conversion rates and population densities (generally found in developing countries) (Schneider and Woodcock 2008). Each of these types had different spatial patterns, whether dispersed or constrained and scattered or contiguous development. To this could be added a fifth type, that of negative growth, more commonly referred to as shrinking cities (Bauer et al. Chap. 7 in this volume). Generally, these definitions of ‘urban’ include what we term here the ‘inner peri-urban’ or urban fringe, directly adjacent or within the shadow of the denser urban area. The ‘outer peri-urban’ – i.e. where the rural areas are in a transition and responding to urban fringe pressures – has not yet been studied at this scale.

Generally the process of urban expansion should not only be seen as a negative change, but also one with positive benefits, particularly for the majority of the world’s population, who occupy on average a space of 3.5 m<sup>2</sup> per person (Hardoy

et al. 2001). However, the implication is that cities in both developed and developing countries should be making realistic plans for large scale physical expansion, building capacity for governance, investing in basic infrastructure and managing sensitive or hazardous areas. Each of these applies in particular to the fast changing peri-urban areas which are the frontiers of expansion.

### ***2.1.2 European Trends***

Europe is a highly urbanised continent. Over 75% of the population lives in urban areas today, with a projection for this to reach 80% by 2020 (EEA 2006). The dense urban network contains almost 1,000 cities with more than 50,000 inhabitants, but only a few very large cities. In the EU only 7% of the population live in cities bigger than 5 million inhabitants, compared to 25% in the USA (CEC 2008). In recent decades, the most prominent result of the ongoing urbanisation in Europe has been the development of ‘functional urban regions’ (Nordregio 2005). This process includes the integration of even relatively peripheral areas into the urban system, the connection of neighbouring cities to form polycentric networks and the formation of large-scale metropolitan regions.

Urbanisation in Europe is, however, extremely unevenly distributed. The metaphor of the ‘Blue Banana’ (Brunet 1989) illustrated the concentration of economic and population development in some core regions in western Europe, while for regions outside the area, in the former CEE countries and in the European periphery, it becomes more difficult for them to compete economically. Since the publication of the European Spatial Development Perspective (ESDP 1999), ‘territorial cohesion’ became the key concept for counter-balancing this trend, promoting a harmonized development across the continent. The challenge of territorial cohesion is, however, not limited to this macro scale but is also an issue within countries, regions and even cities.

Areas close to cities have historically been subject to high development pressures strongly linked to an increasing per capita consumption of urban land. From the 1950s to around 1990, urban areas expanded their surface area by 78% while the population increased only by 33% over the same period (EEA 2006). This trend continued to 2000 where the population in the EU25 increased by 2% while the urban area increased by more than 5%, mainly as a result of increased numbers of households and decreasing size of households (Jansson et al. 2009). The low level of population growth in Europe in recent decades suggests that the growth of urban areas is slower than in other regions of the world. However the ratio between urban and population growth is comparable to other regions in the world such as the USA and China, creating a trend towards continued de-concentration and urban sprawl. Urban sprawl in the form of low density, discontinuous and dispersed urban development is now a common phenomenon throughout Europe (EEA 2006).



## 2.2 The Nature of the Peri-Urban

### 2.2.1 *Theoretical Concepts*

'Peri-urban' and peri-urbanisation are generally loose definitions. Often they are used to describe newly urbanised zones at the fringes of cities, especially in developing countries, which are then called the 'peri-urban interface' (Adell 1999; McGregor et al. 2006). From a European perspective, peri-urban areas are often understood to be mixed areas under an urban influence but with a rural morphology (Caruso 2001). The Council of Europe (CEMAT 2007) defines the peri-urban as a transition area moving from strictly rural to completely urban, related to a high pressure towards urban development (Bertrand 2007). Conversely, peri-urban areas can be far from ephemeral, but instead can form a new kind of permanent landscape. Furthermore, the development is not necessarily limited to purely physical development with urban characteristics, but is often marked by the emergence of urban activities in rural areas like hobby farms and second homes (Briquel and Collicard 2005; Caruso 2001). The fact that the residents can be considered urbanised even if they do not live in a strictly urban spatial type, because of their lifestyles and social focus on the urban, for example, emphasises the uniqueness of the zone. These urban transformations which take place outside the urban cores can be summarized by the term peri-urbanisation.

The peri-urban is something between, neither urban nor rural. The historical dichotomy of urban and rural space started to blur in Europe with the formation of nation states, industrialisation and the liberalisation of the economy in the nineteenth century (Bengs and Schmidt-Thomé 2006). However, firstly with the introduction of mass commuter transport systems such as suburban railways, and finally with the increased affordability of the car, the countryside close to towns became a potential place for living, recreation and sometimes also working for former urbanites. This development led to an expansion of cities not only in physical terms with low density housing but also in terms of functional relationships, creating an area of urban influence around cities, also called the urban field (Friedmann and Miller 1965). In this urban field a variety of places developed, characterised by a mixture of urban and rural features.

The blurring of the urban–rural boundary inspired research into the idea of an urban–rural continuum. Bryant et al. (1982) illustrated this by a model where the urban–rural region ranges from core city through inner and outer fringe, a zone of an urban shadow and out to the rural hinterland. However, in reality, while this model works in general, the complex pattern of actual cities and their surroundings, with all their different spatial structures that emerged through geographical and historical as well as political precursors, is often difficult to fit completely if at all. This is the case regardless of the fact that the idea of the continuum includes several dimensions (or several continua) of urbanisation in the urban–rural space, which can result in complex spatial patterns (Robinson 1990). Most recently the term

*urban–rural interface* appeared in research, emphasizing the mixed character of these areas without fixing them on a single, simple gradient.

The factors leading to this multifaceted character are many. Several different concepts have been used to try to account for it. One popular concept is ex-urbanisation, originally coined as ‘ex-urban’ by Sectorsky (1955), who described the development of a ring of wealthy rural communities around New York City, characterized by urban professionals living there but commuting to the urban core for work. Today many of these areas could also be called suburban, and Nelson and Sanchez (1999, p. 689) argued that ex-urbanisation does not differ from suburbanisation, but that exurbia ‘is simply the latest incarnation of the continued suburbanisation of American cities.’ Ex-urbs are nowadays found in a different manifestation in places like southern Spain, where they form specially built estates for retired people from northern Europe (Zasada et al. 2010).

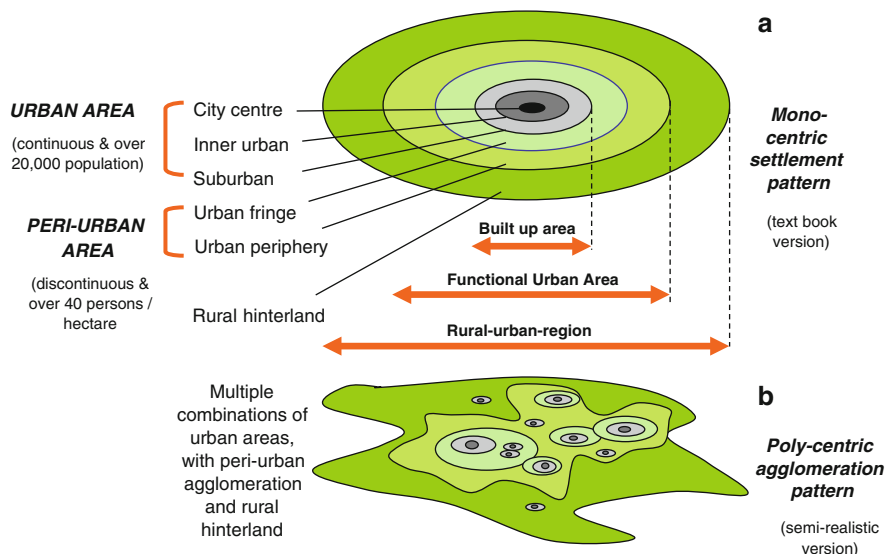
Another widely used concept describing a form of urban–rural dynamics is ‘counter-urbanisation’. This implies an opposite trend to urbanisation, i.e. an increase in migration from the city to the countryside, and was observed in the 1960s and 1970s in the United States and Western Europe (Robinson 1990). Besides the relocation of services and industry into rural areas, the development of part-time farming, second homes and retirement migration play an important role in this process. Champion et al. (1989) emphasized that it is not a unidirectional movement but a tendency towards de-concentration, resulting from a complex pattern of flows.

However, peri-urbanisation also includes other transformations, ones not necessarily dependent on the migration of people. These include movements for commuting or recreation as well as other behavioural changes by old and new rural residents caused by the further integration of the rural area in the system of an urban region. Also, linkages related to human-ecosystem interactions are decisive for peri-urban land use relationships, and will be further discussed below. The impact and significance of these processes, as well as how to turn them towards sustainable development, was the major issue in the PLUREL project and the focus of the case studies presented in Chaps. 4, 5, 6, 7, 8, 9 and 10.

It is clear from this brief overview that one of the main challenges of the PLUREL project was how to develop a research approach to understand the interactions among such multiple forces and complex patterns.

### ***2.2.2 Geographic Definitions of the Peri-Urban as a Basis for Research***

The PLUREL project used the term ‘rural–urban-region’ (RUR) as the main unit of analysis, with a range of area types, shown below as nesting circles (Fig. 2.1). This was based on a wide literature review (e.g. Bryant et al. 1982; Champion 1999; Loibl and Toetzer 2003; Gallent et al. 2006; Leontidou and Couch 2007). It was



**Fig. 2.1** PLUREL concept of peri-urban areas and rural-urban-region

also found that the meanings of each of these terms could vary between different countries and languages. The basic spatial types which define the RUR include:

- **Urban core:** including the Central Business District and the site of many other civic and cultural functions and some public spaces associated with these;
- **Inner urban area:** generally higher density built development (built-up areas) including residential, commercial and industrial types of uses and some public open and green space;
- **Suburban area:** generally lower density contiguous built-up areas, which are attached to inner urban areas, and where houses are typically not more than 200 m apart, with local shops and services, parks and gardens;
- **Urban fringe:** a zone along the edges of the built-up area, which comprises a scattered pattern of lower density settlement areas, urban concentrations around transport hubs, together with large green open spaces, such as urban woodlands, farmland, golf courses and nature reserves;
- **Urban periphery:** a zone surrounding the main built up areas, with a lower population density, but belonging to the Functional Urban Area, as below: this can include smaller settlements, industrial areas and other urban land-uses within a matrix of functional agriculture;
- **Rural hinterland:** rural areas surrounding the peri-urban area, but within the rural-urban-region and accessible within a practical commuting time and so their rural character is affected by residents with urban incomes and lifestyles.

The peri-urban area therefore includes both the urban fringe and urban periphery segments of the above description: defined for the PLUREL project as

‘discontinuous built development, containing settlements of each less than 20,000 people, with an average density of at least 40 persons per km<sup>2</sup> (averaged over 1 km cells)’.

Each of these area types is part of a larger ‘urban system’. There are different concepts in use to describe urban systems with different boundary definitions – some of them flexible, some specific. The PLUREL project focussed on two main levels:

- Functional urban area: (FUA): ‘an urban core and the area around it that is economically integrated with the centre, e.g. the local labour market. Belonging to a commuter catchment area, FUAs represent common local labour and housing markets’ (Nordregio 2005). This overlaps with the statistical unit of the ‘Larger Urban Zone’, as used in the European Urban Audit.
- Rural–urban-region (RUR): spatial clusters of three interrelated regional sub-systems – the urban core, the peri-urban surroundings and the rural hinterland. Areas of recreational use, food supply and nature conservation located in predominantly rural areas are also part of the rural–urban-region. (see Chapter 1). Rural–urban-regions were the overall territorial unit of analysis for the PLUREL project. They include both the ‘Functional Urban Area’ (zone of daily commuting), and the surrounding rural hinterland. For modelling and analysis, PLUREL defined rural–urban-regions in statistical terms (see Chap. 2) but in policy (and indeed in practical) terms, the boundaries are necessarily more flexible, in order to respond to changing problems and opportunities (see case study chapters).

Figure 2.1 shows two interpretations of this scheme. The upper picture shows a simple text-book version of a mono-centric settlement pattern, surrounded by nested circles. The lower picture is a little more realistic: this shows a poly-centric agglomeration of settlements with different sizes and patterns, surrounded by a rural hinterland with a complex boundary. In the poly-centric version, the peri-urban areas are not only surrounding the urban, they become a geographical type and territory of their own, and the reality on the ground is often complex and fast changing. FUAs overlap and merge to form urban agglomerations, existing settlements change their shape and function and in larger FUAs there are many areas with a combination of infrastructure, housing, industry, open space, and land in transition – a challenge for any kind of definition.

In each of these examples, similar questions arise, in particular, that the conventional measure of radial commuting patterns is only one of a range of factors in urban–rural relationships and fields of influence. This is why the ‘rural–urban-region’ is important and topical, but also challenging for analysis.

Perhaps the most important definition is that of ‘urban sprawl’ – generally seen as a land use pattern with lower density, inefficient or wasted land-use, car dependency, and so on. This raises many questions: – which scale or spatial unit is to be counted? Is an airport or industrial complex to be defined as part of urban sprawl, or as economic development or both? A more technical definition looks for low values in one or more of eight measures: density, continuity, concentration, clustering, centrality, nuclearity, mix of uses, and proximity (Galster et al. 2001). In simple

terms we use two definitions for sprawl – ‘unplanned incremental urban development, characterised by a low density mix of land uses on the urban fringe’ (EEA 2006) and also: ‘Low density, scattered urban development, without systematic large scale or regional public land-use planning’ (Bruegmann 2008, p. 18; Reckien and Karecha 2007). Such definitions can be explored further by looking at the key factors in sprawl, as discussed below.

### ***2.2.3 The Peri-Urban Metropolis and Megalopolis***

The context for the ‘rural–urban-region’ is the broader picture of growth and change in human settlements. The process starts with the expansion of free-standing cities into their rural hinterland, absorbing villages into the urban fabric. At some point, if these separate cities are reasonably close together, a regional agglomeration process takes over. If the agglomeration process scales up, the result can be an ‘extended metropolitan region’ or ‘megalopolis’ of over 100 million population, containing within it many types of peri-urban areas, rural areas, or whole rural–urban-regions.

Mumford (1938) defined a megalopolis (also called ‘megacity’, ‘megapolis’ or ‘mega-city-region’) as an agglomeration of adjacent metropolitan areas. Gottmann (1961) used this term to describe the continuous urbanization of the north-eastern seaboard of the USA. Such thinking was then used to inform ‘Ekistics’, the science of human settlements, and a hierarchy of scales was proposed, including a ‘metropolis’ of 4 million, a ‘small megalopolis’ of 25 million, and a ‘megalopolis’ of 150 million population (Doxiades 1968). Interestingly, the largest examples from around the world (Pearl River Delta, Yangtze Delta, Gangetic Plain) are each in this range (Lacquan 2005).

The role of the peri-urban and the rural hinterland in these cases may be different from the typical EU situation. In the Asian megalopolis type there is a focus on the rapid transition from peasant agriculture towards a globalized economic development pattern (Jones and Douglass 2008; Ginsburg and Koppel 2004). By contrast, in the North American type, there is a focus on the ‘edge city’ as a new kind of CBD, and the rural as a zone of enterprise and opportunity (Garreau 1991; Daniels 1998). The peri-urban and rural hinterland is not so much a fixed thing ‘out there’, but highly inter-dependent and inter-woven with urban areas.

## **2.3 Dynamics of the Peri-Urban**

To explore the dynamics of peri-urban change and the peri-urbanization process, we have to look at more than one aspect, not only in physical scales, but also in understanding the complexity of the system. This is not only an academic question, but a practical question for policy makers, who need to understand the peri-urban in order to work with it. The 5-dimensional framework here has developed out of the PLUREL research, together with an extensive review of literature. The aim is to

provide practical routes into a complex situation and to identify the main processes which are visible at different levels. The effects of these in practice can be seen in the regional case study examples in Part 1.

These five dimensions also represent a kind of generic ‘story’ of how peri-urbanization takes place. The first aspect is where urban expansion occurs as a direct result of growth in population, economics and space demands. Next, as cities expand further, they form regional agglomerations, with step-changes in economies of scale taking place, and a new type of peri-urban territory developing. Thirdly, underlying these developments are the effects of various deeper political and cultural forces which shape the peri-urban territory. The fourth factor is where the whole urban system can go through rapid transitions, with radical change and restructuring. The final aspect concerns policy responses to these changes and transitions which often feed back into the mix, and become ‘dynamics’ themselves. In practice, the situation is rarely clear or simple, and each aspect will overlap and inter-connect with the others.

Below we set out the main features of each of these five aspects.

### ***2.3.1 Direct Factors of Urban Expansion***

In simple terms, peri-urban change is a direct result of urban expansion, the peri-urban area spreading outwards into rural areas. This is firstly a result of population and economic growth, which result in demand for housing and commercial areas. The location of housing is then determined in part by transport accessibility to employment and services and in part by the attractiveness of the environment as well as land values. There are usually physical and policy constraints to expansion. Each of these interacts with the others, and each raises further questions, e.g. how do the physical or policy constraints work? What drives the growth in demand for land and buildings, and enables the supply of development? (Fig. 2.2). The following sections outline some of these drivers:

*Demographic and social dynamics* are driven by population change due to fertility and mortality rates and migration. While fertility and mortality are relatively slow to change, over several decades some very different demographic profiles can emerge. International and inter-regional migration flows are more volatile and dependent on political factors and global economic swings among others (Bell et al. 2010). The continuing decrease in average household size as the population ages will also affect housing demand. Urban–rural migration – inwards or outwards – is dependent on spatial policy, the relative attractions of cities or rural areas for jobs and quality of life, as well as transport and communications (Loibl and Bell 2011).

*Economic and employment growth* drives the rate of urbanization. The rate of savings and capital investment feeds into expansion of the building stock and land-use conversion, as both a supply-side push factor of production, and a demand-side pull by consumers. Economic structures and employment patterns also affect