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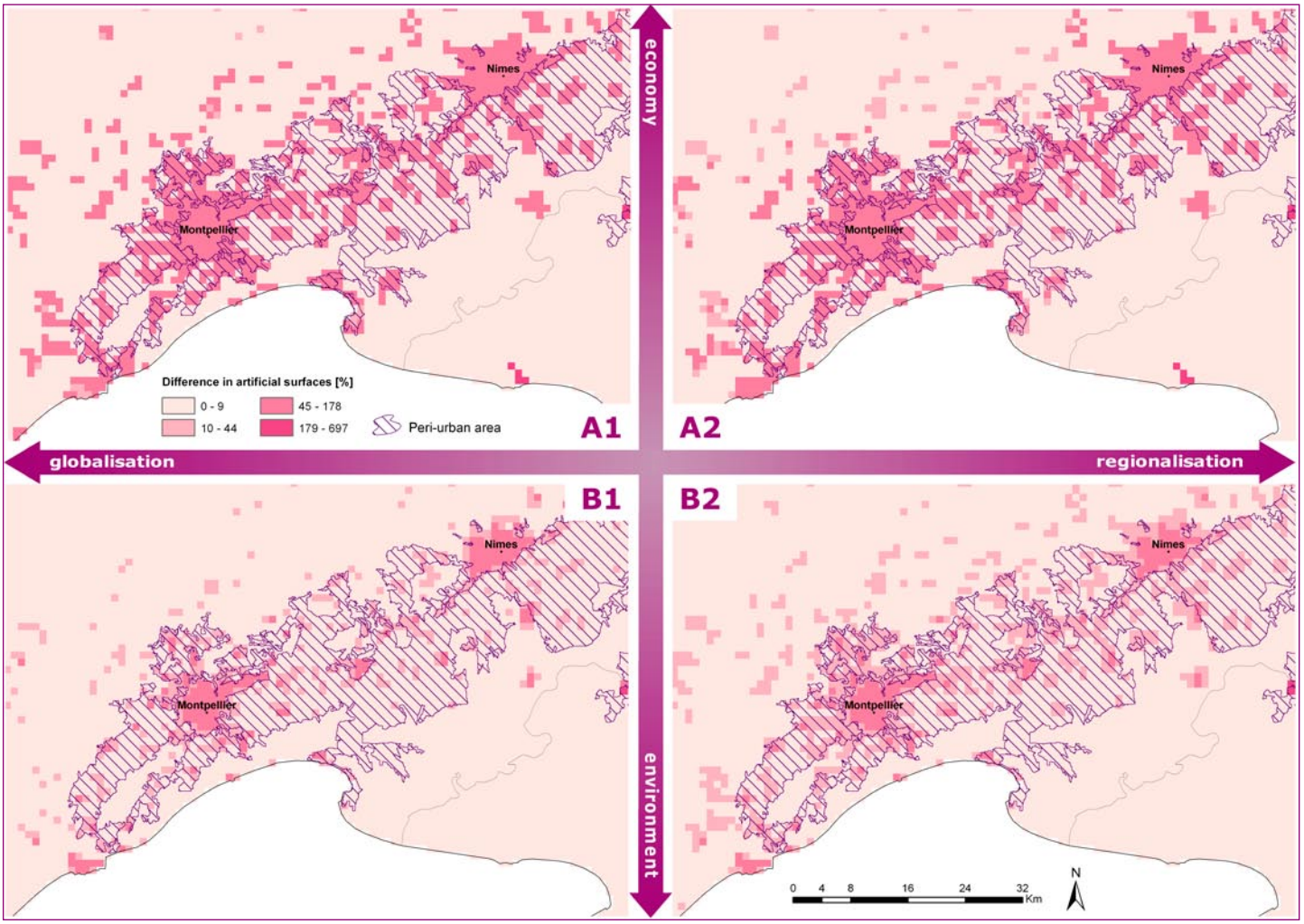
PLUREL

PHOTO: KJELL NILSSON

Where will Europeans live in the future?

Scenarios of the location of built-up areas can help us to understand how people might change European landscapes in the future. Although there are big differences in built-up areas between countries, trends in urban patterns emerge from different scenarios, including sprawl into peri-urban and rural areas or concentration in cities.

Future land-use patterns in peri-urban areas, PLUREL's main focus, depend largely on changes in the density and location of artificial surfaces (CORINE land-cover level 1, class 1). But, where will these changes occur? How can they be influenced by planning policy and household preferences? What is the role of technological development in the transport network? These are just some of the questions we address in a scenario analysis of urban land-use change using the regional urban growth model (RUG).



Difference in artificial surfaces, as a percentage of the current coverage, in the Montpellier region by 2025 for scenarios A1-hyper-tech, A2-extreme water, B1-peak oil and B2-fragmentation. The hatching shows the areas classed as peri-urban.

European-wide modelling: a challenge

If a land-use model is to capture the location of changes, for instance in urban or peri-urban areas, it needs to operate at a reasonably fine resolution. However, this means that the data-sets for a continent-wide model can become extremely large. The RUG model, for example, runs on a 1-km geographic grid, which for 25 European countries (EU-27 minus Bulgaria and Cyprus) covers nearly 4.2 million pixels. The sheer quantity of data limits what can be achieved and how the model is designed with one solution to this problem being to run the model for each region (NUTS 2) in turn.

The main input to RUG is a projection of the quantity of artificial surfaces per NUTS 2 region for 2025. This is derived from projected population and GDP (Gross Domestic Product) per capita, both outputs of the NEMESIS model. To allocate these artificial surfaces within each region, the model also uses data such as travel times to the nearest cities (medium or large), distance from the coast and the presence of flood risk zones.

Changes in built areas have been simulated for 2025 for the four PLUREL scenarios: A1 (hyper-tech), A2 (extreme water), B1 (peak oil) and B2 (fragmentation) (see PLUREL Newsletter No. 3, p. 1-3). The scenario storylines affect some of the input data directly. For example, future travel times will vary with the technological change associated with each scenario. Other factors such as the distance from the coast do not vary, but the scenarios determine the importance of coasts in influencing household location preferences. The scenarios also influence model parameters which are used to reflect alternative land-use planning strategies (e.g. »laissez faire« policy versus compact development).

Case study: projected changes around Montpellier

The four scenarios differ in both the intensity and the patterns of change in artificial surfaces around Montpellier (see the first figure). The A1-hyper-tech scenario has the highest overall increase in built areas due to high population and economic growth. Rapid technological change, which reduces the need for commuting, new transport technologies and few planning constraints lead to counter-urbanisation, that is, increased development in rural areas. In apparent contradiction to the scenario storyline, urban growth also remains quite high in city centres. This is probably due to the peri-urban and rural areas being unable to absorb all of the projected population increase.

Economic growth remains high in the A2-extreme water scenario, but population growth is moderate, leading to a slightly lower overall increase in artificial surfaces than in the hyper-tech world. The rural, hilly areas north and west of Montpel-

lier suffer the most from extreme events linked to water such as drought or landslides brought on by storms, which makes them less attractive to potential new residents. Increases in artificial surfaces are therefore found mostly in urban and peri-urban zones.

In the B1-peak oil scenario, both population and economic growth are lower, leading to a much smaller overall increase in artificial surfaces than in the hyper-tech or extreme water scenarios. However, the main driving force in this scenario is the oil price shock. High fuel costs and strict planning policies concentrate growth in the urban cores of cities. There is little increase in the peri-urban zone, even along the main transport axis between Montpellier and Nîmes, and next to none in the rural areas. The latter are strongly affected by the decline of the car-dependent tourism industry, as holiday-makers shift their preferences to locations accessible by public transport.

Finally, the B2-fragmentation scenario shows moderate population growth, but low economic growth, so the overall increase is slightly higher than in the peak oil scenario. The new artificial surfaces are more spread out than in the previous scenario, mainly in the peri-urban zone. This spread is not uniform but consists of a series of clustered communities of different age groups, ethnicities, etc. in and around the city core. There is also some increase in rural areas, with the formation of green enclaves as older native people move out of the socially and ethnically diverse cities.

European perspective: common trends & national variability

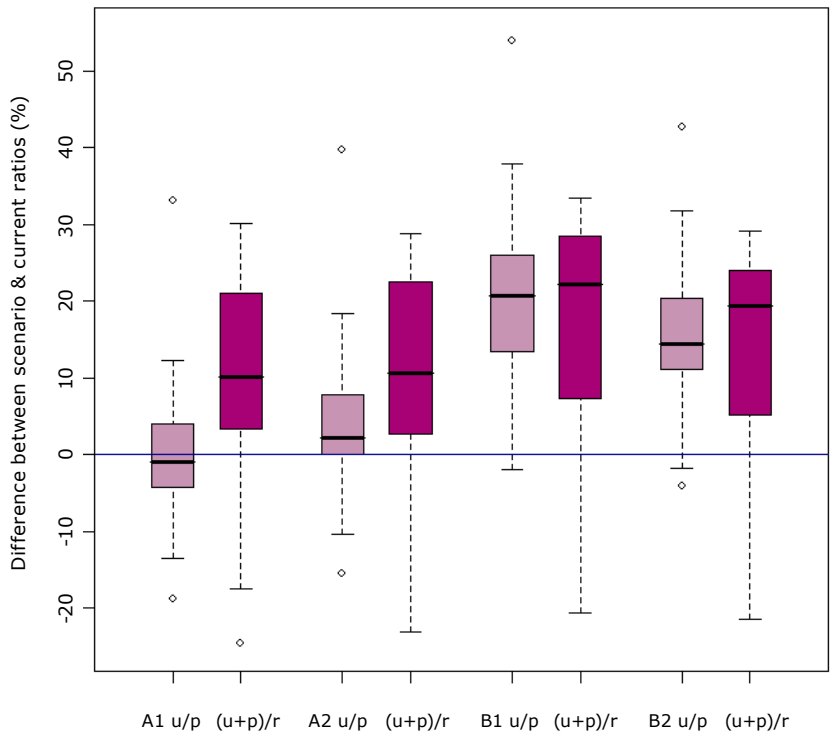
The trends observed for Montpellier are consistent with those found in the rest of Europe. The second figure, for example, shows the changes in the ratios of urban to peri-urban, and urban & peri-urban to rural artificial surfaces for all 25 European countries in the RUG model. For the A1-hyper-tech scenario, there is little change and even a slight decline in the urban versus peri-urban ratio, while the urban & peri-urban to rural ratio shows a small increase. This shows that growth is fairly well distributed across the three zones, although peri-urban areas have slightly more growth than other areas. At the other end of the spectrum, the B1-peak oil scenario shows a strong increase in both the urban to peri-urban and urban & peri-urban to rural ratios, indicating a concentration of new artificial surfaces in city centres.

However, these general trends should be considered in the perspective of the large variability between the 25 countries: a few countries always show the opposite trend. For the urban to peri-urban ratio, Austria and Portugal show a decrease in most scenarios. For urban & peri-urban to rural, Portugal, the United Kingdom and Sweden have the strongest »opposite« trend. This may partly be due to the large differences which currently exist between European countries in the distribution of artificial surfaces across urban, peri-urban and rural areas, although there is no clear link with the current composition for each country. For instance, the United Kingdom has over 50 % of artificial surfaces in urban zones, whereas in Sweden nearly 70 % of artificial surfaces occur in zones classed as rural. The UK also has 35 % of artificial surfaces in peri-urban zones, compared to less than 7 % for Sweden.

The differences between scenarios for the urban & peri-urban to rural ratio are not significant, but as this ratio generally increases, we can conclude that the current trend for slower growth, in terms of new buildings, in rural areas (compared to urban and peri-urban areas) will continue whatever the scenario. On the other hand, the urban to peri-urban ratio does show significant differences, at least between the A (hyper-tech and extreme water) and B (peak oil and fragmentation) type scenarios. This indicates that the scenarios differ mostly in the distribution of new artificial surfaces within the urban/peri-urban areas.

These results show how planning policy may shape land-use patterns and potentially create a more sustainable future. The scenarios mostly contain advantages offset by disadvantages, such as sustainable growth in reaction to an oil price shock (B1). A more pro-active planning policy could mitigate the less desirable aspects while aiming for the outcome of the preferred scenario.

Sophie Rickebusch and Mark Rounsevell, University of Edinburgh



Difference between future (2025) and current (2000) ratios of urban to peri-urban artificial surfaces (u/p, mauve boxes) for the 25 countries in the study area (EU-27 minus Bulgaria & Cyprus). The -purple boxes show the difference in the urban & peri-urban to rural ratio (u+p)/r. Both ratios are shown for the four scenarios: A1-hyper-tech, A2-extreme water, B1-peak oil and B2-fragmentation.

PLUREL's contribution to the European policy debate on urban-rural linkages

EU policies and initiatives are increasingly recognising the importance of urban-rural linkages. PLUREL actively contributes to these debates, in close dialogue with key stakeholders.

Spatial development policies in Europe are mainly a domain of the national states or their sub-entities such as regions and municipalities. The European Union (EU) does not have authority for spatial planning nor for territorial development. It does have, however, a crucial influence on spatial development in Europe with its various sectoral policies and the joint development of guidelines and principles with the member states. In recent years, peri-urban areas and urban-rural relationships have received more prominent part in these documents.

A central document regarding urban-rural partnerships in Europe, and spatial development in general is the European Spatial Development Perspective (ESDP) adopted in 1999 by the Ministers of the then 15 EU member states. ESDP is still an important reference document, setting out a number of policy goals and aims. For urban-rural partnerships it points out that these should be voluntary and built on equality and independence of partners. The basic element is the acknowledgement of the common benefit, i.e. that partnerships across administrative borders have positive effects, something which cannot be achieved in separation. Cooperation across the urban-rural interface leads to more efficient land use planning, better management of natural resources, and makes it easier to maintain a basic supply of service and public transport.

Reinforcing the territorial dimension

The European Commission's Green Paper on »Territorial Cohesion« (October 2008) further sharpened the role of urban-rural linkages for a more balanced and harmonious development. It also highlighted the challenge of the diverse settlement pattern of the EU. The participation rate in the proceeding consultation process showed the importance of the topic. There was consensus on six strands regarding the reinforcement of the territorial dimension in policy design and implementation:

- Coordinated public policies at different levels.
- Better account of territorial impacts.
- Improved multi-level governance.
- Need for functional approaches – regions yes, but also consideration of other geographies where appropriate; e.g., river basins, mountain areas, networks of towns, metropolitan areas, deprived neighbourhoods.
- Territorial cooperation as a clear EU asset.
- Reinforced evidence base – better territorial knowledge is needed.

Important role for PLUREL

PLUREL is directly focused on several of these topics, while others are dealt with indirectly as they all have influences on urban-rural land use changes. Today's policies often imply a clear distinction between urban and rural issues which is unfit to the increasing interdependency of rural and urban in the regions. A more holistic and territorially oriented perspective is needed concerning the development of future sustainable EU agricultural and structural policies. PLUREL, by its high ambitions regarding dissemination of the project's results to European, national and regional policy makers and planners, will highlight this and give a science-based input to the debate.

Besides making the project's results accessible to everybody on the internet, PLUREL is engaged in discussions with important stakeholder networks to foster the importance of urban-rural linkages for a sustainable development in Europe. PLUREL cooperates with the PURPLE network (Peri-Urban Regions Platform


PHOTO: KJELL NILSSON

Europe), and contributes to the CURE initiative (Convention for a Sustainable Urban and Rural Europe), invited by DGRegio. A close link between PURPLE and PLUREL can promote both the dissemination of the knowledge on rural-urban linkages gained in the project and at the same time support the network's targets. On November 12, 2009, PLUREL and PURPLE will also discuss what is needed to ensure a sustainable and successful future for Europe's peri-urban regions in a seminar at Committee of the Regions in Brussels. PLUREL will continue working with the CURE initiative, focusing on how cities and rural regions can work together to achieve a sustainable future for both sides.

Policies on the European level – are they on infrastructure construction, environmental protection, rural development or regional cohesion – can have a significant impact on the development of urban-rural linkages. PLUREL contributes to the debate by improving the evidence base of territorial processes and the knowledge exchange on spatial policies.

Kjell Nilsson, Thomas Sick Nielsen and Christian Fertner, Danish Centre for Forest, Landscape and Planning, University of Copenhagen

Landscape functions in peri-urban areas and the impact of urbanisation

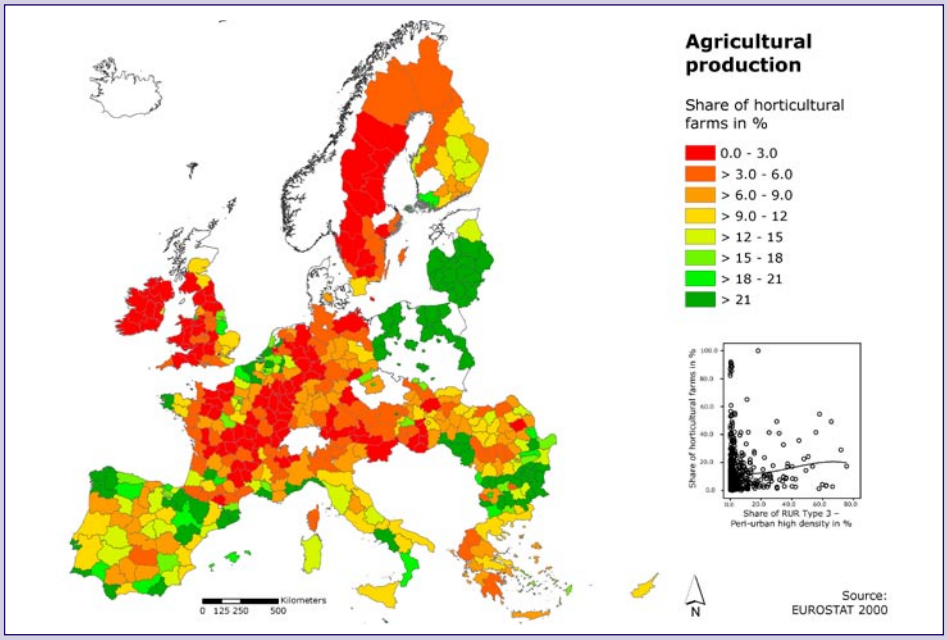
Urbanisation – as physical land conversion or as socio-cultural change of rural areas – is mostly concentrated at the peri-urban fringes of cities and agglomerations. Especially the surrounding open spaces and landscapes, usually important providers of environmental functions and recreational space, are under pressure. To analyse these impacts, we assess land-cover, landscape structures and functions on various spatial levels, considering the broad diversity of conditions.

Agriculture remains an important actor for spatial development in the peri-urban fringe, despite fundamental changes such as globalisation of food production. The proximity to urban areas as centres for demand and consumption offers market opportunities for agricultural goods and services. Facing growing global demand and increased prices for food, higher energy and transportation costs as well as the growing urban demand for local food, the maintaining agricultural production is important for food security reasons. As a major factor in urbanisation history, fertile soils are often situated close to urban areas, which therefore play a role as prime agricultural area. Spill-over from urban areas enables innovative and flexible adaption of production in rural areas nearby, especially in the case of horticulture (fruit and vegetable production).

Providing landscape functions

Traditional functions of agriculture are increasingly replaced by new ones, such as provision of landscape diversity, amenities or nature conservation. Peri-urban areas contribute to the regional provision of drinking water, to soil protection, flood control and moderation of urban climate. Local self-sustenance, provision of biotic and abiotic resources, and resilience to changing framework conditions gain more attention. With moderate urban density and landscape heterogeneity, peri-urban areas offer niches for flora and fauna, resulting in considerable species diversity and abundance.

Natural amenities characterised by immobile nature provided in landscapes and open spaces near urban areas improve the region's recreational capacity. They contribute to healthy, liveable and sustainable cities. Many surveys and hedonic price models underline urban dwellers' preferences for woodland, farmland and other natural amenities. In a leisure-oriented and ageing society, peri-urban areas increasingly fulfil tasks as recreational and residential places.



Impact on landscape and ecosystem
The particular situation of peri-urban regions proves to be highly dynamic within land use change. Characteristic framework conditions exist, affecting landscape structure, integrity and accordingly the functional capability. In the past, agricultural areas were often reduced to a »reserve space« for urbanisation demand, leading to loss of valuable farmland. Proximity to urban areas resulted in additional restrictions and conflicts, such as pollution, disruption by infrastructure networks, high land prices, and legal constraints limiting agricultural operations and profitability. Hobby farming and rural retirement migration represent recent processes which reduce the agricultural production value of peri-urban areas.

High levels of human activity, population density, soil sealing and emission volumes affect ecologically valuable habitats or single species in the peri-urban countryside. Anthropogenic pressures from the growth of settlement and infrastructure network cause cumulative impacts, such as edge effects, habitat loss and disruption, or reduction of connectivity. Negative effects on species, like composition change, homogenisation, or diminished populations are reported for many different kinds of flora and fauna.

Recreational and aesthetical values are related to the bio-physical and climatic conditions of the regions. Still, areas of high environmental value, such as coastal, riparian or mountainous areas, are under urbanisation pressure. Accessibility and exploitation of open spaces is enhanced through the infrastructure expansion, while fragmentation and loss of natural spaces degrade recreational capacity.

PLUREL aims to gain more specific knowledge on the status of peri-urban landscape functions in different European regions, and their responses under different future scenarios. This helps to better identify where urbanisation pressures are more likely to have particular negative impacts, and where counteractions are necessary. Vice versa, we aim to reveal the potentials for vivid, diverse and multifunctional peri-urban landscapes and to support strengthening strategies and measures.

Annette Piorr and Ingo Zasada, Leibniz Centre for Agricultural Landscape Research (ZALF) Müncheberg

Montpellier Agglomeration:
Experimenting with sustainable growth on the Mediterranean seaside?

SOURCE: MONTPELLIER AGGLOMERATION

Montpellier is the capital city of the Languedoc-Roussillon administrative region located on the Mediterranean seaside. The urban region's population has been growing rapidly during the last decades. Urban sprawl has occurred on former peri-urban farmland and has caused dramatic landscape changes.

No coordinated management of urban development existed until the Montpellier Agglomération (MA) was established during late 2001. This new local government brings together 31 municipalities for joint projects in urban planning and development. Main instrument is the scheme of territorial coherence, SCOT (Schéma de COhérence Territoriale), which provides overall planning directions for the agglomeration during the next 15 years.

A changing region
MA comprises 434 km², with 31 municipalities and 406,140 inhabitants in 2006 (935 inhabitants/km²), that is almost 40,000 inhabitants more than in 1999. The urban functional area of Montpellier currently comprises over 510,000 inhabitants (50,000 more than in 1999). Since 1960, changes have not only been demographic. Economic change involved activities of the new economy and of universities, and development of new transportation and touristic infrastructure (e.g. seaside resorts). Changes have also included a new role as »technopolis« since the 1980s, social and transport evolutions such as housing in the outskirts of smaller settlements surrounding Montpellier and the move towards a car-based way of life. As a result, MA has become characterised by its young population of 60,000 students and many young adults working in the new economy. This has led to large-scale demographic growth and great pressure on housing resulting in urban sprawl.

During the three last decades, traditionally strong centralized administration in France has become more decentralised. In the urban planning process, state officers now act as advisers and controllers. This includes providing state opinions on environmental issues when evaluating urban plans and controlling decisions made by local councils. Except for some issues

of national interest, all decisions on urban planning and management of urban fringes are taken locally. The national »urban solidarity and renewal law« of 2000 established new rules with the local urbanism plan, PLU (Plan Local d'Urbanisme). PLU also imposes spatial planning at the inter-municipal level through its scheme of territorial coherence (SCOT). Planning policies at both municipal and inter-municipal levels must now be formalised in a project report, with maps indentifying the different status of land concerned by the project. PLU must be compatible with SCOT and participatory methods are supposed to be part of local planning processes.

Land use and environmental challenges

SCOT, elaborated during 2002-2005, was approved by the Municipal Council in February 2006. As MA only includes 31 local authorities, it does not control all of the urban functional area (93 authorities). Montpellier and its surroundings are very attractive, leading to large space consumption for housing and transportation. Finally, land prices are rising steadily, leading to land discrimination, particularly outside of MA due to its social mix policy. Land price increases are putting pressure on farmers to sell their land for development, as most traditional farming systems are no longer economically viable in their globalising and urbanising context.

Main environmental issues are quality of life, housing and transportation, water and waste management, preservation of open spaces (cropland and natural patches), conserving the areas high biodiversity (for example in the coastal lagoons) and management of natural risks (floods, fire). MA's geographic position explains the occurrence of climatic hazards like flash floods caused by heavy autumn storms. Flood risks are significant and drive the region's urban planning policies. Moreover, with urban sprawl, the wildland-urban interfaces are increasing and thus the risk of devastating forest fires.

Containing urban sprawl, preserving the quality of natural environment and supporting economic activities are the main challenges faced by MA. The hot political topic at the time is enlargement of the agglomeration to over 500,000 inhabitants and more than 50 municipalities.

Jean-Pierre Chery, CEMAGREF and Françoise Jarrige, SupAgro

PLUREL People

Interview with Ingo Zasada, Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg

What is your role in PLUREL?

I take part in the ZALF working group's statistical analysis and modelling work on response functions for sustainability impacts of urban land use change. Along with our interest in urbanisation related changes in landscape and its various properties (e.g. agriculture, biodiversity and recreation), we analyse differences and similarities of regions across Europe. Additionally, I bring in my PhD-study on the topic of multifunctionality in peri-urban landscapes.

How will PLUREL benefit from your specific expertise?

With an educational background in urban and regional planning, I contribute to the integrative work within this interdisciplinary project. My PhD-work and the project tasks are linked in various ways. Moreover, PLUREL offers great personal opportunity to me. I can obtain insights and experiences in a prime research environment, through dialogue with experts from different research backgrounds and with experience in using different methodological approaches.

What will be PLUREL's most important results?

Participation of researchers from many different disciplines enables a comprehensive approach to the complex topic of sustainability impact assessment for urban-rural-linkages. The research team has produced numerous results at different spatial scales and stages, as well as by transferring scientific knowledge into policy implementation. Despite the enormous communication and coordination requirements involved, I am confident that some highly integrated, value-adding chains of results will be the most important research outputs.

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

Although my experiences with this type research projects are rather limited, my impression is that a large project like PLUREL not only demands particular managing efforts. Also needed is a broad agreement on and commitment towards the aims of the project among participants, even when these are beyond their own research fields. In this way, isolated and uncoordinated individual contributions can be avoided.

Why should policy-makers be interested in PLUREL?

Europe's peri-urban areas represent a policy arena characterised by its density of actors, interest groups and land claims, high land use dynamics and corresponding impacts on sustainability. These affect the quality of life of large parts of society. But peri-urban areas enjoy only limited attention from policy-makers and the public. Often decision-making about these areas is fragmented between differing and competing institutions and responsibilities. Therefore PLUREL addresses questions of particular relevance to peri-urban areas. The project provides research findings developed in close contact with practitioners and stakeholders in the varying spatial contexts of peri-urban case study regions.

Upcoming events

International conference organised by the PLUREL project:
Managing the Urban Rural Interface – Strategies and Tools for Urban Development and Sustainable Peri-urban Land Use Relationships
Dates: 18-21 October, 2010
Venue: Faculty of Life Sciences, University of Copenhagen, Denmark
Deadline for abstracts March 1, 2010 • www.plurel.net/conference

Conference organised by PURPLE, Peri-Urban Regions Platform Europe:
Europes peri-urban potential: beyond urban-rural links; Ensuring a sustainable and successful future for Europes peri-urban regions
Date: Thursday November 12, 2009 (14:00-18:00 hrs)
Venue: Committee of the Regions, Brussels, Belgium

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PLUREL Partners

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- Leibniz Centre for Agricultural Landscape Research, Germany
- Wageningen UR / Alterra, The Netherlands
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- The Chinese Academy of Forestry, China
- Alfred Peter Paysagiste, France
- University of Edinburgh, United Kingdom
- Wageningen UR / Van Hall Larenstein, The Netherlands

Peri-urban Land Use Relationships

Strategies and Sustainability Assesment Tools for Urban-Rural Linkages

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