

Defining region classes with similar characteristics

This article describes the difficult task to delineate Rural-Urban-Regions (RURs) for all of Europe and to develop a RUR typology. The first part of this task is to cluster 1300 regions in Europe into RURs. Next, a compact set of RUR types must be developed, using limited available

data. RUR types should be simple and sophisticated enough to elaborate land use-related response functions, tailor-made for a certain RUR type. They should allow for assessing relations between »drivers« and »pressures« which affect different RUR types in different ways.

RUR delineation and typology: purpose and principles

A region is defined by its intra-regional relations. Like hierarchical city systems, urban region hierarchies reflect the influence spheres of cities. Assessing urban-rural relations requires certain region characteristics to distinguish between

the influence of neighbouring core cities on their peri-urban and rural surroundings.

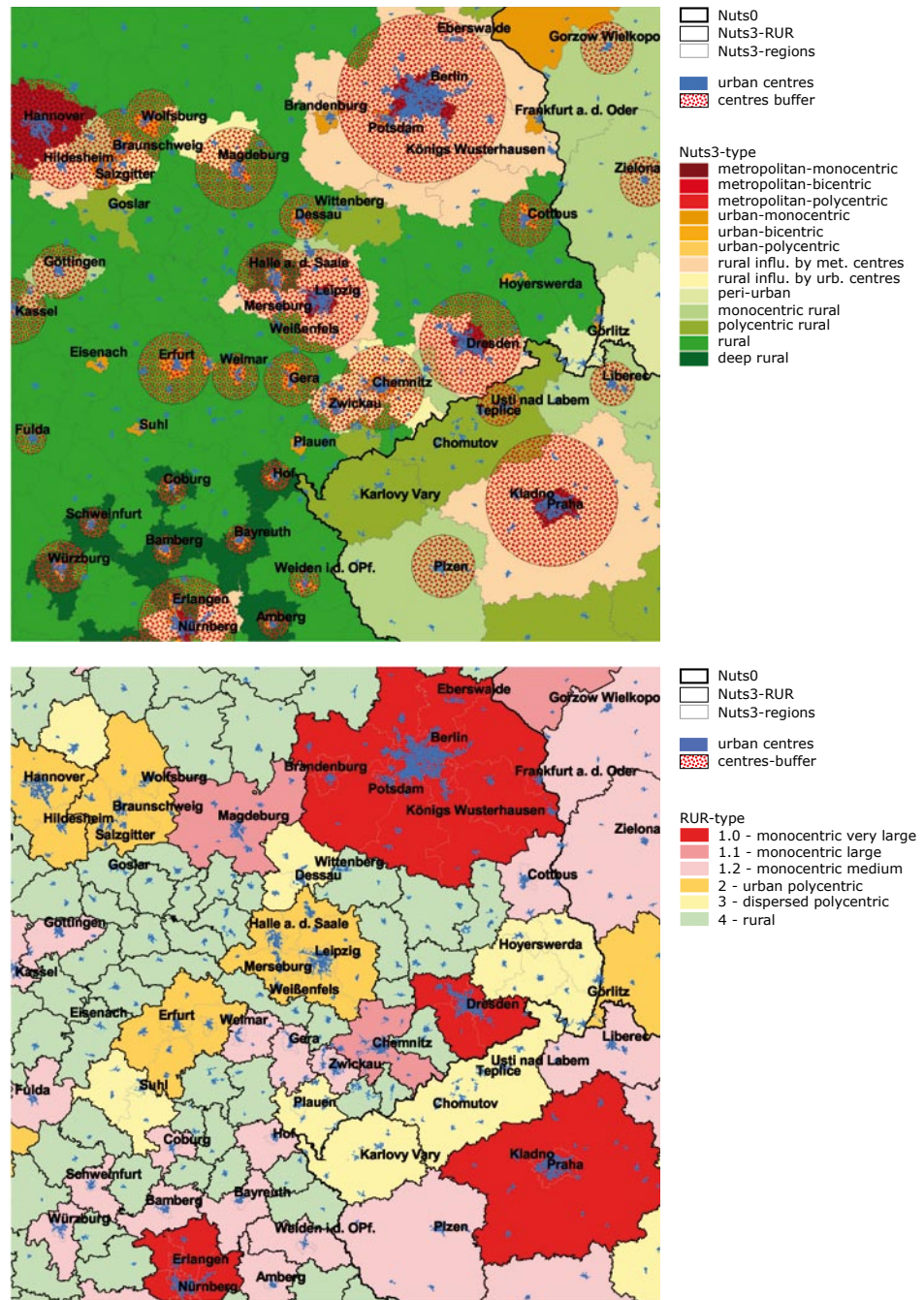
As typologies are developed for certain purposes, they also need to adhere to certain preconditions. The European Commission has identified so-called »NUTS3« regions as appropriate for examining the regional effects of European Union (EU) policies. As PLUREL aims to deliver tools for sustainability impact assessment of urban/peri-urban/rural relationships, the NUTS3 level must be applied as »resolution« for analysis, although it is rather coarse for analysing intra-regional issues.

In PLUREL Newsletter 1 a Rural-Urban Region (RUR) was defined as »the functional urban region reaching beyond the peri-urban commuter belt including the rural hinterland«. Rural-urban regions show certain differences but also similarities regarding distribution of drivers and resulting pressures. A typology will make use of these similarities, helping to identify pressure patterns typical for certain RUR types as response to land-use and interactions. Examining different pressures requires a flexible typology, derived from those spatial features, affected by the respective driver-pressure issues. The typology should support the quantification of very different driver-pressure relations. But it cannot be too detailed if the aim is to develop a manageable set of generic response functions appropriate for basic RUR types. Therefore, three sets of distinct typologies have been developed, allowing for selection for each particular response function:

- Morphology: regional distribution of core city and related sub-centres;
- Spatial dynamics: core city versus surroundings growth- and decline-patterns; and
- Core city shapes: compactness versus fractality of major cities. (This typology will not be presented here because of space limitations.)

Applied data

Due to the large number of NUTS3 entities and the European-wide scope of the analysis, RUR delineation and classification must be carried out automatically, using spatial and statistical data and GIS-methodologies. Limited data availability at European level, however, is a key barrier to develop a sophisticated typology. Only few data are available



Clustering of Nuts3 regions through buffers (top) and final RUR morphology typology (bottom). Berlin-Prague map detail, urbanised settlement areas depicted in blue.

for the entire EU with its 27 countries (EU27). These include EEA's CORINE land cover 2000, a 100 x 100m raster map with 44 land cover classes. Available data further include population numbers for the years 2000 to 2006 for NUTS3 entities, as the only complete EUROSTAT NUTS3 dataset. Additionally, population data from the GISCO urban centre point data base (STEU) have been applied for 5000 settlements, updated with recent World Gazetteer population numbers.

RUR delineation

As first step to delineate RURs, urban centres serving as RUR nuclei have to be identified. Because of the large number of urban settlements in Europe, this selection is conducted automatically, applying land cover and population data with GIS-methodologies. Adjacent land cover patches, identified as parts of settlements, are merged into one settlement area. Settlement areas featuring a STEU urban centre point above 10,000 inhabi-

Dynamic type	Core city	Peri-urban and rural area
GG	Growth	Growth
DG	Decline	Growth
GD	Growth	Decline
DD	Decline	Decline

tants are defined as urban centres and those exceeding 100,000 inhabitants as core cities. NUTS3 entities featuring a core city are defined as RUR centre regions. Buffer circles around the core cities mark commuting and recreation catchment areas, extending the centre regions to »complete« RURs. NUTS3 regions which are significantly overlapped by core city buffers are merged into the respective adjacent RUR centre region. This results, finally, in 900 RURs for EU27 (see the maps on the front page).

RUR morphology typology

When looking at land-use relationships, (intra-regional) mono- and polycentricity are in focus. These types have to be examined separately, as they trigger very different pressure patterns. Monocentricity conveys boosting urban cores and – in centre-less peri-urban surroundings – undirected settlement dispersion known as urban sprawl. Polycentricity, enhanced by regional planning strategies, supports distributed peri-urban functions, relieving pressures from open space through concentration of activities in urban sub-centres. See the morphology types in the table below.

The typology is conducted together with the RUR delineation (see above). The left-hand map on the front page show the morphology typology results for the entire EU27. Certain major trends become apparent, despite the effects of varying NUTS3-region sizes on the classification. Reddish regions indicate the domina-

tion of urban monocentric RURs. These lack notable peri-urban sub-centres to release core city pressure on open space through urban sprawl. Urban polycentric RURs (orange) are observed in England, Belgium, Netherlands, Slovakia, western Hungary, along Germany's Rhine-Valley and in northern Italy. The majority of rural polycentric RURs (yellow) with some small centres is located in the eastern EU27 periphery (Poland, Slovakia, Hungary, Romania) and scattered over France. The remaining rural RURs (green) without any notable centres are located in mountainous and forested areas in peripheral Southern and Northern Europe, in the Alps and scattered over Germany due to the small NUTS3 entities.

RUR dynamics typology

Urban regions demonstrate a certain spatial development »lifecycle«, resulting in waves of urbanisation, sub-urbanisation and counter-urbanisation, triggered by increase and decline of drivers (such as birth and migration balance), related activities (housing, production, commuting etc.) and general economic conditions. This urban life cycle exhibits various spatial development patterns, like core city growth as effect of urbanisation, polycentric growth as effect of controlled (sub-)centre expansion or scattered peri-urban settlement growth (urban sprawl) as effect of uncontrolled settlement dispersion. Other development patterns show declining core cities as effect of counter-urbanisation due to general population and activity loss, or declin-

ing peri-urban settlements as effect of population loss in the entire urban region or as effect of core-city re-urbanisation. Different RURs show either identical or oppositional dynamics in core cities and surroundings, resulting in types as seen in the table to the left.

The classification focuses on recent, short-term momentum (excluding e.g. the Eastern/Central Europe catch up dynamics of the 1990s) to observe latest spatial trends in by now economically consolidated urban regions for obtaining hints for future trends. Dynamic classifications have not been carried out using CORINE land-cover, as data are not available for all countries and/or follow inappropriate land-cover classification rules.

Instead, land-cover data and population numbers from different years serve as land-use activity proxy for comparing RUR dynamics in urban centres and non-urban RUR sub-regions. As different population census years for NUTS3 regions and urban centres hamper accurate dynamics observation, we focus on general dynamic trends rather than on explicit rates. The right-hand map on the front page presents the dynamics typology for RUR centres with coloured dots and for non-urban surroundings as coloured polygons.

A major West – East trend can be observed: a general (population) decline in Eastern Europe and some decline in peripheral, rural RURs in the Mediterranean area, in Scandinavia and the Baltic region. Some regions in eastern Germany and the Ruhr-valley area, in northern France as well as remote alpine RURs in Austria also show also a decline, while RURs in Poland frequently demonstrate positive trends. Core cities mostly show similar trends as the non-urban surroundings, but with certain exceptions. For example, some RUR centres in coastal France, the UK and Ireland, in Germany's heavy industry area and in Poland show a decline, whereas the surroundings demonstrate growth trends. In contrast, growth trends can be noted for some RUR centres in Greece, Romania, Bulgaria, (eastern) Germany, central France and Finland, while the surroundings show a decline.

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Morphology type	Explanation
1. Monocentric	Regions with core city area without notable peri-urban sub-centres, three sub-types by core city size: very large (+metropolitan), large, medium
2. Urban polycentric	Regions with core city(or cities) and peri-urban sub-centres
3. Dispersed polycentric	Regions with several (medium-sized) peri-urban centres
4. Rural	rural regions without notable centres but dispersed smaller settlements

Commuting patterns in Rural-Urban Regions

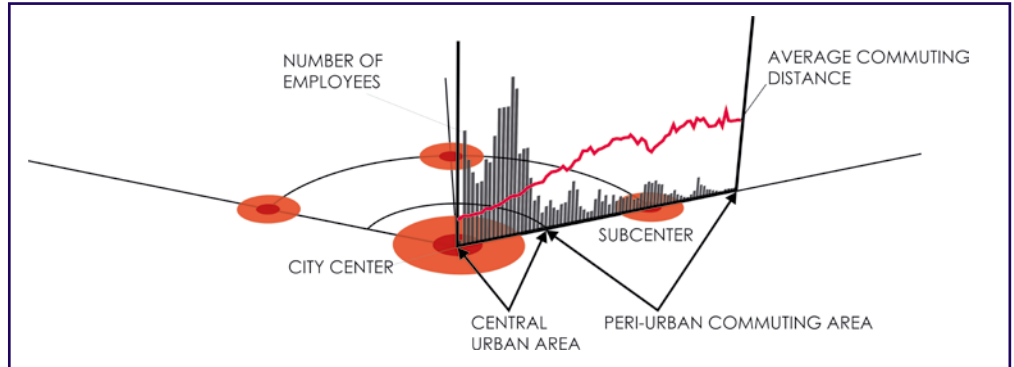
Commuting is the most important single factor that determines daily travel patterns. Commuting intensity and patterns are very much depending on the distribution of workplaces, housing and transport systems. Urban sprawl tends to enlarge the functional regions of commuting and the zone of the automobile dependency. Will increasing distances be conducted daily also in the future or will new technologies emerge that could reduce daily travel demand?

Urban structure and commuting

Spatial decentralisation leads to sub-urbanisation and dispersion of both employees and workplaces. Urban sprawl and decentralisation of employees and workplaces are consequences of changes in accessibility through car availability and transport supply. Distance between home and work reflects the long term location choices made by households. This variable takes into account factors such as housing prices, transport facilities and the like. Commuting distance reflects the spatial interaction between labour force and housing markets – an interaction that generates traffic to the transport system.

Decentralisation and dispersion processes have an effect on commuting behaviour. Traditional compact cities are evolving into large urban areas. The flow patterns that have traditionally been oriented towards central areas are changing into criss-cross patterns. It is not clear, however, how polycentric metropolitan structures affect travel behaviour. Some authors suggest that a de-concentrated structure means reduced commuting distances and times, while others state that polycentricity implies an increase in commuting distance, as commuting distances are significantly longer in the suburbs than in the central area.

Transport in rural-urban regions is one of the major drivers in the context of climate change and greenhouse gas emissions. Reducing climate effects of transport means basically either reducing the



Model of commuting distance, population density and distance to the centre in an urban structure. The graph is based on data from the Helsinki commuting region.

vehicle kilometres travelled or developing more sustainable transport systems.

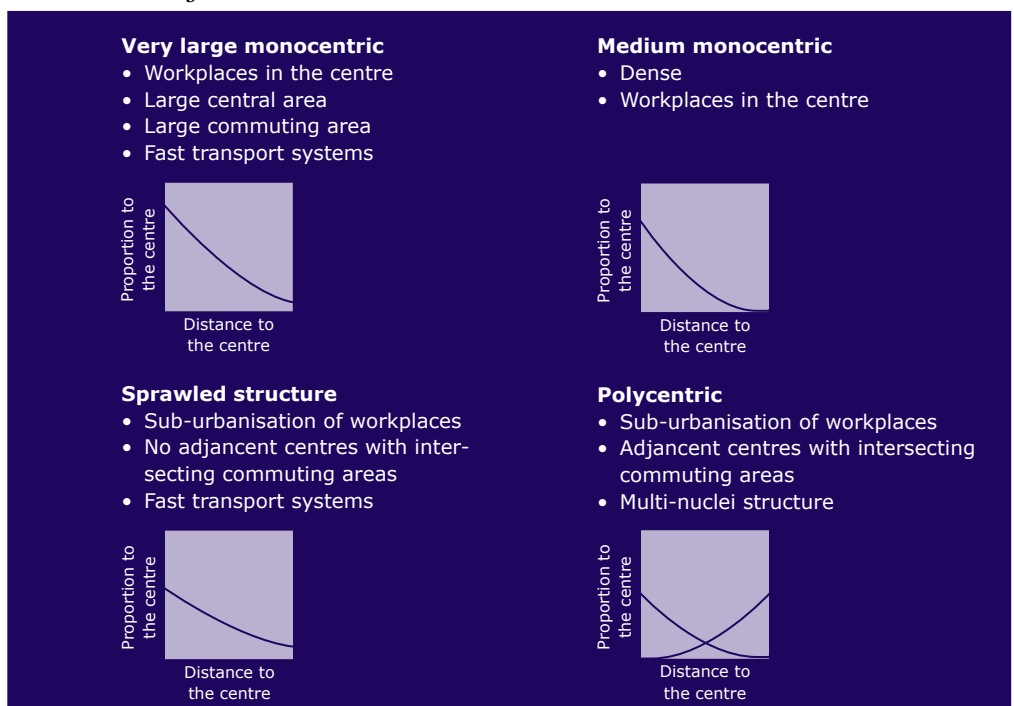
Commuting research in PLUREL

In PLUREL we concentrate on the linkages between commuting and urban structure. Structural factors serve as a framework for individuals within which they choose their transport mode. For example, if an individual lives in an area which is car dependent, and the distance

to the destination is long enough, he or she is not likely to choose public transport or walking as mode of transportation.

One task in PLUREL is to develop a model for the consequence of land use change for transport and commuting that can be applied to all European regions, based on available datasets. In this work, we have been focusing on commuting, since it is a mode of transport that deter-

Illustration of the logit model curve, depicting the probability of commuting to the centre in different kinds of urban structures. »Proportion to the centre« refers to proportion of the resident employed population (night population) travelling to a place of work in the city centre.



mines the need of transport infrastructure. Peak-hour commuting travels cause most congestion, whereas leisure travel is often more multidirectional.

Commuting response function and a logit model

In a monocentric city the key feature that determines the commuting kilometres travelled is the residents' distance from the city centre. This is confirmed by literature as well as by Finnish data sets and empirical analyses of data from other European cities. The schematic model drawing of commuting distance, population density and distance to the centre in an urban structure can serve as illustration. The so-called urban density gradient can be used to analyse how average commuting distance reacts to changes in distance to centre and density.

A natural approach in constructing the response function is to take the distance from the city centre as the main variable. Based on observed data we have developed a so-called logit model, a way of describing the probability of an outcome or choice based on certain predictor variables. Our model can be used to estimate the average commuting kilometres travelled for people living at different distances from the centre. This monocentric model is calibrated for different city region structures, taking into consideration the RUR (rural-urban region) typology and the morphology of the city region (see also the first article in this issue of PLUREL News), as well as the available transport system (e.g. rail or passenger car). The challenge is to adapt the model to polycentric urban structures where commuting is more multidirectional.

Future patterns

The challenging part of the work is to extend the results of today's transportation patterns to future conditions. With help of the scenarios produced in PLUREL and by using spatial allocation rules (future urban structure), we seek to find the future distribution of housing and workplaces. Moreover, we want to use the response function and the logit model to predict future transport needs. One very interesting factor is the effect of new technologies (like teleworking) on commuting and urban structure.

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The power of the public sector to influence land-use changes



Within the large PLUREL network, the Metropolitan Research Institute (Budapest) and University Thessaly are the institutions dealing with the question of how the public sector can influence land use changes. Governance aspects and planning policies are the focus of their analysis.

PLUREL intends to develop a model on the NUTS3 level for all European Union and European Free Trade Association (EFTA) countries. The difficult question is how to incorporate »qualitative« issues related to governance and planning powers into a quantitative model aimed at forecasting land use change for the whole of Europe. The model will estimate the magnitude of the push for more urban land use on the basis of economic, social, and demographic variables. This magnitude will differ according to the four scenarios chosen. Final decisions on land use changes, however, are taken across Europe by the public sector. The task is to estimate the willingness and the ability of the public sector to resist the push from market actors (the population, investors etc.) towards expanding urban land use in ever more dispersed locations.



PHOTOS: IVAN TOSICS

Factors influencing public sector decisions

The decisions of the public sector depend on many factors. In a Europe-wide model, we can only take into account the two most general, nation-wide issues: the structure of government and the type of regional/spatial planning policy.

The ability factor of public decisions to resist urban sprawl is modelled by the fragmentation of government levels (their relative size compared to the rural-urban regions (RURs)), and the relative power of the different levels in deciding on land use change. The latter is based on indices such as elected/delegated/appointed decision-making body, presence of physical or strategic planning, and so forth. According to our hypothesis the closer the administrative level deciding on land-use changes is in size to the RUR, the more power it has to influence land use changes for that region.

The willingness factor of public decisions is modelled by an assessment of planning styles on regional or national level. This can range from non-interventionist, laissez-faire systems, where local govern-

	Type of regional/spatial planning policy		
Degree of fragmentation in land-use change decisions	a) Non-interventionist, laissez-faire systems	b) Medium level of control	c) Strong, controlled spatial policies
A. Very fragmented	1	2	3-5
B. Partly fragmented	2	3	4-5
C. Consolidated	3-5	4-5	5

The numbers reflect the ability of the public sector to resist the push of the market, ranging from 1 (minimum) to 5 (maximum).

ments have total freedom to take their land use change decisions, to controlled systems where land-use changes have to be in accordance with higher level plans and/or pre-set conditions. Here the hypothesis is that stronger regional/spatial policies aim at minimising the sprawl of urban land use. This is done through concentrating development either on already used (e.g. brownfield) areas or into compact areas of new development, ususally with good public transport links. Furthermore an index representing the presence of corruption in the given country can play a role, estimating the possible influence of the investors on the decision-makers.

Interactions between ability and willingness

These two factors, the ability (formal government system) and willingness (the planning power) are not completely independent from one another. On the one hand, a strong regional planning policy can substitute for the missing consolidation of the local government structure. This is the case in France, for example, with the »communauté urbaine«, the compulsory planning cooperation between the fragmented local municipalities. On the other hand, consolidation of fragmented local governments can substitute for the absence of a regional planning policy. In some European countries, the many, previously independent settlements are replaced by larger, consolidated local governments which can make area-wide decisions. The interference of the two factors, i.e. their joint effect, can be hypothesized as illustrated on page 5. The values in the table are presently only tentative and aim to reflect the ability/power of the public sector to resist the push of market actors towards more urban sprawl, ranging from minimum (1) to maximum (5). These values will be included in the PLUREL model as a layer. The value of the strength of public regulation over land use change has to be determined for each NUTS2 region, for all countries. These figures will be determined on the basis of national-level information about formal government systems and regional/spatial planning policies.

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Evocative event: Lounge workshop on landscape



PHOTO: JURJEN BREISE AND AD KOOLEN

PLUREL wants to present its results not only to scientists. Also politicians, practitioners and the general public should be involved. That is the reason why evocative events are part of the project's dissemination strategy. Regional exhibitions, debates, workshops and events are used to catch people's attention on the results of the project and to put its issue of sustainable peri-urban land use in metropolitan areas on the public agenda. This article describes a recent example of such an evocative event.

An international PLUREL lounge workshop held as part of the International Triennial of Landscape Architecture in Apeldoorn, The Netherlands, can be considered as the first public event within PLUREL. During the general PLUREL meeting in September 2008 in Haaglanden an exhibition including debates and workshops is organised in the Stroom gallery on Architecture and Art in The Hague. In other countries similar initiatives are planned.

PLUREL lounge

Sitting comfortably in armchairs and on sofas with a beer, international participants at the conference »A wider view« in Kootwijk discussed issues of landscape and urbanisation in Europe in a lounge

workshop on Monday June 16th, 2008. The »European living room« where the workshop takes place is divided into Polish, English, Dutch and French corners. The Landscape and Urbanisation workshop was organised by Ad Koolen and Wim Timmermans (Van Hall Larenstein, Wageningen UR). That morning they had a truckload of used furniture delivered from a second-hand shop to give the workshop a homely atmosphere.

In the Polish corner, Paulina Jurgiel and Agnieszka Sulenta, both studying spatial management at the University of Warsaw, explain their plan to conserve a green area with forests just outside the capital. »Buildings, housing, roads and traffic are all encroaching on this area«. The first step is to educate the inhabitants, the Polish students explain. The workshop participants try to establish exactly what the problems are in the Warsaw case. The different municipalities involved have no common strategy and almost no limits are placed on investors. A participant from Bulgaria recognises the problems: »In Sofia there are plans, but they are not implemented.« Some of the Dutch participants explain how things work in The Netherlands, referring to the well established regulations that exist. The Polish students are especially interested in all the bicycles they've seen in Holland as a means of transport.

and urbanisation

Better legislation and more communication

The lounge guests rotate regularly, so that everyone has a chance to hear and discuss all the projects. In the English corner, Joe Ravetz, co-director of the Centre for Urban Ecology at the University of Manchester, is a bit cynical about developments on the peri-urban fringe of many UK cities. Rich people are moving to the countryside close to the city and this is driving away the poorer inhabitants. Furthermore, these poor inhabitants have no lines of communication with the decision makers.

The French landscape designer Jennifer Buyck describes a prize-winning project in Montpellier, where spatial planning guidelines have been laid down for the agglomeration around the city. The area spans the mountains and villages nearby, the city itself and the seaside. »The municipalities don't always respect the agglomeration, which is a relatively new administrative level in France. There is no jurisdiction, so it is difficult to enforce the guidelines,« Buyck explains. Two Turkish planners recognise the problems associated with a lack of legislation. In Montpellier the planners are trying to work together with the people who live and work in the area. »Much discussion ends up being at the individual level: residents are unhappy with something being placed in front of their house or garden. It's difficult to discuss the project as a whole,« says Buyck. Because there are large areas of nature in southern France, people don't value green in the urban setting, although Buyck says that this attitude is starting to change.

At the end of the workshop, the guests come up with recommendations for the projects. Not surprisingly, the common factor turns out to be communication with the inhabitants and getting them involved.

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(Previously published in »Resource«
no. 35, 19 June 2008)*

PLUREL People

*Interview with Marcel Houtzager, regional portfolio holder, The Hague Region
(the governing body »Stadsgewest Haaglanden«), The Netherlands*

How are you involved in the PLUREL project?

As the policy maker for green areas, recreation and tourism in the governing body The Hague Region in The Netherlands, I am responsible for urban-rural relationships in our region. The Hague Region is one of the six European case study regions that participate in PLUREL. I represent the policy makers of these regions in PLUREL's Board of Stakeholders, with the task to maintain a sound dialogue between us policy makers and researchers. Moreover, research within PLUREL should lead to results such as scenarios and models targeted towards the regions and their needs. The recommendations of the Board are often followed, leading to more applicable results.

What are your expectations from the project? How can your region benefit from PLUREL?

I expect that the project will deliver practical tools which will help us plan and manage our region in a sustainable way. Tools should assist us in finding a balance between different spatial claims, ensuring preservation of sufficient open, green and historically valuable landscapes. PLUREL offers insight into the experiences and views of other European regions concerning urban-rural relations, models of land use and strategies to maintain sufficient green space and open landscape. But we also need to keep our region economically dynamic and create opportunities for new functions. Valuable elements of PLUREL are the exchange of experiences and knowledge and the opportunities to work towards a better balance in our regions together with researchers, planners and other specialists.

What is your view on the collaboration between scientists and policy makers in the project?

This collaboration is important for keeping the research politically relevant and applicable. Moreover, it offers the opportunity for exchanging views between science and policy. Policy makers will obtain insight in future trends and factors that can influence their regions. In this way we gain a better understanding of the impact of today's decisions on future spatial, economic and social developments in the regions. In this respect the models, scenarios and tailor-made policy recommendations developed for our region are of importance.

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

Ensuring the applicability of the project's end results and their relevance to the work of practitioners and policy makers is a continuous challenge. Researchers need to keep working closely together with the case study regions and the Board of Stakeholders. That is the recipe for a successful project, producing practical end products for decision makers in Brussels or on the local, regional and national level.



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Peri-urban Land Use Relationships

Strategies and Sustainability Assessment Tools for Urban-rural Linkages

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**PLUREL is an Integrated Project under
EU's 6th Framework Programme**



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