

EU-LUPA

European Land Use Patterns

Applied Research 2013/1/8

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This report presents a more detailed overview of the analytical approach to be applied by the project. This Applied Research Project is conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU27, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON Programme and projects can be found on www.espon.eu

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List of authors

TECNALIA (Spain)

Gemma García

Efrén Feliú

UAB (Spain)

Jaume Fons Esteve

ALTERRA (The Netherlands)

Marta Perez Soba

Gerard Hazeu

NORDREGIO (Sweden)

Rasmus Ole Rasmussen

Patrick Galera-Limdbloom

IGSO (Poland)

Jersy Banski

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1. EU-LUPA Project: The General Approach

Changes in land cover in Europe reflect modifications in the uses of land, which often compete for the same resource. Accounting for land cover change in a consistent way at the European scale has been made possible with CORINE Land Cover, covering the period 1990, 2000 and 2006. However, land use and land use change in Europe have been mainly addressed from a thematic perspective.

There is a need to integrate different sector views, realizing that land-use characteristics are becoming increasingly multi-functional, crossing not only sectors but also administrative boundaries, and thereby becoming more demanding in relation to background information and institutional and administrative structures.

Given the complexity of the processes that drive land uses and land uses changes, a comprehensive understanding requires reliable framework for integration of scales and themes which is currently lacking. Understand the complexity of the interactions between the multiple uses of land, their temporal and spatial changes is seen crucial to analyse the significance that policies might have on steering those changes towards sustainability.

The aims of the EU-LUPA project are:

- To analyse comparable information about European regions and cities, based on already available data from different sources and at different levels,
- To supply regionalised information integrating physical dimension (land cover) with socio-economic (land use) and environmental, in order to
- Understand and obtain a clear view on land use dynamics, land use changes and current land use patterns in the European territory,
- Identify main challenges in different types of territories, regions and cities by means of their territorial efficiency and
- Define the policy options and recommendations to cope with these challenges

In order to reach this objectives the project will take a stepwise approach integrating the biophysical dimension with the human system. In that sense the following components are identified:

- Land cover. Is the physical cover of the land (e.g. water, forest,...) providing one dimension for the description or characterisation of a specific area. It reflects the biophysical state of the land.
- Land use is the description on how the land is used and the related socio-economic activities. Then, at a single point there may be multiple uses. This is the core definition used in this proposal and that will be further implemented.

Since the interactions of all these elements is so complex, definition of typologies are key to integrate and facilitate the interpretation of the main processes.

Our approach for the characterisation of Land Use patterns and dynamics in the European territory is based on the land use functions, which reflect the goods and services provided by different land uses, and how those functions could explain certain territorial behaviour.

Challenges for each regional typology will be addressed by means of their territorial performance (compliance of Lisbon/ Goteborg objectives) and their Land Use Efficiency, in order to better define adequate policy options and recommendations.

This report provides a description of the conceptual framework and project methodological approach, first results in relation with data availability, identification of potential case studies, project results and main targeted groups.

2. Methodology and hypothesis for further investigation

This chapter has been elaborated following the project structure in tasks and subtasks. The following figure illustrates the relationship between the different tasks to be undertaken in the EU-LUPA project.

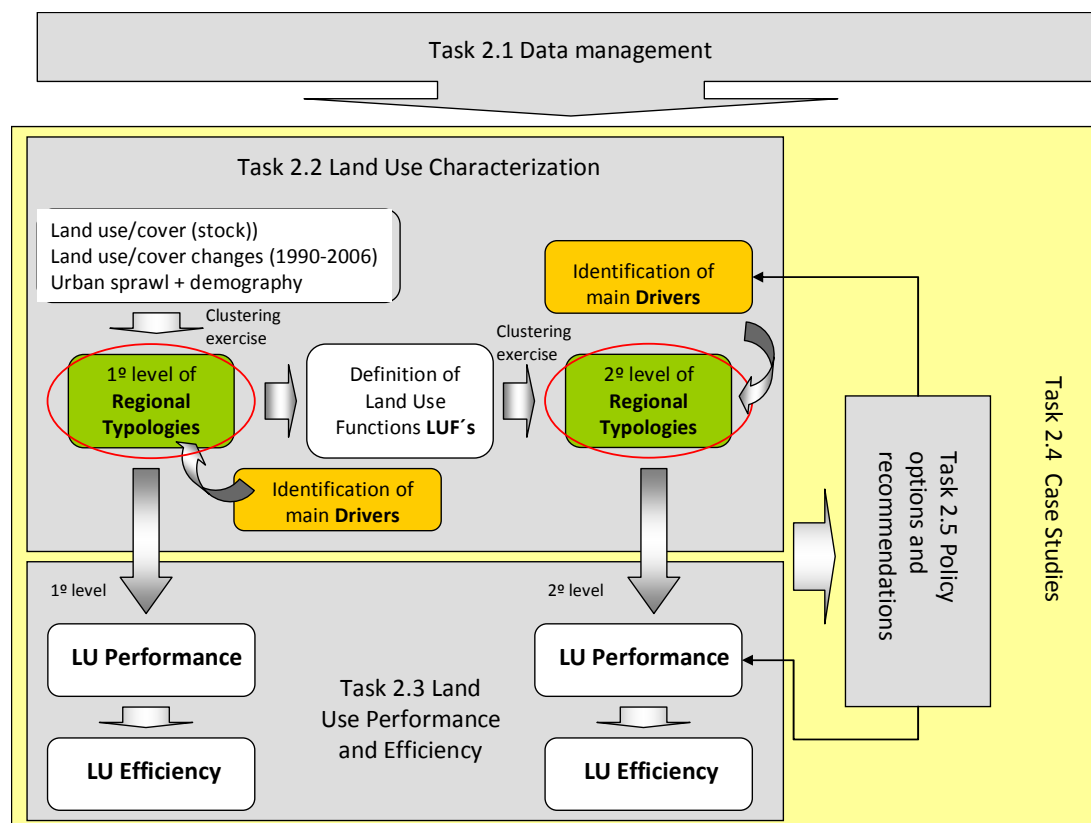


Figure 1 EU-LUPA project conceptual framework

2.1. Data Assessment and Management (Task 2.1)

Context:

In order to understand the process of land use, land use changes and patterns, its drivers and related impacts it is required a multidisciplinary approach. Two groups of data sets could be distinguished:

- Data related to physical environment. This type of data is usually provided as continuous geospatial data and available at different scales. By its nature it is possible to interlink data at different scales by means of standard GIS methodologies.
- Socio-economic data. Since this information is provided by statistical offices in most of the cases it is provided on the basis of administrative units.

This task will collect and harmonise all the needed data for the project considering the following dimensions:

- Spatial dimension: Europe, National, Regional (NUTS 2/3) and Local for the case studies
- Temporal dimension. The temporal dimension will range from 1990 up to 2006 given the existing information at European level.

- Thematic scope: Environmental data (e.g. protected areas, air pollution, water quality), Transport-mobility, Energy, Social data (e.g. demography, education) and Economic data (e.g. GDP)

Finally the all the data will be organised in a geodatabase to keep a coherent structure of the information, easy to search/use for all partners and to avoid inconsistencies between different versions.

Methodology:

The approach that is going to be used focuses on the main challenges that may face the methodology are the integration of different type of data and the integration of scales.

→ Integration of different type of data

This problem usually arises when combining statistical data (e.g. population), provided at administrative level, with land use data which is continuous information in space. One option is simply aggregating the continuous data at the same administrative level as the statistical data and, then, performing any analysis or deriving the desired indicator. Any aggregation of information has as a drawback the loss of information on where the processes are occurring and the patterns (e.g. patchy vs. concentrated in specific areas).

An alternative is to find an intermediate aggregation level which is independent from any reporting unit (administrative or natural –e.g. biogeographic regions). This is possible by using a regular grid where the information is integrated at grid cell. For that it is required to disaggregate the statistical (discrete) data to a higher level of resolution. In the case of population data this methodology has already been applied at European scale in a grid system of 1 km² (INSPIRE reference grid). Land cover data is also aggregated into this grid, loosing some information –but less than in the previous case.

Once the data is organised into the grid level, the analysis can be done at that level, mainly looking for correlations or dynamics between different parameters. Later on the data can be grouped to any reporting unit required (e.g. river basin, NUTS 2/3, biogeographic regions).

→ Integration of data at different scales

The same grid approach can be used to compare data from different scales. A hierarchical structure of grids could be developed. In that case it will be mainly addressed by CLC and Urban Atlas (higher resolution). Finally it is possible to identify the degree of error and uncertainty associated to CLC compared with higher resolution information coming from Urban Atlas –which is specific for European cities.

Two approaches are possible to overcome this problem:

- Aggregation of data at administrative unit. Land use data is aggregated to the same level of socio-economic data. This is the most common approach taken so far. The problem is that when spatial information is aggregated some process or patterns may be lost or jumbled. For example when analysing urban sprawl it is crucial to identify how the urban fabric is extending, in which direction and intensity. If these elements are not analysed before the aggregation and synthesized in some indicators, statistical information on land use change is not enough to describe it.
- Disaggregation of socio-economic data into a grid. This is an intermediate solution where both types of data meet in a regular grid. Land use data is also aggregated in this case, but keeping most of the spatial information given the dimensions and the regular shape of the grid. Different methodologies have been described for disaggregating socio-economic information from a certain administrative level to a grid. This approach has commonly been used for population data (Gallego, 2001¹), but also has been described for GDP. This approach is currently applied in the ESPON data base project and it is also supported by the European Forum of Geostatistics or “European Grid Club” an initiative of a group of National Statistics Institute, supported by Eurostat.

¹ Gallego F.J., Peedell S. (2001): Using CORINE Land Cover to map population density. Towards Agri-environmental indicators, Topic report 6/2001 European Environment Agency, Copenhagen, pp. 92-103.

Data management

Data will be organised in a geodatabase in order to facilitate data collection, quality check and data discovery between partners. Metadata specifications will follow those ones developed in ESPON database.

Preview towards the interim report:

- Inventory on existing land use data covering the ESPON territory together with an analysis on what land use data is available and can best be used in this research and how it can best be combined with data on administrative level
- Data collection achieved, including an overview on statistical and geographical data collected by EUROSTAT, and national Statistical Institutes etc.Task 2.1

2.2. Characterisation of Land Use in the European territory (Task 2.2)

Context:

The analysis of land use and land use change is intended to answer the following four questions:

- What are the main characteristics of ongoing changes in land use characteristics and land use patterns?
- To what extent and how are changes in land use patterns interacting with ongoing urban and socio-economic developments?
- How can typologies reflect on both levels of change, i.e. the physical characteristics of land use patterns, and the dynamics behind these changes?
- Are the trends sustainable, and to what extent will the ongoing changes compromise future developments?

Challenges:

Through the analysis a current picture of land use characteristics and changes in Europe will be presented, providing an objective view on the situation and trends of changes in the last decade: Where are the visible changes happening, by which characteristics, and at what intensity? A description of land use and land use changes will be generated at three geographic levels:

- At the European level: The general land use characteristics will be relating to a more generic typology reflecting the status and changes in land use characteristics in Europe.
- At the regional level: A more comprehensive approach where the focus will be on interactions between land use development and general socio-economic parameters, including urban areas, urban networks, Functional Urban Areas (FUAs) and Metropolitan European Growth Areas (MEGAs), but also looking into marginal areas such as mountain areas, and areas influenced by different socio-economic conditions, such as trans-boundary regions. At this level the typology need to reflect on the dynamics generated through interaction between different types of activities.
- At the local level selected case studies will look into the question of multi-functionalities and will be case study based, looking into multi-functionalities in near-urban areas (housing, production, agriculture, recreation...), mountain and coastal areas (agriculture, fisheries, tourism, nature protection..), and in situations with interacting new and old land use activities (agriculture, energy crops, wind and solar energy generation, recreation, nature protection...).

The approach to the definition of land use typologies at the above levels have common constraints, i.e. they should be simple and operational, ensuring a high explanatory power without being too complex, be built on robust and complete data, should be easy to communicate, and should be able to demonstrate their usefulness in relation to analysis of territorial development.

The reason for the three levels in the analysis is the question of being able to generate typologies that are reflecting the fact that multiple functions are becoming a question of increasing concern. While a traditional focus on land cover and land use typologies can be considered adequate in reflecting the changes at more general levels, the increasing interaction between different activities - and thereby the need of typologies reflecting multiple functionalities - has to be reflected. And it is done through the differences in approach at the three levels. And as emphasized below, the three levels of analysis generate important challenges.

Methodology:

→ In depth assessment of land use and land use changes in Europe (2.2.1)

Based on land use data, an analysis of the current land use characteristics and changes for the period 1990 -2000 – 2006 in Europe will be conducted, including: type of changes, their geographic context, number of changes, which areas are involved, and what are the main factors impacting the changes. Analysis of both administrative level (Nuts 3) and grid based data will be conducted in order to see the differences in results due to the differences in level of details.

→ Characterisation of urban sprawl (2.2.2)

Key political concerns with uncontrolled urban sprawl are all fundamentally related in the interconnected land-use - transport - environment nexus of urban development.

→ Land use and land use changes in certain regions (2.2.3)

The general analysis on land use and land use changes will be closely analysed in these areas in order to identify if some specific pattern emerge. Some of the areas that need further analysis are: Mountain areas, Transboundary areas, Rural and rural-urban fringe, Urban areas and urban sprawl

→ Definition of Land Use Functions and their links to CLC Classes (2.2.4)

The LUFs and their links with the CLC classes will be defined. Initially, the following six LUFs are proposed: living, working, mobility, energy, recreation and maintaining ecosystem functioning. The links between LUFs and CLC land cover classes will not be a 1:1 relation since different CLC classes can be linked to one LUF, just a different LUF's may apply to one CLC (multifunctionality) Furthermore these links can be defined at European or regional level. We suggest defining them at a generic level.

→ State and changes of LUF's in the European Regions (2.2.5)

Based on the LUFs definitions (i) the percentages of total area occupied per LUF will be calculated for 1990 and 2006 and (ii) the changes between these years for each NUTS2 region.

→ Definition of EU-LUPA Regional Typologies (2.2.6)

The definition of typologies will be approached at three levels:

- At the European level a more generic typology will be developed reflecting the status and changes in land use characteristics in Europe. This broad classification of regions will be based on Land cover information and demographic variables (1^a level Regional Typologies -NUTS2/3))
- At regional level a more comprehensive analysis reflecting the interactions between land use development and general socio-economic parameters, including urban areas, urban networks, Functional Urban Areas (FUAs) and Metropolitan European Growth Areas (MEGAs) will be undertaken (2^o level of Regional Typologies –NUTS2)
- At the local level selected case studies will look into the question of multi-functionalities and will be case study based.

The typologies need to be able to respond to the following requirements:

- At the European level they need to be able to encompass the whole spectrum of variations in Europe, and at the same time provide an overview of general trends in changes so that details on one or the other would not blur the analysis.

- At the regional level the typology should be coherent and at the same time provide a proper geographical basis for the identification of different Land use Functions
- And at the local level the typologies should be able to reflect the interaction between the different land use functionalities, including the question of mutually exclusive or interrelated functions.

At this point of analysis the determination of typology will be based on two types of analyses: a) A clustering exercise based on Nuts 3 data determining both the geographical and functional characteristics of possible typologies; b) a combined clustering and geographic proximity (nearest neighbour) analysis of grid data in order to see as well the geographical and functional relations between possible typologies. In addition a set of demographic and socio-economic indicators will be determined in order to see the relationship between the land use characteristics and the socio-economic and demographic parameters.

→ Identification of main driving forces for land use dynamics in Europe (2.2.7)

A starting point for the identification of drivers of land use change is a literature review. Related ESPON literature will be a core part of the review. Two foci will be applied, on one hand a general focus on use changes, and a second with specific focus on urban development. A structural analysis identifying the drivers by identifying the relationships between its variables (Godet, 1994)² will be conducted. A series of simple regression analysis will be used in identifying the potential level of relationship between the chosen drivers and the land use patterns determined in subtask 2.2.1, 2.2.2 and 2.2.4. Finally an analysis of the potential relationship between the main factors, the specific land use characteristics and the land use change will be done by means of a principal component analysis determining the elements adequately describing the major patterns of changes.

→ Verification of the proposed typologies at different geographical levels by means of case studies (2.2.8)

The question of the adequateness of the generated typologies in relation to changes in functionalities – and especially multi functionalities – will, be addressed in this task. By means of a number of case studies the determination of functionalities within specific localities more details regarding indicators of activities – number, frequency, area of influence, etc. – will be included and assigned to an adequate grid. Based on this a similar procedure as described above will be conducted, identifying which indicators and variables are coherent with the overall typologies, and which are less inclined to be reflected in the typologies. Besides cases from urban and urban fringe regions, also selected Mountain areas, Rural areas, Least Favoured Areas, and Transboundary regions will be represented. It is important in the selection of the cases that they reflect a number of new land use functions which already affect or may in the future increasingly affect the land use patterns, such as second homes, renewable energy production etc.

Preview towards the interim report:

- Proposal for reference dates to analyse land use changes
- First definitions and typologies for land use and land use change
- Draft methodology to measure land use change, land use patterns and sprawl (and compact and ribbon development)
- First overview of types of land use patterns that often occur
- Inventory on suitable methods, indicators and/or concepts used on a national level to indicate the link between territorial phenomena (such as mentioned above) and socio-economic developments that can be used in territorial research at European scale

² Michel Godet (1994): From anticipation to action: A handbook of strategic prospective. UNESCO Publications, Paris, France.

2.3. Land Use performance and efficiency evaluation (Task 2.3)

Context:

This task has two main focal points:

Firstly it will focus on the analysis of the **land use performance** in the different types of regions identified in Task 2.2.

- The generic typology based on Land cover information and demographic variables (1st level Regional Typologies- NUTS2/3))
- The comprehensive typology reflecting the interactions between land use development and general socio-economic parameters and their Land Use Functions (2nd level Regional Typologies- NUTS2)

LU performance will be evaluated regarding the socio-economic and environmental goals settled in the Lisbon Strategy and in line with the Goteborg objectives and the Cohesion Policy. Land use performance is therefore a comprehensive indicator on how patterns of land use functions are linked to the achievement or not of policy goals as measured by a set of socio-economic and environmental indicators.

Secondly, it will assess **land use efficiency** as a qualitative indicator of the land-human dynamics of a region, defined in EU LUPA as the ratio of the output (land use performance) to the input (amount of land used per function) of a region.

Consequently, the **inputs** for this task are:

- socio-economic and environmental indicators processed at grid level and NUTS2/3 level (task 2.1.)
- European typologies based on land cover, land use, land use functions, and demographic data (task 2.2.)
- Policy targets

The **Outputs** of this task are:

- Maps, tables and diagrams showing the land use performance and the land use efficiency of the typology regions;
- Report describing and analysing the results per region, considering the key drivers, and within the drivers the past and current policies relevant for the land use dynamics observed. This report will serve as input for the work on policy options and recommendations considering the Europe 2020 strategy for smart, sustainable and inclusive growth.

Challenges:

- Selection of relevant socio-economic and environmental indicators and the availability of data for at least two time steps to measure the land use efficiency.
- Define explicit efficiency goals settled but the Lisbon Strategy and in line with the Goteborg and Cohesion Policy objectives.

Methodology:

A stepwise approach structured in three sub-tasks will be followed to arrive to an assessment of the land use performance and land use efficiency of regions that provides background information to the case studies and means to define policy options.

→ EU-LUPA indicator framework for assessing Land Use Performance (2.3.1)

In close collaboration with Task 2.1 and Task 2.2, review of available and relevant indicator sets and frameworks in the ESPON space that can be linked to the goals settled by the Lisbon Strategy and the Goteborg and Cohesion Policy objectives.

On the basis of the former review, consistent criteria will be defined (protocol for indicator selection):

- considering the different spatial and temporal aspects of the land use functions dynamics;
- ensuring that both the socio-economic and environmental dimensions of land-use are covered. Existing Impact Assessment Guidelines (e.g. European Commission, 2005) will be consulted to ensure that main sustainability issues are included;
- helping to relate the policy goals to the land use performance.

Finally, a harmonised indicator framework for this task will be designed according to the protocol.

The links between the themes, sub-themes, selected indicators and the policy targets will be structured in a table similar to this one:

Theme	Sub-themes	Indicators	Policy targets
Socio-economic	Demography		
	Economic structure and performance		
	Governance		
Environmental	Biodiversity & Nature		
	Soil & Water		
	Landscape		
Land cover	Agriculture		
	Forestry		
	Built-up		

→ Development of Land Use Performance concept for assessment of the effects of land use function patterns on the socio-economic and environmental performance (2.3.2)

It will encompass:

- the definition of Land Use Performance including equations/algorithms.
- the analysis of the performance of the typology regions defined in the different types of regions identified with a double perspective: on the generic typologies based on Land use changes and dynamics and demographic conditions; on the detailed typologies based on their multi-functionality as defined by the Land Use Functions. The relations between the Land Use Function patterns and the socio-economic and environmental indicators will be assessed semi quantitatively. The indicators will provide a comprehensive perspective to help measure economic output and consider people's well-being, social disparities and environmental costs. Considering that enough indicators will be available, performance will be differentiated into social, economic and environmental.
- Finally a meta-analysis of the three sustainability dimensions will allow an integrated assessment of the land use performance in relation to the goals settled by the Lisbon Strategy and the Goteborg and Cohesion Policy objectives.

→ Assessment of Land Use Efficiency (2.3.3)

Bearing in mind the double perspective in the analysis the assessment of land use efficiency will be undertaken by means of:

- Calculation of the land use input, i.e. amount of land used per function for each region of the typology.
- Assessment of the Land use efficiency by calculating the ratio of the output (land use performance) to the land use input.
- Analysis of the results per region, considering the key drivers, and within the drivers the past and current policies relevant for the land use dynamics observed.

Preview towards the interim report:

- First analysis of the relation between land use and land use patterns and other aspects such as the economic, social and environmental performance of European regions
- Proposal on how to measure land use efficiency in relation to aspects such as population, transport, employment, GDP and other economic structures

2.4. Case studies (Task 2.4)

Context:

There is a large variety of European regions that represent the different land use management with different drivers of land use patterns. They represent variety of types (cross-border, mountain areas, highly populated, coastal, peripheral, etc.) located in different geographical space (West, East, South and North Europe). Land use has also a different regional dynamics due to social, economic and environmental development changes.

According to the EEA² the type of land use change varies among different types of regions. *“Urban areas and related infrastructure are the fastest growing land consumers, mainly at the expense of productive agricultural land. Rural landscapes are changing due to agriculture intensification, land abandonment and forest exploitation. Coastal and mountain areas are undergoing profound spatial reorganizations to accommodate intensive tourism and leisure activities.”*

The rationale behind using case studies as a one of the scientific method is to identify, conceptualise and theorise drivers and dynamic processes which are stimulated by specific land use changes on the macro and micro level. The cases shall differ in its features of e.g. endogenous potential of region (physical, human and social capital), its environmental, socio-economic and geographical assets.

Finally case studies are seen as essential elements to provide a better insight and confirm some of the main findings of task 2.2 and 2.3 taking the advantage of additional expertise with good local/regional knowledge.

The pre-selection of the case studies will be made based on the ESPON typologies with regard to represent specific and different geographical regions. The proper selection will reduce the number of case studies on the base of worked out typology and data availability.

Challenges:

- to identify and analyze social, economical, political and environmental factors and drivers of land use changes and land use dynamics in local scale in the different types of areas;
- to give answer about mechanism and trends (processes) of land use changes in micro and macro scale;
- to identify challenges in those areas and formulate policy recommendations to cope with those challenges on the basis of stakeholders opinion;
- to verify and confirm proposed typology and identified processes and challenges (comparison and adjustment of the results in task 2.2. and 2.3. in light of the empirical analysis).

Methodology:

Three consistent steps could be distinguished in this task:

→ Selection of the regions analyzed (2.4.1)

The case studies will identify and analyze different factors and drivers of land use and land cover changes. In this reason they should represent wide spectrum of regions representing various areas from socio-economic and geographical location point of view. A two steps approach will be followed in order to identify the regions for the case studies. In the first step – pre-selection - approximately 8 regions will be selected. The selection will be based on partner expert knowledge and ESPON documents (eg. ESPON projects, ESPON Atlas, ESPON previous typologies. Two main criteria for selecting the case study regions will be taken into account:

- the specific types of territories: It is intended to cover various types of regions (cross border regions, mountain areas, outermost regions, highly populated multifunctional areas),
- the geographical patterns: The pre-selected territories should represent various geographical regions (Western Europe, Mediterranean Europe, East-Central Europe, Nordic countries).

The second step - the proper selection will reduce the number of case studies to four regions on the base of two criteria:

- typologies worked out in task 2.2: The case study regions should represent various types of territories
- the access to data: It is necessary to have a look of the data available in order to have statistical basis for the in-depth evaluation.

Finally chosen regions should be of comparable size, preferably at NUTS 3.

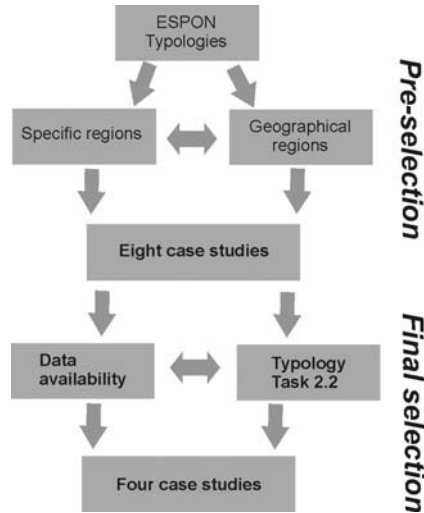


Figure 2 Model of case studies units selection

→ **Statistical survey and characterization of selected case regions (2.4.2)**

At the first step the case study area will focus on the statistical profile of each region with the identification of the main current socio-economic processes and actors with possible impact to land management and land cover change.

Secondly the changes of the land use and land cover structure and they dynamics will be characterised. In each region major effect of the land use change (deforestation, desertification, soil degradation, biodiversity changes, urban sprawl, floods etc.) and dynamics of these changes will be identified.

There will be analyzed regional development strategies and others regional and state documents according to land use policies and influences to land use changes. Other sources with influences to land use changes will be surveyed including interviews with local authorities and other important player.

→ **Identification of the drivers and dynamics of land use changes and verification of the proposed typologies (2.4.3 / 2.4.4)**

This subtask will synthesize the findings in the case study regions. One of the most important results will be detailed identification and evaluation of the drivers of land use and land cover changes. They will facilitate the answer about mechanism and trends of land use changes as well as interrelation between different functions and factors in those changes.

Finally on the basis of mentioned analysis there will be possible to validate proposed typologies and formulate chosen policy recommendations (on the basis of stakeholder's opinion).

In order to ensure the comparability of the investigated results in the selected regions a common design for all studies will be formulated. The following aspects will be take to account:

- a description for the relevant statistical data to be analysed. The statistical survey combines the statistical profile and added relevant data outlining the overall situation of the region. A questionnaire will be elaborated collecting standardised data.

- a potential stakeholders interview guide with the criteria of interviewees selection. In order to get information about the mechanism and trends of land use and land cover change and formulate recommendations, interviews with regional key player will be conducted. Criteria will be set up for the selection of them and a template for the case study report.

Preview towards the interim report:

- First analysis to detect specific land use development patterns in cross border regions and to detect significant differences between patterns in cross border regions and inland regions

2.5. Policy option and recommendations (Task 2.5)

Context:

Land use planning is a national/regional competence; however Europe has developed its own view on territorial development since land is the physical basis of most of the human activities and many European policies have a strong impact on it (e.g. CAP).

A tough focus is given to urban areas as cities are seen the potential motors for the achievement of economic and social goals settled in the Lisbon Strategy. In line with Goteborg objectives, the wise use of the territory is considered as an element of cohesion not compromising its future (sustainability and environment).

Challenges:

Nowadays, the diversity of geographic features, resource opportunities, socio-economic characteristics, land use patterns, spatial management, and so on and so forth, among and within regions and countries in the European context is more than evident.

Therefore, in order to define effective and reasonable policy options and recommendations, an extensive awareness on land use patterns on profiles at regional level in the European context is seen crucial, and it constitutes one the key milestones of the project.

To identify policy solutions, based on the evidences of the land use characterization in European regions, oriented to improve their performance and efficiency

Methodology:

→ Assessment of EU policies, policy options and strategies as key drivers for land use configuration in Europe (2.5.1)

Identification of main policy options as key drivers which have an impact on land use patterns in Europe. Results from this task will mean an input to the Identification of main drivers for land use changes within Task 2.2

A sensitiveness analysis with a qualitative perspective will be undertaken.

→ Identification of objectives for each typology and for Europe (2.5.2)

This subtask will be devoted to the identification of policy objectives for each typology at regional level and below. Validation in case studies.

→ Analysis of trade-off between policies (2.5.3)

Based on project results and literature review a qualitative assessment of trade-off between relevant policy options will be done

→ Elaboration of Guidelines and recommendations (2.5.4)

Guidelines and recommendations will be elaborated linked to each regional typology defined. These recommendations will be derived from process consultations meetings in which partners and representatives of the ESPON programme will participate. The resulting guidelines and recommendations should be disseminated to every EU region, which will constitute a high added value to the project since this will help to establish a good information network on the land use management.

A workshop will be organized (April-May 2012) to confirm and validate policy options and recommendations at regional level, as well as their feasibility from the regional and local authorities' point of view. Based on evidence of actual situation and regional typologies, the identification of the drivers that will be more relevant in the future would help in the definition of policy recommendations.

Preview towards the interim report:

- Inventory on existing policy relevant typologies for land use together with an analysis on what policy relevant typologies can be usefully combined with ESPON data
- First indications on the conclusions and policy relevant options that could be the outcome of the project.

2.6. Hypothesis for further investigation

A main hypothesis of our approach is that the interactions between human activities and land use functions are well reflected on land use and land cover patterns. Moreover, the analysis of the land use provides the necessary link to understand the corresponding impact and existing natural constrains.

Land use patterns have also a scale dimension. Consequently certain process will only be detected in the case studies, while at European scale will be identified as emerging patterns. This may be the case of certain type of urban sprawl occurring in small patches.

In that sense land use change becomes a function of economic growth and spatial localization.

The future in the European territory brings an increase in land use conflicts (mostly in the town's surroundings).

As space is a limited resource, different economic actors compete to obtain the possibly largest area for their needs. A conflict generally occurs when the system is out of equilibrium and a collision of functions takes place.

We will observe permanent changing of land use structure connected with transformation of policy paradigm.

3. Analysis of the relevant information and data availability

3.1. Analysis of relevant information

The research team is undertaken an extensive literature review with regard to the topic of the EU-LUPA project. Two different kind of literature is being revised: the institutional or scientific reports produced for the political bodies; and scientific literature.

Institutional literature is being studied in order to: a) better understand the policy context with regard to land use in Europe and to identify potential policy driving forces that motivate land use changes and dynamics b) determine the variables that will allow us to assess territorial performance; c) elaborate policy recommendations at EU level. Among others the key reports that are being taken into consideration are: "European Spatial Development Strategy" (1999), "Territorial Agenda of the European Union" (2007), Action programme for the implementation of the Territorial Agenda of the European Union" (2007), "Green Paper on Territorial Cohesion" (2008), "EU Strategy for Sustainable Development" (Review 2009), "Conclusions of the 5^o Cohesion report" (2010).

Assessment reports on the impacts of relevant sectors policies are being also consulted such as the Sixth Environment Action Programme of the European Community 2002-2012; Environment Thematic Strategies and Environmental data from the European Environment Agency. Results from previous research projects will be also considered.

Annex III includes the key scientific bibliography with regard to the topic addressed by EU-LUPA project.

With regard to the data sources to be consulted for the project development, two main sources will be addressed: Spatial data sources mainly linked to Land Cover (Corine, Urban Atlas, High resolution soil sealing) and statistical data mainly Eurostat, and national or regional statistical offices. The analysis of relevant data sources both statistical and spatial to be used in the project is being included in Annex IV.

Existing ESPON database and ESPON indicators are going to be used. A review of the ESPON projects from which results are expected is being included in Annex V of this report.

3.2. Data availability

Overview on data collection

In order to understand the process of land use, land use changes and patterns, its drivers and related impacts it is required a multidisciplinary approach. Two groups of data sets could be distinguished:

- Data related to physical environment. This type of data is usually provided as continuous geospatial data and available at different scales. By its nature it is possible to interlink data at different scales by means of standard GIS methodologies.
- Socio-economic data. Since this information is provided by statistical offices in most of the cases it is provided on the basis of administrative units.

The EU-LUPA project will collect and harmonise all the needed data for the project development considering the following dimensions:

- Spatial dimension: Europe, National, Regional (NUTS 2/3), Local for the case studies
- Temporal dimension. The temporal dimension will range from 1990 up to 2006 given the existing information at European level.
- Thematic scope: Environmental data (e.g. protected areas, air pollution, water quality); Transport-mobility; Energy; Social data (e.g. demography, education); Economic data (e.g. GDP).

Data sources

CORINE Land Cover is the main data source for land cover since this is the only one that provides a European wide coverage through time. Indeed this is the only existing information harmonised at European level on land cover. The classification agreed between all the European countries is a mixture between land cover (e.g. forest and water) and land use (agriculture and artificial classes). The three time shots currently available (1990, 2000 and 2006) makes CORINE a reference source when dealing with land use and land use change in Europe. However, CORINE Land Cover has its own limitations (resolution, minimum change detection to name the more relevant ones), so it will be important either to identify additional sources when possible and to define the uncertainties associated with the results. The table 1 shows the geographic coverage for the different time shots of CLC

In addition the following layers, derived from CLC which will be integrated:

- Dominant Land Cover Type. This layer enhances the dominant land use type considering the land at a given point and in a 5 km radius. This approach allows identifying where are dominances of certain uses and where are mixes considering not only a particular point, but also the context.
- CORILIS. It is a methodology developed for land cover data generalization and analysis. The purpose of CORILIS is to calculate "intensities" or "potentials" of a given land cover class in each point of a territory.

	EU 27	Western Balkans	Iceland	Norway	Turkey
CLC 90	All -UK	All -Albania, Bosnia and Hercegovina	No	Yes	No
CLC 2000	All	All	No	Yes	Yes
CLC 2006	All -UK and Greece	All	Yes	Yes	Yes

Table 1 Geographic coverage for the different time shots of CLC

Note: Western Balkans includes Albania, Bosnia and Herzegovina, Croatia, Macedonia, the former Yugoslavian Republic of Montenegro, and Serbia.

- High Resolution Soil sealing layer. This layer has been developed in parallel with the CLC and provides the percentage of impervious surface in Europe. This information is relevant to characterise the urban areas. It is only available for year 2006.
Coverage: EU 27, Western Balkans, Turkey, Iceland.
- Urban Atlas. This is a high resolution land cover for the cities included in Urban Audit. Because there is no time change for this data it will be used to assess the error associated with CLC for urban areas and to better characterise the cities and agglomerations.
- LUCAS. LUCAS is point data on land use in Europe. The information derived from this survey is truly land use since multiple uses are recorded per point if this is the case. It will be used as complementary information, mainly for agricultural areas which was the focus of the first survey (2001, 2003).
- Environmental information: Natura 2000 sites; Air pollution. Air pollution is provided by AirBase and it has a European wide coverage (EU 27, Western Balkans, Norway, Iceland and Switzerland).
- Socio-economic data.
 - Local level. Urban Audit will provide the required socio-economic information for urban areas which are close to the local scale.
 - Regional level (NUTS 2/3) and European level
 - Population and other socio-economic information will be compiled from Eurostat and ESPON database
 - Administrative units (NUTS)
 - Agricultural census
 - Accessibility

Data situation in candidate countries

The research team has assessed the data situation in the EU with regard to the project topic.

Candidates Countries (CC) are the Western Balkans countries -Albania, Bosnia and Herzegovina, Croatia, FYROM, Serbia, Montenegro and Kosovo- and Turkey. According to the overall enlargement strategy, a gradual and carefully managed enlargement policy is in the interest of the EU. Future enlargements will concern the countries of south-eastern Europe. These countries are at various stages on their road towards the EU. Croatia and Turkey are candidates' countries. They started accession negotiations on 3 October 2005. In December 2005, the European Council granted the former Yugoslav Republic of Macedonia the status of a candidate country; accession negotiations have not started. All the other Western Balkan countries are potential candidates: Albania, Bosnia and Herzegovina, Montenegro, Serbia as well as Kosovo under UN Security Council Resolution 1244/99. The EU has repeatedly reaffirmed at the highest level its commitment for the European perspective of the Western Balkans, provided they fulfil the accession criteria. Iceland recently submitted an application for membership on 23 July 2009.

Since the situation in the CC varies considerably from country to country, it was necessary to make an in depth assessment per country using primarily data provided by the Statistical Offices of the CC as well as data from a wide range of other sources: Eurostat, ESPON 2006 projects and other ESPON projects under development, ESTIA-SPOSE project and other relevant projects within INTERREG program, Urban Audit, etc – see Annex I Section II Data sources.

Per country analysis

Albania is divided into 12 prefectures, 37 districts (similar to NUTS3) and 351 municipalities (LAU).

Bosnia and Herzegovina is divided into three entities: Federation of Bosnia and Herzegovina (FBiH), Republic of Srpska (RS), and Brčko District. FBiH is divided in 10 cantons (similar to NUTS3) and 79 municipalities (LAU); RS has 62 municipalities (LAU). There are 9 urban regions with more than 50.000 inhabitants.

FYROM is divided in 8 NUTS3 units and 85 municipalities (LAU). Necessary basic data are provided by the 2002 census at municipality level

Serbia is divided into two parts: Central Serbia and Vojvodina and further into 25 districts (similar to NUTS3) and 157 municipalities (LAU).

Montenegro is divided into 21 municipalities.

On the basis of the availability of the data required to carry out the research, we have determined the geographical coverage that should be considered in EU-LUPA project.

Integration of different type of data

This problem usually arises when combining statistical data (e.g. population), provided at administrative level, with land use data which is continuous information in space. One option is simply aggregating the continuous data at the same administrative level as the statistical data and, then, performing any analysis or deriving the desired indicator. Any aggregation of information has as a drawback the loss of information on where the processes are occurring and the patterns (e.g. patchy vs. concentrated in specific areas).

An alternative is to find an intermediate aggregation level which is independent from any reporting unit (administrative or natural –e.g. biogeographic regions). This is possible by using a regular grid where the information is integrated at grid cell. For that it is required to disaggregate the statistical (discrete) data to a higher level of resolution. In the case of population data this methodology has already been applied at European scale in a grid system of 1 km² (INSPIRE reference grid). Land cover data is also aggregated into this grid, losing some information –but less than in the previous case.

Once the data is organised into the grid level, the analysis can be done at that level, mainly looking for correlations or dynamics between different parameters. Later on the data can be grouped to any reporting unit required (e.g. river basin, NUTS 2/3, biogeographic regions).

Integration of data at different scales

The same grid approach can be used to compare data from different scales. A hierarchical structure of grids could be developed. In that case it will be mainly addressed by CLC and Urban Atlas (higher resolution). Finally it is possible to identify the degree of error and uncertainty associated to CLC compared with higher resolution information coming from Urban Atlas –which is specific for European cities.

Two approaches are possible to overcome this problem:

- Aggregation of data at administrative unit. Land use data is aggregated to the same level of socio-economic data. This is the most common approach taken so far. The problem is that when spatial information is aggregated some process or patterns may be lost or confounded. For example when analysing urban sprawl it is crucial to identify how the urban fabric is extending, in which direction and intensity. If these elements are not analysed before the aggregation and synthesized in some indicators, statistical information on land use change is not enough to describe it.
- Disaggregation of socio-economic data into a grid. This is an intermediate solution where both types of data meet in a regular grid. Land use data is also aggregated in this case, but keeping most of the spatial information given the dimensions and the regular shape of the grid. Different methodologies have been described for disaggregating socio-economic information from a certain administrative level to a grid. This approach has commonly been used for population data (Gallego, 2001³), but also has been described for GDP. This approach is currently applied in the ESPON data base project and it is also supported by the European Forum of Geostatistics or “European Grid Club” an initiative of a group of National Statistics Institute, supported by Eurostat.

³ Gallego F.J., Peedell S. (2001): Using CORINE Land Cover to map population density. Towards Agri-environmental indicators, Topic report 6/2001 European Environment Agency, Copenhagen, pp. 92-103.

Data management

Data will be organised in a geodatabase in order to facilitate data collection, quality check and data discovery between partners. Metadata specifications will follow those ones developed in ESPON database.

4. Overview of the plan, expected deliverables and outputs envisaged by the project

4.1. Work plan

The project will be developed through three work packages (WP). Work package 1 is focused on coordination; work package 2 is dedicated to the research activities that will be carried out to reach the project's objectives, and work package 3, will centre on the dissemination of the project's results.

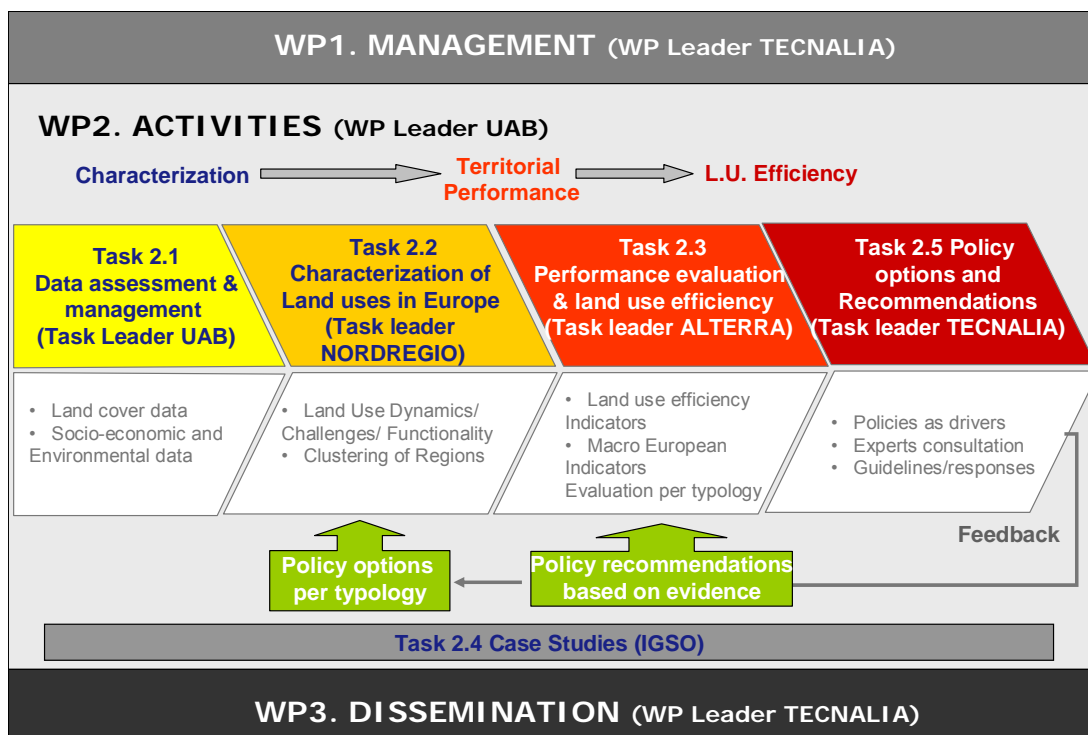


Figure 3 EU-LUPA Project Structure

The WP and tasks that will be carried out throughout the project are the following:

WP1: Coordination as explained in Coordination and Governance Structure. This work package will be led by **TECNALIA**.

WP2: Research Activities. Work package 2 consists of the main operational work needed to reach project's objectives. **UAB** will be this work package leader. The research activities contained in this work package will be divided into the following tasks:

Task 2.1. Data Assessment and Management

Responsible: UAB (PP2)

Participants: ALTERRA (PP3) & IGSO (PP5)

Task 2.2 Characterisation of land use in Europe: dynamics and typologies

Responsible: NORDREGIO (PP4)

Participants: TECNALIA (LP), UAB (PP2), ALTERRA (PP3) & IGSO (PP5)

Task 2.3. Land Use Performance and Efficiency

Responsible: ALTERRA (PP3)

Participants: TECNALIA (LP), UAB (PP2), NORDREGIO (PP4), IGSO (PP5)

Task 2.4. Case Studies

Responsible: IGSO (PP5)

Participants: TECNALIA (LP), UAB (PP2), ALTERRA (PP3), NORDREGIO (PP4)

Task 2.5. Policy Recommendations

Responsible: TECNALIA (LP)

Participants: UAB (PP2), ALTERRA (PP3), NORDREGIO (PP4), IGSO (PP5)

WP3: Dissemination: WP3 has as main objective to disseminate project's results to regional authorities, ESPON partners and Coordination Unit and general public. The responsible of this task is the Lead Partner- **TECNALIA**.

Project workshops: Validation of project advances and results at European level is expected throughout the assessment review of project reports by the ESPON Monitoring Committee and by mean of an ESPON thematic workshop to be held in Brussels in April-May 2011 (to be confirmed). However for validation at regional and local level, consultation to end-users and experts, two project workshops will be organized during the project development:

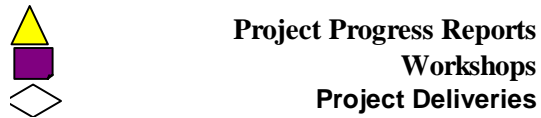
- On one hand a first workshop is planned with regional end-users around February-March 2012, once the land use characterisation and functionality assessment tasks have finished in order to validate the clustering exercise and regional typologies and preliminary results obtained and to obtain their inputs and thoughts for case studies development. The place in which the workshop will be held still to be defined.
- On the other hand a second workshop will be organized in April-May 2012 to confirm and validate policy options and recommendations at regional level, as well as their feasibility from the regional and local authorities' point of view. The workshop will be held in Bilbao in TECNALIA headquarters.

	Start date	End date	Duration
WP1. Coordination	<i>July 2010</i>	<i>July 2013</i>	<i>36 months</i>
WP2. Activities	<i>July 2010</i>	<i>October 2012</i>	<i>27 months</i>
Task 2.1 Data assessment & management	<i>July 2010</i>	<i>May 2011</i>	<i>11 months</i>
Task 2.2. Characterisation of land use in Europe: dynamics and typologies	<i>January 2011</i>	<i>October 2011</i>	<i>10 months</i>
Task 2.3 Land use performance & efficiency	<i>April 2011</i>	<i>February 2012</i>	<i>11 months</i>
Task 2.4 Case studies	<i>January 2011</i>	<i>May 2012</i>	<i>17 months</i>
Task 2.5 Policy recommendations	<i>April 2011</i>	<i>September 2012</i>	<i>18 months</i>
WP3. Dissemination	<i>August 2010</i>	<i>April 2013</i>	<i>33 months</i>

Table 2 EU-LUPA Project time plan

Table 3 EU-LUPA Project Chronogram

	2010			2011			2012			2013																				
	Second half			First half			Second half			First half			Second half																	
	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
WP1. Coordination	[Grey shaded area]																													
WP2. Activities	[Blue shaded area]																													
<i>Task 2.1 Data assessment & management</i>	[Pink bar from month 7 to 12, 2010]																													
<i>Task 2.2 Characterisation</i>	[Green bar from month 1, 2011 to month 6, 2011]																													
<i>Task 2.3 Land use performance & efficiency</i>	[Red bar from month 4, 2011 to month 6, 2012]																													
<i>Task 2.4 Case studies</i>	[Yellow bar from month 1, 2011 to month 6, 2012]																													
<i>Task 2.5 Policy recommendations</i>	[Cyan bar from month 4, 2011 to month 6, 2012]																													
WP3. Dissemination	[Grey shaded area]																													



4.2. Expected deliverables and main outputs of the project

The central expected project results of the project are:

- A **Geodatabase** of land use information in EU
- The **characterization of land use** in EU : In depth assessment of land use dynamics and identification of main Land Use Functions
- The definition of **Regional Typologies** in Europe based on land use dynamics as a result of a clustering exercise and production of maps with European coverage.
- The assessment of territorial **Performance** and related land use **Efficiency**
- The elaboration of guidelines for **Policy Recommendations** of spatial development based on land use patterns in Europe in view of regional specificities

The table in next page shows an overview of the project expected results by task (within work package 2 Activities) and by report.

All along the project development dissemination of project results by the TPG in the framework of international conferences and seminars, e.g. transnational activities of the ECP, will be undertaken but particularly from the **5 October 2012 to 5 April 2013**. Network, events organised by the CU. These activities need to be reflected in the budget proposed by the TPG for the implementation of the project. The ESPON 2013 Programme foresees in Priority 4 also capitalisation of project results including events, printed reports, website facility, etc. The Programme includes, in other words, substantial dissemination activities at Programme level which all projects should make use of and support. This means that the project's dissemination activities shall ensure consistency and avoid overlaps with and repetition of respective activities organised at Programme level. The project team shall refer to the objectives of Priority 4 of the ESPON 2013 Programme "Capitalisation, ownership and participation: Capacity building, dialogue and networking" when considering dissemination activities and closely coordinate these with the ESPON.

Table 4 Expected outputs of EU-LUPA by task and by report

Tasks within WP2 Activities	Inception report 3 rd December 2010	Interim report 3 rd June 2011	Final report 5 th October 2012 1 st June 2012 (Draft Final Report)
Task 2.1 Data assessment & management	<p>Identification of main data sources</p> <p>Assessment of the data situation in the EU candidate countries</p> <p>Geographical coverage of the research</p> <p>Literature review and assessment of the relation of the project with other ESPON projects</p>	<p>Inventory on existing land use data covering the ESPON territory together with an analysis on what land use data is available and can best be used in this research and how it can best be combined with data on administrative level</p> <p>Data collection achieved, including an overview on statistical and geographical data collected by EUROSTAT, and national Statistical Institutes etc</p> <p>Draft European maps</p>	<p>Geodatabase</p> <p>Literature, definitions and methodology theory used</p> <p>Data collected and indicators used, including calculation algorithms and tables with the exact values of indicators</p> <p>Maps produced in support of the results, covering the territory of EU 27, Iceland, Liechtenstein, Norway and Switzerland.</p> <p>Future research avenues to consider, including further data requirements and ideas of territorial indicators, concepts and typologies as well as on further developments linked to the database and mapping facilities</p>
Task 2.2 Characterisation of land use in Europe: dynamics and typologies	<p>Methodological approach</p> <p>Interlinkages with other tasks</p> <p>Identification of main data needed</p>	<p>Proposal for reference dates to analyse land use changes</p> <p>Inventory on existing policy relevant typologies for land use together with an analysis on what policy relevant typologies can be usefully combined with ESPON data</p> <p>First definitions and typologies for land use, sprawl (and compact and ribbon development), open space and land use change</p> <p>Draft methodology to measure land use change, land use patterns and sprawl (and compact and ribbon development)</p> <p>First overview of types of land use patterns that often occur</p> <p>Proposal for a useful indicator for sprawl (and compact and ribbon development)</p> <p>Inventory on suitable methods, indicators and/or concepts used on a national level to indicate the</p>	<p>Characterization of land use in EU : In depth assessment of land use dynamics</p> <p>Definition of Regional typologies in Europe based on land use dynamics as a result of a clustering exercise and production of maps with European coverage</p> <p>Methodologies, typologies and concepts developed and used</p>

Tasks within WP2 Activities	Inception report 3 rd December 2010	Interim report 3 rd June 2011	Final report 5 th October 2012 1 st June 2012 (Draft Final Report)
		<p>link between territorial phenomena (such as mentioned above) and socio-economic developments that can be used in territorial research at European scale</p> <p>First overview of the impacts of urban areas at a certain distance of open space (and natural areas) considering the quality of natural areas, the touristic, recreational possibilities and urban expansion possibilities</p> <p>Draft methodology to measure the impacts mentioned above and a first overview of where the areas with potentials and risks are situated</p>	
Task 2.3. Land Use Performance and Efficiency	<p>Methodological approach</p> <p>Interlinkages with other tasks</p> <p>Identification of main data needed</p>	<p>First analysis of the relation between land use and land use patterns and other aspects such as the economic, social and environmental performance of European regions</p> <p>Proposal on how to measure land use efficiency in relation to aspects such as population, transport, employment, GDP and other economic structures</p>	<p>Assessment of European territorial performance and related land use efficiency</p> <p>Methodologies and concepts developed and used.</p>
Task 2.4. Case Studies	<p>Methodological approach</p> <p>Interlinkages with other tasks</p> <p>Potential case studies</p> <p>Identification of project results targeted groups</p>	<p>First analysis to detect specific land use development patterns in cross border regions and to detect significant differences between patterns in cross border regions and inland regions</p>	<p>Identify and analyze factors and drivers</p> <p>Give answer about mechanism and trends (processes) of land use changes in micro and macro scale;</p> <p>Verify and confirm proposed typology processes and challenges</p>
Task 2.5. Policy Recommendations	<p>Outline of the strategy for the elaboration of policy recommendations</p> <p>Identification of key policy reports</p>	<p>First indications on the conclusions and policy relevant options that could be the outcome of the project</p>	<p>Guidelines for Policy Recommendations for spatial development based on land use patterns in Europe in view of regional specificities</p>

5. Structure of the budget

		WP1 Coordination	WP2. Activities	WP3 Dissemination	TOTAL
LP TECNALIA	Staff	63128	94972	15252	173352
	Administration	4419	6648	1068	12135
	Travelling	7000	3000	2000	12000
	Equipment				
	External expertise	12200	2000	3000	17200
	Total	86747	106620	21320	214687
PP2 UAB	Staff	34640	111280	6600	152520
	Administration	5400	15200	1000	21600
	Travelling	7000	2000	2000	11000
	Equipment				
	External expertise	7200			7200
	Total	54240	128480	9600	192320
PP3 ALTERRA	Staff	5852	105336	2156	113344
	Administration	1170	21067	431	22668
	Travelling	3500	3750	1500	8750
	Equipment				
	External expertise	7200			7200
	Total	17722	130153	4087	151962
PP4 NORDREGIO	Staff	4320	101520	2500	108340
	Administration	864	20304	500	21668
	Travelling	3000	4500	1500	9000
	Equipment				
	External expertise				
	Total	8184	126324	4500	139008
PP5 IGSO	Staff	2000	61408	2000	65408
	Administration	500	12282	500	13282
	Travelling	3500	5000	1500	10000
	Equipment				
	External expertise		2000		2000
	Total	6000	80690	4000	90690
TOTAL		172893	572267	43508	788668

Table 5 Distribution of work packages among partners, the break down of the project's budget on the individual partners per budget line

6. Barriers for project implementation

Lacking data for Land Use Characterisation

One of the main difficulties for project implementation will be the availability of the data needed and its adequateness for the purpose of the project. This constrain will particularly affect some themes such as climate change, accessibility, among others.

The analysis of how climate change may affect land use will be carried out provisionally, to be updated at a later time, once results from ESPON project on climate change are available. For the time being, EU-LUPA will use as basic reference document the EEA Report 4/2008 Impacts of Europe's changing climate – 2008 indicator-based assessment⁴.

Lack of comparable data for case studies

The possible risk is the lack of comparable detailed statistical data for case study regions mostly in validation of processes and dynamic of land use changes. The alternative solution will be qualitative data, results of interviews of key players and local expert knowledge.

There is potential risk of not coherent definition in regional document and different understanding by local key players the structural elements of land use and land cover.

Definition of EU-LUPA Regional Typologies

In the generation of proper typologies, several challenges appear: In relation to data, the two first levels - the national and the regional - will be depending on relevant data based on both administrative units (NUTS 3) and grid based data. At the local level the focus will be on the relevant administrative level defined by the case, and will include data from as well gridded, administrative level, and field work collected data.

As input to the identification of typologies are contributions from other tasks: Feasibility and Input in relation to available data (Task 2.1) and policies (Task 2.5), but also interaction on issues regarding the relevance of typologies in relation to the evaluation of performance and functions (Task 2.3), as well as results of case studies (Task 2.4) testing the possibility of turning the generated typologies into practical use.

Functionality Assessment and data availability

Task 2.3 is ambitious in attempting to tackle a wide range of land use functions and socio-economic and environmental indicators. A plausible risk is the lack of consistent data for the two time steps (1990 and 2006) for all the ESPON space. This may hamper the analysis. However, the combined knowledge and experience of the consortium partners ensures that the project has a high chance of success. The leading Task 2.2 partner has extensive experience within previous European Commission, ESPON, EEA and JRC projects (in many cases as Coordinators) and will be able to draw on this experience in undertaking the task. Furthermore, the partners have detailed knowledge of the vast majority of suitable available data sources as well as developments in other, on-going research projects.

The development of innovative ideas and methodologies can never be entirely without risk. Further, the complexity of the project implies that risks cannot be excluded. For example, the input from Task 2.1 and Task 2.2 is essential to the work in Task 2.3, and failure of delivery of results will directly affect the work progress in this task. Thus the overall success of Task 2.3 depends highly on the mutual exchange of information between Tasks 2.1, 2.2. and 2.3. This exchange will be closely monitored by the LP and the PC in terms of frequent reviews of progress towards the defined deliverables. The work plan also includes frequent interactions through physical meetings, conference calls and electronic communication to identify emerging problems and address them immediately.

⁴ European Environmental Agency, JRC European Commission and World Health Organisation (2008): *Impacts of Europe's changing climate- 2008 indicator-based assessment*. Luxembourg: Office for Official Publications of the European Communities. http://reports.eea.europa.eu/eea_report_2008_4/en

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The ESPON 2013 Programme is part-financed by the European Regional Development Fund, the EU Member States and the Partner States Iceland, Liechtenstein, Norway and Switzerland. It shall support policy development in relation to the aim of territorial cohesion and a harmonious development of the European territory.

ISBN