



D10.2 Audit and use of long-term social and economic data in LTSE Platforms

Frans J. Sijtsma, Carmelina Prete, Per Angelstam, Daniel Orenstein, Jan Dick, Michael Manton

Lead partner for deliverable: UOG

Other partners involved: SLU, EAA, BGU, NERC, CNRS, CNR, MIPANERC, UHEL, SGN, LUBI-IBUL, FFCUL, ILE-SES, CSIC and VMU.

H2020-funded project, GA: 654359, INFRAIA call 2014-2015

Start date of project: 01 June 2015

Duration: 48 months

Version of this document: 2

Submission date: May 31 2018

Dissemination level

PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	
CI	Classified, as referred to in Commission Decision 2001/844/EC	

Version control	Edited by	Date of revision
Created – Version1	Frans J. Sijtsma	December 2017
Internal review	Per Angelstam, Daniel Orenstein, Jan Dick	April 2018
Version 2	Frans J. Sijtsma	May 2018
Feedback	Rejected because of unclear summary and structure	October 2018
Version 3	Frans J. Sijtsma	January 2019
	Comments from WP members	
Version 4		May 2019
Signed off – co-ordinator		

Publishable Executive Summary

This report focuses on identifying LTSER Platforms' access to data for analyses using indicators of environmental economic, social and cultural sustainability. It is thus targeted towards the socio-economic part of LTSER platforms. What options are available for the network to perform analysis that include socio-economics and ecological research and research support.

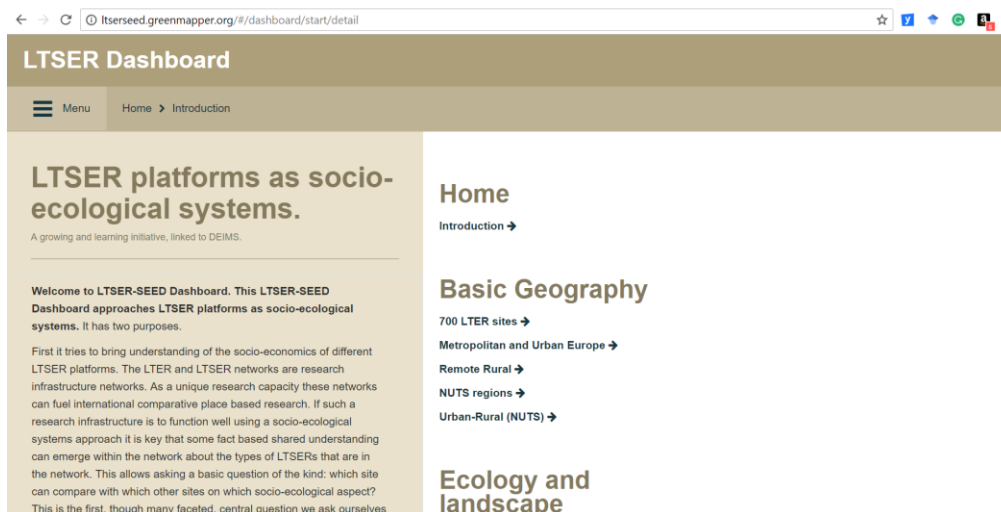
In this report we delivered task 10.2 (in close cooperation with 10.1 and 10.3). To be more precise we deliver three sub-task of task 10.2 1) the 'Analyses of long-term regional-level key indicators of human well-being', 2) 'Involvement of these LTSER platforms in use of an established method for monitoring cultural ecosystem service delivery', sub-task 3) i.e. the 'Mapping and analyses of governance structures and systems for spatial planning' and the added sub-task of 'providing a learning and supporting online environment with key socio-economic data related to the LTSER platforms'.

To this aim in the introductory Chapter 1 we briefly discuss socio-ecological systems, landscapes and regions and explain the structure of the report. Chapter 2 addresses the rationale for joining socio-economic and ecological data and presents key findings from the suite of surveys among 67 LTSER platforms and found that the LTSER platform network is alive and responds to – research – questions. Over 60% of LTSER platforms responded to one of four different requests for information. However, more complex questions reduce the time of response and the response rate strongly. We found that representatives from 21 LTSER platforms out of 67 responded to a question to ascertain a polygon for their LTSE platform. A similar number had resources to becoming involved in use of a method for monitoring cultural ecosystem service delivery (hotspotmonitor/greenmapper). In addition four LTSE platform managers started translation of the greenmapper software; none finished thus far. The latter especially is a very modest result in terms of the capacity of the network to organize unfunded data gathering; and also a modest result in enhancing LTSE platforms capacity for problem solving research in socio-ecological systems. The reason for this however seems to be quite obvious: it is lack of time and funding. We found in the survey that the focus of LTSE platforms in terms of personnel funding for research expertise is mostly on ecological expertise, and limitedly on socio-economics.

In Chapter 3 we presented five tell-tale stories from different LTSE platforms across Europe. Those tell-tale stories, for a selected set of LTSE-platforms in Sweden, UK and Netherlands, showed analyses of longer-term regional-level key indicators of human well-being (i.e. economy, employment, demography, public health and social capital), along with mapping and analyses of governance structures and systems for spatial planning using administrative units with the finest resolution of governance (usually municipalities) and regions. From this we clearly saw the 'land of opportunity' in combining socio-economics with ecology and environmental science. We found that for LTSE platforms there are many available and useful ways to perform this type of analysis. However, we also saw a wide variety of conceptual approaches and an active search to effective, governance-fuelling, information. To make an analysis of this type powerful for the network, there is currently a lack of (socio-economic) data

harmonisation and a lack of standardisation of multi-scale methods that bridge the gap between international and national data and thinking and the fine-grained local and regional or landscape level which is natural to LTSEr platforms and their constituent LTER sites.

Finally, in Chapter 4 we present a first exploration of improving socio-ecological system data availability across the LTSEr network. We created an online LSTERSEED dashboard. (<http://ltserseed.greenmapper.org>) The LTSEr-SEED contains the polygons of 43 different LTSEr platform sites and the locations of 26 others LTSEr platforms. This dashboard (see screenshot below) includes different sub-dashboards which aim to answer the following questions. Q1: Where are LTSEr and LTER areas on European and national urban-rural gradients? Q2 How do areas within and around LTSEr areas perform socio-economically? Q3 To which extent do LTSEr areas deliver cultural ecosystem services? To which extent are they appreciated landscapes? We started to compile and attribute this dashboard with relevant European wide data. This process of adding all relevant data and increasing the functionality of the dashboard needs to be finalized though-out the coming years, to make the LTSEr platform a powerful infrastructure for analysing socio-ecological systems.



Screenshot of ltserseed.greenmapper.org

Contents

Publishable Executive Summary

1. Introduction: Comparing socio-ecological systems as landscapes and regions.....	8
1.1 Targeting the original aim	8
1.2. The structure of this report.....	9
2. SES and LTSER	10
2.1 Landscapes	10
2.2 Regions	10
2.3 Surveying 67 LTSER platforms.....	11
Response and meaning	11
Socio-economic strength.....	12
Polygons and Hotspotmonitor/Greenmapper survey translation.....	13
3. Five tell-tale analyses at the municipal level – examples from Sweden, Scotland and the Netherlands	14
3.1 Tell-tale story 1: Indicators for sustainable development in 18 LTSER area municipalities (Bergslagen - Sweden).....	14
3.2 Tell-tale story 2: Modelling high ecological value and high sociocultural values at municipality level (119 municipalities Sweden)	16
3.3 Tell-tale story 3: Measuring Ecosystem Service delivery bottom-up and top-down. Case study for four clusters of (11 different) LTER sites in the United Kingdom	18
3.4 Tell-tale story 4: Population decline in a highly attractive area (The Netherlands, Germany and Denmark).....	21
3.5 Tell-tale story 5: Socio-economic valuation: employment versus cultural ecosystem services (The Netherlands).....	24
4. The learning and supporting online LTSER environment: LTSER-SEED	26
4.1 General aim and set-up	26
4.2 Questions that structure the LTSER-SEED.....	26
5. Discussion and conclusions	28
6. Literature.....	30
Appendix 1 Dashboard overview: ltserseed.greenmapper.org	32
LTSER Platforms	32
Six sub-dashboards on LTSER areas:	32
1 Showing 67 LTSER Platforms on a variety of layers	32

2 LTSER and ecology and landscape layers.....	32
3 Land use and land-use change and LTSER platforms	32
4 Nature Governance and LTSER platforms.....	32
5 Economic growth and well-being and LTSER platforms	32
6 Relating nature related human well-being to LTSER areas	32
Appendix 2 Details of the design of the dashboards.....	33
DASHBOARD 1 Basic geography: Showing and categorizing 67 LTSER Platforms on a variety of socio-economic layers	34
1-1 (a,b,c,d) A google maps layer	34
1-1 e: LTER sites.....	35
1-2 Title: Metropolitan and Urban Europe	35
1-3 Title: Remote Rural.....	35
1-4 Title: NUTS regions and LAUs	36
1-5 Urban-Rural (NUTS)	39
DASHBOARD 2 LTSER and ecology and landscape layers	41
2-1 Biogeographical regions	41
2-2 Antropogenic impact on forests	42
2-3 Ecosystem types.....	42
2-4 Landscape types.....	43
2-5 Ecological quality.....	44
2-6 Environmental quality.....	45
2-7 Elevation map	46
DASHBOARD 3 Land use and land-use change and LTSER platforms	47
3-1 Fragmentation	47
3-2 Impervousness	47
3-4 CORINE.....	47
3-5 agricultural land conversions.....	48
3-6 Expansion of artificial surfaces	48
3-7 Woodland creation	48
3-8 Estimated soil erosion by water in Europe.....	48
3-9 Loss of High Nature Value Farmland	49
3-10 Designated areas under presurre	49
3-11 Global land-cover 250 m.....	51

DASHBOARD 4: Governance	52
4-2 Spatial planning system.....	52
4-3 Natura 2000	52
4-4 Nationally designated areas	53
4-5 Forest in private ownership	53
DASHBOARD 5 Economic growth and well-being and LTSER platforms	54
5-1 Population: density and development.....	54
5-2 Projected population change due to natural development.....	54
5- 3 Life expectancy	54
5-4 Material well-being, economic growth and their development	55
5-5 A Employment rate, persons aged 20–64.....	56
5-5 B Unemployment rate, persons aged 15–74.....	56
5-5 C Change in employment rate:2006-2016	56
5-6 Education	57
Link in text to OECD regional well-being	57
DASHBOARD 6 Relating nature related human well-being to LTSER areas.....	58
6-1 Greenmapper Global level markers	59
6-2 Greenmapper National level markers	59
6-3 Greenmapper Regional level (for NUTS 3 level with a reasonable amount of markers/respondents)	59
6-4 Greenmapper local level markers (for km2 with at least 10 respondents)	59
6-5 Greenmapper location markers	59
6-6 Greenmapper fans plots Wadden (% of people from NUTS ½ in Netherlands, Germany and Denmark)	59
6-7 Greenmapper fans plots for some other area Cairngorms national park or just Scotland total	59
6-8 Greenmapper clustermaps (heatpoly; or perhaps with different clusterings).....	59
6-9 Greenmapper clustermaps plus overlay with LTSER areas	59
Appendix 3 Email text of survey round 3, sent to 67 LTSER platforms.....	60

1. Introduction: Comparing socio-ecological systems as landscapes and regions

1.1 Targeting the original aim

The aim of deliverable 10.2 as stated in the Grant Agreement is to ‘diagnose LTSER Platforms’ *access to data for analyses of the effects of green/blue infrastructures on urban and rural human well-being using indicators of environmental economic, social and cultural sustainability at multiple spatial scales.* For a selected set of LTSER Platforms with such data, which represent major European socio-ecological gradients, this task analyses human well-being and its maintenance in three stages: (1) *Analyses of long-term regional-level key indicators of human well-being (i.e. economy, employment, demography, public health and social capital).* (2) *Involvement of these LTSER platforms in use of an established method for monitoring cultural ecosystem service delivery, called the hotspot monitor (a spatially explicit web survey tool (hotspotmonitor / www.greenmapper.org)).* This serves two goals: a) testing the LTSER platforms as a research infrastructure that can organize data gathering; and b) since this type of data is essential for establishing the impact of nature on human wellbeing, but which is still missing in many sites and regions, it will enhance the LTSER platforms capacity for problem solving research in socio-ecological systems. (3) *Mapping and analyses of governance structures and systems for spatial planning. The results will be visualised for platform stakeholders using administrative units with the finest resolution of governance (usually municipalities) and regions.’*

In the process of setting up the research for task 10.2 the WP10 parties had plenary discussions with all work packages during eLTER meetings in Riga and Crete while, as a WP10 group, we also more closely concerted the research effort of 10.1, 10.2 and 10.3. Part of this concertation of WP10 efforts was the unfunded *joint surveying* of all 67 European LTSER platforms. This surveying was done in four rounds, increasing in length and effort demanded. Beyond that the discussions led to a targeted approach in task 10.2 which sustained the underlined elements (the italicized parts above) of the original aim but *added the objective of providing a learning and supporting online environment with key socio-economic data related to the LTSER platforms.* Two reasons were particularly relevant for this targeted approach. First, the felt need within the LTSER community to find a jointly shared group of relevant variables to sustain the socio-economic part of their research infrastructure. Second, an inevitable need for harmonization of data measurement.

To deliver upon the sub task 1) i.e. the ‘Analyses of long-term regional-level key indicators of human well-being’ and sub-task 3) i.e. the ‘Mapping and analyses of governance structures and systems for spatial planning’ we present key findings from the survey among 67 LTSER platforms in Chapter 2 and present five tell-tale stories from different LTSER platforms across Europe in Chapter 3. These tell-tale stories are: 1 Indicators for sustainable development in 18 LTSER area municipalities (Bergslagen - Sweden) 2 Modelling high ecological value and high sociocultural values at municipality level (119 municipalities Sweden) 3 Measuring Ecosystem Service delivery bottom-up and top-down. Case study for four clusters of (11 different) LTER sites in the United Kingdom 4 Population decline in a highly attractive area (The Netherlands, Germany and Denmark) and 5 Socio-economic valuation: employment versus cultural ecosystem services (Wadden LTSEr: The Netherlands).

To deliver upon task 2) 'Involvement of these LTSEr platforms in use of an established method for monitoring cultural ecosystem service delivery' we did three things. 1) Survey: Within the larger WP10 survey we asked for platforms willing to translate the Greenmapper survey (see chapter 2). We showed part of the power of the Greenmapper data in two tell-tale stories (in Chapter 3). 2) Data presentation in LTSEr-SEED: we presented all available spatial data from Greenmapper in the LTSEr-SEED (in Chapter 4). 3) To deliver upon the added objective of providing a learning and supporting online environment with key socio-economic data related to the LTSEr platforms we created the website [LTSEr-SEED.greenmapper.org](http://ltserseed.greenmapper.org); to be further filled with data, further developed in terms of functionality and to be integrated with the DEIMS infrastructure.

The whole of the three tasks 10.1, 10.2 and 10.3 through these slight changes better live up to the overall aim to audit and enhance the network in the socio-economic domain.

1.2. The structure of this report

In this report, Chapter 2 addresses the topic of Socio-ecological systems and LTSEr areas, and the linked topics of landscapes versus regions. This chapter ends in section 2.3 with discussing highlights from the joint survey of WP10 among the 67 European LTSEr platforms. Chapter 3 presents five tell-tale stories on the analysis of LTSEr platform areas as socio-ecological systems highlighting the use of socio-economic data in example sites/platforms. This chapter via published papers audits of the socio-economic/human wellbeing data. The tell-tale stories report the fine-grid analysis of socio-ecological developments, starting mostly at the municipality level. In Chapter 4, we discuss the set-up of the online LTSEr-SEED tool. We discuss the questions it aims to answer and the way it does. More details of the LTSEr-SEED are presented in two appendices, and of course 'live' at <http://ltserseed.greenmapper.org> . Chapter 5 discusses and concludes briefly the finding of this . Task 10.2

2. SES and LTSER

The study of socio-ecological systems (SES) has taken up momentum in recent years. There has been a progression from separately studying the ecological and social components of SES towards a more integrated knowledge base useful for addressing complex environmental challenges such as climate change, sustainable development, biodiversity loss, ecosystem management, and environmental hazards (eLTER D10.1). A social-ecological system is mostly seen as an area in physical space and we therefore look at two types of approaches to such space, the one coming from the ecological side, the other from the socio-economic side: landscapes and regions respectively.

2.1 Landscapes

Landscape is a well-established concept with biophysical, anthropogenic and immaterial interpretations (Angelstam et al. 2013). This can aid knowledge production and learning by fostering transdisciplinary approaches, thus integrating researchers from different disciplines as well as stakeholders representing different sectors at multiple levels (Termoshuizen and Opdam 2009).

The ecosystem services framework was developed with the aim to improve inclusion of natural capital into political and economic decision making across governance levels (Carpenter et al. 2009). However, fragmented policy, governance and land ownership often hinders the opportunity for multifunctional land management and necessary spatial planning. Furthermore, to support translation of policy into action, it is essential to focus both on sustainable development as an inclusive societal process and on ensuring sustainability in social-ecological systems. To complement the role of the ecosystem services approach as an advocacy tool in land use policy, governance and planning, support of implementation on the ground urgently requires skills to navigate the complexity of interactions within landscapes as social-ecological systems.

2.2 Regions

Approaching landscapes and socio-ecological systems from the socio-economic perspective brings in another concept: regions. A region is a well-established concept that can help understanding areas smaller than countries but larger than individual settlements: villages or cities (Parr, 2014). Within modern society, urbanisation and cities play a key role in human development and well-being, regions are often defined with reference to cities or metropolitan areas. Parr argues that there are three main types of regions: 1) homogeneous (or uniform) regions (e.g. regions with equal spread of population), 2) nodal regions (i.e. with a centre-periphery) and 3) programming (that is, policy-related) regions (e.g. administrative regions like German Bundesländer).

In our analysis, and in discussions around regions, we recognize the usefulness of this tripartite distinction. For instance, if one looks into regions of a shared population density or if one performs spatial clustering of regions, based on e.g. GDP per capita then homogeneous regions emerge; i.e. regions of the first kind. If we look at the concept of Functional Urban Areas developed by the OECD and used in our analysis below this is typically of the second kind. The broadly used NUTS regional division, although not completely without functional aspects in its construction, is largely of the third kind.

Spatial structure is essential to define and understand (the performance strength of) regions. Parr concludes that the city-region has emerged as a dominant spatial form, and it is common for a national space economy to comprise a set of city-regions, usually hierarchically differentiated.’(Parr, 2014, p.1936). City-regions is an important term for understanding socio-ecological systems. City-regions seems to be especially useful as the socio-economic counterpart of the landscape concept within researching socio-ecological systems. According to Rodriguez-Pose (2008, p.1027) The minimum common denominator of virtually all definitions of a city-region is the presence of a core city linked by functional ties to a hinterland (it is therefore a nodal region). The nature of those ties may vary but will generally refer to economic aspects like for instance travel-to-work or retail catchment, but aspects of identity and the social and cultural domination by the core city can also be included (Davoudi, 2003). Hall substantiates this approach ‘...the modern concept of the city region is specifically not defined in physical or morphological terms; neither are such regions based on administrative units, though administrative units must usually be used to define them. Rather, they are defined on the basis of what Manuel Castells has called the ‘Space of Flows’: flows of people, information, or goods, on a regular basis, for instance daily commuting, or weekly shopping or reading a local paper (Castells, 1989). They are thus Functional Urban Regions (FURs) (Hall, 2013, p 804).

2.3 Surveying 67 LTSER platforms

As a joint effort of WP10 we surveyed all 67 European LTSER platform. For a full discussion of the survey results, including a broader framing in the search for effective transdisciplinary place based research, see Angelstam et al.(in press). In this chapter we report from this jointly written paper.

The surveying of the 67 LTSER platforms was done in four rounds, increasing in length and effort demanded. The first very brief survey (Survey-1) aimed at identifying the individuals responsible for LTSER platform co-ordination, ecological system research and social system research in each platform. The second survey (Survey-2) focused on characterizing the construction and maintenance of an LTSER platform. The third survey (Survey-3) was designed as an on-line web tool which LTSER platforms could use to check that their GIS polygon was correct, and if needed draw or adjust its shape directly. The fourth survey (Survey-4) focused on evaluating the extent to which and how LTSER platforms work with green infrastructure as a key transdisciplinary topic to address the supply and provision of ecosystem services in the LTSER platform areas as social–ecological systems.

Response and meaning

We show the response to the surveys in different rounds. Figure 2-1 shows the extent to which the 67 platforms responded. The first and most simple survey was answered by nearly 30 platforms within the requested 10 days. Only a few of the 67 platform managers answered the more time consuming 4th survey within that time. Of the 14 that answered eventually some took nearly 100 days. All in all, from the 67 entries denoted as “platforms” in Europe and Israel we received answers to Surveys 1–4 from 28, 29, 21 and 14 respondents respectively. In total, 43 LTSER platforms out of 67, i.e. 64%, responded to at least one of the four surveys. It is

important to notice that this unfunded surveying in itself, apart from the specific content of the surveys, is an indicator of the power of the network as a research network.

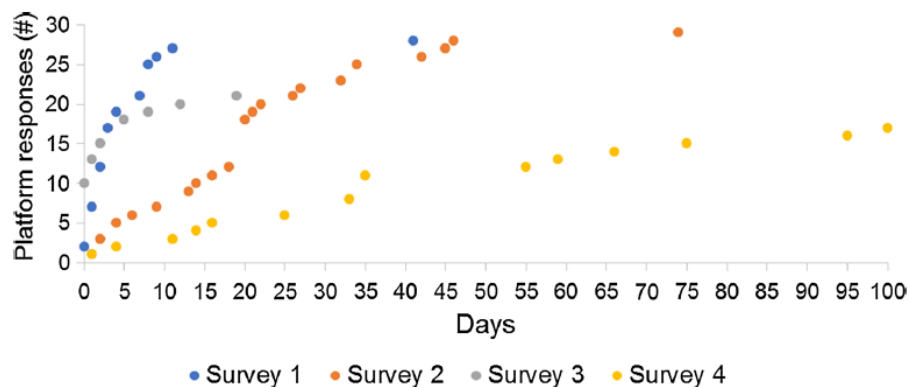


Figure 2-1 LTSER platforms' response time in days after distribution of the four surveys (of increasing complexity/time demands). The requested response time was 10 days.

Socio-economic strength

Below we present a key finding from the survey as to the ability of LTSER platforms to analyse socio-economic in conjunction with ecological data. A first prerequisite for access to data for analyses of human well-being using indicators of environmental economic, social and cultural sustainability is the capacity in terms of personnel and funding to gather data and perform such analysis. Figure 2-3 shows the results. LTSER platforms most often have 1-2 or 3-5 full time positions available (fig 2-3 A). As for the funding, only a small share, the bar second from the right in figure 2-3B is specifically devoted to socio-economic research salaries.

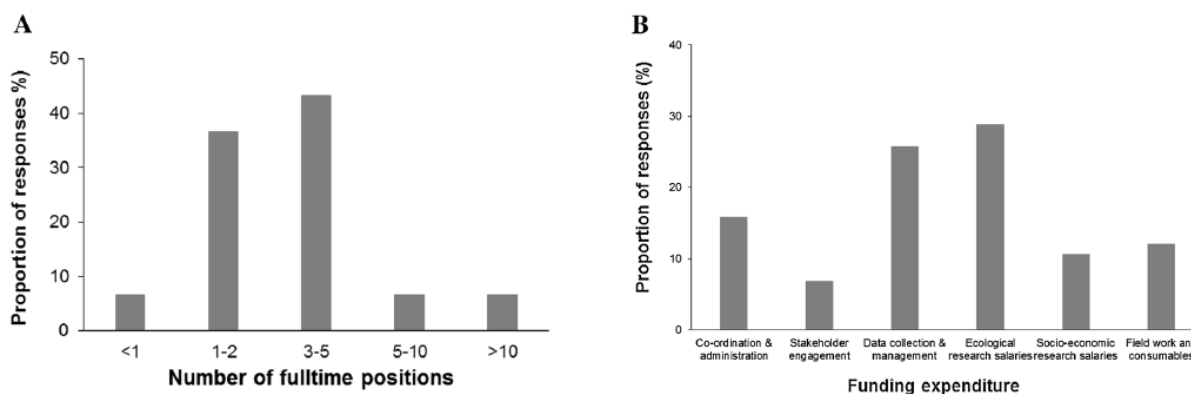


Figure 2-3 A: Number of full-time working positions (40 h/week/year-round) reported as a minimum to maintain a LTSER platform's basic functions in terms of co-ordination, stakeholder engagement, infrastructure and ecosystem and social system research (S2: Q5). B: LTSER platforms' estimation of how funding is spent for maintenance of these basic functions (S2:Q8).

Polygons and Hotspotmonitor/Greenmapper survey translation

We focus now on survey 3. For the full text of the email that was sent to the LTSER platforms see appendix 3. The first part was an online map-based survey which had as its main purpose to assure a correct polygon of the LTSER platforms. The survey can be found at <http://ltser.greenmapper.org>. (see screenshot below in figure 2-4) As to the first purpose, polygons or point locations were shown of the LTSER areas. Respondents could confirm the available shape of their area or they could draw a new area. Of the 67 requests to respond, 21 LTSER platforms ultimately confirmed a correct polygon.

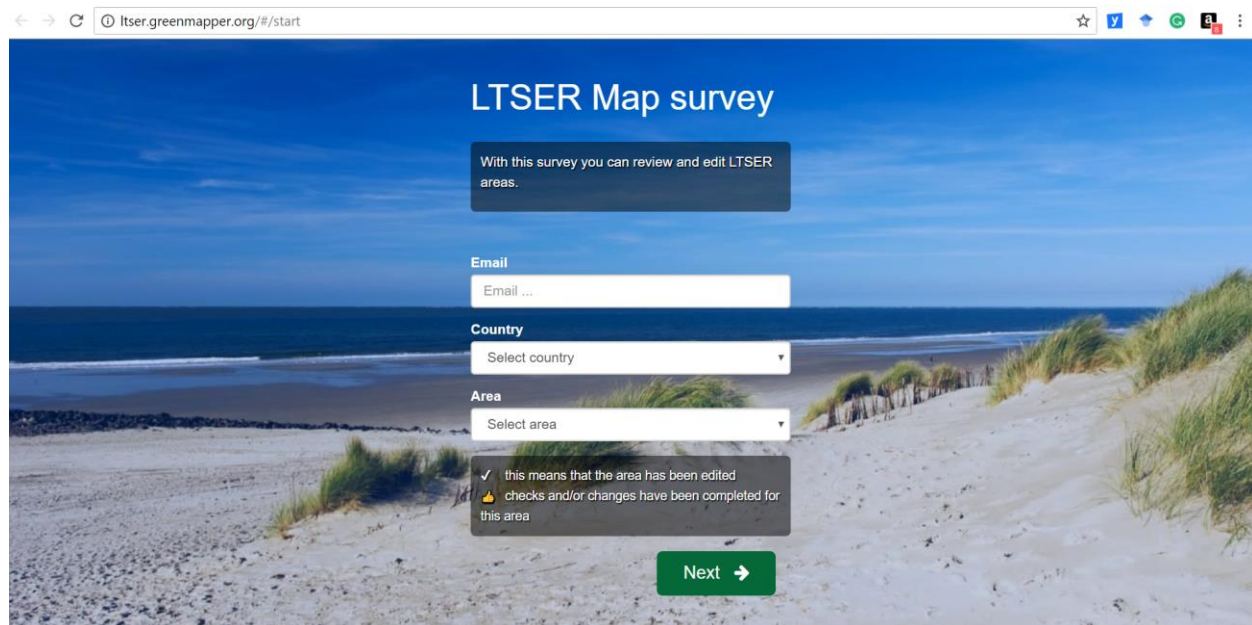
The screenshot shows a web browser window with the URL 'ltser.greenmapper.org/#/start'. The page has a background image of a sandy beach with dunes and the ocean. The title 'LTSER Map survey' is at the top. Below it, a dark box contains the text: 'With this survey you can review and edit LTSER areas.' The form includes three input fields: 'Email' with a placeholder 'Email ...', 'Country' with a dropdown menu showing 'Select country', and 'Area' with a dropdown menu showing 'Select area'. Below these fields, a dark box contains two lines of feedback text: '✓ this means that the area has been edited' and '👉 checks and/or changes have been completed for this area'. At the bottom right of the form is a green 'Next' button with a right-pointing arrow.

Figure 2-4: Screenshot from the polygon drawing tool for LTSER areas created in WP 10.2 (<http://ltser.greenmapper.org>)

Second, after the request to assure the polygon, the platforms were asked they would be interested in using the Hotspotmonitor/Greenmapper survey software. The software is in principle free to use, but does require a translation; and the platforms were asked whether they would be willing to translate. Platforms in 4 countries (Sweden, Lithuania, Portugal and Sweden), at some point after the request started a translation. As of January 2019, none of these translations have been finished. This response highlights the desire for some members of the network to act collectively but the effort was not sustained. Lack of resources to devote to socio-economic data and analysis are the most probable reason for this.

3. Five tell-tale analyses at the municipal level – examples from Sweden, Scotland and the Netherlands

In this part we present the work described in different published papers by members of WP10 on how different LTSER platforms and LTER sites have analysed data with the purpose of identifying the effects of green/blue infrastructures on urban and rural human well-being. For this they use combinations of indicators of environmental economic, social and cultural sustainability at multiple spatial scales. We here in this chapter particularly focus on analyses and visualisations that use administrative units with the finest resolution of governance (municipalities) to act as tell-tale possibilities of analysis at this level. The tell-tale stories of these individual countries or platforms also act both as audit of the proven scientifically sound possibilities that LTSER platforms and LTER sites have shown, and they act as a source and inspiration for data that need to be provided across the LTSER network; which is the subject of Chapter 4.

3.1 Tell-tale story 1: Indicators for sustainable development in 18 LTSER area municipalities (Bergslagen - Sweden)¹

Sustainable development as a process towards sustainability requires collaboration among societal actors and stakeholders at multiple levels. A key issue is to provide them with a comprehensive and transparent knowledge base representing the state and trends of different dimensions of sustainability. Here the focus is on 18 municipalities in the crisis-struck LTSER-platform Bergslagen region in Sweden and a comparison of those 18 with 101 surrounding municipalities. Data from 2001 and 2006 on 15 indicators representing ecological, economic and social sustainability criteria were transformed to a common scale through normalization around the median, and summarized. Bergslagen region municipalities performed poorer than the surrounding ones for all dimensions in 2006. However, looking at absolute change, the change from 2001 to 2006 was positive for economic and social criteria, while the ecological dimension developed negatively in all municipalities. One could say, that this a classical pattern for many regions, and even for the globe. Table 3-1 shows the 15 measurement variables which were used in this Swedish municipal level study.

¹ Based on: Andersson, K., P. Angelstam, R. Axelsson, M. Elbakidze, J. Törnblom. 2013. Connecting municipal and regional level planning: analysis and visualization of sustainability indicators in Bergslagen, Sweden. *European Planning Studies* 21(8): 1210-1234

Table 3-1: Description of 15 indicators chosen to illustrate municipalities' profile of sustainability in Bergslagen and nine counties for the years 2001-2006.

Dimension	Indicator	Unit	Source
Ecological	Energy consumption	KWh/capita	SCB
	Protected area	Protected area/total land area	SCB and Swedish Environmental Protection Agency
	Greenhouse gases	Carbon dioxide equivalents	Swedish County Boards
	Biological production capacity	Area agricultural land/capita	Swedish Board of Agriculture
Economical	Travelling by car	Km/capita and year	SCB
	Employed between 20 and 64 years	Percent	SCB
	Salary level	Salary/capita	SCB
	Business climate	New companies minus bankruptcies	ITPS and SCB
Social	Commuting	Commute/job	SCB
	Tax base	Taxes SEK/capita	SCB
	Level of education	Number of persons with higher education than secondary school/ number of persons between 20–64 years	SCB
	Exposed for violence	Number of reported violence/ 100,000 capita	Swedish National Institute of Public Health
	Expected average life span	Average year born (2002–2006)	Swedish National Institute of Public Health
	Sick leave	Number of days paid from social endurance/capita	Social Insurance in Sweden
	Democratic dependency	Number of inhabitants 0–19 years and over 65 years/inhabitants 20–64 years	SCB

This study clearly shows how a broad set of indicators are available and can be used to generate spatially fine-grained comparative data on sustainability. These indicators can be the basis for an informed planning process. However, how the actual governance should be set up and how the need for municipalities to collaborate with each other and other actors at regional levels towards a more sustainable development remains an open question.

A key point this study stresses is the visualisation supported by maps. The map in figure 3-2 shows five clusters of municipalities with largely similar indicator values, allowing a new way of understanding the different municipalities. For the LTSER platform network this is a procedure which is useful on a European (or Global) scale, and this is one of the reasons that the online LTSER-SEED map application (see chapter 4) is developed.

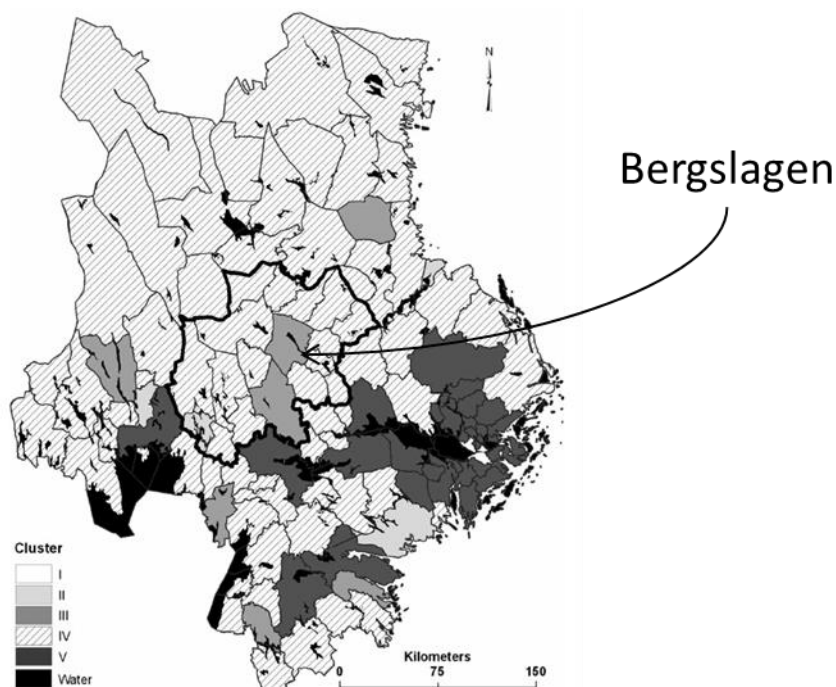


Figure 3-2. Visualization of the five clusters of municipalities with similar indicator values in the nine counties in central Sweden. The 18 (LTSER) Bergslagen municipalities together are marked with a thick black border.

3.2 Tell-tale story 2: Modelling high ecological value and high sociocultural values at municipality level (119 municipalities Sweden)²

LTSER platform landscapes/regions often face the pressure that economic development puts on ecology and biodiversity. There is an industrial and societal interest in Europe to further intensify the yield of wood for the forest industry and biomass; a mainly economic process. At the same time, green infrastructures for ecological and sociocultural values in forest landscapes should be functional. In Sweden, municipalities have exclusive responsibility for comprehensive planning. The spatial distribution of green infrastructures in terms of three forest types with high ecological values was modelled on the one hand, and three sociotopes with high sociocultural values on the other. This was done in 119 municipalities in a rural-urban gradient in Sweden. The idea then is that forest land without high ecological value or without high social value could be available for intensive forestry; and then have lower conflict risk.

² Based on: Andersson, K., Angelstam, P., Elbakidze, M., Axelsson, R. and Degerman, E. 2013. Green infrastructures and intensive forestry: Need and opportunity for spatial planning in a Swedish rural–urban gradient. *Scandinavian Journal of Forest Research* 28(2): 143-165.

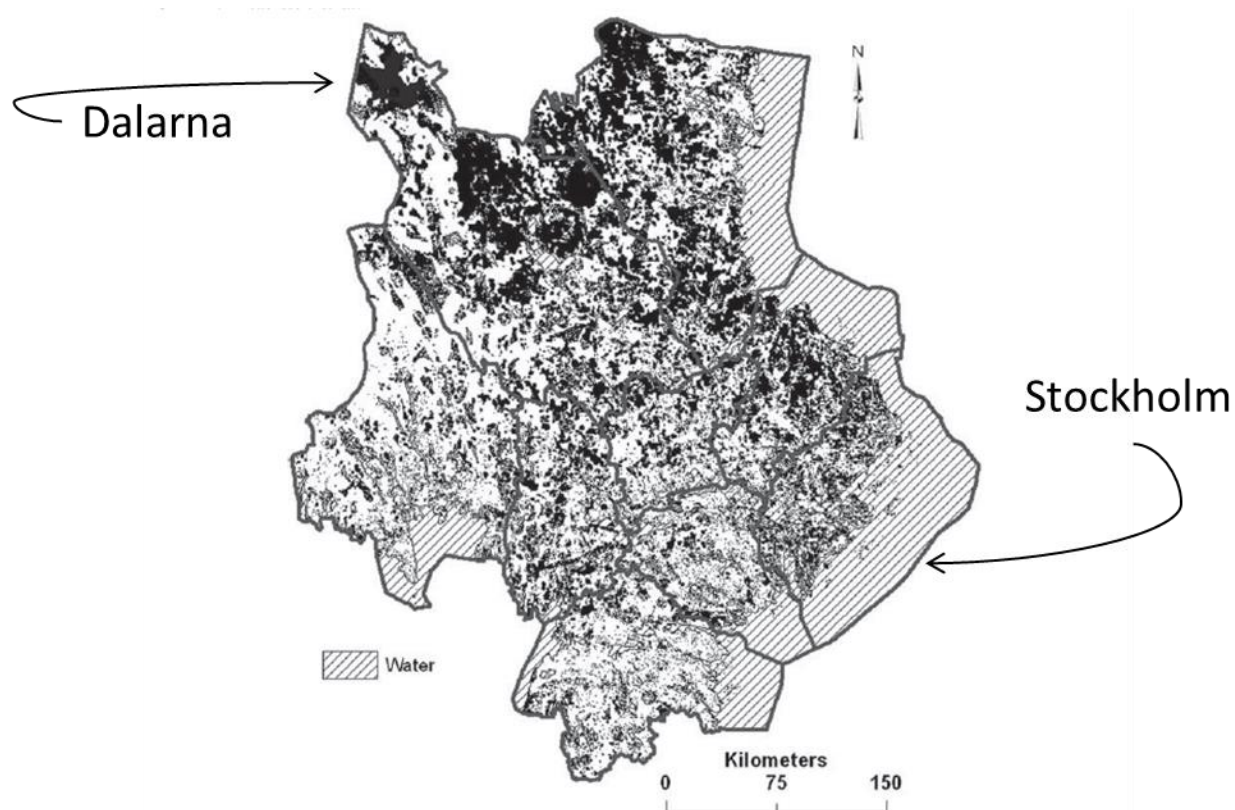


Figure 3-2 The location of green infrastructure in terms of the union of three habitat index and three sociotope models. The white area represents 'conflict-free' areas.

Based on the habitat suitability indices on the one hand and sociotope models on the other, areas where conflicts arise for green infrastructure can be identified at a fine grid. The white areas in figure 3-2 are 'conflict free'. On the governance side, assessing the options for actually steering policy towards such a logical development of sparing high ecological and high socio-cultural areas, the municipalities' potential for physical planning in terms of financial and social capital, and ownership category structure was estimated.

The analysis showed that municipalities with a high proportion of functional green infrastructure, and thus having less area available for intensive forestry, were characterised by a stronger tax base, higher population density and lower demographic dependency ratio, and lower proportions of industrial and state forest ownership.

This study furthermore shows that to accommodate both functional green infrastructures and intensive forestry, a landscape approach (as LTSEr platforms aim to be) including knowledge-based collaboration is needed *at multiple-levels* of governance and management, and not only at the municipal level.

3.3 Tell-tale story 3: Measuring Ecosystem Service delivery bottom-up and top-down. Case study for four clusters of (11 different) LTER sites in the United Kingdom³

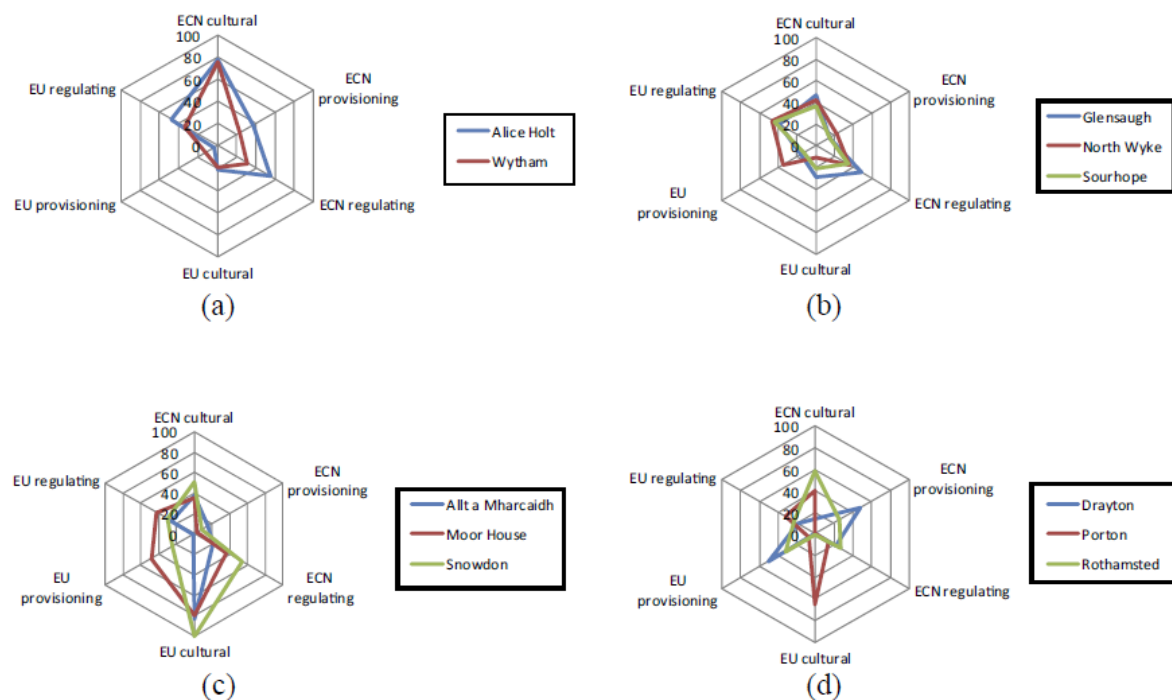
The ecosystem service (ES) concept has been discussed as an important model to aid sustainable land-use management. In this tell-tale story, based on Dick et al. 2014a&b, we compare two contrasting methods of measuring Ecosystem Service delivery; here ECN and EU. The ECN approach is bottom-up. The EU approach is top-down. The ECN is a local place-based assessment which uses locally derived data in participatory mode with local land managers and comprises 73 indicators derived from the Millennium Ecosystem Assessment. The second is a mapping assessment using spatially explicit data downscaled from national or international data sets and comprising 16 indicators. In these studies, Dick et al compare these two approaches to assess the ecosystem services delivered for 11 sites, clustered in four groups, in the Environmental Change Network (ECN), the UK's long-term ecological research network.

All scores are normalised using the formula

$$ES_{norm} = (X_{ES} - X_{min}) / (X_{max} - X_{min})$$

where ES_{norm} is the normalised value of the ES indicator for the site, X_{ES} is the (original) site value of the ES indicator, X_{min} is the lowest value of X_{ES} at any site and X_{max} is the highest value of X_{ES} at any site. The ES_{norm} values are averaged per category of provisioning, regulating and cultural services. The sample data minimum and maximum (across site) values of the indicators are used in the normalisation rather than an attempt to estimate population values. The calculated values are therefore completely linked to the choice of the set of sites used in the study; they compare relative scoring in ecosystem service delivery between the chosen set of sites, and do not allow comparisons across other site selections.

³ Based on: Dick, J., Smith, R., Banin, L., & Reis, S. (2014). Ecosystem service indicators: data sources and conceptual frameworks for sustainable management. *Sustainability Accounting, Management and Policy Journal*, 5(3), 346-375.



Notes: (a) Land with at least 50 per cent forest cover; (b) productive livestock farmland; (c) uplands; and (d) a mixed-use group of lowland grass/arable sites

Figure 3-4 Comparison of the TESI values for ECN and EU cultural, provisioning and regulating services, respectively for four site groups.

In the Dick et al. 2014a study, spider diagrams are used to scores for the cultural, provisioning and regulating services from the two methodologies (Figure 4-4), using four clusters of sites. For both the forest and productive livestock farmland cluster of sites, shown in the upper left and upper right part of the fig 3-4 respectively, there is visually good agreement between the two methods. In the uplands cluster (below left in fig 3-4), the differences in the ECN and EU indicators for provisioning services shows some lack of agreement between methods; in the case of Allt a' Mharcaidh, for example, there is no farming activity according the EU method. But there actually is some shooting of wild deer contributing to a provisioning service; however this is not recognised in the current implementation of the EU methodology. Moor House and Snowdon are the two sites with water bodies, recognised as a provisioning service under the EU methodology, and this results in their higher-than-expected level of provisioning services compared to the ECN methodology. For the final mixed-use cluster (below right in fig 3-4), only regulating services show any consistency between the three sites. Dick at al. 2014a (p363) find that these sites are either research sites or they are within restricted areas where the ability to deliver ESs is highly dependent on management decisions rather than environmental and ecological conditions.

In Dick et al. (2014b)⁴ a quite similar analysis is performed as in figure 3-4 but the results are plotted on a map (see Figure 3-5 below), giving extra insight as to the spatial distribution of scores in different areas across the UK.

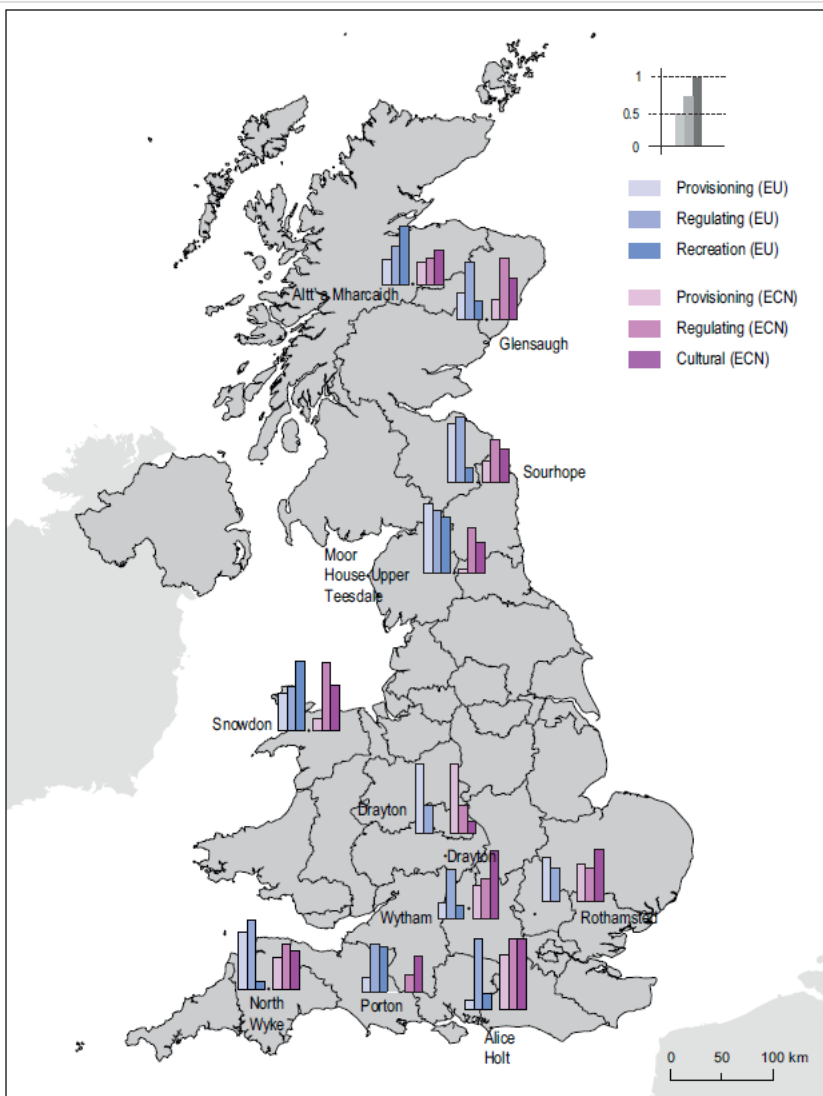


Figure 3-5. Total Ecosystem Service Index (TESI) for the provisioning, regulating and cultural services at 11 sites in mainland UK calculated from the ECN and EU datasets.

⁴ Based on: Dick, J., Maes, J., Smith, R. I., Paracchini, M. L., & Zulian, G. (2014a). Cross-scale analysis of ecosystem services identified and assessed at local and European level. *Ecological Indicators*, 38, 20-30.

One interesting, and quite indispensable, approach to come to spatially detailed data series for LTSER platforms used by Dick et al. 2014a deserves mentioning here. When they focus on the provisioning services / agricultural production only, they use Eurostat data. For instance on Standard Output of farms or their number of livestock. However, these data often relate to NUTS 2 or NUTS 3 level regions, which is quite a coarse spatial scale. Dick et al. 2014a for instance note that average area of the NUTS2 regions used in their study is 9,500 km² and of the NUTS3 regions is 4,000 km² while their largest ECN site was 136 km² and the average area of the others is around 10 km². A mismatch of a factor 400-950. Data then obviously need to be disaggregated. For many socio-economic variables it is often appropriate to use population statistics for disaggregation (for instance population density per km² can be used; compare dashboard 5 in Chapter 4). However, Dick et al. 2014a (p.359) notice 'most of the ES-indicators are more closely related to habitat occurrence and, therefore, Corine Land Cover (CLC) data with a spatial resolution of 250 x 250 m were used to spatially disaggregate each ES indicator separately.' A valuable approach.

3.4 Tell-tale story 4: Population decline in a highly attractive area (The Netherlands, Germany and Denmark)⁵

In this tell-tale story on the trilateral Wadden area the focus is on a spatially narrow definition of the Wadden area, on which a basic socio-economic analysis was performed. The area, around the Wadden sea, comprised the Wadden islands and a narrow mainland coastal strip. Four major issues were analysed: population, employment, natural attractiveness of the Wadden, and recreational housing prices. We found a population in the Wadden area of around 1 million inhabitants showing a declining trend of -0,3% per year over the last decade. We recorded an increase of elderly people and a decrease of all others. For migration the German mainland coast outperforms both the Netherlands and Denmark.

Employment growth shows a mixed performance across the trilateral area, Denmark especially has performed rather weakly. Along the coast many areas record low employment. In the Wadden area as a whole manufacturing takes a bigger share of employment than tourism. The Wadden islands do have a large share of tourism jobs, and in several coastal cities the navy is a large employer.

The Wadden area was shown to be a strong hotspot of natural attractiveness in all three countries, and highly appreciated for its natural beauty (see figure 4-6). The figure 4-6 is a result of using the Hotspotmonitor/Greenmapper survey in all three countries (www.greenmapper.org).

⁵ Based on: F.J.Sijtsma, N.Mehnen, P. Angelstam and J. Muñoz-Rojas (in press). Multi-scale mapping of cultural ecosystem services in a socio-ecological landscape: A case study of the international Wadden Sea Region. *Landscape Ecology*. DOI: 10.1007/s10980-019-00841-8

Sijtsma, F. J.; Broersma, L.; Daams, M. N.; Mehnen, N.; Oostra, M.; Sietes, A. M. 2014. A socio-economic analysis of the international Wadden area. Analysis carried out through Wadden Sea Long-Term Ecosystem Research (WaLTER) and University of Groningen. URSI Report 345. University of Groningen/WaLTER, Groningen.

This assures a standardized way of measuring the cultural ecosystem service across the different countries. Figure 4-6 shows a spatially explicit mapping of the attractiveness of the international Wadden area. As can be seen, the islands are deemed very attractive in all three countries everywhere, but strong differences occur along the Wadden mainland coast.



Figure 3-6. National Wadden hotspots, coming from Hotspotmonitor/Greenmapper respondents in Netherlands, Germany and Denmark.

Figure 3-7 shows the share of 'fans' of the Wadden area per region in the respective countries (those marking the attractive Wadden places in figure 3-6). The attractiveness of the Wadden is strongest across Germany; even in the most southern parts of Germany a substantial group of respondents have marked the Wadden area as an attractive, valuable or important natural place. In the three countries together, we have estimated around 14 million fans of the Wadden area. The Netherlands are estimated to host about 2 million fans, Germany over 11 million and Denmark around 0,5 million. If we compare number of fans with number of inhabitants (nearly 1

million), we count 14 times more Wadden fans than Wadden inhabitants. In the Netherlands the factor of fans/inhabitants is x7, in Germany x17, while in Denmark we record x7.

A clear relation is visible in our analytical comparison of hotspots between natural attractiveness and square meter prices of recreational homes. The Wadden Islands show higher prices of recreational homes than the mainland coast everywhere, but the difference is modest in Denmark. The German Wadden Islands especially show very high prices – comparable to metropolitan square meter prices of the Paris region and outer London.

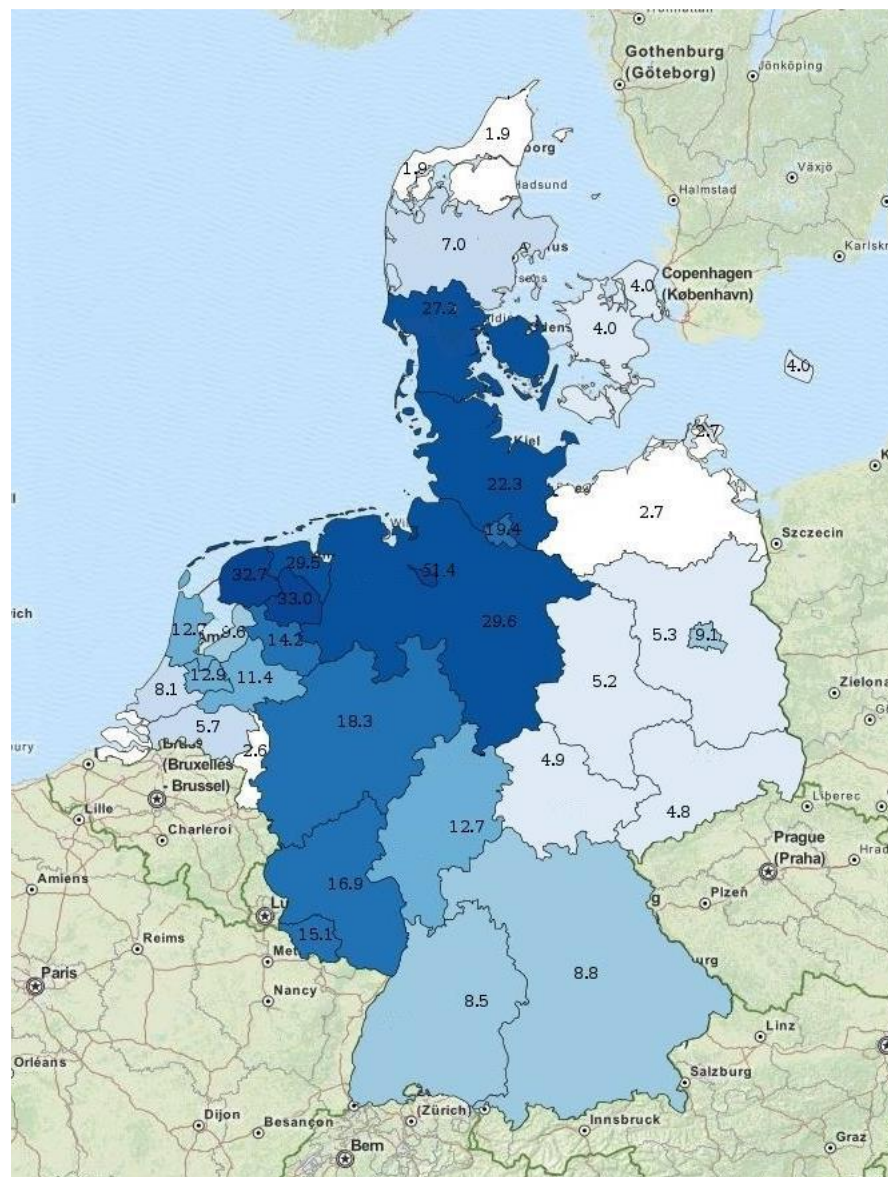


Figure 3-7 Percentages of Wadden area markers (national level) by Bundesland (D), Region (DK) and Province (NL)

3.5 Tell-tale story 5: Socio-economic valuation: employment versus cultural ecosystem services (The Netherlands)⁶

The Dutch Wadden area is an internationally renowned natural area with World Heritage status. Its ecological uniqueness can be attributed to its shallow coastal waters. However, the Wadden area is also a rural area in search of competitive economic activity so as to provide employment to its population. The aim of the analysis in this tell-tale story based on Sijtsma et al. (2014) is to ascertain the level of the contribution of tourism to different parts of the rural economy, and to examine which parts and aspects of the natural area are highly appreciated by visitors and thus may serve as immobile resources for the local economy (see figure 3-8). The natural attractiveness of the Wadden area relates mainly to the islands and the sea, whereas the mainland coast is very modestly appreciated for its natural qualities. The results show that although strongly attractive parts of the Wadden area are often spatially-related to huge numbers of visitors, they nevertheless lead to only modest employment figures.

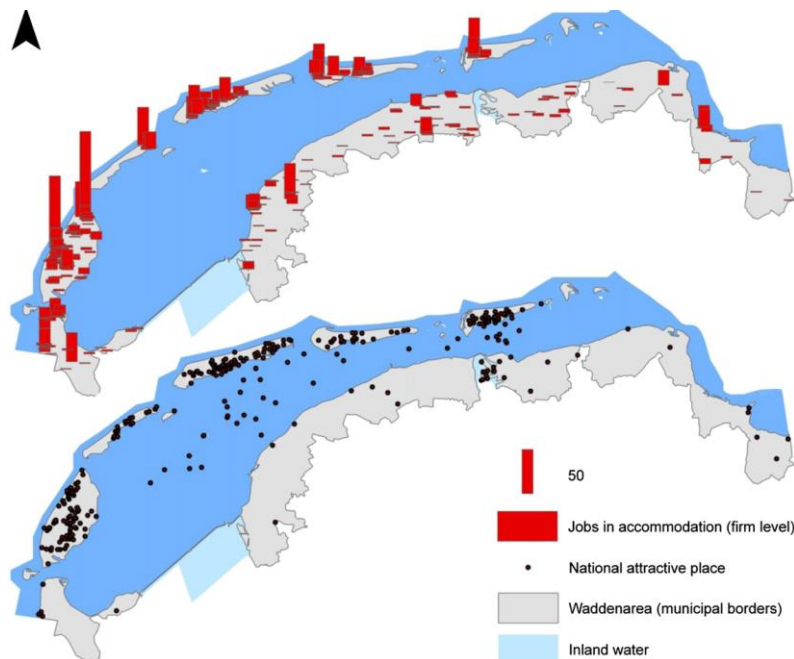


Fig. 3-8. Tourism employment (SBI'08; 55) (above) and nationally attractive places (Hotspotmonitor markers) (below) in the Wadden area. Source: LISA and Greenmapper/Hotspotmonitor.

⁶ Based on: F.J. Sijtsma, M.N. Daams, H. Farjon and A.E. Buijs, (2012). Deep feelings around a shallow coast. A spatial analysis of tourism jobs and the attractiveness of nature in the Dutch Waddenarea. *Ocean and Coastal Management*, 68 (2012), November, pp138-148. DOI: <http://dx.doi.org/10.1016/j.ocecoaman.2012.05.018>

We also find that the natural attractiveness of the Wadden area arouses deep feelings in visitors in that they experience priceless qualities such as the purity and immensity of the natural environment, and they feel strongly connected to nature. (See table 3-2). Our findings cast light on the need for an integrative management approach to the Wadden area as both a rural and a natural area, and meanwhile relating it to competing urban areas. An example of a suitable integrative policy would be one that accounts for the trade-off between the value of urban dwellers' deep feelings (as tourists) and the value of rural jobs.

Table 3-2. Selection of deeply felt attractiveness quotes from the Hotspotmonitor/Greenmapper data. Selection from 320 respondents.

Selection of 'deeply-felt-attractiveness' quotes	Marker ID
I've experienced a lot of freedom in an overwhelming nature	5485
Pureness, peacefulness (...) wonderful nature. Actually: fantastic!	2343
I always feel like I can finally breathe and I actually do; frequently and deeply!!	568
A place where you can be together with nature and the elements without disturbing anyone	6137
The immensity of nature in which man seems only a very little crumb.	304
Space, vastness, silence. You can be with your memories without being disturbed.	5364
No words to describe what I feel.	4185
A prehistoric piece of the Netherlands, with virtually no visual pollution. A sense of freedom and room to roam.	1228
The most beautiful place in the Netherlands where nature is still in charge.	4838
Nothing more beautiful than a very distant horizon over water.	250
Experienced precious and intense moments, both sailing and falling dry. This area is so dynamic and autonomous. It has a strong presence, but is also vulnerable and sometimes tranquil.	2503
The last truly great nature in the Netherlands.	4229
The vastness, the smells, the wind in your hair, the sounds: priceless!	1211
Beautiful, beautiful, beautiful under all weather conditions.	2982
Spacious, dynamic, unique, magnificent!	827
The last wilderness in the Netherlands: you never know what you will encounter, and you feel the power of nature.	3910

4. The learning and supporting online LTSER environment: LTSER-SEED

4.1 General aim and set-up

We aim to create a learning and supporting online environment for the LTSER community which gives enhanced access to data for analyses of the effects of green/blue infrastructures on urban and rural human well-being using indicators of environmental economic, social and cultural sustainability at multiple spatial scales.

As an online form of doing this we use the online concept of a Spatial Economic Ecological Database (Daams and Sijtsma, 2013). Such a SEED for LTSER (hereafter LTSER-SEED) needs to show data that allows analyses of long-term regional-level key indicators of human well-being (i.e. economy, employment, demography, public health and social capital) and combine this with ecological and landscape data, although the latter is not the primary aim. The LTSER-SEED should include data from the greenmapper survey identifying cultural service delivery. And it will map and analyse governance structures and systems for spatial planning. The results will be visualised for platform stakeholders using different regional units.

To allow the learning and supporting process the LTSER-SEED contains the polygons of different LTSER platform sites. As of May 2018, and after having surveyed the LTSER platforms asking them to confirm existing polygons or draw new ones (As discussed in section 2-3) we have identified 43 polygons for LTSER platforms.

For the current (Beta) version of the LTSER-SEED please visit:

<http://ltserseed.greenmapper.org>

4.2 Questions that structure the LTSER-SEED

The LTER and LTSER networks are research infrastructure networks. As a unique research capacity these networks can fuel international comparative place-based research. If such a research infrastructure is to function well using a socio-ecological system approach it is key that some fact based shared understanding can emerge within the network about the types of LTSERs that are in the network. This allows asking a question of the kind: which site can compare with which other sites on which aspect? Answering this multi-faceted question supports the growing understanding of a multi-scale approach to socio-ecological systems, which acknowledges and understands the complex and dynamic spatial structure of the socio-economics in and around a nature area; at various spatial scales.

In order to understand, analyse and classify existing European LTSER platforms in various socio-economic ways, using both a landscape and regions approach we use two approaches relating the social to the ecological. The first is nearness in terms of distance to the social environment. What happens socially in the near environment is relevant to the ecology through many different ways and even if the relation is not explicit or aimed for e.g. not building houses on flood plains. The second classification is nearness in terms of strong personal appreciation. If the scenery or ecology is well-appreciated by humans then the social dimension of the area

and, the human well-being of residents and visitors, can be explicitly linked to the ecologically of the area.

To give substance to these two approaches, we asked a series of questions and created the above mentioned the online LSTERSEED dashboard. This dashboard includes different sub-dashboards.

Q1 Where are LTSER and LTER areas on European and national urban-rural gradients?

Relevant (sub-)dashboards:

1 Basic geography Showing 67 LTSER Platforms on a variety of layers (also leading to the do it yourself polygon draw tool)

4 Governance and LTSER

Q2 What ecological and landscape qualities do LTSER areas have? (From non in-situ data)

Relevant (sub-)dashboard:

2 LTSER and ecology and landscape layers

Q3 How do areas within and around LTSER areas perform socio-economically?

Relevant dashboards:

3 Land use and land-use change and LTSER platforms

5 Economic growth and well-being and LTSER platforms (also linking to EU statistical sources)

Q4 To which extent do LTSER areas deliver cultural ecosystem services? And to which extent are their landscapes appreciated?

Relevant dashboard:

6 Relating nature related human well-being to LTSER areas

5. Discussion and conclusions

In this report we delivered upon task 10.2, in close cooperation with 10.1 and 10.3. We delivered upon sub task 1) i.e. the 'Analyses of long-term regional-level key indicators of human well-being', sub-task 2) 'Involvement of these LTSEr platforms in use of an established method for monitoring cultural ecosystem service delivery', sub-task 3) i.e. the 'Mapping and analyses of governance structures and systems for spatial planning' and the added sub-task of 'providing a learning and supporting online environment with key socio-economic data related to the LTSEr platforms', by the following means.

First, after discussing briefly socio-ecological systems, landscapes and regions in chapter 2, we presented in 2-3 key findings from the survey among 67 LTSEr platforms and found that the LTSEr platform network is alive and responds to – research – questions. Over 60% reacted to one of four different requests for information. However, more complex questions reduce the time of response and the response rate strongly. We found that only 21 out of 67 responded to a question to ascertain a polygon for their LTSEr platform. And to the linked question of becoming involved in use of the method for monitoring cultural ecosystem service delivery (hotspotmonitor/greenmapper) only four LTSEr platform countries started translation, none finished thus far. The latter especially is a very modest result in terms of the capacity of the network to organize data gathering; and also a modest result in enhancing LTSEr platforms capacity for problem solving research in socio-ecological systems. The reason for this however seems to be quite obvious: it is lack of time. We found in the survey that the focus of LTSEr platforms in terms of personnel funding for research expertise is mostly on ecological expertise, and limitedly on socio-economics.

Second, in Chapter 3 we presented five tell-tale stories from different LTSEr platforms across Europe. These tell-tale stories, for a selected set of LTSEr-platforms, showed analyses of longer-term regional-level key indicators of human well-being (i.e. economy, employment, demography, public health and social capital), along with mapping and analyses of governance structures and systems for spatial planning using administrative units with the finest resolution of governance (usually municipalities) and regions. From this we clearly saw the 'land of opportunity' in combining socio-economics with ecology and environmental science. We found that for LTSEr platforms there are many available and useful ways to perform this type of analysis. However, we also saw a wide variety of conceptual approaches and an active search to effective, governance-fuelling, information. To make such type of analysis powerful for the network there is currently a lack of (socio-economic) data harmonisation and a lack of standardisation of multi-scale methods that bridge the gap between international and national data and thinking and the fine-grained local and regional or landscape level which is natural to LTSEr platforms and their constituent LTER sites.

Finally, in Chapter 4 we present a first exploration of improving socio-ecological system data availability across the LTSEr network. We created an online LTSErSEED dashboard. (<http://ltserseed.greenmapper.org>) This dashboard includes different sub-dashboards which aim to answer the following questions. Q1: Where are LTSEr and LTER areas on European and national urban-rural gradients? Q2 How do areas within and around LTSEr areas perform socio-economically? Q3 To which extent do LTSEr areas deliver cultural ecosystem services?

To which extent are they appreciated landscapes? We started out filling this dashboard with relevant European wide data. This process of adding all data and increasing the functionality of the dashboard needs to be finalized the coming years, to make the LTSEr platform a powerful infrastructure for analysing socio-ecological systems.

6. Literature

Andersson, K., P. Angelstam, R. Axelsson, M. Elbakidze, J. Törnblom. 2013. Connecting municipal and regional level planning: analysis and visualization of sustainability indicators in Bergslagen, Sweden. *European Planning Studies* 21(8): 1210-1234

Andersson, K., Angelstam, P., Elbakidze, M., Axelsson, R. and Degerman, E. 2013. Green infrastructures and intensive forestry: Need and opportunity for spatial planning in a Swedish rural–urban gradient. *Scandinavian Journal of Forest Research* 28(2): 143-165.

Angelstam, P., Manton, M., Elbakidze, M., Sijtsma, F., ..., T. Yamelnyets, (2018). LTSER platforms as a place-based transdisciplinary research infrastructure: learning landscape approach through evaluation. *Landscape Ecology* (1-24). doi.org/10.1007/s10980-018-0737-6.

Axelsson, R., P. Angelstam, E. Degerman, S. Teitelbaum, K. Andersson, M. Elbakidze, and M.K. Drotz. 2013. Social and cultural sustainability: criteria, indicators and verifier variables for measurement and maps for visualization to support planning. *AMBIO* 42(2): 215–228.

Binder, C.C.R., Hinkel, J., Bots, P.W.G. and Pahl-Wostl, C. (2013), “Comparison of frameworks for analysing social-ecological systems”, *Ecology and Society*, Vol. 18 No. 4, available at: <http://dx.doi.org/10.5751/ES-05551-180426Research>

Brondizio, E.S., Ostrom, E. and Young, O.R. (2009), “Connectivity and the governance of multilevel socialecological systems: the role of social capital”, *Annual Review of Environment and Resources*, Vol. 34 No. 1, pp. 253-78.

Cumming, G., Allen, C. and Ban, N. (2015), “Understanding protected area resilience: a multi-scale, social-ecological approach”, *Ecological Applications*, Vol. 25 No. 2, pp. 299-319.

Cumming, G.S. (2011b), “Spatial resilience: integrating landscape ecology, resilience, and sustainability”, *Landscape Ecology*, Vol. 26 No. 7, pp. 899-909.

Carpenter, S. R., Mooney, H. A., Agard, J., Capistrano, D., DeFries, R. S., Díaz, S., ... & Perrings, C. (2009). Science for managing ecosystem services: Beyond the Millennium Ecosystem Assessment. *Proceedings of the National Academy of Sciences*, pnas-0808772106.

Castells, M. (1989) *The Informational City: Information Technology, Economic Restructuring and the Urban-Regional Process*. Basil Blackwell, Oxford.

Daams, M.N. & F.J. Sijtsma (2013), Planting the SEED: Towards a spatial economic ecological database for a shared understanding of the Dutch Wadden area. *Journal of Sea Research*. Volume 82, September 2013, Pages 153–164. <http://dx.doi.org/10.1016/j.seares.2012.12.002>

Davoudi, S. (2003) Polycentricity in European spatial planning: From an analytical tool to a normative agenda, *European Planning Studies*, 11(8), pp. 979–999.

Dick, J., Smith, R., Banin, L., & Reis, S. (2014a). Ecosystem service indicators: data sources and conceptual frameworks for sustainable management. *Sustainability Accounting, Management and Policy Journal*, 5(3), 346-375.

Dick, J., Maes, J., Smith, R. I., Paracchini, M. L., & Zulian, G. (2014b). Cross-scale analysis of ecosystem services identified and assessed at local and European level. *Ecological Indicators*, 38, 20-30.

Fabinyi, M., Evans, L. and Foale, S. (2014), "Social-ecological systems, social diversity, and power: insights from anthropology and political ecology", *Ecology and Society*, Vol. 19 No. 4, available at: <http://dx.doi.org/10.5751/ES-07029-190428>

Hall, P. (2009). Looking Backward, Looking Forward: The City Region of the Mid-21st Century. *Regional Studies*, 43(6), 803-817.

Meyer, J. R. (1963) Regional economics: a survey, *American Economic Review* 53, 1–54.

Halliday, A. and Glaser, M. (2011), "A management perspective on social ecological systems : a generic system model and its application to a case study from Peru", *Human Ecology*, Vol. 18 No. 1, pp. 1-18.

Higgins-Desbiolles, F. (2006), "More than an industry': the forgotten power of tourism as a social force", *Tourism Management*, Vol. 27 No. 6, pp. 1192-208.

Mirtl, M, Orenstein, D.E., Wildenberg, M., Peterseil, J., Frenzel, M. (2013) Development of LTSER platforms in LTER-Europe: challenges and experiences in implementing placebased long-term socio-ecological research in selected regions. In: Singh SJ, Haberl H, Chertow M, Mirtl M, Schmid M (eds) Long term socio-ecological research. Springer, Dordrecht, pp 409–442

Parr, J. B. (2014). The regional economy, spatial structure and regional urban systems. *Regional Studies*, 48(12), 1926-1938.

Rodríguez-Pose, A. (2008). The rise of the "city-region" concept and its development policy implications. *European planning studies*, 16(8), 1025-1046.

Sijtsma, F. J.; Broersma, L.; Daams, M. N.; Mehnen, N.; Oostra, M.; Sietes, A. M. 2014. A socio-economic analysis of the international Wadden area. Analysis carried out through Wadden Sea Long-Term Ecosystem Research (WaLTER) and University of Groningen. URSI Report 345. University of Groningen/WaLTER, Groningen.

Sijtsma, F.J., Daams, M.N., Farjon, H. and Buijs A.E., (2012). Deep feelings around a shallow coast. A spatial analysis of tourism jobs and the attractivity of nature in the Dutch Waddenarea. *Ocean and Coastal Management*, 68 (2012), November, pp138-148. DOI: <http://dx.doi.org/10.1016/j.ocecoaman.2012.05.018>

Appendix 1 Dashboard overview: Itserseed.greenmapper.org

Below we give a detailed description of the Dashboard as it is planned to be when fully realized. Large parts of the Dashboard have been realized as May 2019. Some remaining parts still need to be filled in the future. In due time the LTSEER-SEED will be integrated/linked to the DEIMS-SDR (<https://data.lter-europe.net/deims/>).

LTSEER Platforms

There are 67 LTSEER platforms in DEIMS in Europe (Angelstam et al. 2018). All of these platforms have a point location on the map showing their location. However, LTSEER areas are landscapes and not point locations. How about their polygons then?

Of the 67 LTSEER platforms listed in DEIMS-SDR only 43 had designated spatial data in terms of a GIS polygon, which enables us to visualize their more exact location as a landscape. However, these 43 differ widely in size, which may be a signal of quite a different landscape size and socio-ecological reality, or it may be signal of not completely mature definition matters of what is actually an LTSEER platform with a recognizable identity. For all LTSEER platforms we therefor created a standardized platform area of 10 000 km². Therefore, depending on our purpose we have the following sets of group-polygons to use for comparing and classifying LTSEER platforms as a large group:

- ➔ Group 1: 67 standardized 10.000 km² areas
- ➔ Group 2: 43 specific LTSEER polygons + 24 standardized 10.000 km² areas
- ➔ Group 3: 43 specific LTSEER polygons
Various groups: defined in the first sub-dashboards
- ➔ Group 4: Metropolitan LTSEERs
- ➔ Group 5: Remote rural LTSEERs
- ➔ Group 6: Rural, intermediate and urban (NUTS 3) LTSEERs

Six sub-dashboards on LTSEER areas:

1 Showing 67 LTSEER Platforms on a variety of layers

2 LTSEER and ecology and landscape layers

3 Land use and land-use change and LTSEER platforms

4 Nature Governance and LTSEER platforms

5 Economic growth and well-being and LTSEER platforms

6 Relating nature related human well-being to LTSEER areas

On the web the dashboard can be found at:

[Itserseed.greenmapper.org](https://itserseed.greenmapper.org)

Appendix 2 Details of the design of the dashboards⁷

Introduction to the Dashboard

LTSER platforms as socio-ecological systems.

A growing and learning initiative, linked to DEIMS.

Welcome to LTSER-SEED Dashboard. This LTSER-SEED Dashboard approaches LTSER platforms as socio-ecological systems. It has two purposes.

First it tries to bring understanding of the socio-economics of different LTSER platforms. The LTER and LTSER networks are research infrastructure networks. As a unique research capacity these networks can fuel international comparative place-based research. If such a research infrastructure is to function well using a socio-ecological systems' approach it is key that some fact based shared understanding can emerge within the network about the types of LTSERs that are in the network. This allows asking a basic question of the kind: which site can compare with which other sites on which socio-ecological aspect? This is the first, though many faceted, central question we ask ourselves in this LTSER-SEED dashboard.

Second it tries to bring a careful selection of socio-economic data (and datalinks) to the LTSER platforms. In the natural science domain LTER sites are powerful because of their in-situ data gathering, but in the socio-economic realm many data about (the areas of) LTSER platforms are not gathered by LTSER platforms themselves, but through European, national or regional statistical offices. We aim to empower the LTSER platforms collectively in the use and easy access to these data. At this moment the dashboards only visualize the data, in future downloads could be provided. Furthermore, the aim is that, if local data gathering is required for sound socio-economic analysis, the LTSER-SEED empowers the platforms by lining them to tools to do so.

The LTSER-SEED Dashboard is a growing and learning initiative, linked to DEIMS.

LTSEr Long Term Socio-Ecological Research. SEED Spatial Economic Ecological Database (See: Daams, M. N., & Sijtsma, F. J. (2013). Planting the SEED: Towards a spatial economic ecological database for a shared understanding of the Dutch Wadden area. Journal of Sea Research, 82, 153-164.)

⁷ The text is a design text: giving instructions on what to build and how to build it. Therefore for instance the text often indicates what the dashboard 'should have'. For the real-live version see ltserseed.greenmapper.org.

DASHBOARD 1 Basic geography: Showing and categorizing 67 LTSE Platforms on a variety of socio-economic layers

Introduction to Basic Geography of LTSE

There are 67 LTSE platforms in DEIMS in Europe (Angelstam et al. 2018). All of these platforms have a point location on the map showing their location. However, LTSE areas are landscapes and not point locations. How about polygons? Of the 67 LTSE platforms listed in DEIMS-SDR only 43 had designated spatial data in terms of a GIS polygon, which enables us to visualize their more exact location as a landscape. However, these 43 differ widely in size, which may be a signal of quite a different landscape size and socio-ecological reality, or it may be a signal of a still not yet completely mature LTSE definition and identity. For all LTSE platforms we therefore created a standardized platform area of 10 000 km². Therefore, depending on our purpose we have the following sets of group-polygons to use for comparing and classifying LTSE platforms as a large group:

Groups:

Group 1: 67 standardized 10.000 km² areas

Group 2: 43 specific LTSE polygons + 24 standardized 10.000 km² areas

Group 3: 43 specific LTSE polygons

When navigating the Dashboard maps these groups can be chosen (see screenshot below)

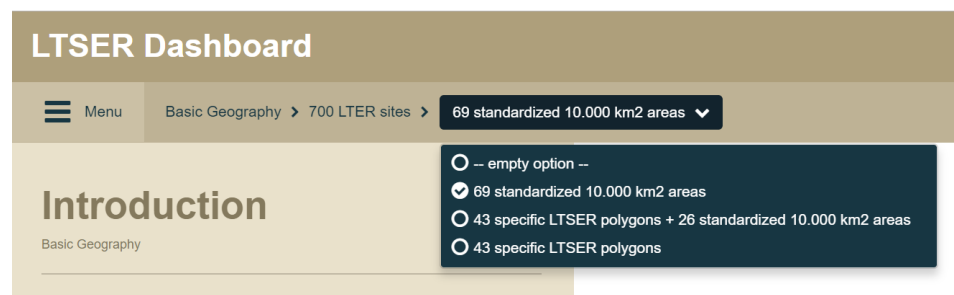


Figure Appendix 2 – 1: Groups in LTSE Dashboard

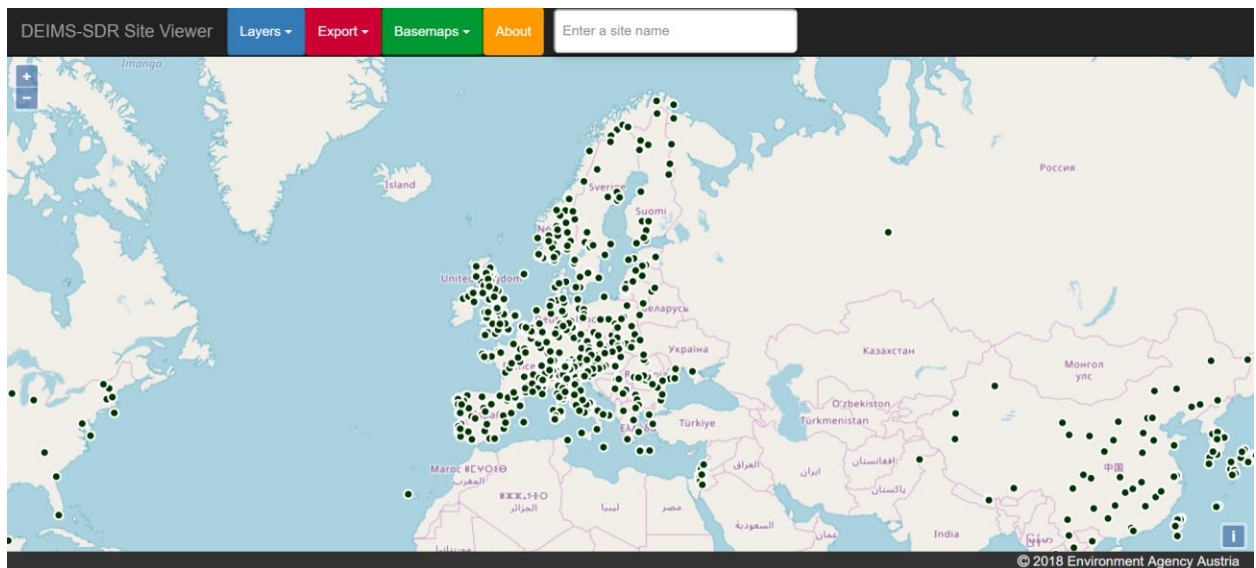
In Dashboard 1 we allow the user to choose any of these three groups (with an individual label with the name of the LTSE area), and activate a number of maps below them:

1-1 (a,b,c,d) A google maps layer

(satellite, terrain) / open street map (as standard in Greenmapper)

1-1 e: LTER sites

A map with the European and Israeli LTER sites based on the online DEIMS-SDR site viewer from provided (https://stopopol.github.io/ef_viewer/)



In a total of 700 LTER sites, 199 LTER sites were located in the 67 platforms, with 91 in the 43 platforms that provided GIS polygons. All LTSEr platforms had at least one LTER site. On average the 67 platforms with standardized 10,000 km² areas had 2.9 sites, and platforms with polygons (43) 2.1 sites. (Angelstam *et al.*, 2018).

1-2 Title: Metropolitan and Urban Europe

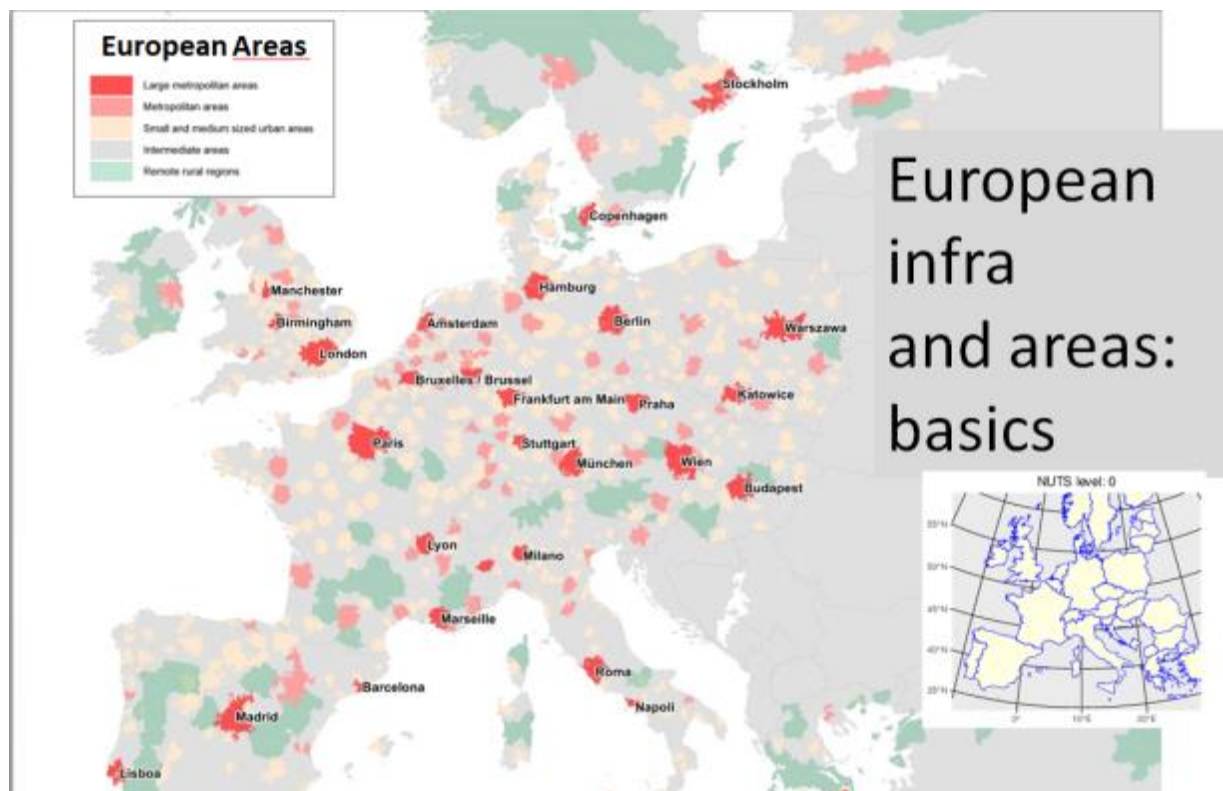
A map showing the Functional Urban Areas of the OECD. This includes metropolitan areas (large metro red; metro pink) and non metropolitan areas (yellow).

- ➔ The page should also show the LTSEr areas which fall in metropolitan areas or their commuting zones, and those that fall in other urban (non-metropolitan) areas as a list. With a link to their DEIMS url.

1-3 Title: Remote Rural

A map showing the Remote Rural areas of Europe . (Richard and Carmelina have it).

- ➔ The page should also show the LTSEr areas which fall in remote rural areas as a list. With a link to their DEIMS url.



1-4 Title: NUTS regions and LAUs

A map of the NUTS 1, NUTS 2 and NUTS 3 definitions of the EU. And the Local Administrative Units. **Only showing their borders.**

(ec.europa.eu/eurostat/web/regions-and-cities/overview for different regional divisions in Europe)

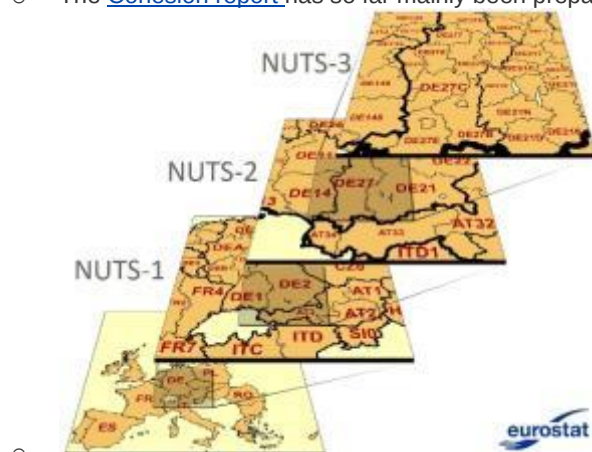
For NUTS definitions: <http://ec.europa.eu/eurostat/web/nuts/background>

The current [NUTS 2016 classification](#) is valid from 1 January 2018 and lists

- 104 regions at NUTS 1,
- 281 regions at NUTS 2 and
- 1348 regions at NUTS 3 level.

The NUTS classification (Nomenclature of territorial units for statistics)⁸ is a hierarchical system for dividing up the economic territory of the EU for the purpose of:

- The collection, development and harmonisation of European regional statistics
- Socio-economic analyses of the regions
 - NUTS 1: major socio-economic regions
 - NUTS 2: basic regions for the application of regional policies
 - NUTS 3: small regions for specific diagnoses
- [Regional typologies and local information corresponding to NUTS 3](#)
- Framing of EU regional policies.
 - [Regions eligible for support from cohesion policy](#) have been defined at NUTS 2 level.
 - The [Cohesion report](#) has so far mainly been prepared at NUTS 2 level.



-
- ELI: <http://data.europa.eu/eli/reg/2003/1059/2018-01-18>

LOCAL ADMINISTRATIVE UNITS (LAU)

[HTTP://EC.EUROPA.EU/EUROSTAT/WEB/NUTS/LOCAL-ADMINISTRATIVE-UNITS](http://ec.europa.eu/eurostat/web/nuts/local-administrative-units)

To meet the demand for statistics at a local level, Eurostat maintains a system of Local Administrative Units (LAUs) compatible with NUTS. These LAUs are the building blocks of the NUTS, and comprise the municipalities and communes of the European Union.

Until 2016, two levels of Local Administrative Units (LAU) existed:

- The upper LAU level (LAU level 1, formerly NUTS level 4) were defined for most, but not all of the countries.
- The lower LAU level (LAU level 2, formerly NUTS level 5) consisted of municipalities or equivalent units in the 28 EU Member States.

Since 2017, only one level of LAU has been kept.

⁸ Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS)

The LAUs are:

- administrative for reasons such as the availability of data and policy implementation capacity;
- a subdivision of the NUTS 3 regions covering the whole economic territory of the Member States;
- appropriate for the implementation of local level typologies included in TERCET, namely the coastal area and DEGURBA classification.

Since there are frequent changes to the LAUs, Eurostat publishes an updated list towards the end of each year.

The NUTS regulation makes provision for EU Member States to send the lists of their LAUs to Eurostat. If available, Eurostat receives additionally basic administrative data by means of the annual LAU lists, namely total population and total area for each LAU.

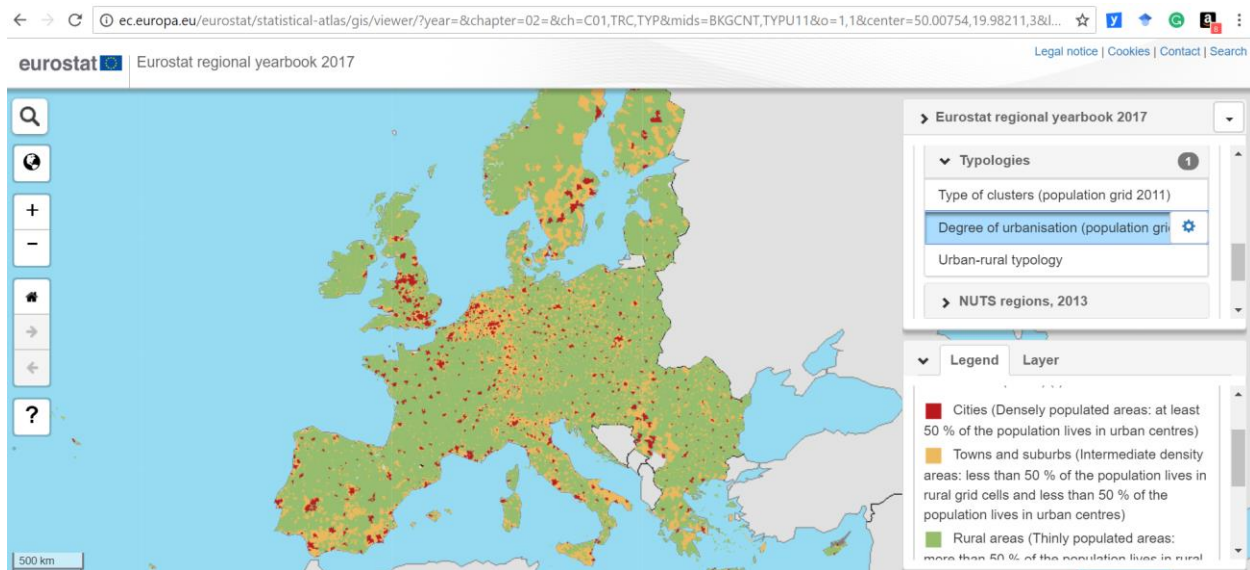
Tables	Year	Links
Correspondence table LAU – NUTS 2016, EU-28 and EFTA / available Candidate Countries	2017	
Correspondence table LAU – NUTS 2013, EU-28 and EFTA / available Candidate Countries	2017	
Correspondence table LAU 2 – NUTS 2013, EU-28	2016	
Correspondence table LAU 2 – NUTS 2013, EU-28	2015	
Correspondence table LAU 2 – NUTS 2013, EU-28	2014	
Correspondence table LAU 2 – NUTS 2013 /NUTS 2010, EU-28	2013	
Correspondence table LAU 2 – NUTS 2010, EU-28	2012	
Correspondence table LAU 2 – NUTS 2010, EU-28 (Census)	2011	
Correspondence table LAU 2 – NUTS 2010, EU-27	2011	
Correspondence table LAU 2 – NUTS 2010, EU-27	2010	

Acknowledgement: © EuroGeographics for the administrative boundaries

1-5 Urban-Rural (NUTS)

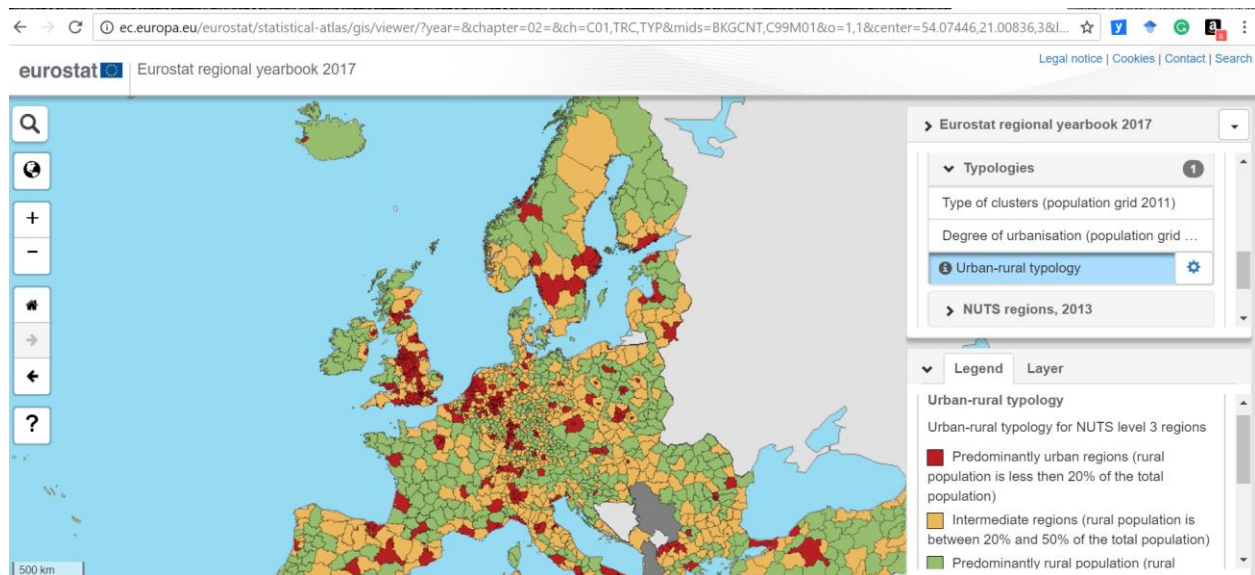
A map of the NUTS 1, NUTS 2 and NUTS 3 definitions of the EU. And the Local Administrative Units. Showing their urban-rural gradients : urban intermediate or rural.

Results urban and rural grids



<http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/?year=&chapter=02=&ch=C01,TRC,TYP&mids=BKGCNT,TYPU11&o=1,1¢er=54.07446,21.00836,3&lcis=TYPU11&>

Results Urban and Rural NUTS 3



<http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/?year=&chapter=02=&ch=C01,TRC,TYP&mids=BKGCNT,C99M01&o=1,1¢er=54.07446,21.00836,3&lcis=C99M01&>

➔ The page should also show the 67 LTSE areas which fall in NUTS 3 urban areas, in NUTS 3 intermediate areas and in NUTS 3 rural areas as a triple list. Possibly with a fourth doubt category... And with links to their DEIMS url.

DASHBOARD 2 LTSER and ecology and landscape layers

2-1 Biogeographical regions

The following two maps (left two maps from Michael Manton)

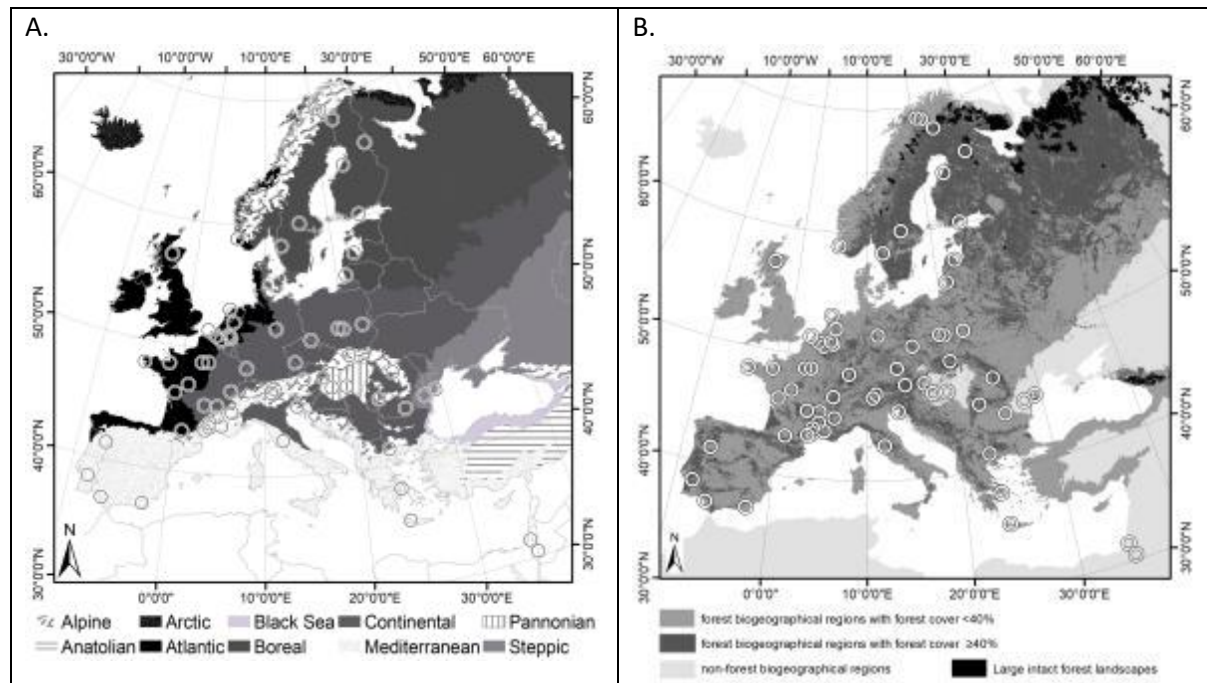


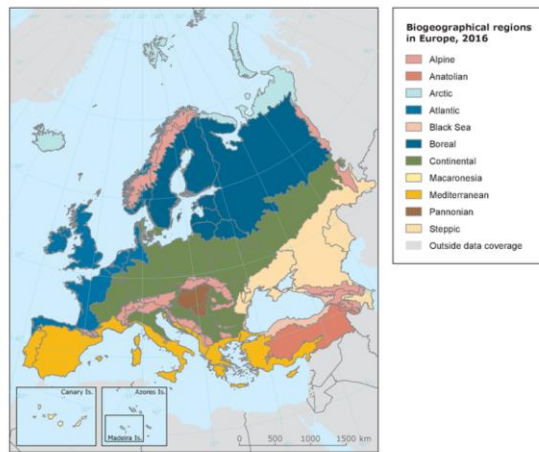
Figure 4. Maps showing the location of 67 self-reported LTSE platforms on the European continent in relation to examples of biophysical, anthropogenic and intangible interpretations of the landscape concept (Grodzinskiy 2005; Angelstam et al. 2013a).

(left) Biogeographical regions (official delineations used in the EU Habitat Directive (92/43/EEC) and for the EMERALD Network under the Bern Convention); see http://www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-europe-2001/biogeo_graphic.eps).

<https://www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-in-europe-2>

links available:

This map reflects the status of the Biogeographical Regions in Europe from 2016 onwards. Changes compared to previous versions are explained in the source dataset.



2-2 Antropogenic impact on forests

(right) Areas with different anthropogenic impact on European forests exemplified by the gradient from forest biogeographical regions with forest cover <40% and ≥40% (Schuck et al. 2002) to large intact forest landscapes (Potapov et al. 2008). The biogeographical regions where forest is not the potential natural vegetation include arctic, pannonian, anatolian and steppe; see map A.

- ➔ The page should also show the 67 LTSER areas which fall in Alpine, Arctic, Black Sea, Continental etc. Biogeographical regions. Possibly with a doubt category... And with links to their DEIMS url.

2-3 Ecosystem types

<https://www.eea.europa.eu/data-and-maps/data/ecosystem-types-of-europe>

Ecosystem types of Europe

Topics: Biodiversity — Ecosystems

The dataset combines the Corine based MAES ecosystem classes with the non-spatial EUNIS habitat classification for a better biological characterization of ecosystems across Europe. As such it represents probabilities of EUNIS habitat presence for each MAES ecosystem type.

Based on EUNIS habitat classification level 1

- **100m**
[Download file](#)
- **1km**
[Download file](#)

Based on EUNIS habitat classification level 2

- **100m**
[Download file](#)

INSPIRE compliant metadata set

- [Download file](#)

2-4 Landscape types

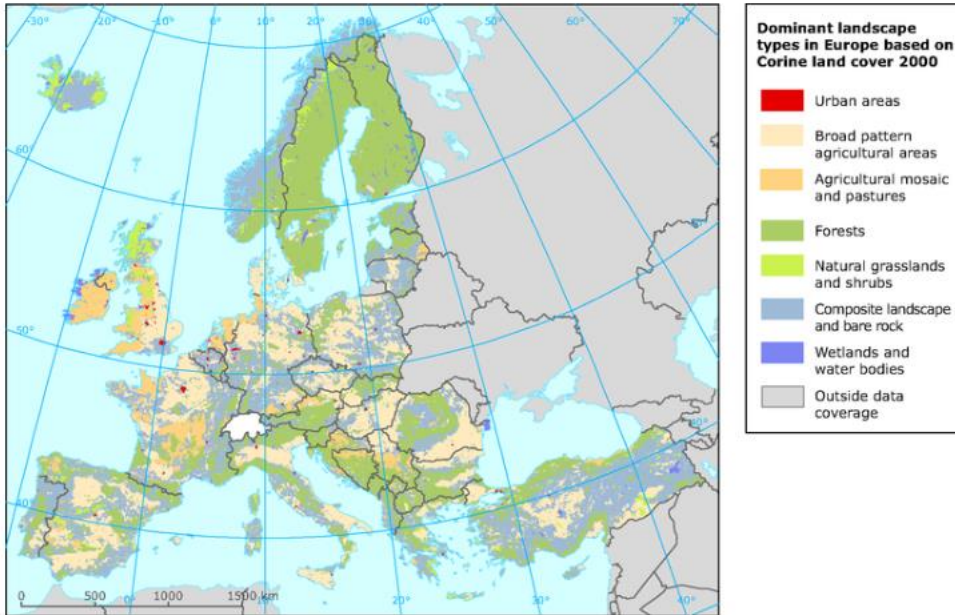
<https://www.eea.europa.eu/data-and-maps/figures/dominant-landscape-types-in-europe>

Dominant landscape types in Europe based on Corine Land Cover (CLC) 2000

Figure — Created 04 Oct 2012 — Published 22 Oct 2012 — Last modified 27 Nov 2017
— 1 min read



Topics: Biodiversity — Ecosystems



Download

2-5 Ecological quality

<https://www.eea.europa.eu/data-and-maps/figures/estimated-high-nature-hnv-presence>

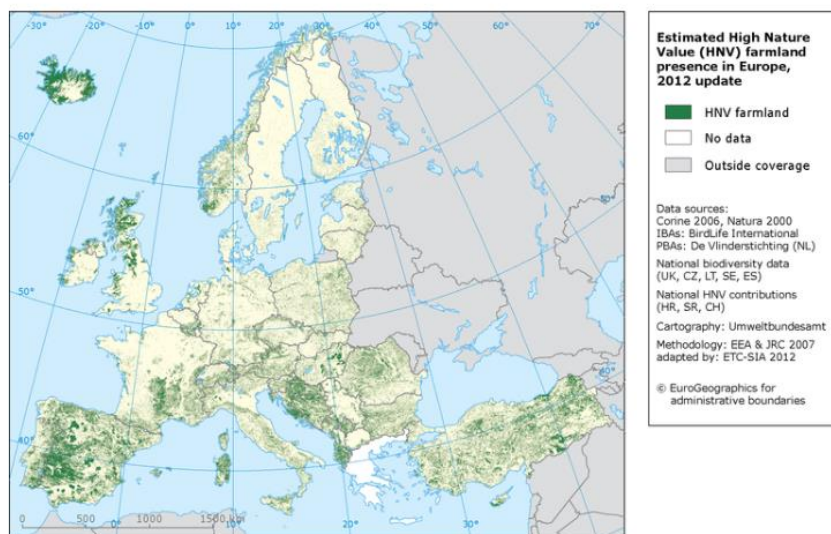
Estimated High Nature (HNV) presence in Europe

Figure — Created 29 Oct 2014 — Published 17 Feb 2015 — Last modified 07 Nov 2017
— 2 min read



Topics: Biodiversity — Ecosystems

How to read the map: Green areas show likelihood to contain primarily HNV land, on the basis of a stratified selection of CORINE land cover classes per country and environmental zone, and national biodiversity data when available. The values in the map are a proxy for the proportion of HNV in each 1 km² cell, 2012 update.

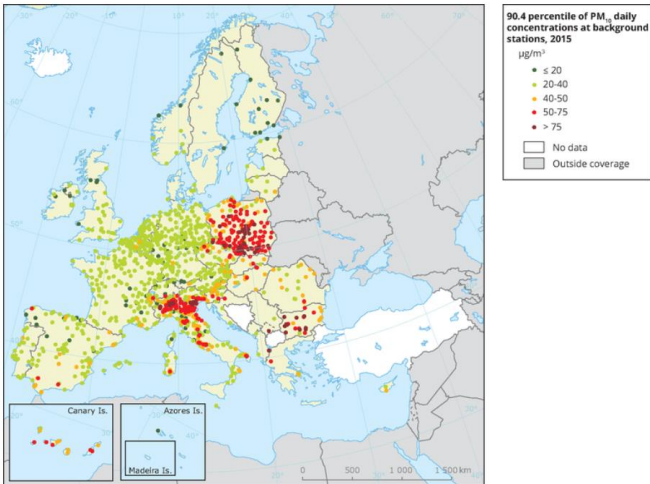


2-6 Environmental quality

90.4 percentile of daily PM₁₀ concentrations at background stations, 2015

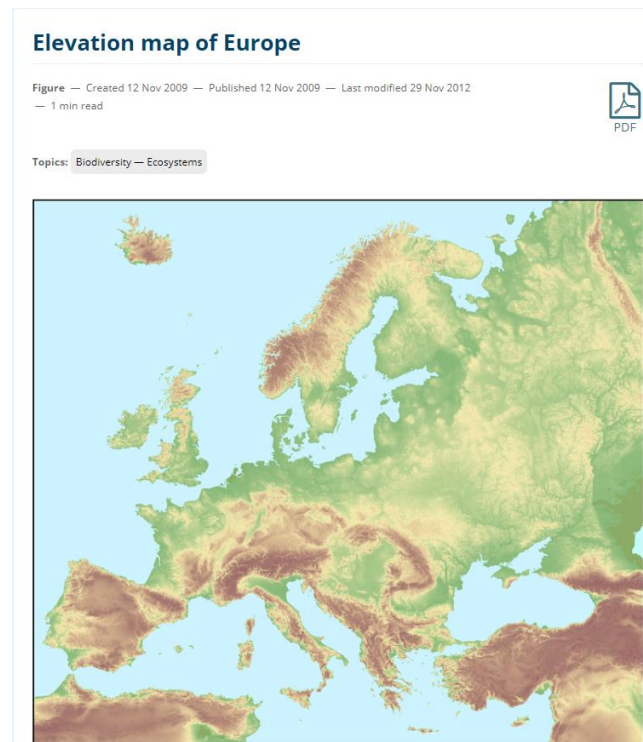
<https://www.eea.europa.eu/data-and-maps/figures/90-4-percentile-of-pm10-3>

The map shows the 90.4 percentile of daily mean PM₁₀ concentrations at background stations. This represents the 36th highest value in a complete series. It is related to the PM₁₀ daily limit value, which allows 35 exceedances of the 50 µg/m³ threshold over a 1-year period. The red and dark-red dots indicate stations with exceedances of this daily limit value. Only stations for which more than 75 % of data are valid have been included in the map.



2-7 Elevation map

<https://www.eea.europa.eu/data-and-maps/figures/elevation-map-of-europe>



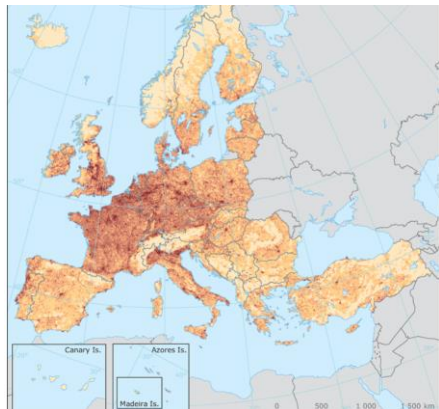
DASHBOARD 3 Land use and land-use change and LTSER platforms

(also linking to EU statistical sources and to the Marine Elbakidze survey tool on land use change)

3-1 Fragmentation

<https://www.eea.europa.eu/data-and-maps/figures/fragmentation-pressure-number-of-meshes>

(includes downloads)



3-2 Imperviousness

<https://www.eea.europa.eu/data-and-maps/data/copernicus-land-monitoring-service-imperviousness-2>

Based on the high-resolution raster data of 2006 2009 2012

3-4 CORINE

The dashboard should show a map with the surface categories for 2012 at least.

<https://www.eea.europa.eu/data-and-maps/data/copernicus-land-monitoring-service-corine>

But these following datavisualisations are also very powerful for LTSER pressures

Related content

Figures produced Visualisations produced



Agricultural land conversions



Expansion of artificial surfaces



Woodland creation



Estimated soil erosion by water in Europe

3-5 agricultural land conversions

3-6 Expansion of artificial surfaces

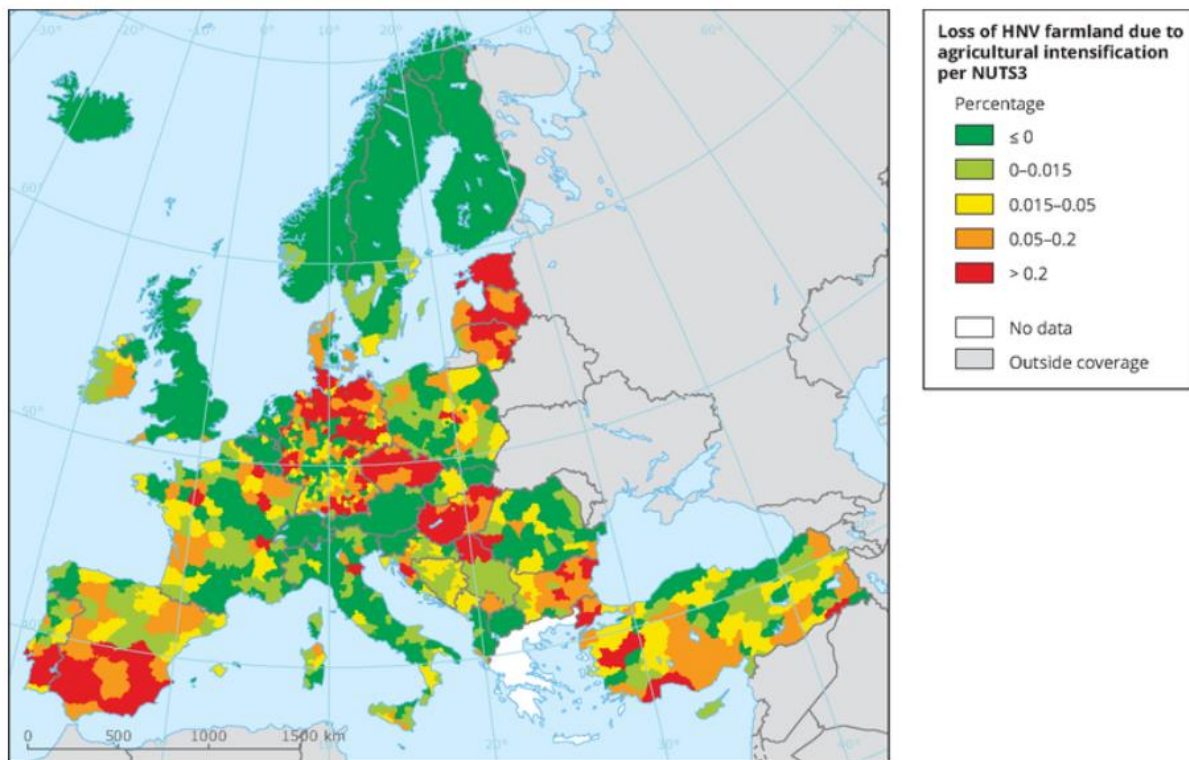
3-7 Woodland creation

3-8 Estimated soil erosion by water in Europe

3-9 Loss of High Nature Value Farmland

<https://www.eea.europa.eu/data-and-maps/figures/loss-of-hnv-farmland-due>

The High nature Value Farmland (HNV) comprises hot spots of biodiversity in rural areas and is usually characterised by extensive farming practices. This figure shows where the HNV are at higher risk due the pressure of agricultural intensification.



Download available

3-10 Designated areas under pressure

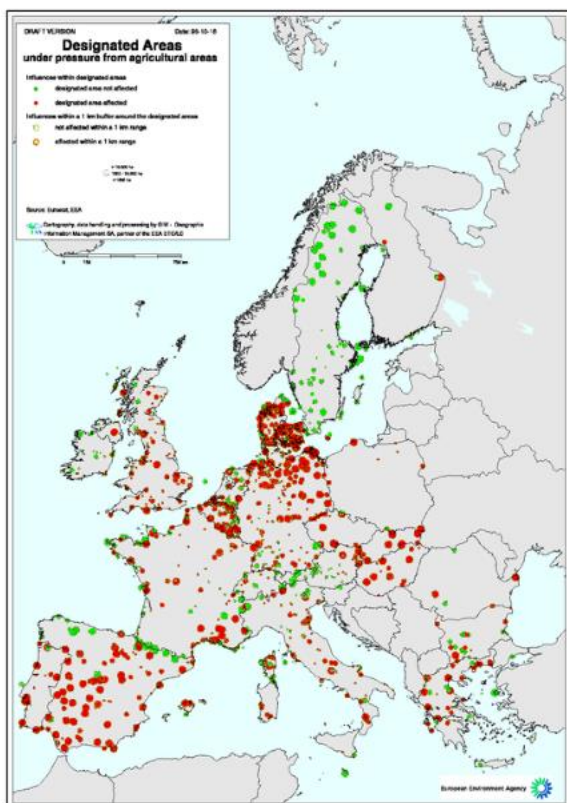
<https://www.eea.europa.eu/data-and-maps/figures/designated-areas-under-pressure-from-agricultural-areas>

Designated areas under pressure from agricultural areas

Figure — Created 12 Nov 2009 — Published 12 Nov 2009 — Last modified 29 Nov 2012
— 1 min read

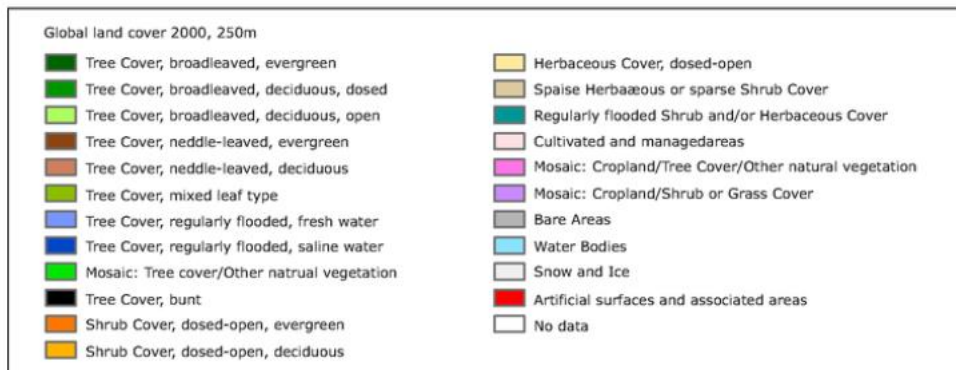


Topics: Biodiversity — Ecosystems



3-11 Global land-cover 250 m

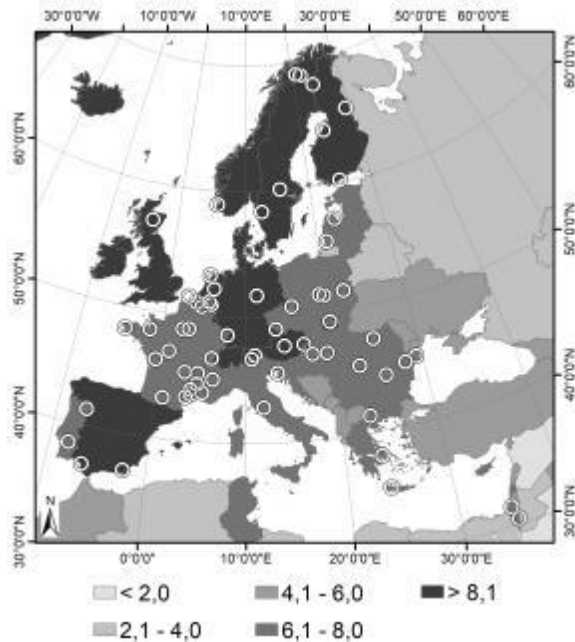
<https://www.eea.europa.eu/data-and-maps/figures/global-land-cover-2000-250m>



DASHBOARD 4: Governance

4-1 Title: Democracy

The Economist Intelligence Unit's (2017) democracy index, which ranges from 0 to 10 (With 0 representing less democracy and 10 representing higher democracy). Because polygons were available for only 43 of all 67 reported LTSER platforms at the end of 2016 the map illustrates their location with a ring covering 10,000 km² (Angelstam *et al.* 2018).



4-2 Spatial planning system

<https://www.espon.eu/planning-systems>

4-3 Natura 2000

<https://www.eea.europa.eu/data-and-maps/data/natura-9#tab-gis-data>

<https://www.eea.europa.eu/data-and-maps/figures/natura-2000-birds-and-habitat-directives-8/eu28-birds-and-habitats-directives>

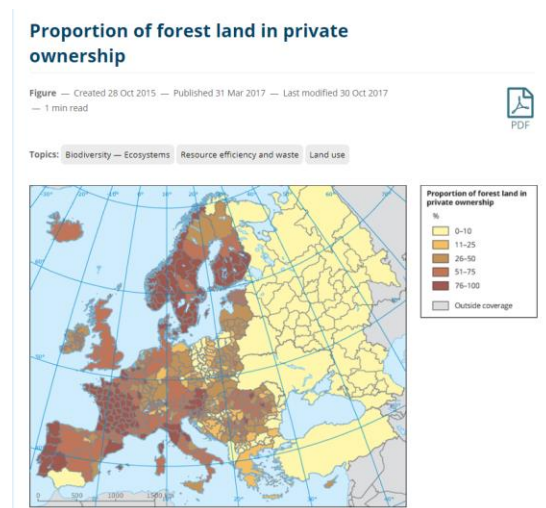
4-4 Nationally designated areas

2009 site boundaries, status 2014.

<https://www.eea.europa.eu/data-and-maps/figures/nationally-designated-areas-cdda-2009-site-boundaries-4>

4-5 Forest in private ownership

<https://www.eea.europa.eu/data-and-maps/figures/proportion-of-forest-land-in>



DASHBOARD 5 Economic growth and well-being and LTSER platforms

(also linking to EU statistical sources)

5-1 Population: density and development

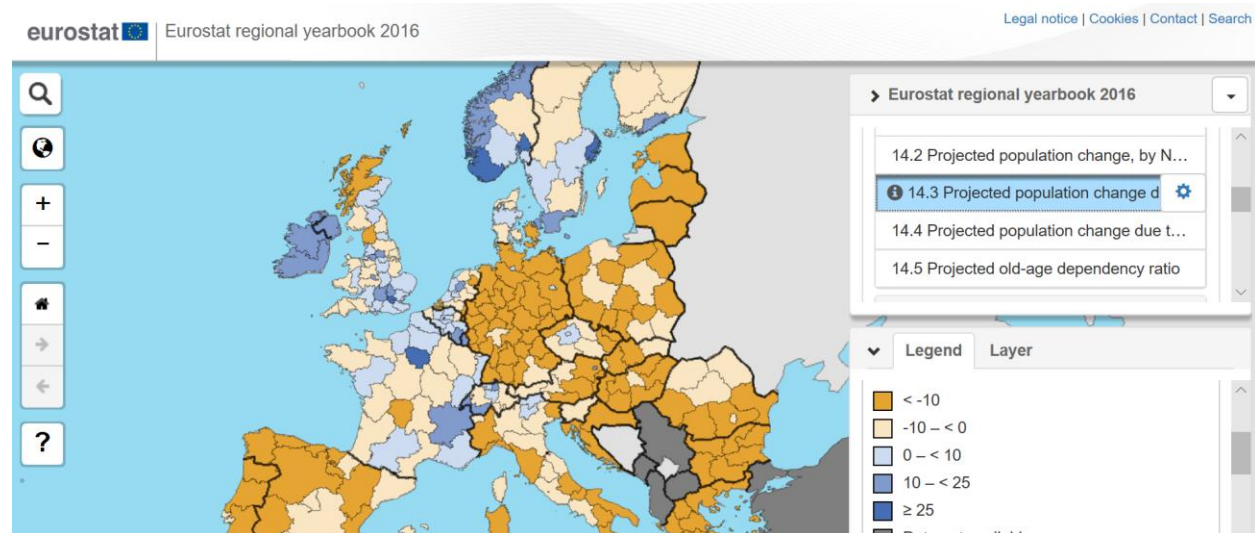
global human settlement data:

1975, 1990, 2000, 2015

per km²

http://ghsl.jrc.ec.europa.eu/ghs_pop.php

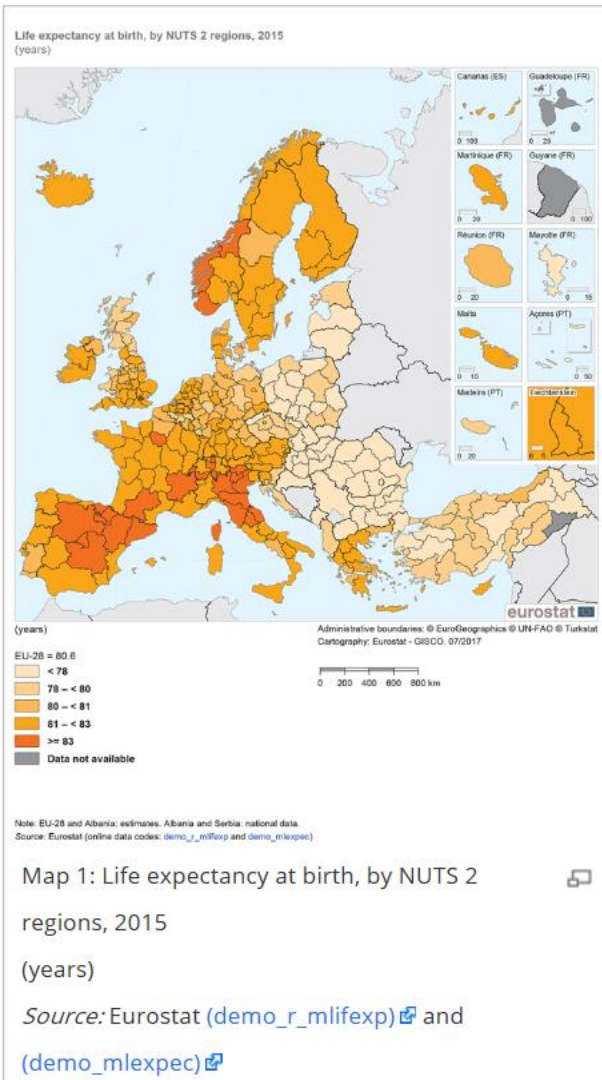
5-2 Projected population change due to natural development



➔ Page should contain lists of declining population-LTSErregions and high population growth LTSErregions

5- 3 Life expectancy

NUTS 2



http://ec.europa.eu/eurostat/statistics-explained/index.php?title=Population_statistics_at_regional_level#Life_expectancy

5-4 Material well-being, economic growth and their development

5-4 A **Gross domestic product (GDP) per inhabitant** in purchasing power standards (PPS) in relation to the EU-28 average, by NUTS 2 regions, 2015

5-4 B **Growth of GDP (GDPGROW), 2010-2015**. (Kaart Richard: Clustered?)

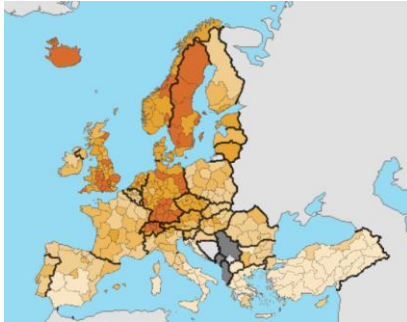
OR

Change of gross domestic product (GDP) per inhabitant in purchasing power standards (PPS) in relation to the EU-28 average, by NUTS 2 regions, **2007–2015** (EXCEL FILE DIMITRIS)

5-5 A **Employment rate, persons aged 20–64**

Employment rate, persons aged 20–64, by NUTS 2 regions, 2016 (%)

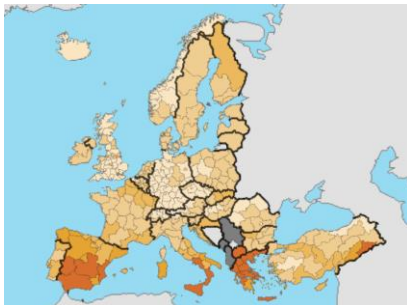
Source: 5.1 in [Eurostat regional yearbook 2017](#) ec.europa.eu/eurostat/statistical-atlas/gis/viewer/



5-5 B **Unemployment rate, persons aged 15–74**

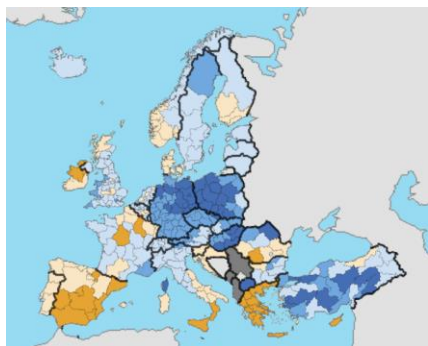
Unemployment rate, persons aged 15–74, by NUTS 2 regions, 2016 (%)

Source: 5.5 in [Eurostat regional yearbook 2017](#) ec.europa.eu/eurostat/statistical-atlas/gis/viewer/



5-5 C **Change in employment rate:2006-2016**

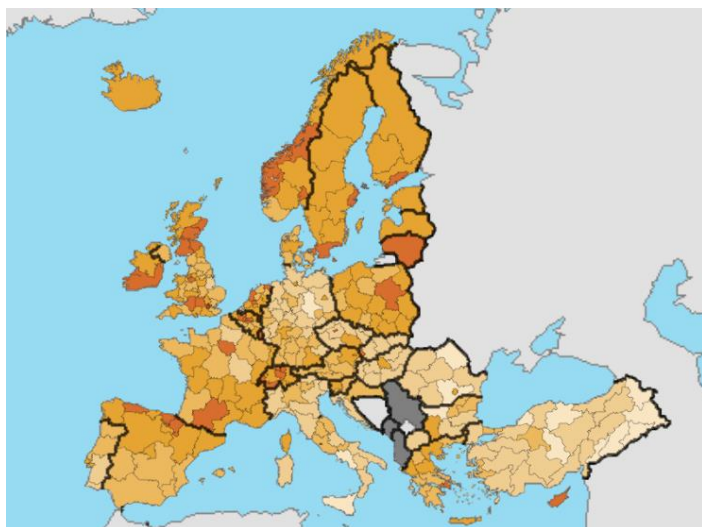
Source: 5.2 in [Eurostat regional yearbook 2017](#) ec.europa.eu/eurostat/statistical-atlas/gis/viewer/



<http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/?mids=BKGCNT,C05M02,CNTOVL&o=1,1,0.7&ch=POP,C05¢er=54.00172,33.72866,2&lcis=C05M02&>

5-6 Education

5.5 Share of persons aged 30–34 with tertiary education (ISCED levels 5–8) attainment Share of persons aged 30–34 with tertiary education (ISCED levels 5–8) attainment, by NUTS 2 regions, 2016 (%)



<http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/?mids=BKGCNT,C04M05,CNTOVL&o=1,1,0.7&ch=POP,C04¢er=54.00172,33.72866,2&lcis=C04M05&>

Link in text to OECD regional well-being

OECD: regional well-being indicators (<https://www.oecdregionalwellbeing.org/index.html>).

Select a region relevant to LTSEr and find regions with comparable well-being structure



➔ Lists of high well-being and low well-being LTSErS

DASHBOARD 6 Relating nature related human well-being to LTSEr areas

For 5 countries: Netherlands, Germany, Denmark, Switzerland and Italy (the five countries in Europe where we have serious numbers of respondents for Greenmapper) we look at the appreciation of LTSEr area by the population. Where are the hotspots of appreciation, and are these hotspots located in LTSEr platforms. Which LTSEr Platforms are relatively highly appreciated, which lesser.

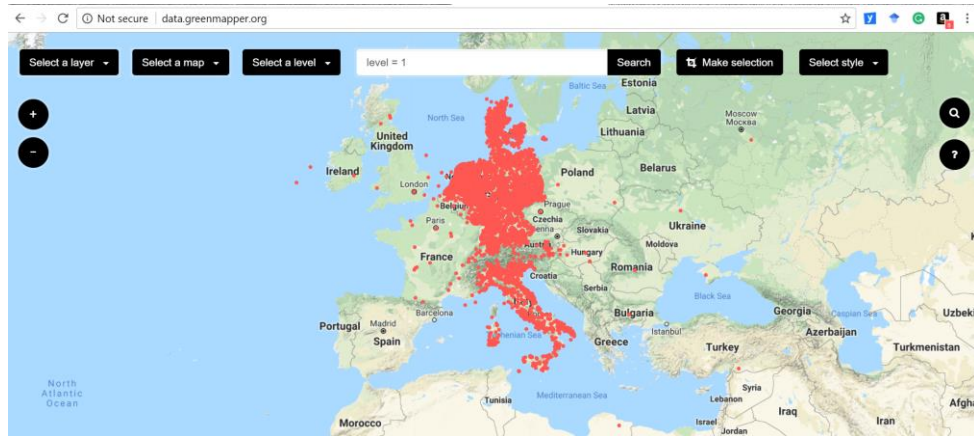


Figure 6-1. Home locations of respondents to the Greenmapper survey that identifies nature-related human well-being to LTSER areas

6-1 Greenmapper Global level markers

6-2 Greenmapper National level markers

6-3 Greenmapper Regional level (for NUTS 3 level with a reasonable amount of markers/respondents)

6-4 Greenmapper local level markers (for km2 with at least 10 respondents)

6-5 Greenmapper location markers

6-6 Greenmapper fans plots Wadden (% of people from NUTS ½ in Netherlands, Germany and Denmark)

6-7 Greenmapper fans plots for some other area Cairngorms national park or just Scotland total

6-8 Greenmapper clustermaps (heatpoly; or perhaps with different clusterings)

6-9 Greenmapper clustermaps plus overlay with LTSER areas

With in text a link to www.greenmapper.org

Appendix 3 Email text of survey round 3, sent to 67 LTSER platforms

(Sent late April 2017)

Dear LTSER colleague,

We from the H2020 eLTER project are working on strengthening the LTSER platforms as a European research infrastructure. For this reason we want to bring two things for all LTSER platforms.

First, we want to gather in an online map-portal socio-economic data about the regions where LTSER platforms are located (as a part of the DEIMS database). The coming months we will gather data from the OECD, Eurostat and from the CORINE land-use database about the different LTSER regions. This will enhance the possibilities for comparative international place-based research with multiple LTSER platforms. We want to make it easy for platform managers and researchers to more easily position their own areas in a European socio-economic context, and answer questions like: How does my LTSER platform area/region perform in terms of ecosystem service delivery in comparison to other European LTSER areas?

We from the eLTER project will do the data compilation and thus work for you!

But first of all we need to be sure where your LTSER area is located!

Sometimes we only have a point, no area!

Therefore, can you please spare a few minutes to go to ltser.greenmapper.org to either (1) confirm that the polygon shape we have for your LTSER area is correct, or (2) edit the shape of the default circle area (which we made if only a point was available). If you edit the shape, don't worry too much about precision. It is OK to draw the rough contours according to your own perception, since these will always be much better than a simple point.

Second, we want to prepare future joint LTSER research and management benchmarking on the cultural ecosystem service delivery of different LTSER regions. For which people is the nature in the LTSER area important and attractive? For this future research we want to make use of an internationally standardized online survey called Greenmapper ([see. www.greenmapper.org](https://www.greenmapper.org)). This survey has been used already in different countries and translated to a few different languages: Dutch, German, Danish, Hungarian, Portuguese and South-Korean. But for future joint research this survey needs to be translated in all relevant LTSER languages. For this reason, we would like your help in translating the Greenmapper survey to your own language (if not already available). The translation will probably take about an hour. It is a half-automated process which you can spread in time this spring/early summer. Could you spare another minute and indicate at translate.greenmapper.org whether you are willing to help in translating? You will then be contacted by us about the exact procedure.

Thank you very much for your cooperation!

All the best,

Frans Sijtsma (University of Groningen, The Netherlands) and Per Angelstam (SLU, Sweden)