

The GEOSTAT project

(Version 20080929)

Geostatistics to describe monitor and analyse human societies and their habitat.

Background

Solvable problems?

In the light of current Global concerns like overpopulation, climate change, threats to important ecosystems, limited resources etc. it seems obvious that we cannot do without well orchestrated integrated policies, programs, plans and projects for sustainable development.

We need a true IISS¹

In tune with the “information society” and the conviction that “if you cannot describe it, you cannot manage it”, it stand to reason that the cluster of major projects oriented towards this end, must share the overriding purpose and rest their actions on a sound foundation of qualified information.

The first step towards “a sound foundation of qualified information “ would be to make sure that all major actors cooperate to form a harmonised hierarchical integrated information system of systems (an IISS?) to serve as a shared frame of reference for all major government and the market actions. This integrated system of knowledge must take a holistic approach and describe the dialectic between the environment (both natural and artificial systems) and society (both economic and sociocultural systems). It should also include all major projects like INSPIRE (with its focus on cartographic information), GMES (with its focus on remote sensing), SEIS (concentration on information to describe the natural environment). It should also include and support initiatives attempting to build information systems that are lacking as for instance a shared SDI to describe, monitor and analyse human societies and their habitat. The GEOSTAT project is an initiative to fill this gap.

Maps and Statistics and commentaries

To pursue the ideal of sustainable development, it is essential that we are able to describe our world as systems of phenomena in space and time. According to the state of the art for this kind of modelling, we use an OO approach to describe the world as a system of objects. Objects are modelled in terms of the spatial aspects (maps) and in terms of their properties (statistics). A qualified description, monitoring and analysis of man-environmental systems thus require a proper integration of geography and statistics.

All issues related to our actions require a broad professional, intellectual and political discourse to keep projects on track. It is therefore essential that an integrated IISS also include the need to access a great range of alphanumeric

¹ It may be argued that the GEOSS project is a genuine IISS, but since this initiative does not include descriptions of societies and the human habitat, it is restricted to descriptions and analysis's of natural systems in a global perspective.

documents with relevance to the man-environmental systems modelled in our shared IISS.

The next user of an integrated infrastructure of spatial data will, we believe, in most cases be well served with a data infrastructure and web services to seek, explore, buy and download not only the cartographic information that the current state of the INSPIRE project offers, but all three major information types: maps, statistics and commentaries.

The Geostat project

The GEOSTAT project aims to provide public authorities and the market with a harmonised system of geostatistics to describe monitor and analyse human societies and their habitat that integrated with other information systems may serve as a foundation for policies programs plans and projects for sustainable development in Europe.

Geostatistics

To describe and analyse Society and the human habitat

We have, during the last decades, seen the emergence of a series of impressive initiatives to describe monitor and analyse the environment, but none except traditional systems of administrative areas (as the NUTs-based ESS system on the European level) to describe human societies and their habitat with (geo-) statistical methods. Why this focus on the effects while neglecting the causes of many of these problems?

Administrative areas not suitable for spatial analysis

When discussing any of the big issues above, it is essential that we are able to describe and analyse integrated causes and effects on both society and the environment. A quick look at a map showing structure of the Nuts system in combination with the structure of water catchment areas on different levels will reveal the obvious: These administrative areas excellent for reporting purposes, but not very suitable for the kind of spatial analysis needed to discover and respond to threats and opportunities in our search for paths towards sustainability.

A hierarchy of grids (The grid alternative)

We have a proposal for a Eurogrids system that provides a hierarchy of stable, neutral harmonized system of grids that may serve as a foundation for spatial analysis across all disciplines that rely on spatial analysis. This is certainly the case for statistics in general, but especially for demographics and socioeconomic descriptions of human societies and their habitat.

The Geostat project

Objective

The objective of the project proposal is twofold:

1. To deliver an infrastructure for system of Geostatistics
The primary objective of the GEOSTAT is to provide a harmonized high resolution foundation for spatial statistics that may serve as a foundation for policies programs plans and projects for sustainable development in Europe.
2. To contribute to an Integrated Information System of Systems (IISS)
The secondary objective is to contribute to the integration of

GEOSTAT with all major other major European information systems (GMES,INSPIRE, SEIS etc.).

Six sub projects (Work packages)

We hope, that the Geostat maps will gradually, through a series of iterations, become so accurate that they may be used for comparable analysis's across the union.

1. Project management (and coordination)

The project management work package consists of 2 key tasks:

- 1.1. Project Coordination. A task mainly focussing on professional issues including reporting and documentation
- 1.2. Project management that is focussed primarily on finances and administration issues.,

Objectives:

Deliverables:

2. User needs

This work package will describe real user needs with regards to a harmonized high-resolution foundation for geostatistics that may serve as a foundation for more detailed socioeconomic information at a later stage.

2.1. User needs from a Public authority perspective

2.2. User needs from a Market perspective

Objective: To start an iterative accumulative process towards a deeper understanding of real user needs with regards to geostatistics.

Deliverable: An analysis of users and their needs that may be used as a foundation for professional discussions for the development of an information system for GeoStatistics as discussed in this project.

The "user needs" workpackage should provide specification required for workpackages 3-4.

3. GeoStatistics

The second is to compile a dataset that serve to map the gross European population on km² grids (for the whole europe 27+ territory) and demonstrate its utility on a series of representative case studies. This will be achieved through a tripple strategy.

3.1. The first "top-down" strategy is intended for those countries that have census-based systems to compile demographic information. In its first iteration this project used corine landcover data to disaggregate nuts3 statistics to km² grids.

3.2. The second "bottom-up" strategy is used by countries that have register-based systems, or otherwise may aggregate their small area statistics to km² grids.

3.3. The final third "hybrid" strategy is to search methods to produce a third map by using the "bottom-up" dataset to calibrate the disaggregation of data in the "top-down" strategy in order to improve the over-all dataset.

Objective: To start an iterative accumulative process towards a system of geostatistics with focus on descriptions of human societies and their habitat.

Deliverable: A dataset starting with mapping the gross population of Europe on 1km grids. This dataset will then be successively be improved and developed over a series of iterations over time.

4. Infrastructures

The third concern is to provide the necessary SDI required to structure spatial statistics and communicate/disseminate geostatistics over the web,

4.1. Data Infrastructures

4.2. Technical infrastructure

Objective: To start an iterative accumulative process towards a spatial data infrastructure for geostatistics.

Deliverable: Draft for an infrastructure for geostatistics and its presentation on the web. The infrastructure will focus on an extended object model, metadata, and an extended web statistical service.

5. Contactpoint

The contactpoint will carry the responsibility for contacts with related projects and partners.

Objectives:

Deliverables:

6. Evaluation, distribution and dissemination

6.1. The EFGS will function as a professional reference for the Geostat project. This network of experts from key users and and producers communities will scrutinize the output for every iteration and suggest improvements to the project result.

6.2. The dissemination task will be concerned with the distribution of the project results over the internet.

6.3. The exploitation task will have to consider how to make sure that our users may integrate our data into their systems.

Objective: To start an iterative accumulative process towards an integrated network of professionals working in cooperation with key user communities to develop adequate information systems for the description, monitoring and analysis of human societies and their habitat.

Deliverables:

The network will organise professional conferences and workshops. The dissemination task will make the project results visible on the web. The exploitation task will measure its result on registered active users.

Initiatives

The Geostat project would like to see its efforts in a hierarchical perspective

1. National initiatives (e.g. Geostat_Slovenia , Geostat_Sweden etc.)

The project encourages each of the member countries to provide and develop a population gridmap for Europe.

2. An European Initiative (Geostat_Europe)

This project is described in these pages. we take for granted that Europe should be in the lead to pioneer the integration of information systems.

3. A Global initiative (Geostat_Earth)

In order to participate in ongoing efforts to map and analyse the global population in harmonisation with the local national and

European efforts, The European Forum for Geostatistics plan to invite the international community of experts that work in this field to a symposium with the objective to map the global population on km grids.

Project implementation

Consortium

The consortium to lead and implement the GEOSTAT project will mainly consist of representatives from a series of National Statistical Institutes (NSI's) in Europe, since March 2008 organised as the European Forum for Geostatistics.

Leading partner:

- Statistics Sweden

Consortium:

- Statistics Austria
- Statistics Denmark
- Statistics Estonia
- Statistics Finland
- Statistics Netherlands
- Statistics Norway
- Statistics Poland
- Statistics Slovenia
- Statistics Switzerland
- Etc.

Partners

The European Forum for Geostatistics is seeking cooperation with a series of projects, organisations and institutions that supports the need for a proper geostatistical system. We are discussing, or seeking discussion with:

- INSPIRE
- EUROSTAT
- ESPON
- GMES
- EEA
- SEIS
- ETC.

Implementation

The GEOSTAT project is intended to become a more extensive and permanent project to provide a future IISS with information to describe, monitor and analyse human societies and the human habitat. This will be attempted over a series of iterative steps starting with an initiation project with a duration of 36 months (30 month project + 6 months evaluation). The start of the initiation project depends on funding and mandate, but is at present set to January 1 2009.

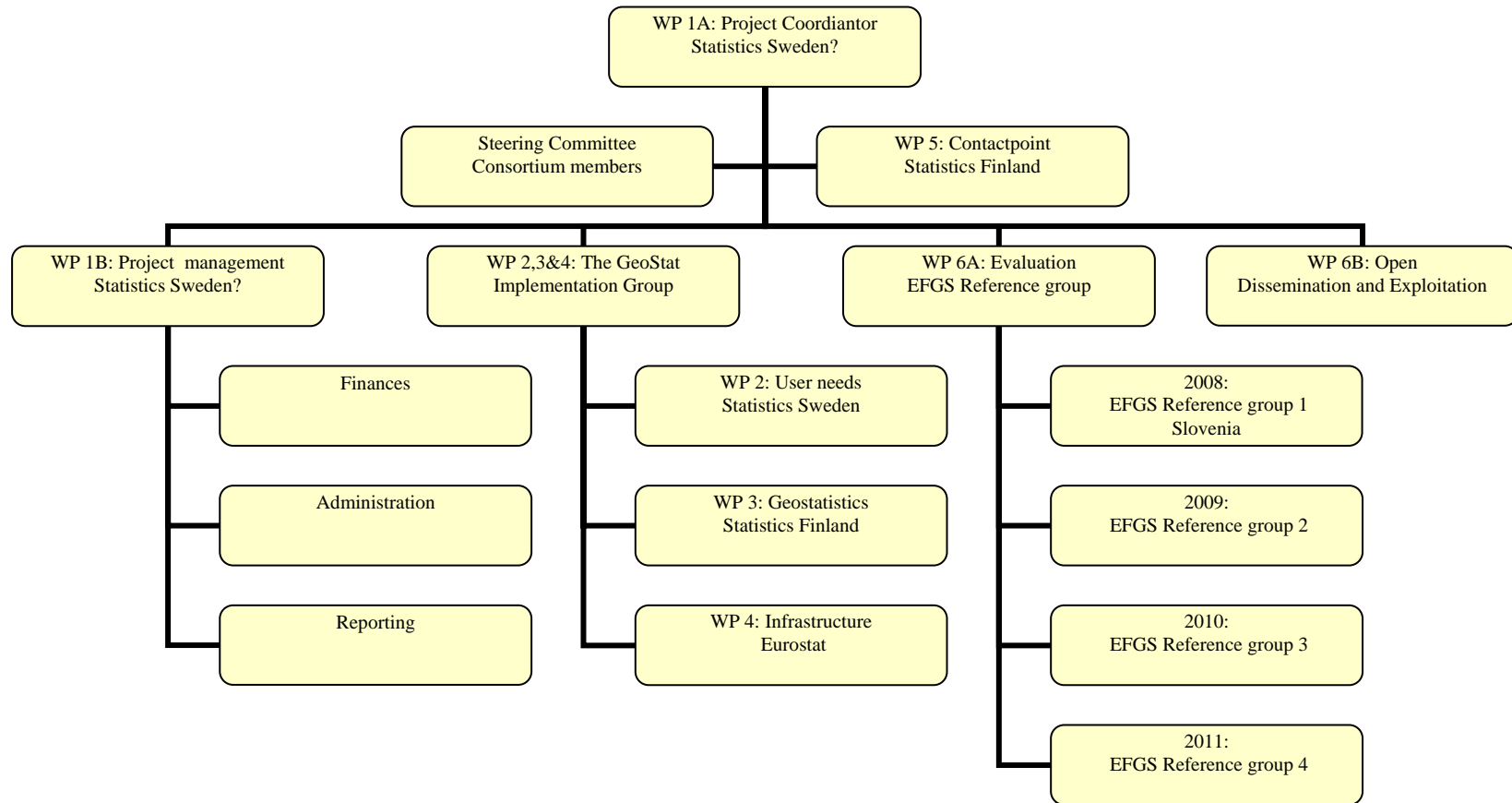
Milestones

1. Preparation 2008

- 1.1. Presentation of the GEOSTAT as an ESSnet project at the annual Eurostat joint Working party meeting on "Geographical Information Systems for Statistics", Luxembourg, March 2008.

- 1.2. Contributions to the INSPIRE conference in Maribor (June / July 2008). (“The next step towards an integrated SDI for Europe”)
- 1.3. 1st European forum For GeoStatistics Bled October 1-3, 2008. Draft for GEOSTAT project proposal.
- 1.4. Submission of ESSnet proposal for the GEOSTAT project (December 2008)
2. Year 1: 2009
 - 2.1. GEOSTAT contribution to the annual Eurostat joint Working party meeting on "Geographical Information Systems for Statistics", Luxembourg, March 2009.
 - 2.2. Contributions to the INSPIRE conference in Rotterdam (June / July 2009).
 - 2.3. 2nd European forum For GeoStatistics October, 2009. Draft for GEOSTAT project proposal.
 - 2.4. Contribution to the UN Climate Conference in Copenhagen 30. November - 11. December 2009.:
To launch the idea of a 3 international (UN-ECE?) annual workshops on Global Population Grid maps for spatial analysis.
3. Year 2: 2010
 - 3.1. Presentation of the GEOSTAT as an ESSnet project at the annual Eurostat joint Working party meeting on "Geographical Information Systems for Statistics", Luxembourg, March 2010.
 - 3.2. Contributions to the INSPIRE conference in Rotterdam (June / July 2010).
(Progress report 1 from the GEOSTAT project)
 - 3.3. 3rd European forum For GeoStatistics October, 2010. Progress report 1 for the GEOSTAT project.
 - 3.4. 1st Global (UN-ECE?) International Workshop on “Global Grid maps for Spatial Analysis 1”.
4. Year 3: 2011
 - 4.1. Report to the annual Eurostat joint Working party meeting on "Geographical Information Systems for Statistics", Luxembourg, March 2011.
 - 4.2. Contributions to the INSPIRE conference (June / July 2011).
(Report 2 from the GEOSTAT project)
 - 4.3. 4th European forum For GeoStatistics October, 2011. Progress report 1 for the GEOSTAT project.
 - 4.4. 2nd Global (UN-ECE?) International Workshop on “Global Grid maps for Spatial Analysis 2”.
5. Year 4: 2012
 - 5.1. Report to the annual Eurostat joint Working party meeting on "Geographical Information Systems for Statistics", Luxembourg, March 2012.
 - 5.2. Contributions to the INSPIRE conference (June / July 2012). (Report 1 from the GEOSTAT project)
 - 5.3. 5th European forum For GeoStatistics October, 2012. Progress report 1 for the GEOSTAT project.
 - 5.4. 3rd Global (UN-ECE?) International Workshop on “Global Grid maps for Spatial Analysis 3”.

Organisation



Budget 1: Estimated Total costs

Project	Distribution		Estimated costs		Partner funding	ESSnet funding
	Key 1	Key 2	Total WP	Total Tasks	30%	70%
WP1 Management (administration)	15%		€ 150 000	0 €	45 000 €	105 000 €
1.1 Management		50%	€ 0	75 000 €	0 €	0 €
1.2 Coordination		50%	€ 0	75 000 €	0 €	0 €
WP2 User needs	20%		€ 200 000	0 €	60 000 €	140 000 €
2.1 Public Authorities		80%	€ 0	160 000 €	0 €	0 €
2.2 Market		20%	€ 0	40 000 €	0 €	0 €
WP3 Geostatistics	30%		€ 300 000	0 €	90 000 €	210 000 €
3.1 Bottom-up project		40%	€ 0	120 000 €	0 €	0 €
3.2 Top-down projects		40%	€ 0	120 000 €	0 €	0 €
3.3 Hybrid map		20%	€ 0	60 000 €	0 €	0 €
WP4 Infrastructures	20%		€ 200 000	0 €	60 000 €	140 000 €
4.1 Technical infrastructure		20%	€ 0	40 000 €	0 €	0 €
4.2 Data infrastructure		80%	€ 0	160 000 €	0 €	0 €
WP5 Contactpoint (INSPIRE etc)	5%	100%	€ 50 000	50 000 €	15 000 €	35 000 €
WP6 Evaluation, dissemination and exploitation	10%		€ 100 000	0 €	30 000 €	70 000 €
6.1 Reference group (EFGS)		50%	€ 0	50 000 €	0 €	0 €
6.2. Dissemination		30%	€ 0	30 000 €	0 €	0 €
6.3 Exploitation		20%	€ 0	20 000 €	0 €	0 €
Total	100%		€ 1 000 000	1 000 000 €	300 000 €	700 000 €

This is a first tentative budget for the Geostat project. For discussion only. The amounts are disaggregated from a total budget of 1000000€ for a 3 year project + costs for the followup (Year 4).

Budget 2: Estimated distribution of costs over time

	Project	Key 1	Total WP	Key 3.1	Year 1	Key 3.2	Year 2	Key 3.3	Year 3	Key 3.4	Year 4
WP1	Management (administration)	15%	€ 150 000	40%	60 000 €	20%	30 000 €	30%	45 000 €	10%	€ 15 000
WP2	User needs	20%	€ 200 000	40%	80 000 €	30%	60 000 €	30%	60 000 €	0%	€ 0
WP3	Geostatistics	30%	€ 300 000	30%	90 000 €	30%	90 000 €	40%	120 000 €	0%	€ 0
WP4	Infrastructures	20%	€ 200 000	40%	80 000 €	40%	80 000 €	20%	40 000 €	0%	€ 0
WP5	Contactpoint (INSPIRE etc)	5%	€ 50 000	30%	15 000 €	30%	15 000 €	30%	15 000 €	10%	€ 5 000
WP6	Evaluation, dissemination and exploitation	10%	€ 100 000	10%	10 000 €	30%	30 000 €	30%	30 000 €	30%	€ 30 000
Project	Total	100%	€ 1 000 000	34%	335 000 €	31%	305 000 €	31%	310 000 €	5%	€ 50 000

This is a first tentative budget for the Geostat project. For discussion only. The amounts are disaggregated from an assumed total budget of 1000000€ for a 4 year project (three years implementation and one year followup).

The Key 1 Shows the estimated distribution of the total budget between the 6 subprojects (workpackages). The Keys 3.1 – 3.3 show the distribution of costs over the planned 4 year period.

Funding

The total budget for the first initial (3 year) phase of the GEOSTAT project is estimated to 1000k € that the consortium hopes may be cofunded through the ESSnet programme (70%) and the NSI's (30%). The project will after the initial phase consider if it is feasible to continue the project as an EEIG.

Risks

The Geostat project is at present in a very vulnerable situation, as all initiatives project promotion and other activities is funded by the consortium member. We need the support of the European Commission and community of active EU partners to secure funding and mandate for necessary actions.

Stockholm, Monday, 29 September 2008

Lars H. Backer
Statistics Sweden
Interim Chair for the European Forum for GeoStatistics.

Annexes:

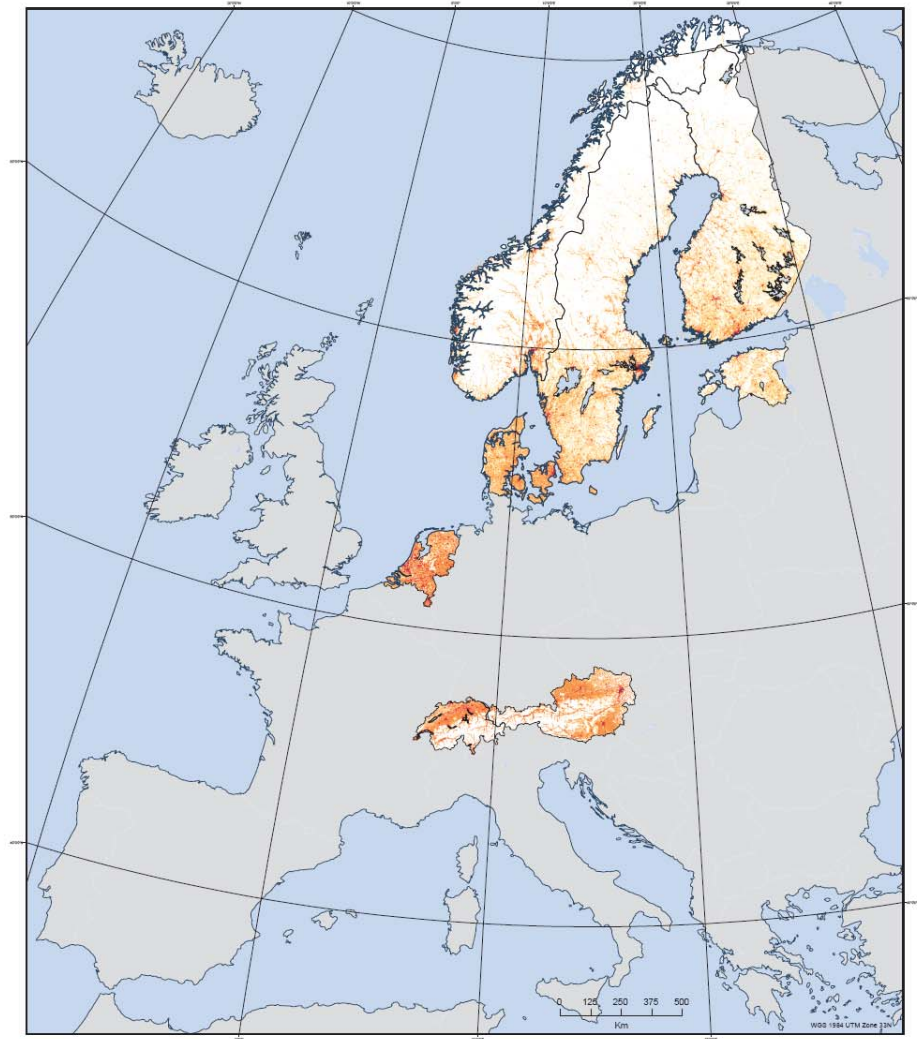
Please consult the following annexes:

1. Appendix 1: Population GridMap for Europe: The Bottom-up method (Aggregated data)
2. Appendix 2: Population GridMap for Europe: The Top-down method (Disaggregated data)
3. Appendix 2: Population GridMap for Europe: The hybrid map (Integration of the bottom-up and the top-down methods)

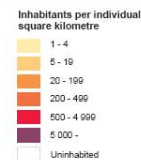
Appendix 1: Population GridMap for Europe The Bottom-up method (Aggregated data)

Population by 1 square km grids

A grid map based on population register data. Population data are geocoded with coordinates on buildings, addresses or real estates.



	Anglia	Denmark	Estonia	Finland	The Netherlands	Norway	Sweden	Switzerland
Date	1.1.2004	1.1.2005	31.3.2002	31.12.2004	1.1.2005	1.1.2005	31.12.2004	31.12.2000
Total area - km²	83 871	43 851	46 227	338 144	41 643	323 892	442 248	41 268
Land area - km²	82 720	43 036	42 264	324 472	33 763	294 202	410 335	39 862
Total population	5 268 104	5 411 426	1 170 262	5 238 611	16 302 656	4 609 362	8 211 362	7 288 002
Population - grid dataset	7 794 889	5 384 420	1 397 872	5 189 277	16 305 526	4 597 482	8 999 201	7 288 272
Population in grid cells - per cent	94,2	94,7	99,8	99,0	100,0	99,9	99,9	100,0
Inhabited grid cells	42 962	39 126	21 723	122 865	29 988	85 654	116 216	19 269
Inhabited grid cells - per cent of land areas	52	91	51	34	89	18	28	48
Inhabitants per km² land areas	102	126	52	17	483	16	22	182
Inhabitants per inhabited km²	181	139	63	52	544	82	77	278
Total population in one grid cell	24 896	21 634	17 362	17 222	21 179	18 197	23 362	23 237



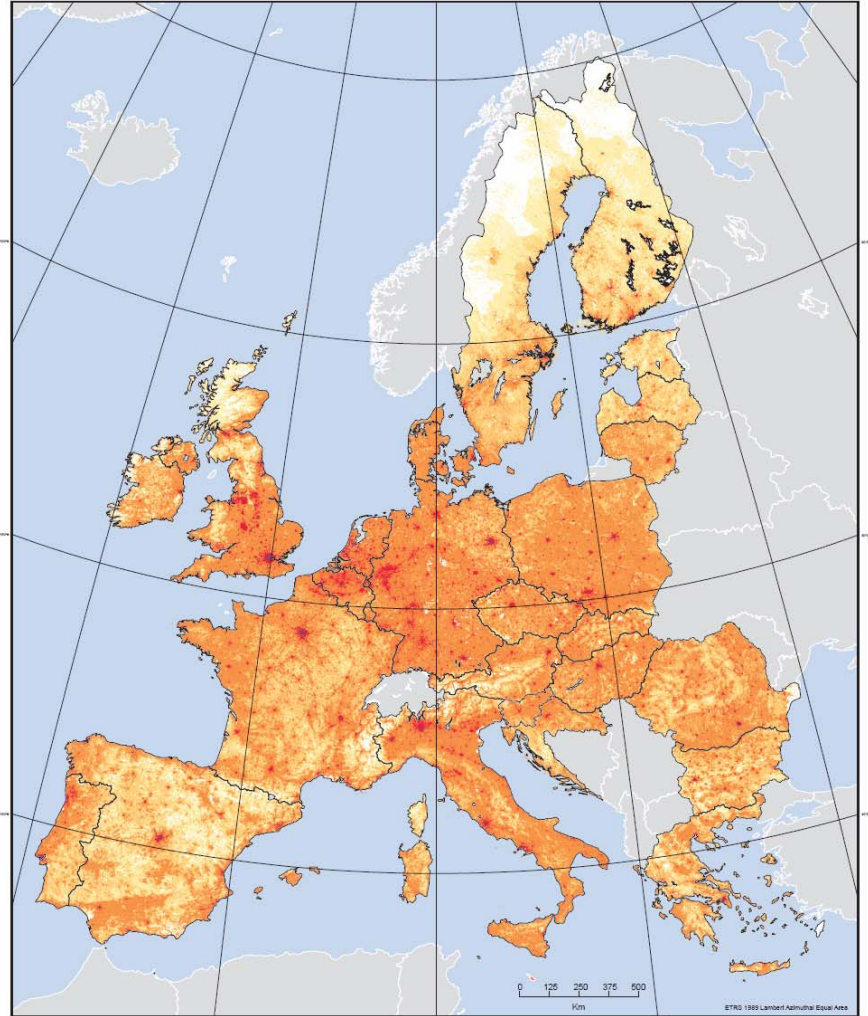
Statistics: National Statistical Institutes
Geographical features: © EuroGeographics for the administrative boundaries

Map composed by Statistics Finland 9/2006.

This map has a long history. It started with a Swedish GridMap presenting the gross population on 1km grids in 1994/95. Finland presented its own version the same year and the two maps were joined into one dataset at the end of that year. The further improvements to this map were presented at the yearly meetings of the Nordic Forum for GeoStatistics (founded 2000). Norway followed in 2002 and Denmark 2003 Then The Netherlands, Switzerland, Estonia and Austria followed in 2006.

Appendix 2: Population GridMap for Europe The Top-down method (Disaggregated data)

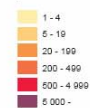
Population by 1 square km grids (estimated)



Population data based on disaggregation of population at LAU2 level through Corine Land Cover 2000 data to square km grids.

Data source: European Commission - JRC
Geographical features: © Eurogeographics for the administrative boundaries
Map composed by Statistics Finland 9/2006.

Estimated number of inhabitants per individual square kilometre



This Map was presented for the first time by Albrecht Wirtman (of the GISCO team Eurostat) was presented at the extended Nordic Forum for GeoStatistics in Kongsvinger (Norway) in 2006. It is produced with Nuts3 data disaggregated with Corine landcover data. The project has been improved by Javier Callego at JRC in ISPRA 2007. in cooperation with Rina Tammisto at Statistics Finland. Further plans for its improvement includes ideas to use data aggregated to of smaller statistical units on the one hand and better maps for disaggregation on the other.

Appendix 2: Population GridMap for Europe

The hybrid map (Integration of the bottom-up and the top-down methods)

Population by 1 square km grids

A hybrid grid map based on population register and estimated data.

