

Doing the  
spatial job  
through a  
satellite's eye



## OUR SERVICES AND PROJECT EXAMPLES

### BACKGROUND

GeoVille provides products, services and consultancy for geo-information applications specializing in satellite earth observation.

### SERVICES

GeoVille "starts its services where Google Earth ends" and transforms images into intelligent geo-information. Working with geographic information system and cutting edge image interpretation software is GeoVille's daily business. We are dedicated to customer satisfaction and deliver quality controlled products and a wide range of geo-information solutions in the following fields:

- Land cover mapping
- Urban and regional mapping
- Spatial Planning
- Infrastructure
- Cartography and Promotion
- Agriculture
- Forestry
- Environment and Consultancy

Our customers stem from private industry sectors, public organisations and research institutes.

### CAPACITY

Since its establishment in 1998 GeoVille has established a broad international customer base and successfully participated in more than 250 national and international projects located in over 60 countries around the world. GeoVille's team has experience and expertise in managing and executing projects from local to global scale in Europe, Asia, Africa and the Americas.

GeoVille allocates substantial resources to research and development resulting in outstanding geo-information products.

GeoVille is an **ISO 9001:2008 certified company**, member of AUSTROSPACE - The Association of Austrian Space Industries and EARSC - European Association of Remote Sensing Companies.

### ORGANISATION

At GeoVille, we know that success in the rapidly advancing field of remote sensing requires not only adequate technical infrastructure, but also profound understanding of the relationship between customer demands, fields of application and available technology — that is exactly what we offer.

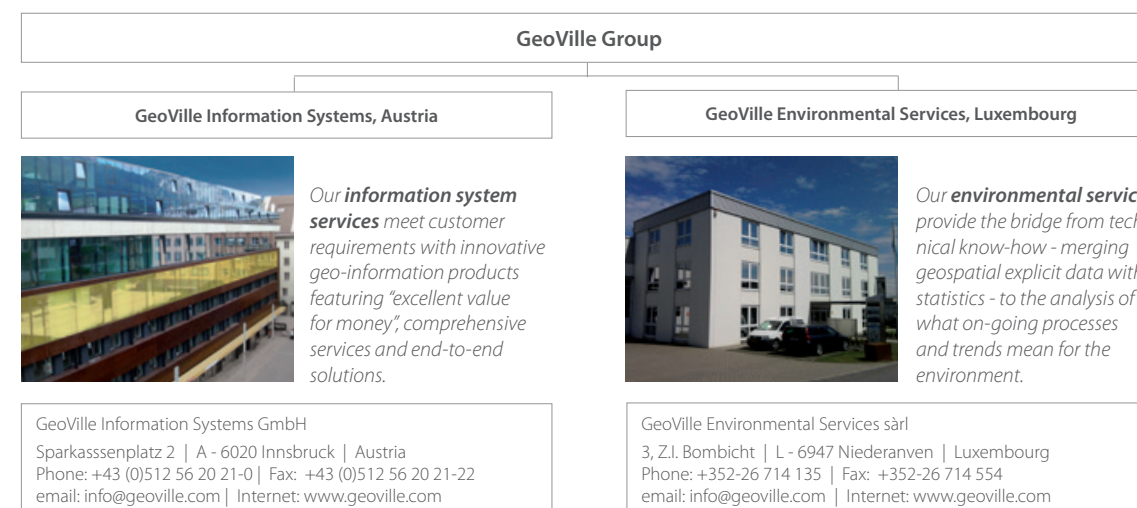
### GEODATA

With regard to the distribution of geodata, GeoVille owns the marketing and distribution rights for products of SPOT, TerraSAR-X, Pleiades, IRS-1C and 1D, GeoEye, Worldview, Quickbird, Landsat, Envisat, ERS, JERS, KVR 1000, IKONOS, RapidEye, NEXTMap® products (very high-resolution 3D digital elevation data and geometric images).

Together with these partners and with productions under own investment we have established an impressive quality controlled data and information archive, which is updated on a regular basis.



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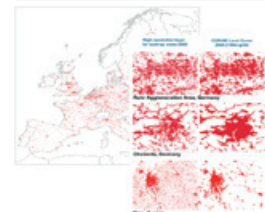
## REGIOCOVER – GEOVILLE SOFTWARE

### REGIOCOVER-LAND

Land cover mapping from satellite images and aerial photographs is a key component of RegioCover. Products range from local very high resolution mapping to continental scale applications covering millions of square kilometres.

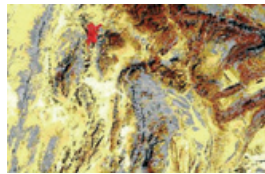
RegioCover significantly enhances GeoVille's capability to analyze images and automate their interpretation and to identify land cover with a high degree of automation and high thematic accuracy.

European map of built-up areas



Copyrights © EEA, GeoVille

Regional land cover data base Pakistan



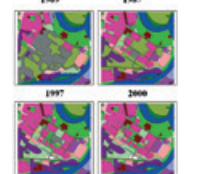
Copyrights © UN Operations Service, GeoVille

Urban land use data base Seoul / South Korea



Copyrights © EC, GeoVille

Urban land use data base Belgrade / Serbia



Copyrights © EC, GeoVille

Mesoamerican Biological Corridor Map



Copyrights © ESA, UNESCO, GeoVille

### REGIOCOVER-CADASTRE

RegioCover is employed to produce or update urban 'cadastral' data bases by detailed mapping of urban land use types and transport networks. RegioCover allows efficiently generating and validating high-precision land use maps using very high resolution satellite imagery (IKONOS, Quickbird) or aerial photographs for thousands of square kilometres.

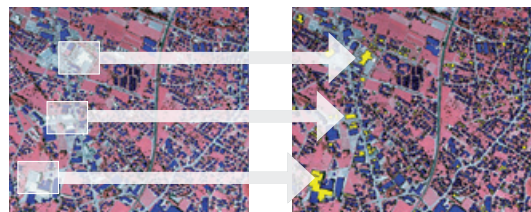
Classified land use maps are further processed with GIS-based post-processing algorithms in RegioCover with thematic accuracies going beyond 95%. This highly detailed geospatial information allows for cross-analyses with terrestrial surveying data.

Urban cadastral map Belgrade / Serbia



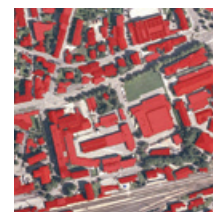
Copyrights © Belgrade Town Planning Institute, GeoVille

Revision of digital cadastre Dornbirn / Austria



Copyrights © Government of Vorarlberg, GeoVille

Building map Bratislava / Slovakia



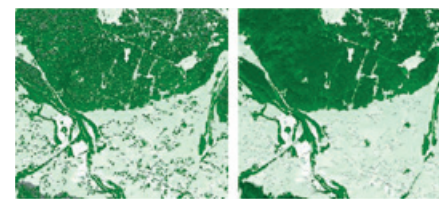
Copyrights © EC & Town Planning Institute Bratislava, GeoVille

### REGIOCOVER-FOREST

RegioCover enables the automated mapping and inventorying of trees and forests according to standardized definitions of forest extent, tree crown cover and species.

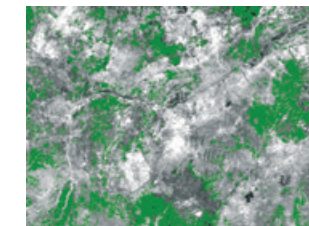
Applications range from highly detailed classifications of biological forest extent, i.e. mapping every single tree from aerial photographs, over detection of forest changes relevant for national forest law to mapping of forest extent and carbon stock for Kyoto verification. Guaranteed accuracies exceed 95% for forest cover, with flexible minimum mapping units between 0,05 and 1 ha.

Forests maps from aerial images Vorarlberg / Austria



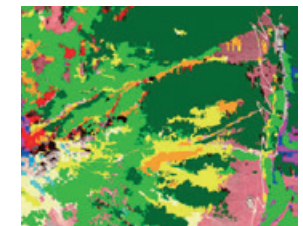
Copyrights © Government of Vorarlberg, GeoVille

Forest map for Kyoto monitoring Nigeria



Copyrights © EC, GeoVille

Tree species map Nicaragua



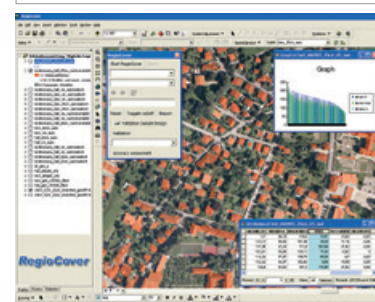
Copyrights © UNESCO, ESA, GeoVille

### REGIOCOVER-VALIDATION

RegioCover provides quality-controlled geoinformation on land cover and land use with known levels of precision and accuracy.

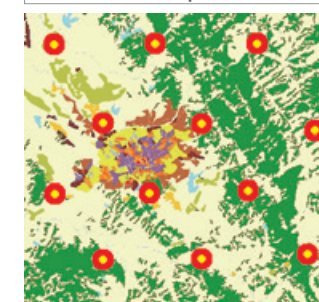
RegioCover contains a validation tool for GIS-based rapid quality control of LC/LU maps based on both point or object samples, respectively. With its built-in statistical analysis capabilities the tool provides the typical range of accuracy measures for assessing the quality of EO derived land cover and land use maps.

Validation of building features Austria



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Validation of land cover / land use maps Albania



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Validation of land cover Senegal



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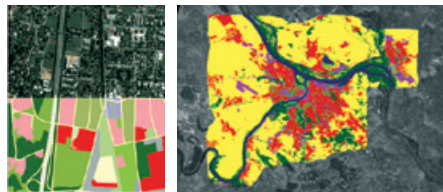


# LAND COVER MAPPING

## GEOVILLE – YOUR PARTNER FOR SATELLITE BASED LAND COVER MAPPING

Land cover mapping from satellite images is a key component of GeoVille's capacity. Our experience ranges from local very high resolution mapping to continental scale applications.

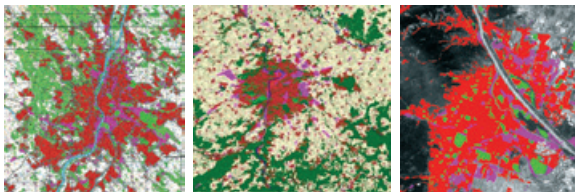
### SEOUL, BELGRADE



Thematic accuracy: > 95%  
Classes: >25  
Area covered: 4,000 km<sup>2</sup>  
Input data: IKONOS  
Image resolution: 1 m  
Year: 2002 – 2003

Copyrights © EC, JRC, GeoVille; Data: Space Imaging, SIE, Antrix, Euromap

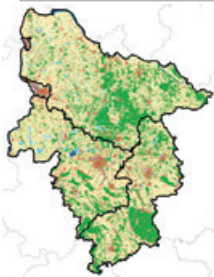
### BUDAPEST, VIENNA, PRAGUE



Thematic accuracy: > 95%  
Classes: 8  
Area covered: 6,000 km<sup>2</sup>  
Input data: Spot  
Image resolution: from 2.5 to 10 m  
Year: 2005

Copyrights © GeoVille; Data: Spot Image

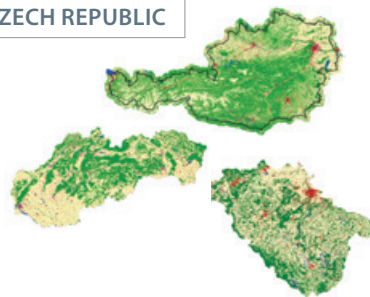
### NIEDERSACHSEN (WESER CATCHMENT)



Thematic accuracy: > 95%  
Classes: 8  
Area covered: 34,000 km<sup>2</sup>  
Input data: Spot  
Image resolution: 10 m  
Year: 2006

Copyrights © Landesvermessungsamt Niedersachsen, ESA, GeoVille; Data: Spot Image

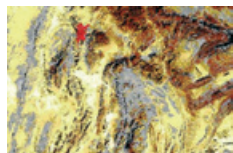
### AUSTRIA, SLOVAKIA, CZECH REPUBLIC



Thematic accuracy: > 95%  
Classes: 15  
Area covered: 83,000 km<sup>2</sup>  
Input data: Landsat  
Image resolution: 15 m  
Year: 2003

Copyrights © GeoVille; Data: Eurimage

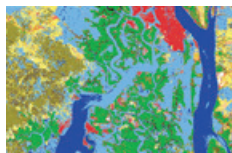
### SOUTH-EASTERN PAKISTAN



Thematic accuracy: > 95%  
Classes: 10  
Area covered: 450,000 km<sup>2</sup>  
Input data: Landsat

Copyrights © United Nations Operations Service, GeoVille; Data: Eurimage

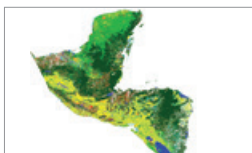
### ECUADOR



Thematic accuracy: > 90%  
Classes: 7  
Area covered: 60,000 km<sup>2</sup>  
Input data: Landsat & Radarsat

Copyrights © United Nations Operations Service, GeoVille; Data: Eurimage, Radarsat

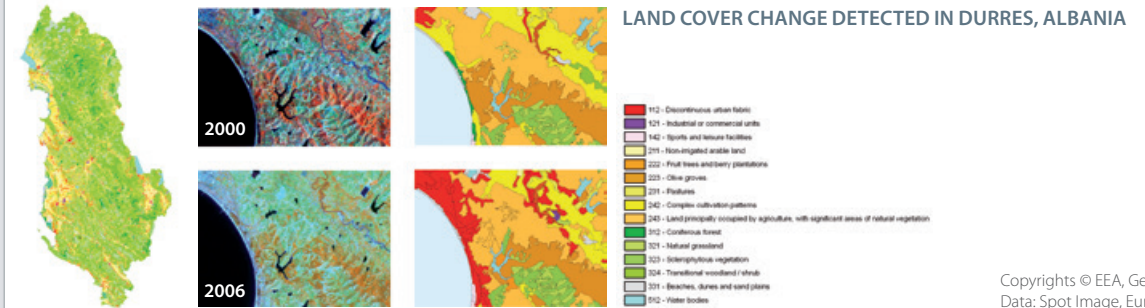
### MESOAMERICA



Thematic accuracy: > 90%  
Classes: 12  
Area covered: approx 1,100.00 km<sup>2</sup>  
Input data: MERIS, MODIS

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## CORINE LAND COVER CHANGE MAPPING 2006 - WEST BALKAN



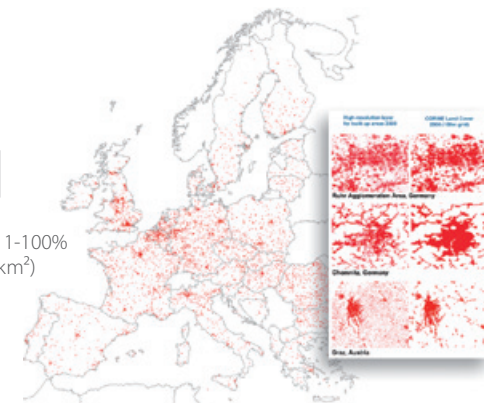
Thematic accuracy: > 85%  
Classes: 44  
Area covered: approx. 200,000 km<sup>2</sup>  
Input data: SPOT, IRS  
Image resolution: 20 m  
Year of production: 2007

Copyrights © EEA, GeoVille; Data: Spot Image, Euromap

## SOIL SEALING MAP OF EUROPE

Thematic accuracy: > 85%  
Classes: Built-up area incl. degree of soil sealing on continuous scale 1-100%  
Area covered: 5.8 Mill km<sup>2</sup> (Lot produced by GeoVille covers 1,2 Mill km<sup>2</sup>)  
Input data: SPOT, IRS  
Image resolution: 20 m  
Years of production: 2007/2008

Copyrights © EEA, GeoVille; Data: Spot Image, Euromap



## URBAN ATLAS – BADAJOZ, SPAIN

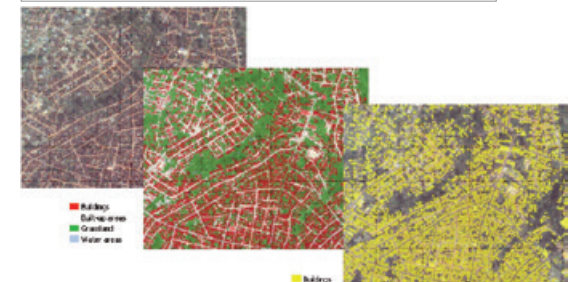


Thematic accuracy: 80%  
Classes: 26  
Area covered: 200 km<sup>2</sup>  
Input data: IKONOS / SPOT-5  
Image resolution: 1 m / 2,5 m  
Year of production: 2007

Copyrights © ESA, EC, GeoVille; Data: Space Imaging

- 81100 Central Business District (CBD), mixed use, very dense urban fabric 60-100%
- 81130 Informal continuous dense settlement
- 81200 Mixed use, dense urban fabric 30-60%
- 81230 Primary residential, medium density urban fabric 30-60%
- 81230 Primary residential, low density urban fabric 30-60%
- 81340 Informal discontinuous residential structures
- 81350 Apartment blocks with communal open space
- 81360 Isolated structures
- 82100 Industrial uses and related areas
- 82200 Commercial uses, retail parks and related areas
- 82300 Public, military and private services
- 82400 Water supply infrastructure, sea walls and flood defences
- 82500 Post, transit roads and associated land
- 82700 Other roads and associated land
- 82800 Railways and associated land
- 82900 Air areas
- 82930 Airports
- 83100 Mineral extraction and disposal
- 83200 Construction sites
- 84000 Land without current use
- 84100 Open urban areas
- 84300 Sports and leisure facilities
- 85000 Agricultural areas
- 86000 Forests and semi-natural areas
- 86300 Wetlands
- 90000 Water

## NIGERIA URBAN MAPPING



Thematic accuracy: 85%  
Classes: 8  
Area covered: 2000 km<sup>2</sup>  
Input data: IKONOS  
Image resolution: 1 m  
Year of production: 2007

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## LAND COVER MAPPING

### GEOVILLE – YOUR PARTNER FOR THEMATIC ORTHOPHOTO MAPPING

So far we successfully carried out mapping projects in Austria, Italy and Luxembourg ranging from very local to state-wide scales. Our processing chain RegioCover encompasses functionalities of PCI, eCognition and ArcGIS and enables us to map thousands of square kilometers with high precision and accuracy.

#### BUILDING AND SOIL SEALING MAPPING IN LUXEMBOURG



Thematic accuracy: > 95%  
Classes: 2  
Area covered: approx. 2.586 km<sup>2</sup>  
Input data: True colour orthophotos  
Image resolution: 25 cm  
Year of production: 2009

Copyrights © GeoVille, CEPS

#### BUILDING FOOTPRINT EXTRACTION IN AUSTRIA



Thematic accuracy: > 91%  
Classes: 1  
Area covered: approx. 130 km<sup>2</sup>  
Input data: True colour orthophotos  
Image resolution: 15 cm  
Year of production: 2008

Copyrights © Herald, GeoVille

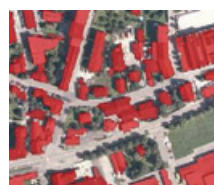
#### SETTLEMENT MAPPING IN VORARLBERG



Minimum Mapping Unit: 60 m<sup>2</sup>  
Thematic accuracy: > 95%  
Classes: 7  
Area covered: 2,600 km<sup>2</sup>  
Input data: Colour infrared orthophotos and laser scanning data  
Image resolution: 1 m  
Year: 2006 - 2007

Copyrights © Government of Vorarlberg, GeoVille

#### SETTLEMENT MAPPING IN TYROL



Minimum Mapping Unit: 25 m<sup>2</sup>  
Thematic accuracy: > 95%  
Classes: 7  
Area covered: 700 km<sup>2</sup>  
Input data: True colour orthophotos  
Image resolution: 25 cm  
Year: 2006

Copyrights © Government of Tyrol, GeoVille

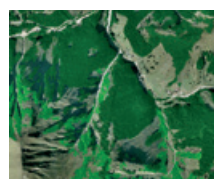
#### BIOLOGICAL FOREST MAPPING IN VORARLBERG



Minimum Mapping Unit: 0,01 / 0,1 ha  
Thematic accuracy: > 95%  
Classes: 4  
Area covered: 2,600 km<sup>2</sup>  
Input data: Colour infrared orthophotos  
Image resolution: 1 m  
Year: 2004

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#### FOREST MAPPING IN TYROL



Minimum Mapping Unit: 0,1 ha  
Thematic accuracy: > 95%  
Area covered: 5,000 km<sup>2</sup>  
Classes: 4  
Input data: True colour orthophotos  
Image resolution: 1 m  
Year: 2006 - 2007

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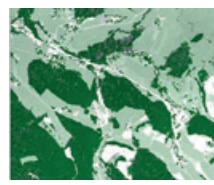
#### PROTECTION FOREST MAPPING IN CARINTHIA



Minimum Mapping Unit: 100 m<sup>2</sup>  
Thematic accuracy: > 95%  
Area covered: 1,600 km<sup>2</sup>  
Classes: 4  
Input data: True colour orthophotos  
Image resolution: 25 cm  
Year: 2005 - 2006

Copyrights © Government of Kärnten, GeoVille

#### FOREST MAPPING ACC. TO FOREST LAW IN SALZBURG



Minimum Mapping Unit: 0,1 ha  
Thematic accuracy: > 95%  
Classes: 4  
Area covered: 8,000 km<sup>2</sup>  
Input data: True colour orthophotos  
Image resolution: 1 m  
Year: 2005

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### GEOVILLE – YOUR PARTNER FOR LAND INFORMATION SYSTEMS

Digital, web-based Land Information Systems (LIS) provide easy access to land information and overcome the shortcomings of analogue and/or non-harmonized data sets for local, regional, national as well as cross-national management and reporting requirements. LIS serve a wide range of downstream sectoral applications and user groups.

GeoVille applies cutting edge science, innovative technology and provides cost efficiency by combining high resolution satellite with in-situ data, to achieve economy of scale and sustain-ability of funding through a shared effort across different administration units.

**We provide individual services as well as the full cycle implementation of Land Information Systems, such as:**

- Comprehensive user requirement analysis
- Feasibility studies under consideration of technological & economic aspects and international standards & local laws
- Collection and harmonization of existing land information data
- Production of new land cover and derived geoinformation data
- Implementation of state of the art, standardized web-based land information systems
- Update services of datasets, upgrading and change detection
- Maintenance of infrastructures and software

#### LAND INFORMATION SYSTEM AUSTRIA



Full cycle development and implementation of a standardized Land Information System for entire Austria.

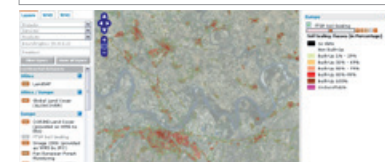
For more information on the project LISA or access to the LISA geoportal please log on to [www.landinformationssystem.at](http://www.landinformationssystem.at)

Copyright © GeoVille

### CUSTOMER GEOPORTALS

GeoVille produced the geo-information products and/or the web map viewing system for the following customer geoportals.

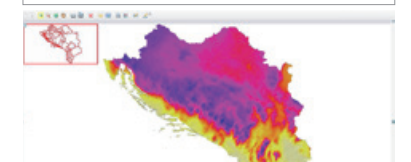
#### GMES Land Monitoring GeoPortal <http://www.land.eu/portal/>



#### Geoland2 Data Portal <http://www.geoland2.eu>



#### Renewable Energy Potential Maps <http://www.geoville.com/geoportal.html>

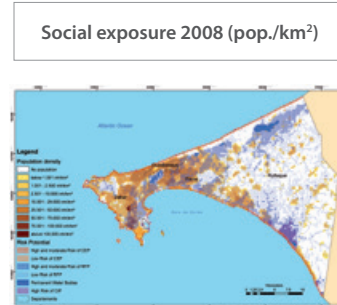
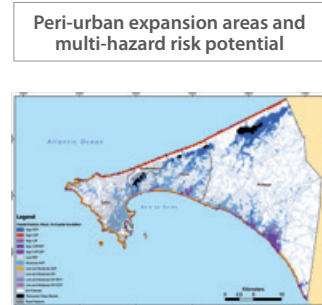
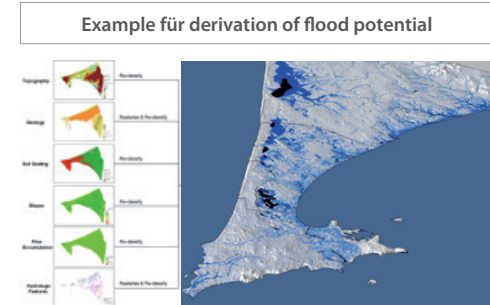
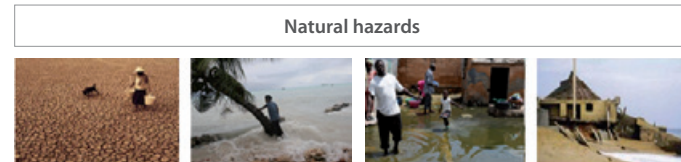


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## URBAN & REGIONAL MAPPING

### ASSESSMENT OF NATURAL AND CLIMATE CHANGE RISKS – DAKAR

Identification and spatial assessment of natural hazards, climate change risks and multi-temporal urban development to identify areas of low settlement risk. The service was used to assess low-risk peri-urban expansion areas in Dakar, Africa.

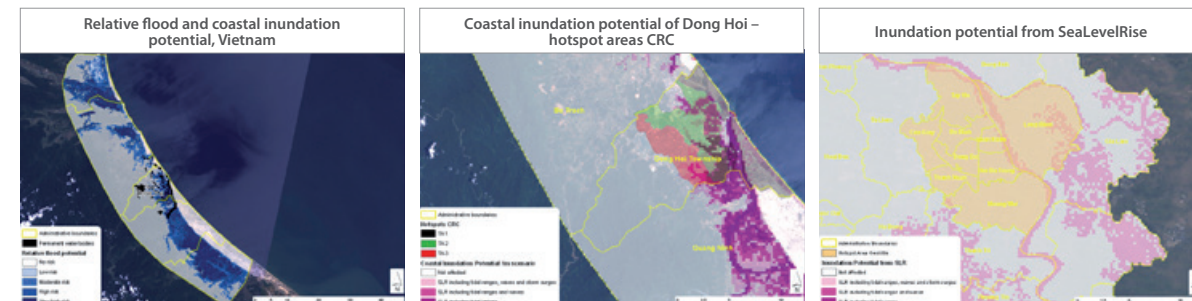


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### SPATIAL ANALYSIS OF NATURAL HAZARD AND CLIMATE CHANGE RISKS

Satellite, topographical and multi-level GIS based analysis to generate natural hazards and climate change risk potential maps, along with provision of statistics and hazard potential profiles.

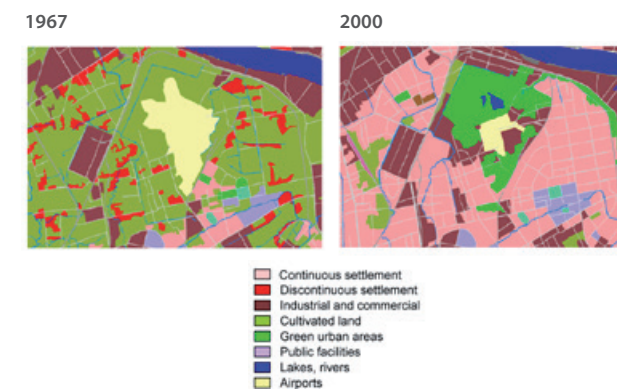
The results were used by the World Bank to assist the cities of Can Tho, Dong Hoi and Hanoi (Vietnam) in the establishment of disaster and climate risk reduction measures.



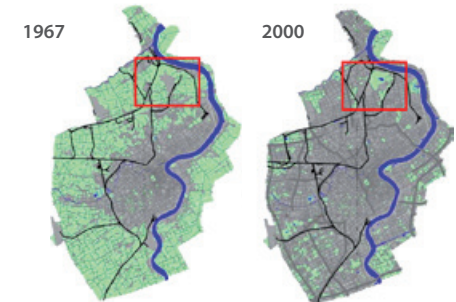
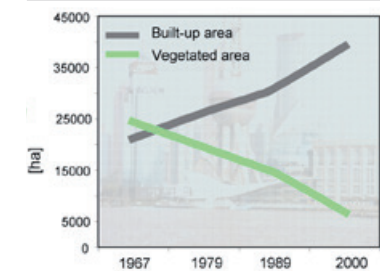
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### URBAN MONITORING - SHANGHAI

Analyses on the changes of the built-up area for the Shanghai metropolitan area, one of the fastest growing mega-cities worldwide. The analyses were based on aerial photographs, SPOT, IRS, and IKONOS data and are used by the Shanghai City Administration as input to urban planning.



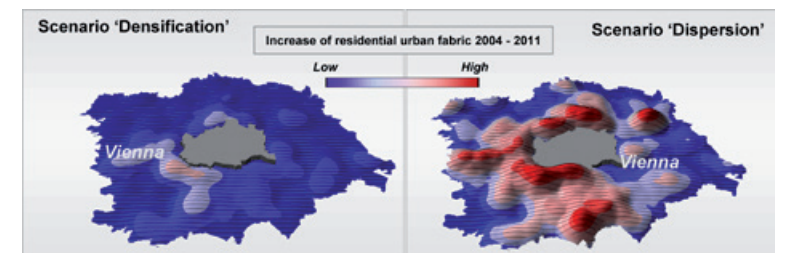
Shanghai increase in built-up area from 1967 - 2000



Copyrights © EC, JRC, Tongji University, GeoVille; Data: SIE, Antrix, Euromap

### URBAN GROWTH MODELLING

Urban growth models allow to predict future patterns of urbanisation. GeoVille uses the well-known STAU model developed by the Austrian Research Centres, which is based on cellular automata and spatial agents. The model has been validated and further operationalized by GeoVille to allow calculation of urban development scenarios up to 10 years into the future.



Urban growth predictions are an integral part of city management and land use planning, and have therefore been part of many related projects, such as the assessment of natural hazards in the evaluation of urban expansion areas.

Countries covered:  
Austria, Bulgaria, Czech Republic, Germany, Greece, Italy;

Copyrights © EC-FP6 + FP7 geoland, GeoVille, AIT

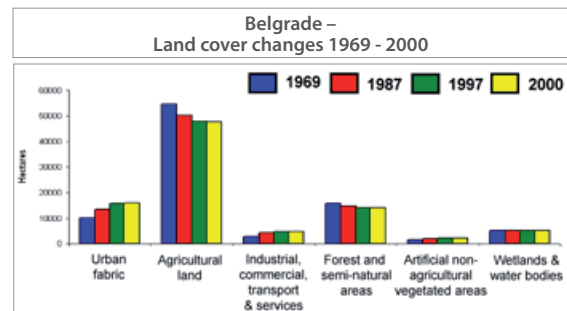
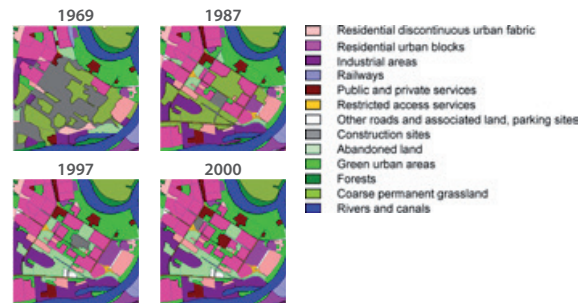


## URBAN & REGIONAL MAPPING

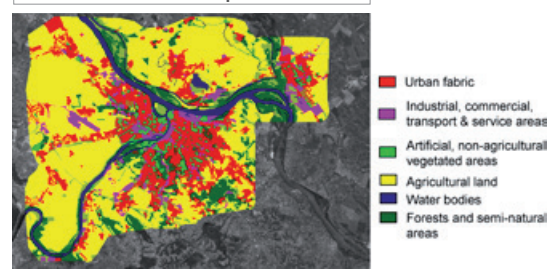
### URBAN CHANGE MAPPING – BELGRADE

Mapping of detailed land use types and transport networks in scale 1:25.000 for the city of Belgrade in the frame of the EC Programme MOLAND (Monitoring Land Use/ Cover Dynamics). CORONA, IRS, SPOT and IKONOS data were used to derive land use maps for the years 1969, 1987, 1997 and 2000.

#### Novi Beograd – detailed land cover / use mapping



#### Belgrade – Land cover map 2000



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### MASTER PLANS

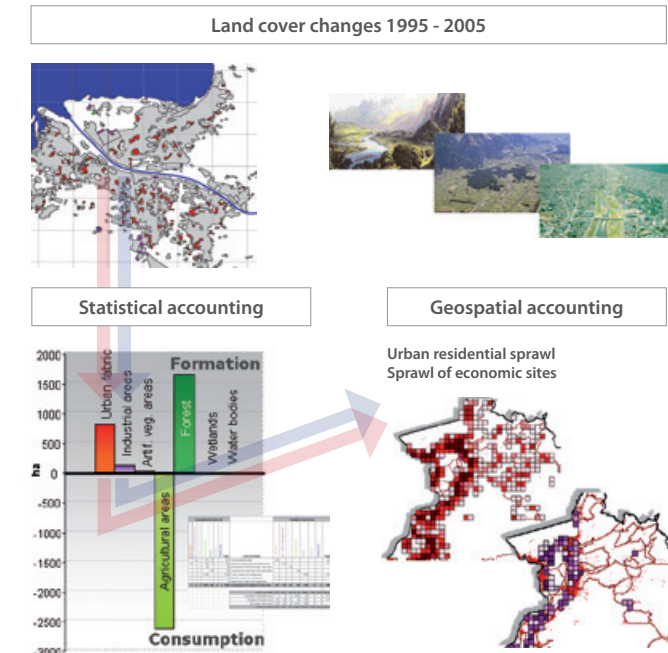
Change analysis based on very high resolution images help to plan new housing developments. In Belgrade the city administration used these data to detect more than 10.000 illegal buildings erected between 1997 and 2000 and for establishing a new Urban Master Plan limiting further uncoordinated housing development.



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### LAND COVER ACCOUNTING

Determination of recent land cover / land use and changes thereof are key elements for an improved understanding of the processes and trends in landscape development. Spatial planning authorities and administrations call for a regular and comparable accounting and reporting framework in order to get a consistent and traceable picture of what is happening, where is it happening and in which intensity is it happening. Land cover / use change accounting is normally performed within 5 to 10 year intervals. Urban growth models allow projection of scenarios of up to 10 years into the future.



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### NATIONAL PARK MONITORING

Detailed monitoring and mapping of urban development along the Kruger National Park in South Africa to support park boundary control.



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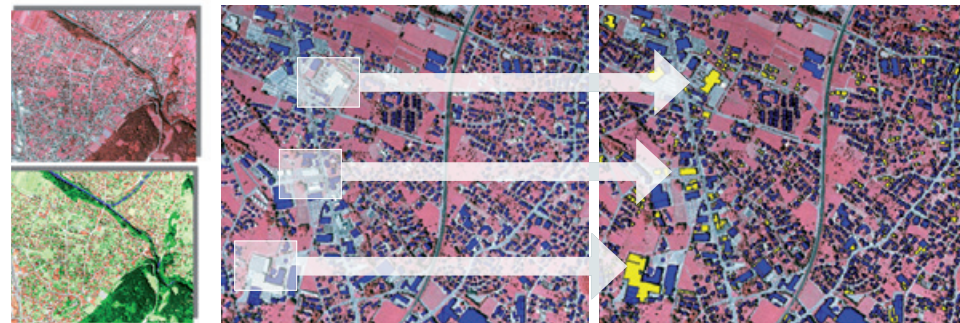
## SPATIAL PLANNING

### SPATIAL PLANNING MAP REVISION

Spatial planning measures on state level rely on up-to-date and accurate geospatial data and statistics. Aerial photography serves for regular revisions of existing land use/ cover maps in order to provide localised and topical information on recent territorial developments.

This geospatial information allows for GIS-based cross-analyses with other geographic data, e.g. for the accounting of building land, and helps to overcome well-known limitations of aggregated areal statistics.

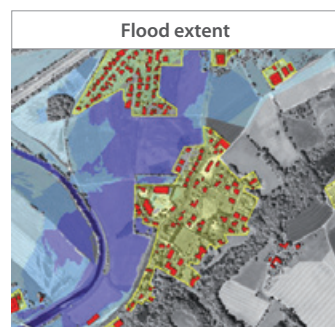
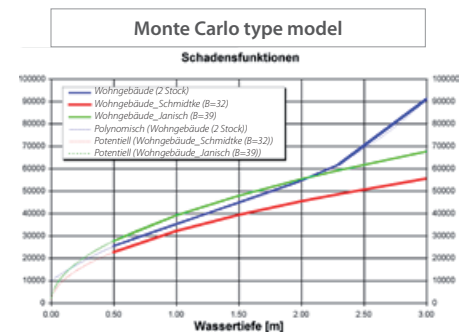
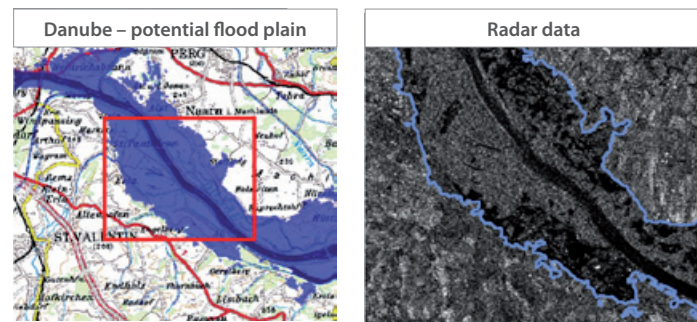
Revision of digital cadastre using automated orthophoto interpretation



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### FLOOD IMPACT MAPPING

Combination of Monte Carlo type models of spatial uncertainty with satellite-based flood extent, geospatial data on predicted flood extents (100-year flood statistics), orthophotos and cadastral data to assess financial impact of floods. During flood events radar data from ENVISAT and RADARSAT satellites allow to provide accurate and timely flood extent information independent of day-time and weather conditions.

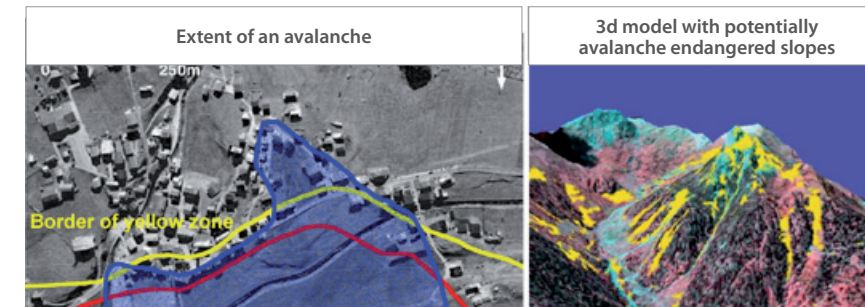
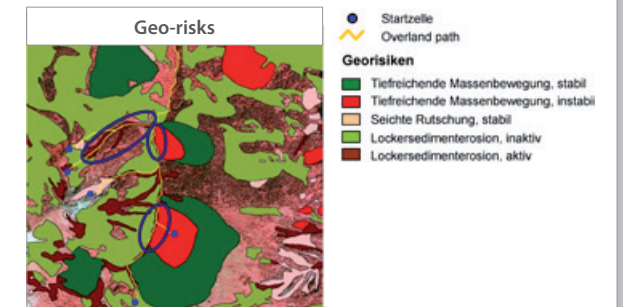


- 0-1 m
- 1-2 m
- 2-4 m
- mehr als 4 m
- Versiegelte Flächen
- Gebäudeflächen

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### DANGER ZONE MAPPING

Natural hazards recurrently cause damage to housing, property and infrastructure facilities and are therefore a key topic for spatial planning. Danger zone mapping supports pre- and post-impact vulnerability analyses and monetary damage assessments. To ensure the safety of the local population, reliable information on the number and location of people exposed to natural hazards can be obtained through cross-analysis with local population figures.

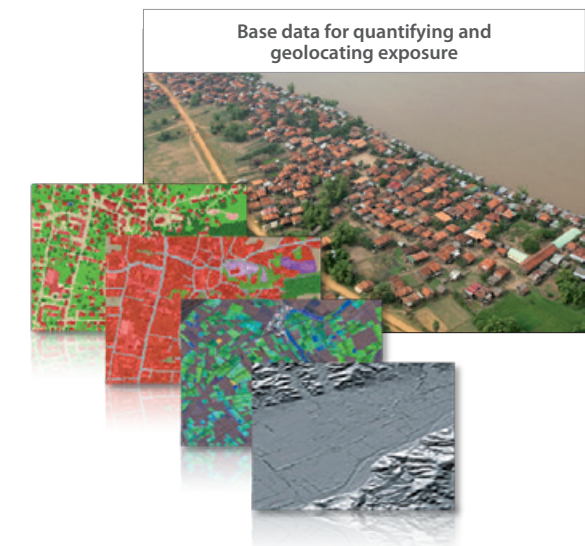


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### EXPOSURE MAPPING OF URBAN INFRASTRUCTURES, MEKONG RIVER BASIN

The service exploits very high and high resolution optical multispectral and SAR satellite imagery with field data to support to establish a cartographic database of urban infrastructure and building inventories including

- building footprints
- building material
- building location
- building height (number of stories)
- structure type
- load bearing structure system
- construction technique
- floor area
- distance from building to building.
- elevation height



The purpose is to build capacity for mapping the impacts for floods, flash floods and droughts within the basin and ultimately to manage the sustainable basin development.

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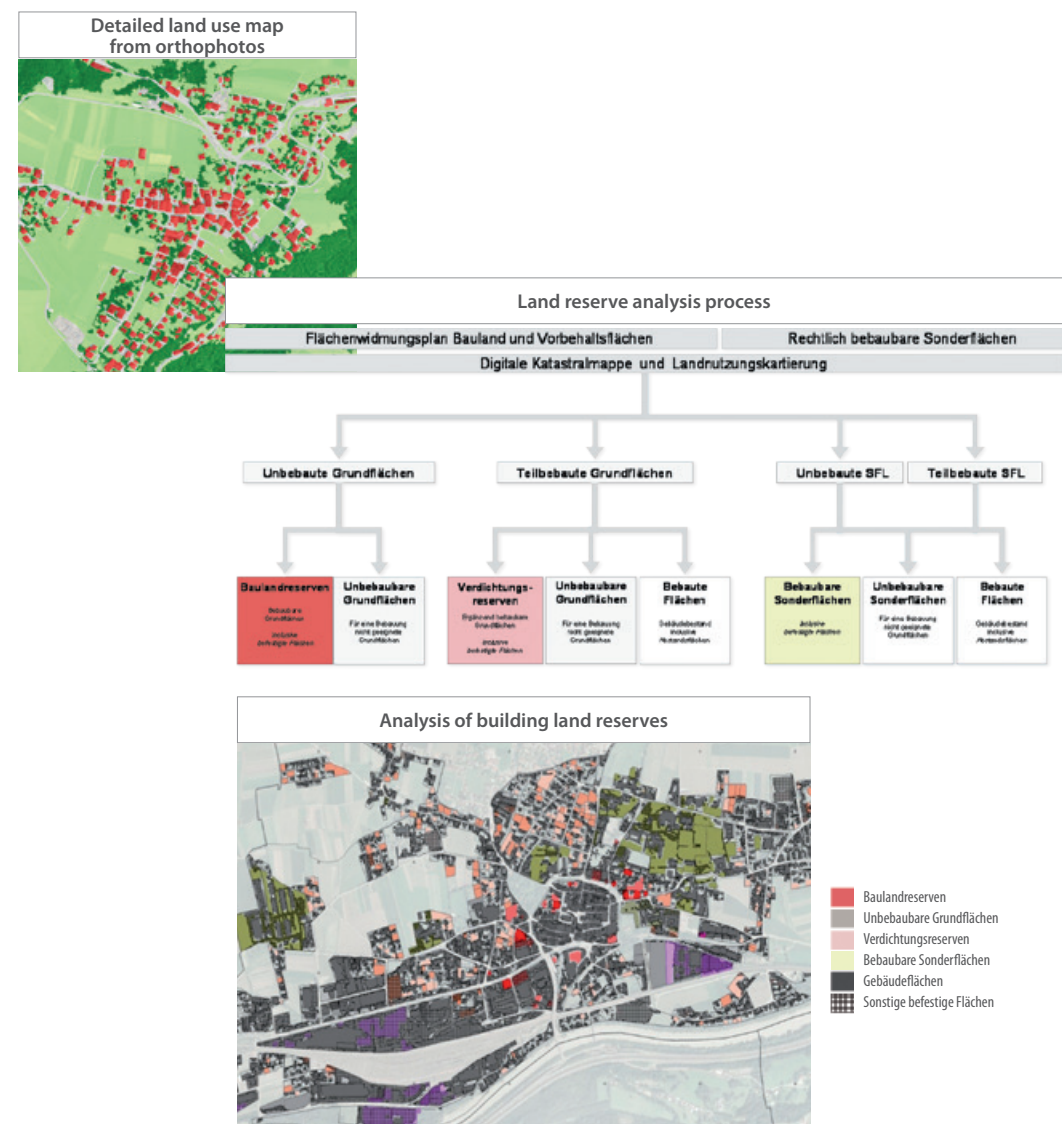


## SPATIAL PLANNING

### BUILDING LAND RESERVES

The need for spatial data and statistics on land take, available building and compaction reserves, as well as special areas which would be suitable for building, has become a public necessity of high political importance.

Geoville delivers the input data or the full end-to-end service for the identification of building land reserves. Detailed land use information derived from aerial photographs is combined with cadastral information to obtain statistics with regards to availability of building land on parcel level. The land use maps exceed 95% thematic accuracy and have 25m<sup>2</sup> minimum mapping units for buildings. The analysis provides a distinction between land reserves and special areas for development as well as land reserves for compaction.

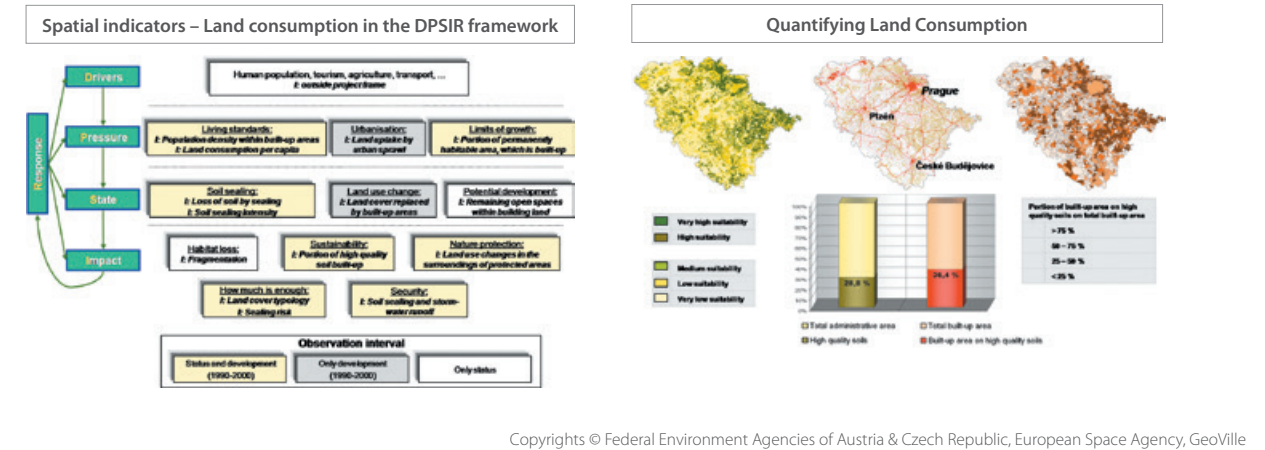


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### INDICATORS - LAND CONSUMPTION

Spatial indicators are developed to provide fundamental and policy-relevant spatially explicit information on selected spatial phenomena. The methodology for deriving spatial indicators is based on GIS functions intersecting EO-based land cover/use data with other geo-spatial data and statistical information. The land consumption indicator portfolio has been developed within the ESA financed projects GSE - SAGE and GSE - Land. GeoVille has been the responsible organisation for SoilSAGE and for the spatial planning component of GSE Land.

For more information please refer to the following website: [www.gmes-sage.info](http://www.gmes-sage.info)



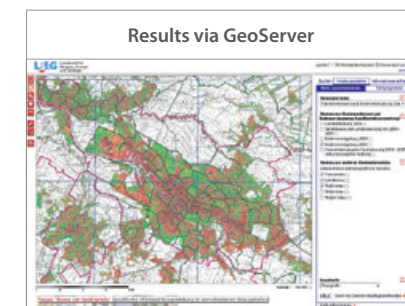
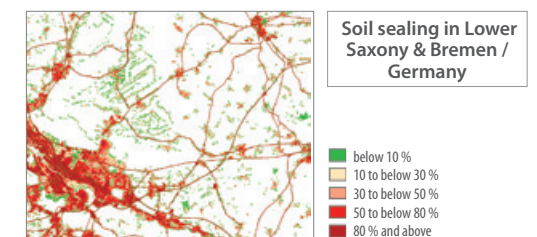
Copyrights © Federal Environment Agencies of Austria & Czech Republic, European Space Agency, GeoVille

### LAND CONSUMPTION AND SOIL SEALING IMPACT

SPOT satellite data and aerial photography are used to derive geospatial explicit up-to-date and historical information on the extent, development and density of built-up areas. In addition to homogeneous, high quality maps on land cover/use, the information is integrated with ancillary data in GI procedures and models to analyse, describe and understand the Drivers, Pressure, State and Impact of land consumption. Outputs are maps, statistics and indicators.

Key policy questions answered include:

- How much and in what proportions is land being taken for urban and other development?
- Where the areas with the most significant land area take?
- What are the drivers of uptake for urban and other artificial land development?
- How many people are affected?



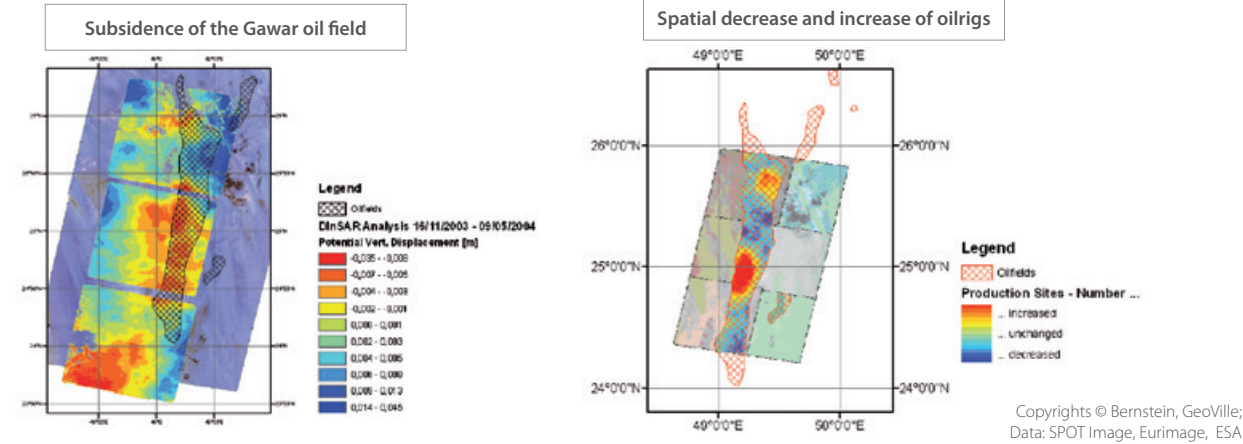
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INFRASTRUCTURE

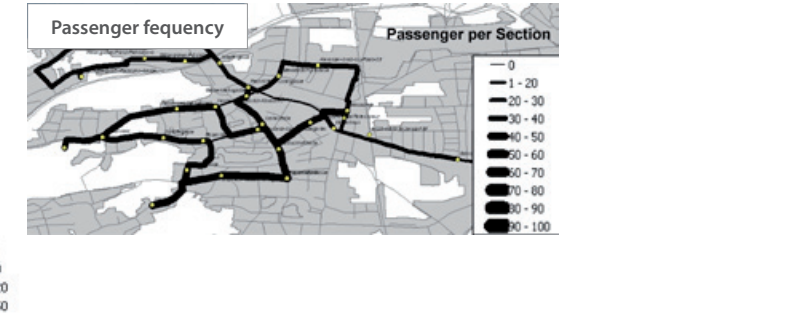
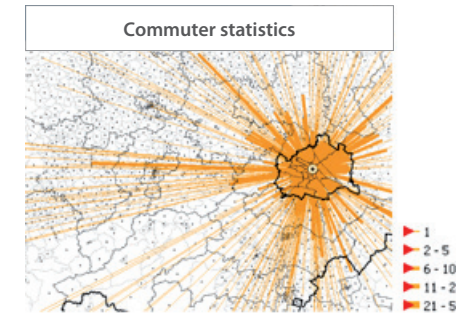
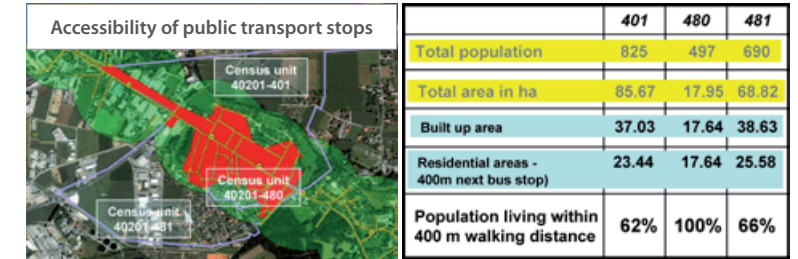
**SPATIAL MONITORING OF SURFACE MOVEMENTS AND OIL PRODUCTION FACILITIES**

GeoVille has implemented a monitoring system allowing analyses of vertical surface movements caused by oil production in the Ghawar oilfield / Saudi-Arabia. SAR data from Envisat have been used to determine surface displacements in the sub-centimeter range. Extents and amplitudes of subsidence signals are correlating with those of oil-bearing geological structures and movements caused by oil extraction. Optical data from SPOT and Quickbird are applied to determine oil rig activity over time.



**PUBLIC TRANSPORT PLANNING**

In collaboration with public transport providers a range of dedicated GI tools were developed to analyse and provide decision support for improvement of public transport offerings.



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**FORSCHER BEOBACHTEN „ATMUNG“ DES ÖLFELDES GHAWAR**

Wien APA - Die Atmung des saudi-arabischen Ölfeldes Ghawar beobachten derzeit Wissenschaftler der in Innsbruck ansässigen Firma GeoVille im Auftrag des USFinanzdienstleisters Sanford C. Bernstein.



APA, EPA

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**Saudi Output Growth Can Help Forestall Peak Oil, Bernstein Says**

By Greg Willers - April 25, 2008 05:32 EDT

April 25 (Bloomberg) -- Saudi Arabian oil output has the potential to rise, helping avoid a peak in world crude production, according to Sanford C. Bernstein & Co.

Oil prices may fall toward the end of this year as worsening economic conditions reduce demand, analysts Neil McMahon and Ben Dell forecast in a report today. Prices will probably rise later, beyond 2010, and reach \$114 a barrel by 2015 as spare capacity declines, they wrote.

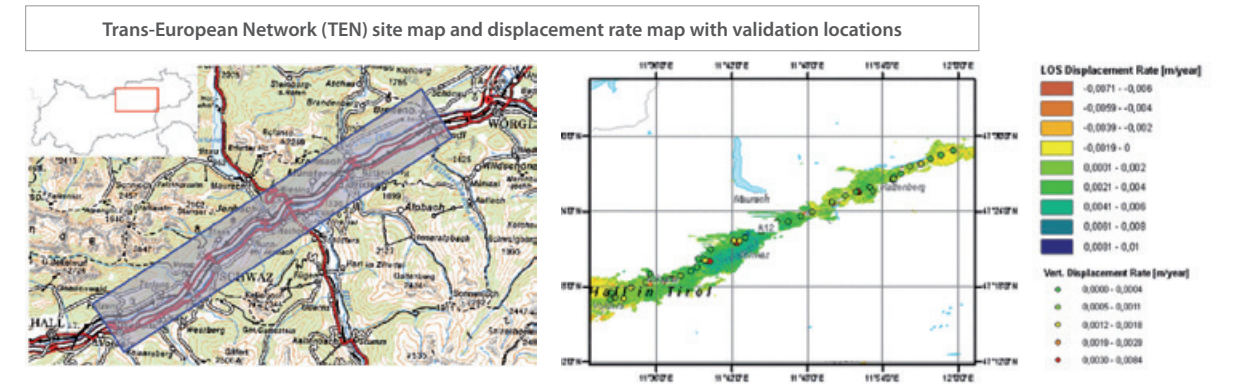
"Saudi and global oil production has the potential to grow slowly going forward," the authors wrote. "We do not believe world oil production supply is peaking today."

Proponents of peak-oil, the theory that global production has or is about to reach its zenith, say booming demand and dwindling supply are responsible for the rising price of oil. Analysts debate the extent and timing of a drop in crude production in Saudi Arabia, the world's biggest oil exporter. Some argue Saudi Arabian Oil Co., known as Saudi Aramco, is downplaying reservoir declines and that the country may be forced to reduce output.

Sanford Bernstein commissioned a survey by GeoVille Information Systems to use satellites to monitor drilling at Ghawar, Saudi Arabia's biggest oil field. The analysis "concludes that the Saudi peak oil production conspiracy theories, based on little or incomplete current field data, do not fit with our findings."

**SPATIAL MONITORING OF SURFACE MOVEMENTS ALONG TRANSPORT AXES**

Analyses of vertical surface movements in the Inn valley along the Trans European Network Brenner railway axis. SAR data from Envisat have been used to determine sub-centimeter displacements and were validated with terrestrial measurements.



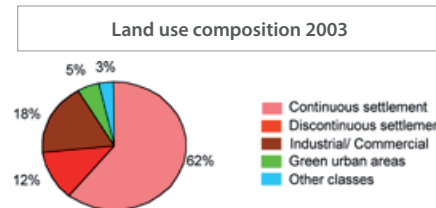
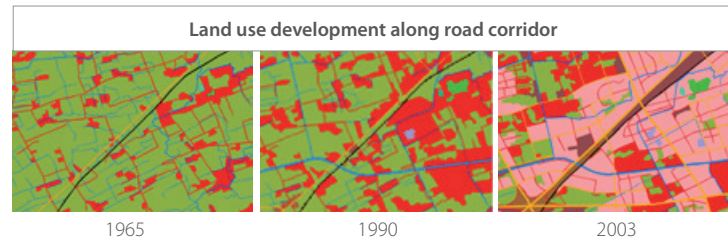
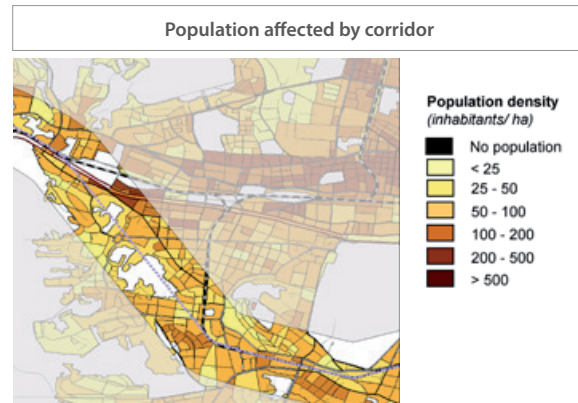
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INFRASTRUCTURE

**TRANSPORT CORRIDOR IMPACT ASSESSMENT**

Assessing land use and land use changes and population affected along major transport corridors. The analysis is based on CORONA, SPOT and IKONOS images and shows land developments along the trans-European corridor V near the Italian city of Trieste.

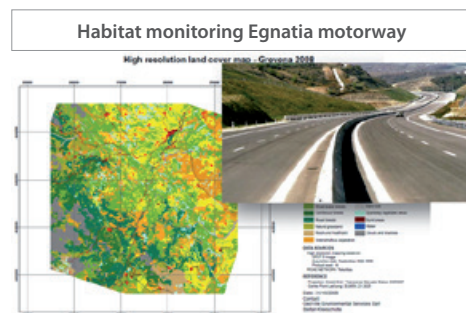


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**HABITAT MONITORING ALONG MOTORWAYS – GREECE**

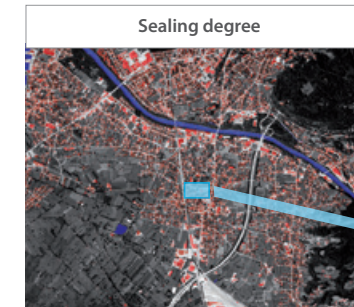
The European Investment Bank (EIB) finances major parts of the Trans-European Transport Network. In order to independently evaluate progress of the construction work and to replace respectively better plan on-site visits the EIB is exploring the use of very high resolution Earth Observation data.

A stretch of some 30 km of new motorway construction has been mapped to assess the environmental impact of the new road on different rare species habitats during and after finalisation of the construction.

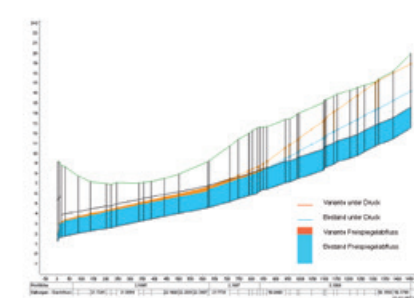


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**ENGINEERING SUPPORT FOR SANITARY SYSTEMS DESIGN**



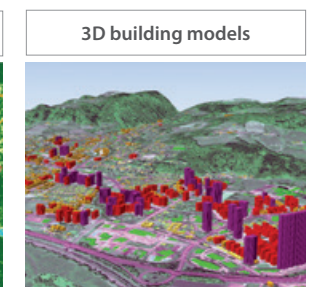
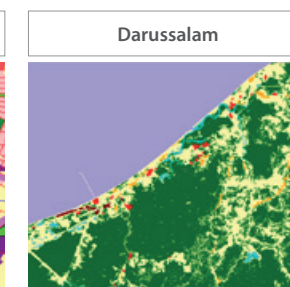
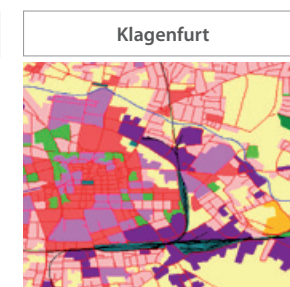
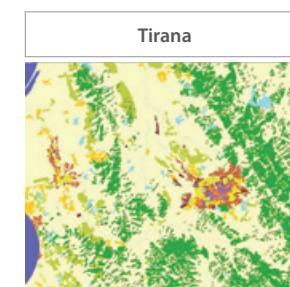
Base mapping information on land use, terrain and slope from VHR satellite data is integrated with local sanitary system infrastructure information to generate scenarios of sewage capacity under different conditions of utilization, hard rain occurrence and failure. Modelling is performed with infrastructure cross-section information provided by engineering companies using the MOUSE model.



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**RADIO COMMUNICATION PLANNING**

Clutter data are essential elements for wave propagation modelling and subsequent planning of radio communication networks. Clutter examples below show the cities of Tirana (Albania), Klagenfurt (Austria) and Darussalam (Brunei) and are based on SPOT, IKONOS and Landsat data.



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FORESTRY

**KYOTO REDD MONITORING**

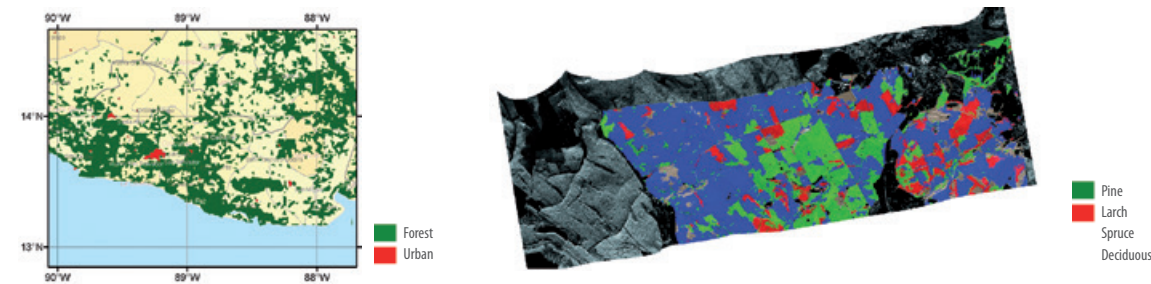
Kyoto based application of Reducing Emissions from Deforestation and Degradation (REDD) monitoring for

- determining land use and forest extent
- detecting forest degradation
- detecting, monitoring and quantifying changes
- quantifying stem volume and carbon stock changes

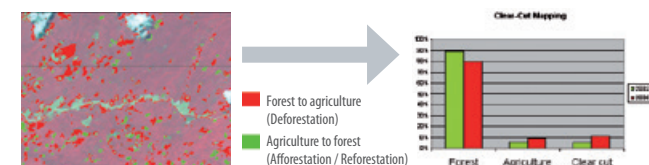


The system integrates various forest information including forest registers, forest maps, sampling systems and remote sensing imagery. It was tested and implemented in various Central American regions and allows the quantification, assessment and verification of changes against the baseline.

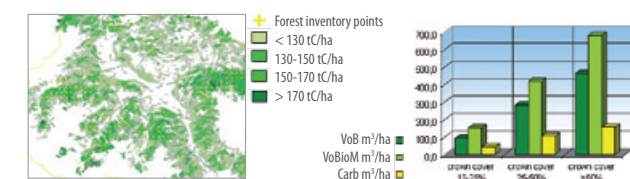
Monitoring land use and forest extent



Monitoring deforestation, afforestation and reforestation



Monitoring timber biomass and carbon stock



Monitoring forest degradation



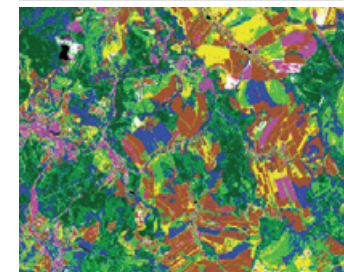
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**LAND TENURE SECURITY**

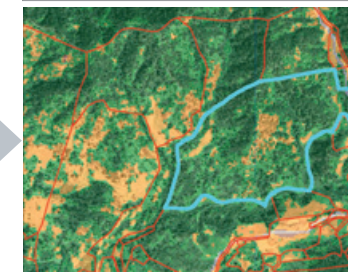
Detailed satellite based assessment of the trends in forest clearing and degradation of land parcels with different types of management and examination of the causal relationship between deforestation and tenure security.



Land cover map SPOT-4 (20m)



Land cover changes within parcels



Since 1990 the forest area in Honduras decreased at an annual change rate of 590 km<sup>2</sup> (=1 % p.a.)

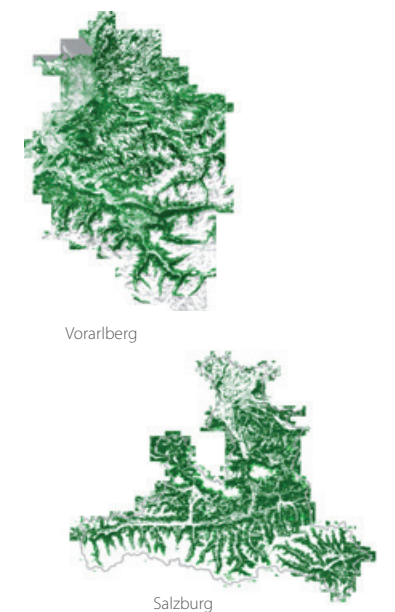
Detailed parcel change statistics

Main Type	Parcel ID	to_start	to_end	Main Area	Mean Slope	Landuse ID	Landuse	Soil type	Plot Area	Plot City
National forest	jo-22_104	jo-22_104	270	10,0002	401	open/young forest	Leghool	119,230600	1200,475004	
National forest	jo-22_105	jo-22_105	270	17,407309	420	stratus	Leghool	159,263342	1341,582753	
National forest	jo-22_106	jo-22_106	270	6,42996	430	beane	Leghool	88,919604	1424,970676	
National forest	jo-22_107	jo-22_107	180	24,824284	401	open/young forest	Leghool	407,905027	1441,040933	
National forest	jo-22_100	jo-22_100	270	6,46312	425	pasture	Leghool	6,749179	1462,479512	
private title granted by MA	jo-22_11	jo-22_11	0	19,700009	406	cafe	Leghool	163,142135	1040,676783	
National forest	jo-22_110	jo-22_110	270	9,04204	0	building land	Leghool	18,620147	1979,467215	
National forest	jo-22_111	jo-22_111	270	19,990081	0	building land	Leghool	436,59632	2364,209522	
National forest	jo-22_112	jo-22_112	180	9,52936	425	pasture	Leghool	153,813442	2484,371446	
National forest	jo-22_113	jo-22_113	180	9,13296	425	pasture	Leghool	205,666269	2453,296786	

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**AUTOMATED FOREST MAPPING BASED ON ORTHOPHOTOS**

Automated mapping of forest extent based on orthophotos with 0,25 m resolution has been conducted for several Austrian States. Guaranteed accuracies supersede 95% for biological forest extent as well as forest cover according to forest law. Minimum mapping units are 0,05 and 0,1ha respectively.



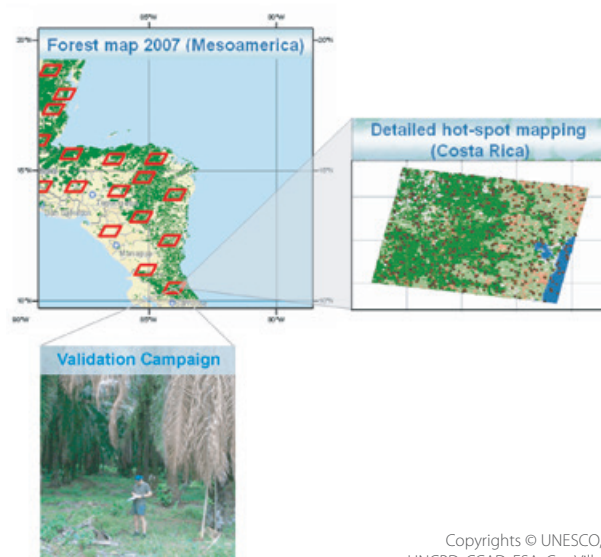
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## FORESTRY

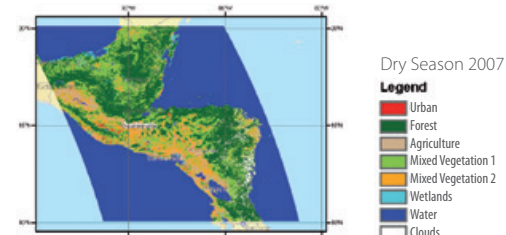
### FOREST MONITORING – MESOAMERICAN BIOLOGICAL CORRIDOR (MBC)

A monitoring system based on medium and high resolution satellite data was established for the MBC to observe the state of the forests as well as changes therein. For hot spots, a detailed monitoring delivers information on forest extent, species and density. Thematic accuracy is exceeding 90 % and determined by validation based on a random point sampling using ground truth data collected by the Centro American Commission for Environment and Development (CCAD).



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#### Rapid forest mapping to detect hot-spots

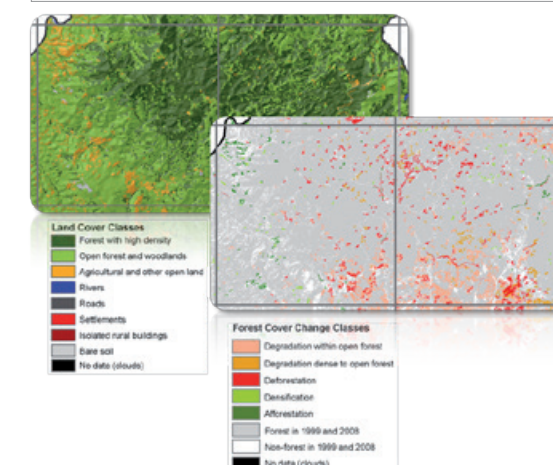


### FOREST RESOURCES MAPPING

The service exploits high resolution optical multispectral and SAR satellite imagery combined with field data for independent forest monitoring and land-use planning to establish sustainable forest management in Liberia, covering 8682km<sup>2</sup> of concessions. The following historical and up-to-date map data are produced:

- forest area,
- forest type,
- clear cuts,
- burned areas,
- changes of forest area,
- assessment of available forest,
- land cover,
- and terrain.

#### Forest Resources and forest cover change

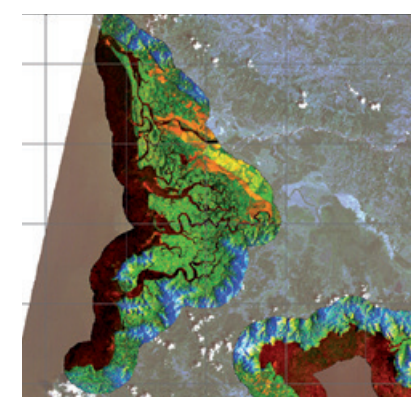


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### MANGROVE MONITORING – CENTRAL AMERICA

Mangrove forests are an integral part of the coastal environment but are put at risk through the growth of intensively operated shrimp farms and agricultural activity in coastal areas. Other risk factors are water pollution and drainage efforts as well as severe hurricanes, to name but a few. Satellites are an ideal source to provide information on mangroves and have been produced for the Yucatan Caribbean Coast (Mexico, Belize, Guatemala), the Terraba-Sierpe Reserve (Costa Rica) and the Golfo de Fonseca. The information is available for two different dates to represent the historic (1995) and the actual state (2007) of mangrove forest.

#### Mangrove map of the Terraba-Sierpe Reserve

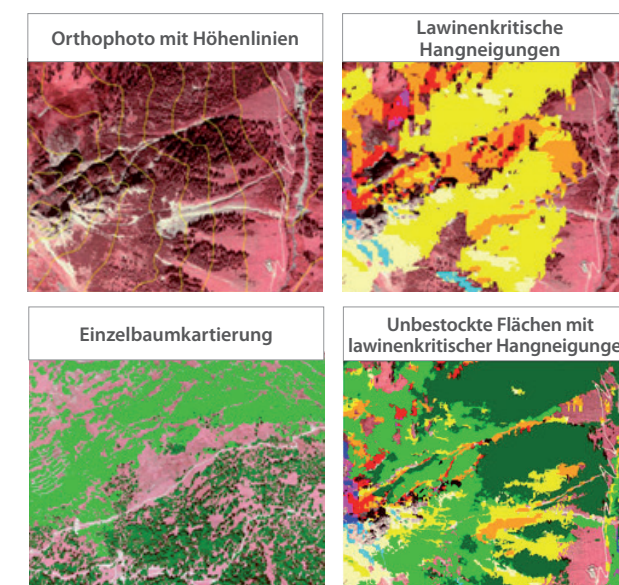


Class	mangroves	no mangroves	water	Total		User accuracy	Producer accuracy	Total class accuracy
				Number	%			
mangroves	44	5	1	50	17%	88%	72%	90%
no mangroves	16	132	2	150	50%	88%	96%	92%
water	1	0	99	100	33%	99%	97%	98%
<b>Total</b>	<b>61</b>	<b>137</b>	<b>102</b>	<b>300</b>	<b>100%</b>			
<b>Producer Accuracy</b>	<b>72%</b>	<b>96%</b>	<b>97%</b>			<b>92%</b>		

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### AUTOMATED MAPPING OF PROTECTION FORESTS

Mapping of protection forests and knee timer with subsequent GIS analyses to determine avalanche prone slopes. Minimum mapping unit on orthophoto amounts to 0,01 ha.



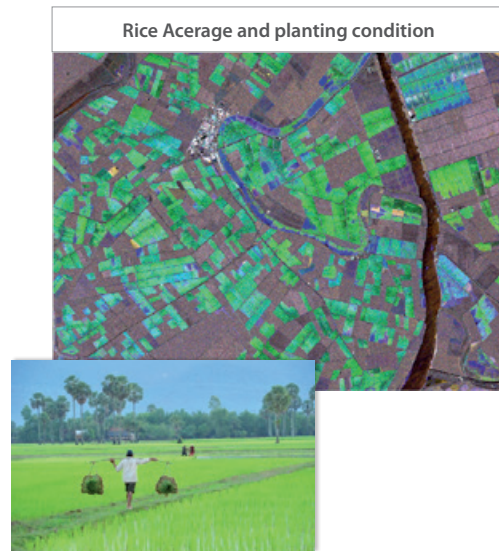
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AGRICULTURE

**CROP MAPPING AND MONITORING**

The service exploits high resolution SAR and optical multi-spectral and satellite imagery with field data support to establish inventory map data of crop type and acreage in the Mekong river basin. Additional rice parameters comprise rice cropping systems, crop cycles, date of emergence and harvest and the identification of rice planted under the System of Rice Intensification (SRI) methods.

The purpose is to build capacity for mapping and monitoring crop yields, to evaluate the impacts for floods and droughts and ultimately to manage the sustainable basin development.



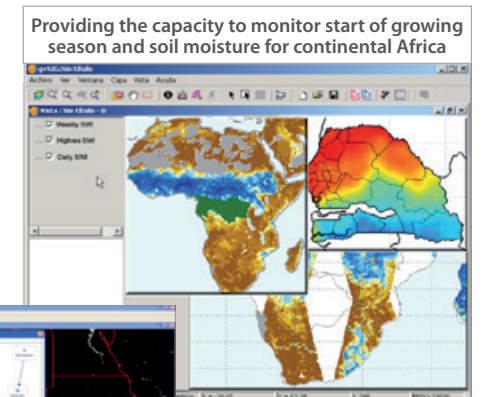
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**SUPPORTING FOOD SECURITY ASSESSMENTS**

As part of the Global Monitoring for Environment and Security Services Element, the Global Monitoring for Food Security project (www.gmfs.info) of ESA aims to provide Earth Observation based services in order to assist stakeholders, nations and international organizations to better implement their policies towards sustainable development.

GeoVille develops Soil Moisture derived Index products based on radar satellite (ERS, ASAR) data and provides related GIS services to the Early Warning Service of the GMFS Stage III project.

The products are provided to national users in all states of Africa on an operational basis.



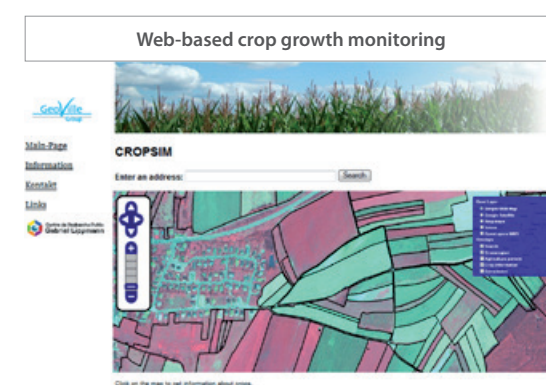
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**CROPSIM - AN IMPROVED CROP MANAGEMENT DECISION TOOL**

CROPSIM provides new techniques and services based on Earth observation

- (1) to estimate crop yield and the optimal time of harvest,
- (2) to facilitate and fasten decision making for an adequate management of crops by providing reliable short-term forecasts,
- (3) to improve the predictions of the crop model at regional scale by assimilation of space-borne remote sensing data soil moisture retrievals,
- (4) to establish a prototype for a Web-based decision tool that will offer in a near real time and operational context analyses and information on crop growth monitoring, yield forecasting at a regional level.

GeoVille Environmental Services established the user requirements, implemented the geoportal web application and executes commercial roll-out.



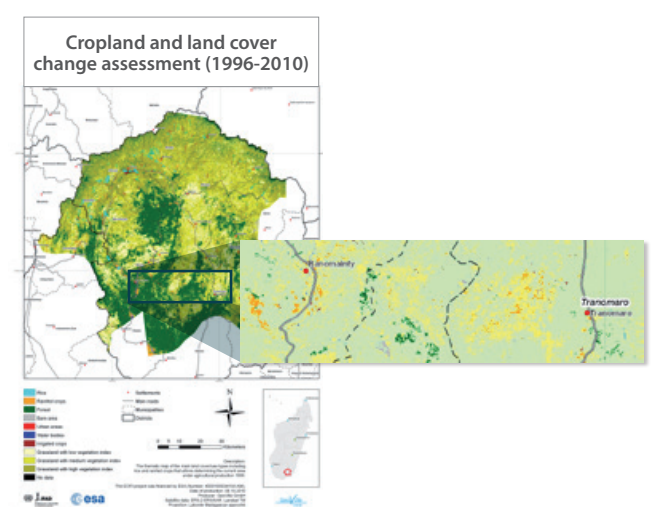
Copyrights © Centre de Recherche Public-Gabriel Lippmann, GeoVille

**DETERMINING CHANGES OF AGRICULTURAL PRODUCTION – MADAGASCAR**

In cooperation with the European Space Agency (ESA), GeoVille provides products and services to the UN International Fund for Agricultural Development (UN-IFAD).

Within the EOFI project, the aims were to support the Ministry of Agriculture, Livestock and Fisheries of Madagascar to understand the occurred land use changes, and determine the changes and current state of agricultural production.

GeoVille used historical radar and optical satellite data to map rice fields and other cropland along with high level land cover classes from 1996 to 2009 and performed a multi-year change detection analysis of the agricultural production areas.



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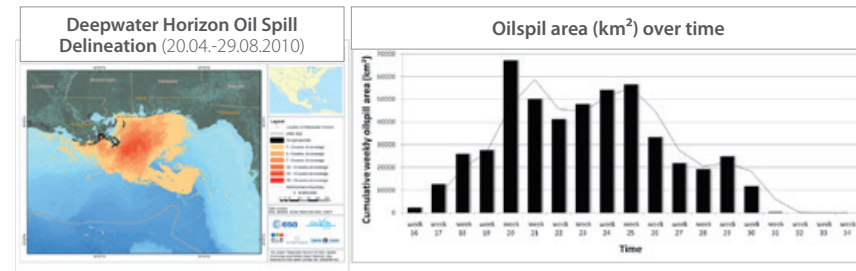
ENVIRONMENT

**HABITAT IMPACT ASSESSMENT OF THE DEEPWATER HORIZON OIL SPILL**

State-of-the-art Earth observation (EO) technologies based on optical and radar satellite sensors were employed to conduct a comprehensive documentation in map and statistical form of the oil spill disaster following the Deepwater Horizon oilrig explosion featuring:

- cumulative weekly maps (overall area impacted during one week) documenting the extent of the oil spill and identifying site impacts of critical terrestrial and marine habitats of natural and economic value
- summary statistics and graphs quantifying area and sequences of oil interaction with habitats

The results of the study were featured at the United Nations 10th Conference of Parties to the Convention on Biological Diversity in Nagoya and in the Wall Street Journal.

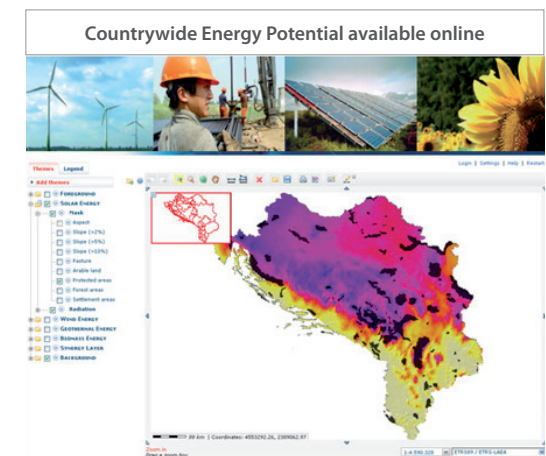


Copyrights © The Ocean Foundation, ESA, GeoVille

**RENEWABLE ENERGY POTENTIAL MAPS – WEST BALKAN COUNTRIES**

The Demonstration Project for the Development of Renewable Energy Potential Maps for the West Balkan Countries aims

- (1) at providing local and regional decision-makers with a simple and efficient tool to obtain first level information about sites suitable for the production of energy from renewable sources and
- (2) providing the European Environment Agency (EEA) with information where synergies in the production of energy from renewable sources can be obtained and where potential future conflicts between nature protection and renewable energies might be played out.

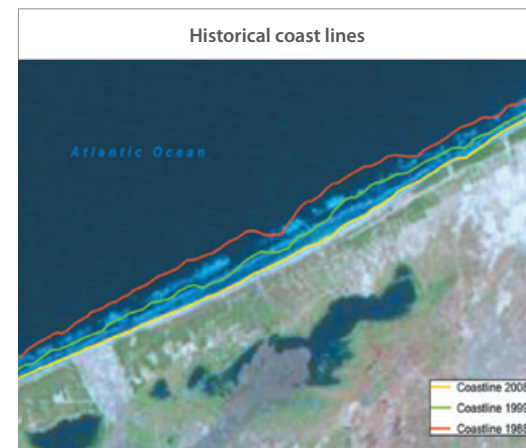


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**COASTAL CHANGE MAPPING – WEST AFRICA**

State-of-the-art Earth observation (EO) technologies based on high to very high resolution optical multispectral satellite imagery were employed to conduct a comprehensive documentation of 950km of coastline throughout WestAfrica.

The service provides for historical maps of the coastline of the last 20 years derived from as well as a quantitative map of coastal changes derived from analysis of the historical coastline maps.

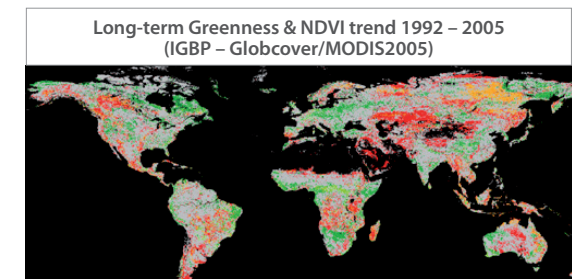
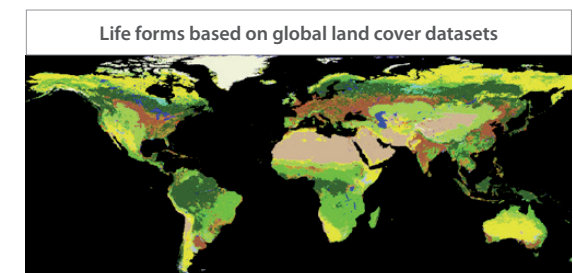


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**ECOSYSTEM MONITORING FOR BIODIVERSITY 2010 TARGET ASSESSMENT**

The ESA DIVERSITY project extension "Supporting the Convention on Biodiversity" aimed at developing and implementing a method allowing a rigid comparison of existing global land cover data sets to document global land cover changes since 1992.

GeoVille's scientific team developed a new concept of "life forms", enabling a reliable trend analysis along with determination of trend certainty.

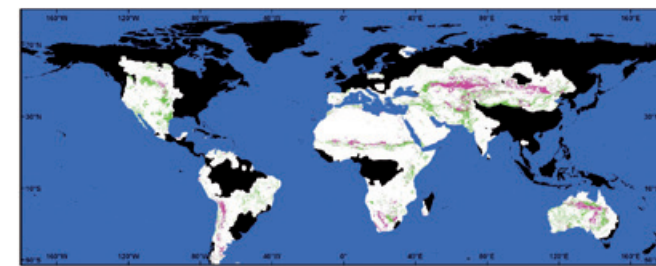
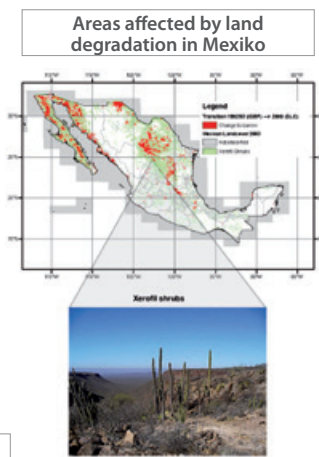


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ENVIRONMENT

LAND DEGRADATION IN DRY AND SUB-HUMID LANDS

Monitoring of land degradation (e.g. soil erosion, overgrazing, habitat conversion) is a key element for meeting the Biodiversity 2010 target of the United Nations Convention on Biological Diversity (UNCBD). GeoVille has developed for the UNCBD a methodology to identify areas of potential land degradation. The approach is based on a spatial and thematic harmonisation of the IGBP 1992/93, GLC2000 and Globcover2005 data. Hotspots are being monitored with higher resolution satellite data such as SPOT and have yielded in Mexico an overall accuracy of 80% against data obtained from national sources. Differences are flagged as potential land cover changes. These potential change areas are further analysed using long-term vegetation and leaf area indices to confirm changes in vegetation vigour. In dry areas land degradation is expressed as "change to barren land", indicating a change from a higher form of land use (e.g. agriculture, forestry) to unused, barren land.



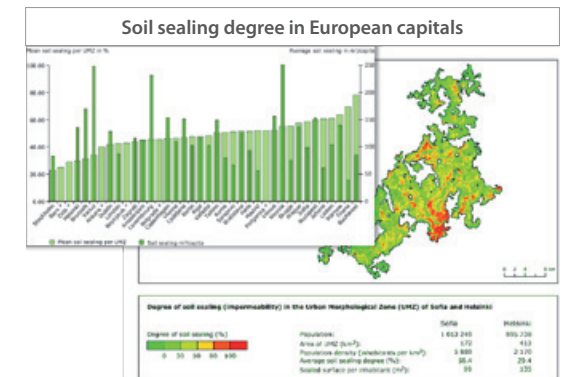
Diversity drylands  
Areas of potential land degradation 1992/93 - 2000 and 2000 - 2005

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EEA STATE OF ENVIRONMENT REPORT 2010 (SOER 2010)

The European Environment Report - State and outlook 2010 (SOER 2010) provides a set of assessments of the current state of Europe's environment (32 EEA member countries and six cooperating countries in the Western Balkans; it also addresses four regional seas: the North-east Atlantic, Baltic, Mediterranean and Black Seas), its likely future state, what is being done and what could be done to improve it, how global megatrends might affect future trends.

GeoVille Environmental Services has provided the analysis and underlying map data to the thematic assessments "Land use" and "Urban environments" as well as to the SOER 2010 "Synthesis".



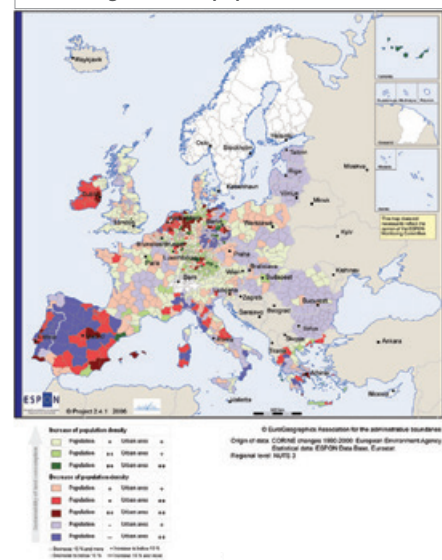
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INDICATORS FOR ANALYSING TERRITORIAL TRENDS AND POLICY IMPACTS IN THE FIELDS OF EU ENVIRONMENTAL POLICY

Environmental indicators simplify, quantify and communicate complex environmental data and tell about the state or quality of the environment. CORINE Land Cover data were combined with socio-economic data to furnish spatial overviews about key aspects of environmental developments and trends within the EU territory.

- Urban growth
- Growth of residential areas
- Growth of industrial areas
- Urban growth and population development
- Productivity of land consumption
- Agricultural intensity
- Degree of urban dispersion
- Land cover replaced by built-up area
- Usage of land
- Loss of natural areas

Urban growth and population 1990 - 2000



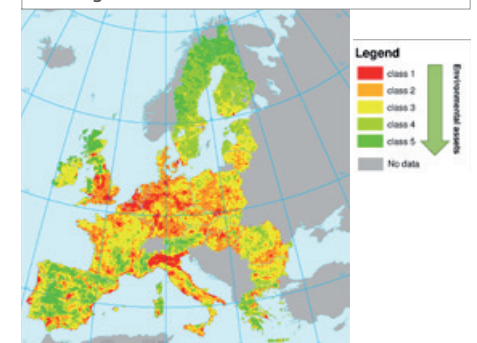
Copyrights © ESPON, GeoVille; Data: EEA for CORINE Landcover

EEA TECHNICAL REPORT ON "THE TERRITORIAL DIMENSION OF ENVIRONMENTAL SUSTAINABILITY"

The EEA technical report on "The territorial dimension of environmental sustainability" undertakes an analysis of the environmental dimensions of territorial cohesion and of related EU policies. It is intended to contribute to and support external processes including the European Commission's Green Paper on Territorial Cohesion, revision of the EU budget (e.g. regarding Cohesion Policy) and the work of ESPON (the European Spatial Planning Observation Network) on territorial is to prove internal coherence or functionality that forms a logic base for policymakers and stakeholders to exploit common territorial capital and to tackle common challenges.

The aim of the work carried out by GeoVille Environmental Services was to develop a "new geography" which supports the territorial identity of European regions through the identification of current natural and environmental assets.

Regional environmental characterisation



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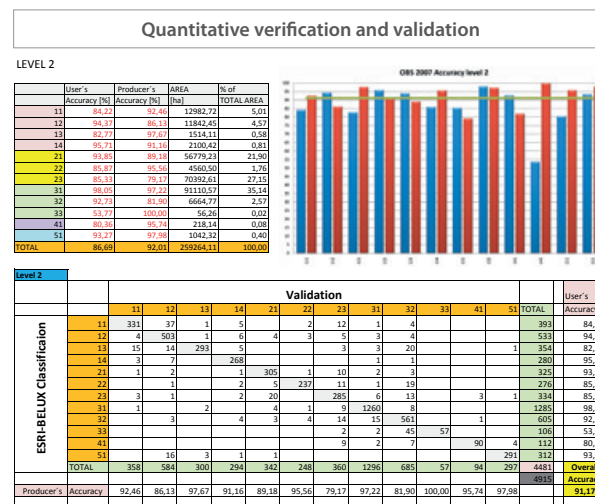
## PRODUCT QUALITY CONTROL AND VALIDATION

### PRODUCT QUALITY CONTROL / TECHNICAL AND THEMATIC VALIDATION

GeoVille Environmental Services specialises in the quality assessment of digital spatial data. Quality assessments provide potential users with the evidence that a specific product or service provision will yield useful information products with a predictable quality under a defined set of operational constraints.

Generally there are two different kinds of quality assessment procedures:

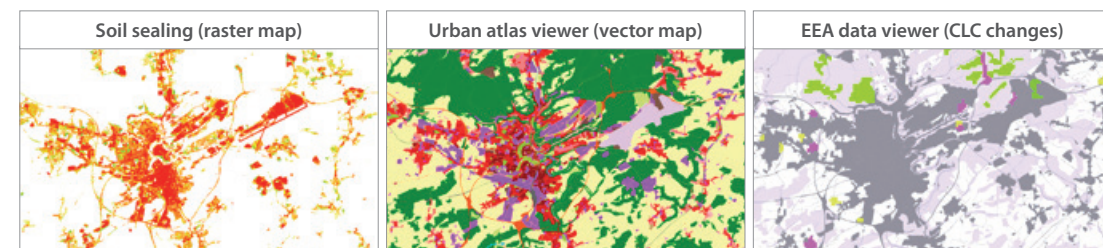
- **Verification** to enhance the quality of the product. Therefore it is often carried out in parallel to / during the production process. It normally provides a qualitative feedback which is meant to improve the data quality. Typical examples of verification are the country visits carried out by the CLC technical team during the Corine Land Cover production.
- **Validation** is performed after the end of production. It is a quality control process with the aim to assess the accuracy of the database in quantitative form.



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Different data types created from EO data require different quality control methods.

- Vector maps – classification of data into discrete categories, e.g. land cover maps
- Raster maps – continuous information maps, e.g. density maps, elevation maps
- Change maps – changes between two dates



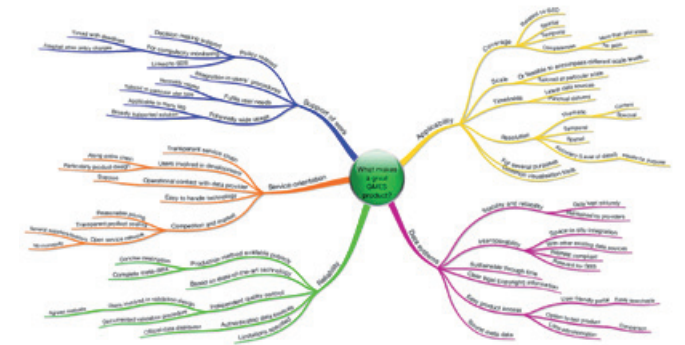
- Blind Remapping Methods
- Blind Point Methods
- Enhanced Pausibility Methods
- Different Interpreters Methods
- Evaluation of density layers
- Sampling schemes

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### QUALITY CRITERIA

The following collection of criteria is intended to increase the general understanding on the users' perspective on product quality and product design and will aim at covering as much as is feasible and realistic.

- **Support the users' work** – integration in users' procedures, fulfils users' needs
- **Service orientation** – transparent production chain
- **Reliability** – known production method, independent quality control, limitations specified
- **Applicability** – completeness, timeliness, resolution
- **Sustainability of the data systems** – INSPIRE compliant, interoperability, meta data



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### REFERENCE PROJECTS

GeoVille has a long track record in quality control activities including the development of validation methods and intensive discussions with the user community on its definition of accuracy and accuracy measures.



#### European level

- GSE Land: methodological developments and verification/validation
- geoland-2: methodological developments and verification/validation
- GMES Urban Atlas: technical conformity control and being part of the independent expert team carrying out the thematic validation on site of the contractor's premises
- GNU: GMES User Network, which also dealt with the identification of appropriate quality measures

#### National level

GeoVille Environmental Services was contracted by the Luxembourg Ministry of Environment to draft the updated specifications for the national land use/land cover reference map, the Occupation Biophysique du Sol (OBS) which was updated in 2007. The resulting product developed by a third party was then quality controlled by GeoVille Environmental Services.

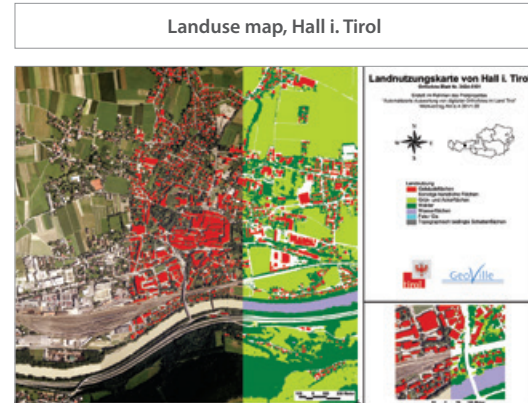
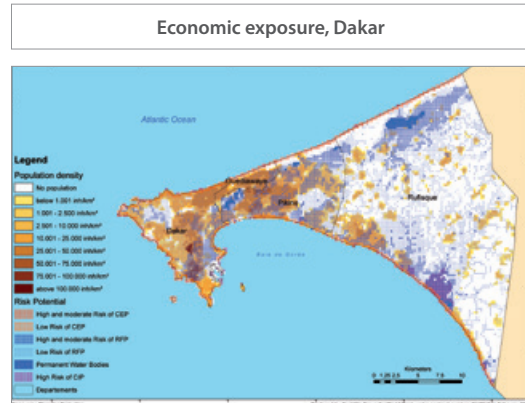
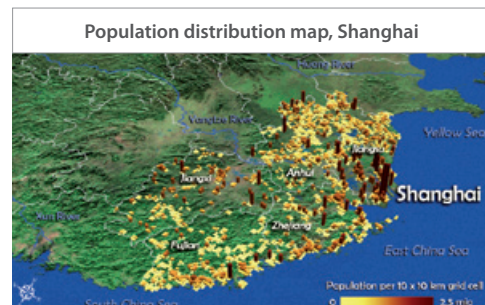
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CARTOGRAPHY

IMAGE MAPS

Our image processing experts have produced more than two-hundred high quality image maps along with cartographic annotations for overviews and presentation purposes in 35 countries of the world.



Copyrights © ESA, Government of Tyrol, GeoVille; Data: Space Imaging, Orbimage, Spotimage

SATELLITE MOSAIC MAPS

Generation of a seamless, cloudless image mosaics around the globe.



ENVISAT - MERIS Mosaic of EU-25

Mosaic maps covering the entire EU territory as well as 25 individual country mosaics. Image processing comprised geocoding and mosaicing of more than 300 MERIS full resolution images. More information: [www.esa.int](http://www.esa.int)

Copyrights © European Space Agency, GeoVille

ENVISAT - MERIS, Europe



ENVISAT - MERIS, Italy



ENVISAT - MERIS, Poland



ENVISAT - MERIS, United Kingdom



ENVISAT - MERIS, Germany



LANDSAT, Alpine Arc

LANDSAT Mosaic of the Alps

This Landsat mosaic was produced from 98 individual images.

Copyrights © GeoVille; Data: Eurimage



PROMOTION

**WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT**

The centrepiece deliverable for CEOS's participation in the 2000 World Summit on Sustainable Development Conference has been a technical document highlighting advances in EO technologies since Rio 1990. The document served as background material for the CEOS delegation within the WSSD working groups and was complemented by fact sheets, an exhibition stand as well as web pages and promotion material.



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**CD REALISATIONS FOR THE EUROPEAN SPACE AGENCY**

CD realisations by GeoVille for the European Space Agency. The CDs highlight ENVISAT applications, the Earth Explorer generation of satellites, the Global Monitoring for Environment and Security Programme and a satellite version of Jules Verne's voyage around the Earth.



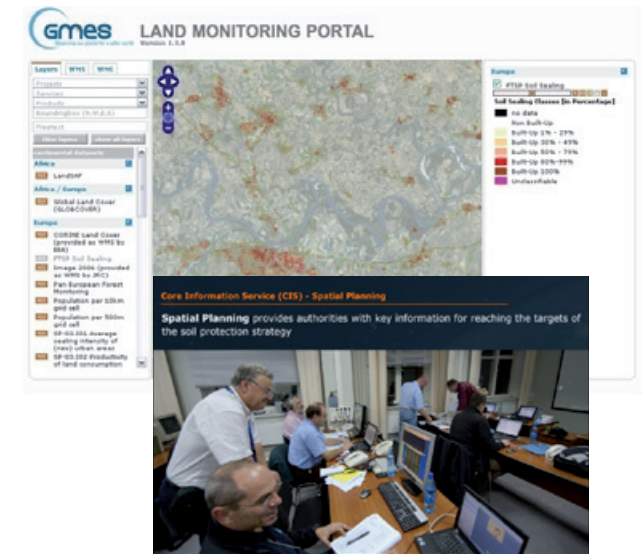
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**INTERACTIVE PROMOTION SHOWCASES FOR GMES**

The EU Land Information Services operationally provide sound, reliable and affordable land related geo-information products on the regional, European and global scale.

Beside production of core mapping and core information products in the framework of geoland and geoland 2, GeoVille has established the interactive promotion showcases explaining the background of the geo-information products featured at the GeoPortal.

Please refer to <http://www.land.eu/portal/>



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**ESA GMES BRIEFS**

ESA publishes a series of 36 „GMES Briefs“, each presenting a concrete application of the Earth monitoring programme managed by the European Commission. Together with ESA,

GeoVille identifies current, late-breaking topics and presents the potential of EO data from dedicated GMES missions in a brief.

The GMES briefs are available under: <http://www.gmes.info/pages-secondaires/newsletters/>.



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PROMOTION

CITY VIEWS

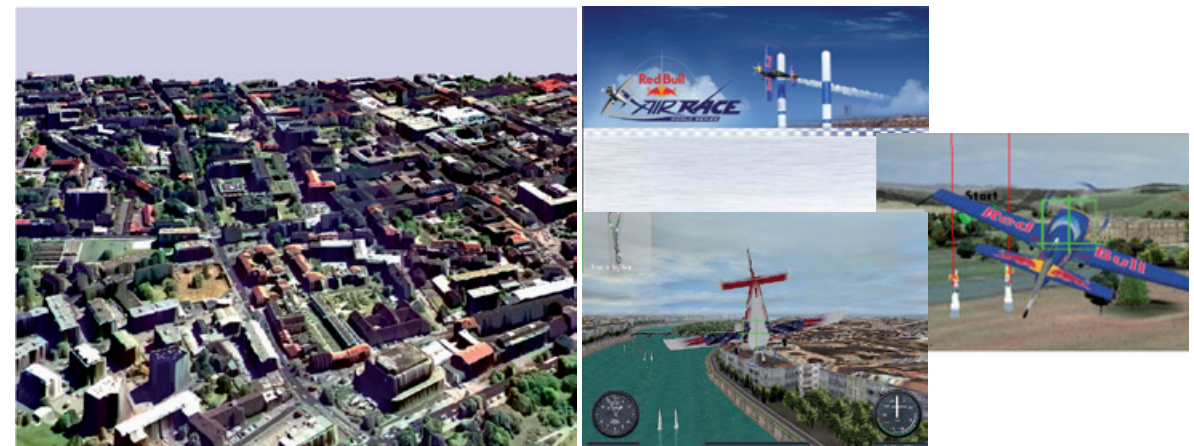
City view image maps are produced from very high resolution satellite images as provided by QuickBird, Ikonos and Spot sensors.



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VIRTUAL CITY MODELS

Virtual city models are based on very high resolution satellite or aerial images and precise building models. Images above show virtual city models realised for the Red Bull Air Races.



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VIRTUAL REALITY FLIGHTS

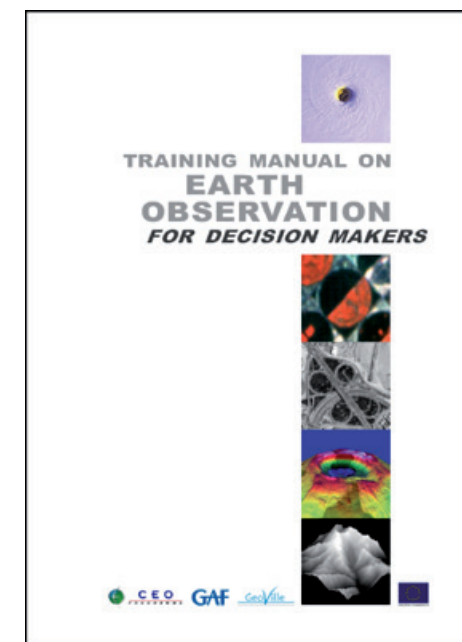
Magic Mountain is an example on how satellite data can be used to generate motion based virtual reality flights. Hundreds of satellite images and digital terrain models were processed to realise the flight over Mount Everest, Cotopaxi, Mount Kilimandscharo and the Three Torches.



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EARTH OBSERVATION FOR DECISION MAKERS

The Training Manual on Earth Observation For Decision Makers highlights 50 successful satellite applications in fields such as planning, forestry, infrastructure and agriculture. It is aimed at potential users of satellite applications in international organisations and be downloaded at our website: More Information



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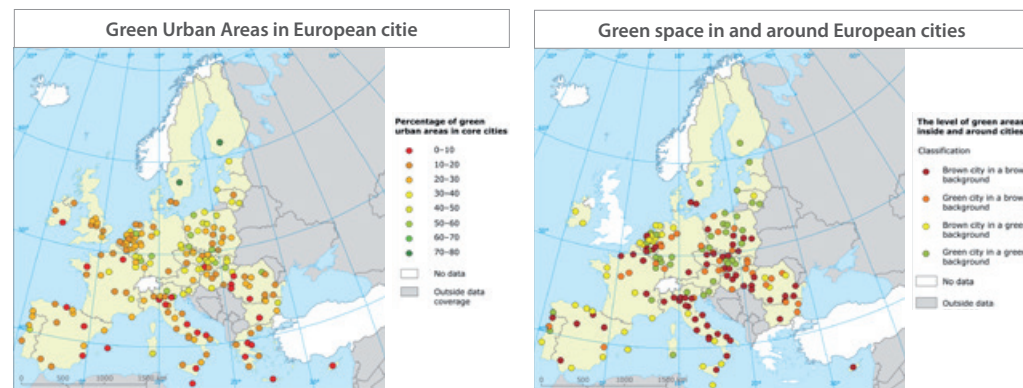


CONSULTANCY

**EEA – URBAN ECOSYSTEMS MESSAGES FOR 2010**

The United Nations declared 2010 to be the International Year of Biodiversity. One of the EEA contributions to 2010 was the preparation of a series of messages for 2010.

GeoVille Environmental Services provided input to the sixth message on "Urban Ecosystems". The contribution contained maps of the share of green spaces in urban areas, based on the GMES Urban Atlas.

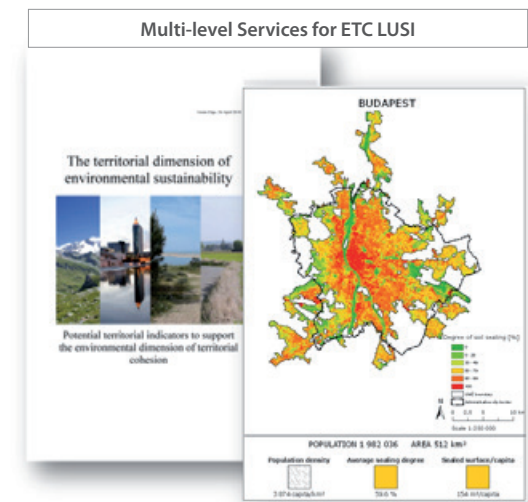


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**EUROPEAN TOPIC CENTRE ON LAND USE AND SPATIAL INFORMATION (ETC LUSI)**

From 2006 to 2010 GeoVille has been partner in the ETC LUSI, one of five European Topic Centres which are collaborating with the European Environment Agency (EEA) in specific thematic areas.

In the ETC GeoVille has supported the EEA in issues related to GMES land related activities (CLC, GIO, high resolution layers, validation, Urban Atlas technical review), data management and analysis as well as policy assessment (e.g. territorial cohesion, urban areas).

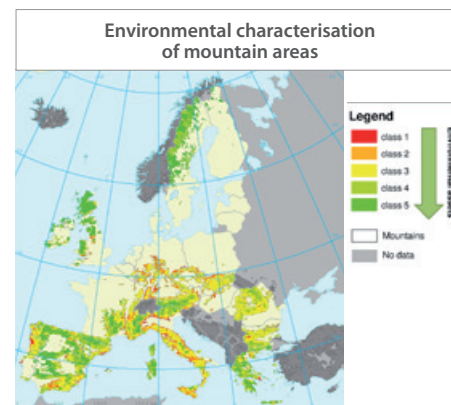


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**EEA REPORT "EUROPE'S ECOLOGICAL BACKBONE: RECOGNISING THE TRUE VALUE OF OUR MOUNTAINS"**

Europe's mountain areas have social, economic and environmental capital of significance for the entire continent. This importance has been recognised since the late 19th century through national legislation; since the 1970s through regional structures for cooperation; and since the 1990s through regional legal instruments for the Alps and Carpathians. The European Union (EU) first recognised the specific characteristics of mountain areas in 1975 through the designation of Less Favoured Areas (LFAs). During the last decade, EU cohesion policy and the Treaty of Lisbon have both focused specifically on mountains.

GeoVille Environmental Services has contributed to the report by providing a map of natural and environmental assets for European mountain areas.



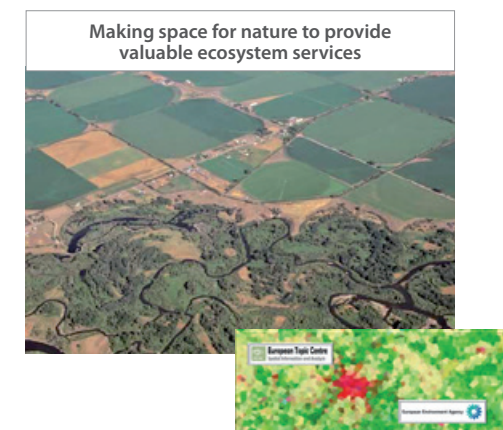
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**EUROPEAN TOPIC CENTRE FOR SPATIAL INFORMATION AND ASSESSMENTS (ETC/SIA)**

Since 2011 GeoVille is partner in the ETC SIA, The European Topic Centre for Spatial information and Analysis, which is supporting the European Environment Agency (EEA) in developing seamless European wide spatial reference data and in analysing these data for environmental issues.

GeoVille is leading or involved in activities related to Corine Land Cover, Green Infrastructure, Territorial Cohesion, Urban Assessments, Resource Efficiency and Data Integration.

For more information please refer to ETC/SIA website <http://sia.eionet.europa.eu/>.



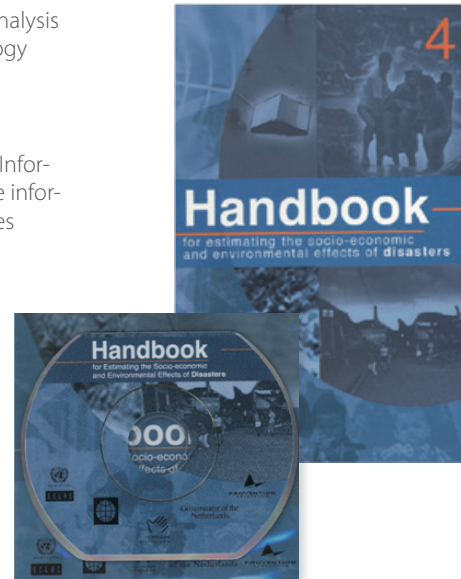
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CONSULTANCY

**METHOD HANDBOOK FOR THE WORLD BANK**

Development and implementation of EO and GIS spatial analysis methods for the Damage and Loss Assessment Methodology Handbook of the Global Facility for Disaster Reduction and Recovery (GFDRR), World Bank.

The handbook describes in detail the use of Geographical Information System (GIS) and Earth Observation data to analyze information gathered by different sectors of damages and losses related to natural hazards.



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**IMPLEMENTATION OF CLC2006 IN THE WEST BALKAN**

Management of the implementation of CLC2006 in the West Balkan Countries (Albania, Bosnia Herzegovina, Croatia, Macedonia, Montenegro, Serbia, Kosovo). The tasks included capacity building, i.e. on-site training of local experts in the CORINE methodology as well as quality control of the project output.

The project filled an important gap in the European CLC database bringing comparable information in the West Balkan Countries to the same level as in the rest of Europe.



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**THE ENVIRONMENTAL ATLAS OF EUROPE**

GeoVille provides content to The Environmental Atlas of Europe, an interactive web-mapping service showcasing communities responding to environmental change across Europe. Satellite based analysis results are employed to visualize historical changes of sites – eg. <http://www.eea.europa.eu/atlas/eea/eco-tourism/>.

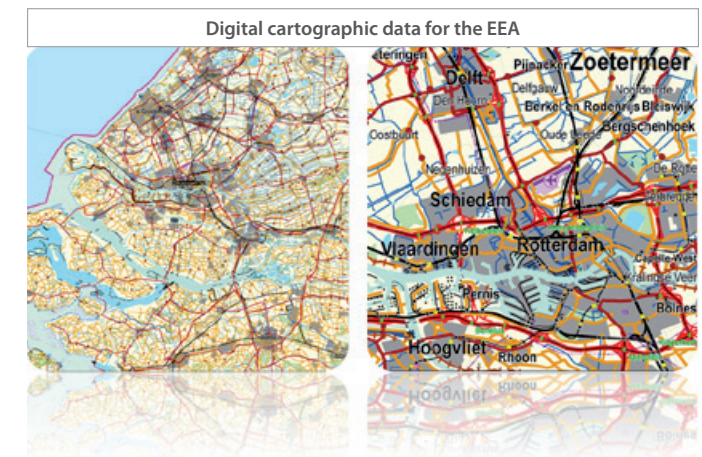
The Environmental Atlas of Europe is UNEP-EEA-ESA joint project and can be accessed under <http://www.eea.europa.eu/atlas>.



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**EEA FRAMEWORK CONTRACT FOR THE PROVISION OF DATA SERVICES**

GeoVille signed a 4-year framework contract with the European Environment Agency for the provision of data services. Through this framework contract the EEA procures external data sets (e.g. Eurogeographics products) as well as related services.



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## FOCUS GMES

### GEOVILLE AND GMES (GLOBAL MONITORING FOR ENVIRONMENT AND SECURITY)



represents a concentrated effort to bring data and information providers together with users, so they can better understand each other and make environmental and security-related information available to the people who need it through new enhanced services.

GMES is the next flagship initiative for space in Europe after Galileo, contributing to establish a European capacity for Global Monitoring for Environment and Security. GeoVille has been playing a key role in GMES services for land applications, related to both land cover production as well as downstream services in the spatial planning and forestry domain. To view the geo-data produced by GeoVille for GMES please visit the GMES Land Monitoring portal under <http://www.land.eu/portal>.

### PAN-EUROPEAN LAND COVER MAPPING FOR THE EUROPEAN ENVIRONMENT AGENCY (EEA)



In the first operational GMES application for land monitoring GeoVille is part of a service provider network to map built-up areas and soil sealing for Europe. By 2008, consistent high-resolution land cover information for 5.8 mio square kilometres from 20m satellite data will be available.

GeoVille is responsible for mapping of 12 countries, for set-up of the processing chain, for training the consortium partners comprising GISAT s.r.o. (Cz), Infoterra GmbH (D; Prime), Metria (S), Planetek srl. (It), Tragsatec SA (ES) and acts as thematic and scientific advisor to the European Environment Agency.

### EEA FRAMEWORK CONTRACT FOR THE PROVISION OF DATA SERVICES

GeoVille signed a 4-year framework contract with the European Environment Agency for the provision of data services. Through this framework contract the EEA procures external data sets (e.g. Eurogeographics products) as well as related services.



### CORINE LAND COVER MAPPING

Since 2007 GeoVille has implemented several CLC mapping projects: CLC2006 for Luxembourg, CLC2006 for Albania, and a CLC-type map in the context of the Egnatia motorway project.

In addition GeoVille has managed the implementation of CLC2006 in six Western Balkan Countries (Bosnia Herzegovina, Croatia, Macedonia, Montenegro, Serbia, Kosovo).



### BOSS4GMES

The BOSS4GMES project aims to provide the technical, financial and contractual foundations which will enable the transition of GMES from a concept to an effective, operational programme.

As such BOSS4GMES will link GMES with key political decision makers, a broader sphere of users and the wider public.



### GSE LAND

GSE Land Information Services are aimed to deliver geo-information services, which are harmonised and standardised for cross-border applications. They are based on Land Cover and Vegetation. By integrating this information into existing infrastructure, models and management tools international and national public institutions will be enabled to fulfil their reporting and management obligations in an improved way.

GeoVille is in this ESA GSE Stage 2. Project task manager on the "Impervious areas and sealing levels" and responsible for service implementation in 10 European countries.



### GEO LAND

The ambition of EC-FP6 funded project geoland was to develop and demonstrate a range of European geo-information services for supporting the implementation of European directives. GeoVille was Manager of the Spatial Planning Observatory.

geoland2 aims to organise a qualified production network and demonstrate operational processing lines. GeoVille is responsible for production of core mapping products for the GMES Land Monitoring core service and managing the core information products for Spatial Planning.

Please refer to [www.land.eu/portal](http://www.land.eu/portal)



### GMES PREPARATORY PROJECTS >asap>

#### NEOS-QUICK

The aim of NEOS-QUICK was to explore the capabilities and limitations of novel EO systems for mapping Land Use, Land Use Change and Forestry (LULUCF) parameters as specified by the reporting standards of the Kyoto Protocol.

GeoVille has been the co-ordinator of this project financed by the FFG/BMVIT via the Austrian Space Application Programme (ASAP).

Please refer to <http://www.geoville.com/neos/index.html>

### GMES NETWORK OF USERS (GNU)

GNU intends to initiate a structuring of the GMES demand side by setting up an independent platform that will become the focal point and mouthpiece of European GMES user needs, and, likewise will foster a systematic dialogue between the stakeholder communities.

GeoVille supports the project in the future design of a land monitoring core services.

### SOIL SAGE

The „Service for the Provision of Advanced Geo-Information on Environmental Pressure and State“ (SAGE) offers a comprehensive product portfolio to serve the demands coming from the European Water Framework Directive and the upcoming regulations of the Soil Thematic Strategy.

GeoVille acted in this ESA-GSE Stage 1

Project as Task Manager of SoilSAGE.

### AUSTRIAN CLUSTER FOR GMES

The Austrian Cluster for GMES (Global Monitoring of Environment and Security) combines the forces of industry, applied research, university institutes and user organisations to develop sustainable Earth Observation (EO) based services in the settlement and alpine environment context.

GeoVille is the project co-ordinator of this project financed by the FFG/BMVIT via the Austrian National Space Programme (ASAP).



### LAND INFORMATION SYSTEM AUSTRIA

The development of a national Land Information System for Austria (LISA) was funded and initiated through the special GMES initiative of the sixth programme of the Austrian Space Application Programme (ASAP).

GeoVille is project leader and responsible for the full cycle development and implementation of a standardized Land Information System for Austria.

Please refer to [www.landinformationsystem.at](http://www.landinformationsystem.at)





MEDIA REFERENCES

TREND SPEZIAL: TIROL

# Umwelt-Spionage

Keine Angst vor Big Brother: Das Innsbrucker Unternehmen **GEOVILLE** wertet internationale Satellitendaten aus – für gute Zwecke.

VON PETER SEMPELMANN

**A**usspioniert und ausgeforscht – in dutzenden Hollywood-Thrillern wurde das Horrorszenario einer totalen Überwachung bereits skizziert. Eine Bedrohung, die von den über 2000 Kommunikations-, Navigations- und Fernerkundungssatelliten ausgeht, welche die Erde umkreisen. Satelliten, mit deren Hilfe es möglich sein soll, einzelne Personen ständig im Visier zu behalten und aus dem Weltraum derart detaillierte Fotos zu schießen, dass man die Uhrzeit vom Zifferblatt ihrer Armbanduhr lesen kann.



„Wir können Aussagen über ein Gebiet von 185 Quadratkilometern machen.“ Christian Hoffmann, GeoVille-Geschäftsführer

„Das ist nicht realistisch“, beruhigt Christian Hoffmann, Geschäftsführer des Innsbrucker Unternehmens GeoVille, „es ist zwar bereits seit 1965 die gesamte Erdoberfläche mehrfach durch Satelliten abgedeckt, aber von nur zehn Prozent der Oberfläche gibt es so detaillierte Aufnahmen, dass man darauf einzelne Autos oder Fußgänger erkennen kann.“ Die Uhrzeit von einer Armbanduhr zu lesen sei nicht möglich, meint der GeoVille-Chef, der allerdings einräumt, nichts über die Anzahl und die Funktion militärischer Satelliten sagen zu können.

**Umwelt und Städteplanung.** Aus Tiroler Sicht ist Hoffmanns Unternehmen gleich doppelt bemerkenswert. Unternehmer, die von Tirol aus weltweit arbeiten, sind nämlich besonders rar. Vielleicht liegt es an der wesentlich globaleren Sicht der Dinge, welche die Arbeit mit sich bringt. GeoVille ([www.geoville.com](http://www.geoville.com)) ist Spezialist für die Analyse von Satellitenaufnahmen, insbesondere für die Bereiche Umweltbeobachtung, Städtewachstum und das Lesen von Naturkatastrophen und deren Auswirkungen. Die Tiroler kooperieren mit dem größten internationalen Anbieter für Sat-Analysen, Space Imaging ([www.spaceimaging.com](http://www.spaceimaging.com)) mit Sitz in Thornton, Colorado, und gehören mitt-

lerweile selbst zu den weltweit führenden Unternehmen.

Das würde man von dem 9-Mann-Betrieb, der jährlich nur rund eine Million Euro umsetzt, auf den ersten Blick kaum erwarten. Die Fülle der aktuellen, weltweit durchgeführten Projekte spricht jedoch für sich.

So hat GeoVille soeben einen 2-Millionen-Euro-Auftrag der EU-Kommission für die Auswertung von Raumplanningdaten im Rahmen des Projekts „Global Monitoring for Environment and Security“ an Land gezogen.

Davor hat das Unternehmen die Entwicklung der Stadt Belgrad unter die Lupe genommen und eine Übersicht illegal errichteter Bauten und der Kriegsschäden in der serbischen Metropole erstellt. Im Auftrag der europäischen Weltraumorganisation ESA wurden im Projekt „Space Based Kyoto Monitoring“ die Kohlenstoffvorräte in Wäldern analysiert. Für die UNO hat GeoVille die Landnutzung in

Pakistan analysiert und im Auftrag der Weltbank die polnischen Hochwassergebiete an der Oder und der Weichsel erforscht.

**Wirtschaftlich sinnvoll.** Projekte, die durchaus einen wirtschaftlichen Nutzen haben. So konnten in Belgrad beispielsweise über 100.000 illegal errichtete Gebäude gezählt werden. Ihre nachträgliche Bewilligung wird dem serbischen Finanzminister dringend benötigtes Geld einbringen. Und bei der Untersuchung der polnischen Hochwassergebiete konnte das Unternehmen belegen, dass ein Hochwasserschutz in den Regionen wirtschaftlich nicht zu begründen ist. Hoffmann: „Ein Schutz würde so viel kosten, dass er keinen Sinn macht. Es ist günstiger, die dortigen Siedlungen zu verlegen.“

Satellitenbilder sind eine hervorragende Basis für derart aussagekräftige Analysen. Mittlerweile liegen Aufnahmen aus 40 Jahren zum Vergleich vor. Damit können auch langfristige Entwicklungen sichtbar gemacht werden, wie zum Beispiel bei der von GeoVille durchgeführten Untersuchung Shanghais. „Dort haben wir ein extremes, völlig unkontrolliertes urbanes Wachstum nachgewiesen“, sagt Hoffmann, „binnen weniger Jahrzehnte ist Shanghai von einem Dorf zu einer Metropole gewachsen, mit allen Problemen, die dabei auftreten.“

Die Tiroler Satellitenkundler können aber nicht nur langfristige Entwicklungen bewerten. Auch in akuten Fällen wie bei der Hochwasserkatastrophe vom letzten Sommer liefern sie wertvolle Informationen für Einsatz- und Sicherheitskräfte, denn Satellitenbilder sind in einer solchen Situation eine hervorragende Möglichkeit, einen Überblick über die Gesamtlage zu bekommen. Hoffmann: „Wir können Aussagen über ein Gebiet von 185 Quadratkilometern machen, fast den gesamten österreichischen Donauraum auf einmal analysieren. Das ist sonst nicht möglich.“

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THE WALL STREET JOURNAL

Friday - Sunday, January 14 - 16, 2011

IN DEPTH

# Tuna fight muddies the waters over damage from BP oil spill

Scientists' conclusions about accident's effect on the fish will determine environmental tab levied against company

By JEFFREY BALL

**T**HE BLUEFIN TUNA is one of the most majestic and prized creatures in the sea. Last week, one caught off Japan sold in Tokyo for \$396,000, to be used as sushi. Now the fish is the subject of a scientific fight that shows how hard it will be to gauge the environmental fallout of the biggest offshore oil spill in U.S. history.

The U.S. government will wrap up public meetings next week on whether to recommend declaring the Atlantic bluefin an endangered species. If the government declared the fish endangered, it would bar fishermen from targeting the fish in U.S. waters.

An environmental group filed the request last year, claiming in part that the western-Atlantic stock of the fish, long believed to spawn only in the Gulf of Mexico, would "be devastated" by last year's spill from a blown-out BP PLC well.

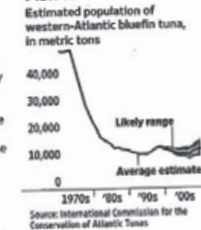
But scientists disagree about what por-

tion of last spring's crop of young tuna, or larvae, were hit by oil. They disagree about whether the Gulf is the only place where the western-Atlantic bluefin spawns. In short, they disagree about virtually every aspect of the spill's effect on the fish.

Hundreds of experts are studying the BP spill's impact in the Gulf, one of the richest ocean ecosystems in the world.

What these scientists conclude will help determine how much money—potentially billions of dollars—BP will pay in environmental damages. Their conclusions also could shape future rules governing industries crucial to the Gulf economy, such as fishing and oil-and-gas drilling.

**Fish fall**



Source: International Commission for the Conservation of Atlantic Tunas

Among the marine life scientists are examining are ones vital to Gulf businesses, such as shrimp, oysters and snapper. But experts also are trying to put a price on whatever damage the spill caused to species from microscopic plankton to massive whales.

Under federal law, the government can tally ecological harm from a spill, and such those responsible to pay for it—money that's in addition to compensation for losses to businesses and residents.

Measuring the ecological impact of oil spills and other industrial mishaps is notoriously difficult. A dizzying array of factors—natural and man-made—shapes an ecosystem.

More than two decades after the oil tanker Exxon Valdez dumped some 250,000 barrels of oil into Alaska's Prince William Sound, experts continue to argue about whether the spill was responsible for a subsequent crash in the local herring population.

"In hindsight, no one can say," said John Incardona, a scientist at the National Oceanic and Atmospheric Administration, who has spent years studying how oil spills to distinguish whether one pollutant overrides all of the others and causes an ecological effect.

Fishing for Atlantic bluefin isn't a big industry in the U.S., largely because of efforts to protect the fish. Limited fishing for Atlantic bluefin is allowed along the East Coast. But targeting bluefin is banned in the Gulf, mostly because the Gulf is an important spawning area for the fish.

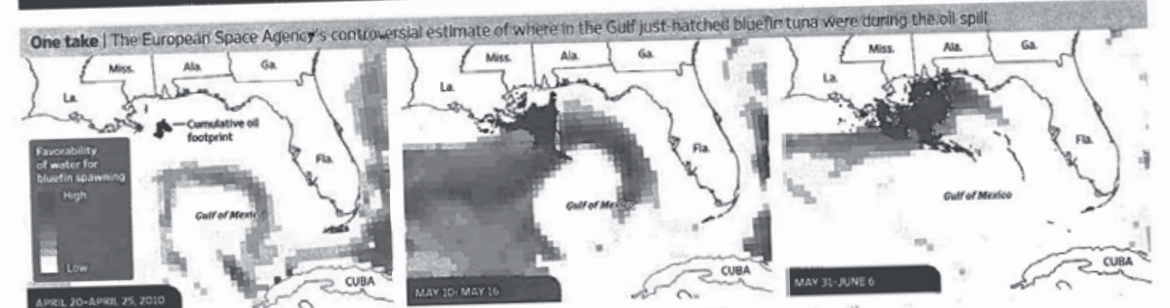
The oil spill in the Gulf hasn't so far hurt the catch, which in 2009 brought U.S.

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IN DEPTH



Sources: European Space Agency; Geoville; Collocate Localisation Satellites

commercial fishermen \$13.3 million, NOAA officials said.

The question is whether the spill hurt or killed enough young bluefin that it will reduce the population in future years.

Bluefin hatch in the northern Gulf from roughly May through June—in the general area, and at the general time, of the BP spill. Eggs and larvae in the oil almost certainly died, scientists say.

That doesn't address the bigger issue: how the spill affected the bluefin popula-

tion they say is pushing the bluefin to waters the industry hasn't found.

Each side has sponsored scientists whose work bolsters its view. A major point of contention is whether western-Atlantic bluefin spawn beyond the Gulf. If they do, then under U.S. and international fishing rules, there might be less justification for declaring the fish endangered.

Stanford University tuna expert Barbara Block's work has helped underpin the just-in-the-Gulf view.

New England fishing industry, which was fighting environmentalists' calls for tougher bluefin limits.

She said her scientific conclusions aren't influenced by that industry backing. Since that initial project, she said, she has gotten all her research money from the government.

NOAA is growing increasingly persuaded by the possibility western-Atlantic bluefin may spawn in significant numbers beyond the Gulf.



Scientists disagree about what portion of last spring's crop of larvae were hit by oil.

The U.S. will wrap up public meetings next week on whether to recommend declaring the Atlantic bluefin an endangered species That would bar fishermen from targeting the fish in U.S. waters.



MEDIA REFERENCES

PRESS RELEASE  
26.02.2007

**GMES introduced by GeoVille's CEO to United Nations Secretary General**

The Global Monitoring for Environment and Security - GMES - Programme was introduced to H.E. Ban Ki-moon by Dr. Christian Hoffmann, CEO of the GeoVille group, on the occasion of an invitation to the Austrian Federal Economic Chamber. Mr. Hoffmann explained how GMES, one of Europe's flagships in space, can assist the UN in their environmental & humanitarian aid programmes.



UN Secretary General Ban Ki-moon and GeoVille's Christian Hoffmann at the invited meeting for Austrian CEO's

environmental and geo-spatial domain.

GeoVille group is a leading GMES service provider supplying geo-information products to the EU, ESA the European Environment Agency as well as national ministries and regional administrations. GeoVille products centre on land based applications related to land use and land cover mapping, urban and regional planning, forestry, environmental monitoring and modeling.

GeoVille group has long term project experience in working with UN organisations such as the World Bank, United Nations Operational Services and UNESCO. Currently GeoVille is implementing a habitat monitoring system in seven Central American countries for ESA and UNESCO.

In GMES, GeoVille group is putting urban growth on the map in nine European countries within the ESA financed GSE Land project. In the project geoland, financed by the EU 6th Framework Programme, GeoVille has successfully developed environmental indicators for urban and regional development.

Among the United Nations organisations identified to profit from GMES are the World Bank, the Environment and Food Programme, UNESCO and the Offices for Humanitarian Affairs. Examples centred on countering negative effects of urban sprawl, monitoring of habitats and adaptation to climate change as key challenges of the 21st century.

**GMES**

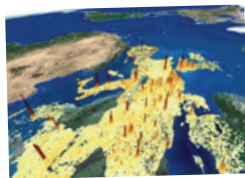
GMES represents a concerted effort to bring together data and information providers with users. Thereby they can better understand each other and make environmental and security-related information available through enhanced or new services.

GMES is driven by the European Union (EU) and the European Space Agency (ESA), together with their Member States.

GMES will strengthen Europe's role as a world leader in collecting and managing environmental and civil security information for the benefit of its citizens and institutions.

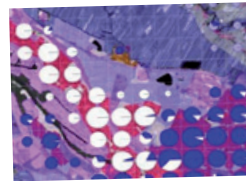
**GeoVille group**

GeoVille is an internationally operating group based in Austria and Luxembourg and uses satellite data to provide products and services in the



Monitoring of the environment for climate change adaptation in Europe  
Copyright: GeoVille/EU

Urban growth versus natural hazards - maintaining security of European citizens  
Copyright: GeoVille/ESA



GeoVille CEO, Christian Hoffmann, meets UN Secretary General

www.wirtschaftsblatt.at

INTERNATIONAL

VORZEIGEPROJEKT Experte des Verkehrsministeriums schätzt Kosten auf 2,3 bis 2,4 Milliarden €

**EU feilt an neuem System für die Erdbeobachtung**



Die EU-Staaten wollen sich von der Erde - zumindest von dem Teil, den sie bedecken - ein besseres Bild mithilfe von Satelliten machen

Hinter dem Kürzel „GMES“ verbirgt sich ein Projekt, das es der EU ermöglichen soll, mehr über ihren Naturraum zu erfahren. Für innovative Dienstleister tun sich Geschäftschancen auf. brüssel. Das Terrain der 25 EU-Staaten soll unter die Aufsicht von Satelliten gestellt werden: Mit „Global Monitoring for Environment and Security“ (GMES) plant die EU ein System zu schaffen, das es ermöglicht, Veränderungen

der Erdoberfläche aufzuspüren, die Einhaltung von EU-Umweltzielen zu kontrollieren und besser auf Naturkatastrophen zu reagieren. Eines der vielen Einsatzgebiete für GMES sind Tankerunglücke, sagt Ingolf Schädlner, Leiter des Bereichs Innovation im Verkehrsministerium. Dank der Beobachtung der Meeresverschmutzung aus dem All und Daten über die Strömung lässt sich die „Route“ eines Ölteppichs prognostizieren. „Man kann wertvolle Tage gewinnen, um Strände abzusichern.“ GMES kombinierte satellitengestützte Erdbeobachtung mit Daten, die am Boden gesammelt werden, fast Schädler zusammen. Das System kann auch der Landwirtschaft wichtige Informationen liefern. Derzeit sind etwa zehn Prozent der EU-Fläche von GMES abgedeckt, weiss Christian Hoffmann, Geschäftsführer des GMES-erfahrenen Tirolet Unternehmens GeoVille Informationssysteme und Datenverarbeitung. Die EU will die Erdbeobachtung verbessern und ausbauen. Zu diesem Zweck sollen 2008 und 2009 neue Satelliten im Orbit stationiert werden. Schädlner beziffert die Kosten mit 2,3 bis 2,4 Milliarden €. Die Details der Finanzierung müssen noch geklärt werden, eine

Möglichkeit sind Private-Public-Partnership-Modelle. Laut Experten soll das erweiterte System 2012 startklar sein. „Neue Versicherung“ Schätzungen zufolge wird sich dank des flächendeckenden GMES ein Dienstleistungsmarkt von 200 bis 300 Millionen € aufbauen. Aber: „Die gesellschaftlichen Vorteile sind viel grösser“, fügt Schädlner hinzu. „Wir schaffen eine neue Versicherung“, betont der Experte die Rolle von GMES als Frühwarnsystem, etwa im Hinblick auf Lawinenabgänge. GMES und die Dienstleistungen rundherum sind Thema einer Konferenz in Graz

am 19 und 20. April. Hoffmann knüpft an den Ausbau von GMES Expansionshoffnungen für sein Unternehmen, das derzeit 17 Mitarbeiter beschäftigt. GeoVille ist unter anderem in der Umsetzung der EU-Bodenschutzstrategie in zehn Mitgliedstaaten involviert. Was wäre-wenn-Szenarien werden im Hinblick auf Demografie und Landverbrauch - er wird mit Hilfe von Satelliten quantifiziert - erarbeitet. Freie Flächen sind in der EU ein knappes Gut. Europa sei der am dichtesten besiedelte Kontinent der Erde, gibt Hoffmann zu bedenken. SABINE BERGER s.berger@wirtschaftsblatt.at

Wirtschaftsblatt

derStandard.at » Wissenschaft » Welt » Forschung Spezial

**Österreich übersichtlicher machen**

VON ALOIS PUMHÖSEL | 23. November 2010, 23:19



Infrastrukturausbau wird geplant sein. Lisa hilft.

Mit Lisa wird nun ein Instrument entwickelt, das die Nutzung exakt zu beobachten. Das Monitoring soll Analysen für einen möglichst breiten raumplanerischen Steuerung verbessern.

Die Kategorisierungen der Lisa-Daten umfassen Gebiete der Zwergertrücker. Die Klassen: von Siedlung und Acker über Sportplätze bis hin zu Industrie- und Gewerbegebieten. In einer ersten, nun abgeschlossenen Phase und Nutzerbedürfnisse erheben. In der nächsten Phase werden die Daten in bestimmten Zeitintervallen umgesetzt und der Aktualisierung überlassen.

Zwar sind alle Bundesländer als Nutzer unterschiedliche Rechtslagen gehen die An der Erarbeitung des Projekts sind neben dem Institute of Technology, Joanneum Research und dem Verkehrsministerium. Phasen des Projekts mit insgesamt ca. 1,5 Millionen Euro. (Alois Pumhösel, DER STANDARD)

Link Lisa

Daten des Landbeobachtungsprojekts „Lisa“ sollen Raumplanung, Naturschutz und Regionale Entwicklung erleichtern

1928 gab es in Österreich etwa 11.000 Autos, die Hälfte davon waren Taxis. 1970 gab es bereits mehr als eine Million Fahrzeuge. 2009 waren es über 4,4 Millionen. Die Zahl der Zulassungen und die damit verbundene Etablierung von Verkehrswegen ist ein Hauptinflussgeber für die Raumstrukturen eines Landes. Das Beispiel, das Gebhard Banko vom Umweltbundesamt bei seiner Präsentation des Land Information Systems Austria, kurz Lisa, am vergangenen Monat im Wiener Haus der Forschung brachte, veranschaulicht, dass sich Nutzung und Bebauung des Landes stärker verändern als die Bewohner wahrnehmen.

Auch künftig wird es substantielle Veränderungen der Landbedeckung und -nutzung geben. Täglich werden in Österreich an die zehn Hektar Land „verbraucht“, also in Infrastruktur-, Gewerbe- und Wohnflächen umgewandelt. Bis 2030 soll, ausgehend von 2005, die Bevölkerung um 19 Prozent wachsen und die Anzahl

**LISA vermisst Österreich neu**

Landkarten gehören der Vergangenheit an, digitale Landinformation kann mehr.

Die öffentliche Verwaltung braucht für Raumplanung, Forst-, Land- und Wasserwirtschaft, Naturgefahrenmanagement, Umwelt- und Naturschutz genaue Daten zur Landnutzung und Landbedeckung. Auch in der Privatwirtschaft zum Beispiel für Standortplanung und Geomarketing gefragt. Bis vor einigen Jahren wurden solche Datensätze hierzulande von unterschiedlichen Nutzern unter Berücksichtigung ihrer Interessen erstellt. Sie waren also kaum miteinander vergleichbar und entsprachen oft auch entweder aufgrund ihres groben Maßstabes oder ihrer unterschiedlichen zeitlichen Erhebung nicht mehr den Anforderungen. Um den gesetzlichen Berichtspflichten auf europäischer, nationaler, regionaler und lokaler Ebene nachkommen zu können, sind aber aktuelle, harmonisierte Informationen nötig.

Dem Projekt Land Information System Austria (LISA) – gefördert durch BMVIT / FFG im Rahmen des Österreichischen Welt- raumprogramms – fällt die Aufgabe zu, einen Konsens zu den Nutzeranforderungen zu erzielen und für Österreich in vierjähriger Arbeit ein Daten-Modell sowie ein operationelles Landbeobachtungssystem zu entwickeln. „Über 90 Prozent der öffentlichen Nutzer von Landnutzungsdaten sind mit an Bord. Das ist also ein System von Nutzern für Nutzer“, sagt Projektleiter Andreas Walli der GeoVille Group stolz. Mit dem, was auf alten Karten zu finden ist, hat das neue System nur mehr am Rande zu tun: „Es werden nicht mehr nur Abgrenzungen von Landschaftsobjekten, wie zum Beispiel von Siedlungen, auf Karten dargestellt, sondern eine Vielzahl von Objektattributen, wie

Nutzungstypen oder Versiegelungsgrad. Alle Informationen sind digital verfügbar und kartographisch darstellbar. Bei Flächen sehe ich zum Beispiel, ob es sich um ein Industriegebiet handelt, das vielleicht in einem Gefahrenbereich liegt. LISA kann auch für eine Vielzahl von Berichtspflichten, wie zum Beispiel die Baulandbilanzierung, eingesetzt werden“, erklärt Walli die Komplexität des Vorhabens.

Auch technisch ging man neue Wege, indem für eine ökonomisch effiziente Produktion vorhandene Fachdaten der Länder mit Luftbild-, Satelliten- und Laserscanning-Daten kombiniert werden. Bis Mitte 2012 wird das System weiter ausgebaut. Nun gilt es, Finanzierungsfragen zu klären und wie oft die Basisdaten auf den neuesten Stand gebracht werden. Im Sinne von Open Government wird LISA von den öffentlichen Bedarfsträgern betrieben und genutzt und für die Bürger durch ein offenes Geoportal, wie GoogleMaps, zugänglich gemacht werden.

www.landinformationssystem.at  
www.ffg.at/asap



Der Standard



MEDIA REFERENCES

BUNDESLÄNDER

wirtschaftsblatt.at

TIROL Innsbrucker Unternehmen wertet weltweit Satellitendaten aus

# GeoVille fasst bei der Weltbank Fuß

Die Tiroler GeoVille hat Aufträge der Weltbank an Land gezogen. Sie hat zum Beispiel untersucht, wie sich Mikrokredite auf die Bewirtschaftung von Wäldern auswirken.



Innsbruck. Das Tiroler Unternehmen GeoVille – es ist auf die Gewinnung räumlicher Informationen aus Satellitendaten spezialisiert – hat die Weltbank als Auftraggeber gewonnen. „Wir haben mehrmals versucht, in das Consulting-Geschäft reinzukommen“, sagt Geschäftsführer Christian Hoffmann. „In den vergangenen zwölf Monaten ist der Durchbruch gelungen.“ Die GeoVille Information Systems GmbH liefert Daten, die der Weltbank bei der Planung von Infrastrukturprojekten helfen.

In der senegalesischen Stadt Dakar wurden zum Beispiel „rote Zonen“ identifiziert, die von Überschwemmung bedroht sind. In Honduras hat das in Innsbruck ansässige Unternehmen untersucht, wie sich Mikrokredite auf die Bewirtschaftung des Waldes auswirken. Das Ergebnis: „Die Nutzung der Wälder ist viel

GeoVille hat für die senegalesische Stadt Dakar nachhaltiger, wenn die Landwirte die Möglichkeit haben, Eigentümler zu werden“, sagt Hoffmann. Der Wert der bisherigen Aufträge der Weltbank lag je zwischen 50.000 und 100.000 €. Hoffmann hofft, auch bei einer aktuellen Ausschreibung für ein Projekt in Mosambik zum Zug zu kommen.

**Büro in Luxemburg**  
Mithilfe der satellitengestützten Erdbeobachtung klären

Entwicklungsprozesse und die Erdoberfläche zeitlich genau werden – GeoFortgeschrittenen Ville hat im Wertungsdienstleistungen 2,5 Millionen € im laufenden Jahr von einer Krise betroffen.“ Das Unternehmen beschäftigt 30 Mitarbeiter



Wirtschaftsblatt

Les cahiers du développement durable

## La cartographie du XXI<sup>e</sup> siècle

Chaque jour, une superficie de 1,2 hectare est 'urbanisée' au Grand-Duché avec les conséquences que cela implique pour la biodiversité. Dans ce contexte, il est impératif de bien répertorier et identifier les zones bâties et les zones vierges dans une optique d'un développement durable, une mission que propose GeoVille grâce à des méthodes automatisées de télédétection des images spatiales et aériennes.

“Nous traitons différents aspects environnementaux comme par exemple la cartographie de la consommation du sol

Société de conseil à portée internationale basée à Innsbruck (Autriche) et Luxembourg (Niederlande). GeoVille offre des services, des produits, et des activités de conseil dans les domaines environnementaux et géo-spatiaux, avec pour spécialité la télédétection des images spatiales et aériennes et les applications SIG. Les systèmes d'information géographique (SIG) sont une intégration organisationnelle d'un logiciel et de données géographiques qui assurent la collecte, le stockage, l'analyse, la visualisation et l'interprétation des images satellite et aériennes qui permettent une vue impartiale et actualisée des situations. Ils aident à la prise de décision, à la planification et à la gestion dans un contexte de résolution de problèmes.

électricité, protection des écosystèmes aquatiques, gestion des risques environnementaux, augmentation de l'accessibilité à l'eau potable, suivi de la qualité de l'eau, etc. Les SIG sont donc des outils efficaces pour synthétiser l'information et faciliter la compréhension globale de l'étude.

“Nous traitons différents aspects environnementaux comme par exemple la cartographie de la consommation du sol, une donnée incontournable pour la définition de terrains à urbaniser”, nous explique Stefan Kleeschulte, délégué commercial de la filiale luxembourgeoise, GeoVille Environmental Services, qui a vu le jour en 2007 et qui se charge d'intégrer la composante environnementale.

Dans le domaine de l'environnement, par exemple, les SIG permettent de réaliser des études d'impact; ils sont un instrument de planification et de recherche qui prend en considération l'ensemble des facteurs environnementaux avec pour objectif d'éclairer les prises de décision pour une gestion durable de l'environnement. Les SIG sont un des outils qui marquent un grand pas en avant dans le domaine. Par exemple, les applications des systèmes d'information géographique aux ressources en eaux sont multiples: recherche scientifique en hydrologie, hydro-



### Occupation Biophysique du Sol Grand-Duché de Luxembourg

Validation and statistics

### Renewable Energy

Demonstration project for the development of renewable energy potential maps for the West Balkan countries

### Urban Atlas

Validation and statistics

### High Resolution Mapping Luxembourg

Letzebuurger Gemengen – Actualité politique et économique luxembourgeoise

## INTELLIGENT GEOINFORMATION TO GO!

GeoVille Group Uses GIS to Automatically Transform Images into Affordable and Precise Geoinformation Products

Based in Austria and Luxembourg, GeoVille Group is an environmental and geospatial consulting company serving a global customer base. The company specializes in products and services for earth observation (EO) and GIS. GeoVille's portfolio includes spatial planning, forestry, and environmental applications, as well as land-use and land-cover mapping. Clients include private enterprises, international organizations, and government bodies involved in urban, regional, and infrastructure planning and environmental monitoring.

A quality control urban land-use map, which GeoVille generated with GIS. With increasing pressure on organizations and agencies to assess the environmental impact of regional policies and activities, there is an ever-growing demand for reliable land-use information. In Germany alone, every day some 100 hectares of land—the equivalent of 200 soccer fields (football pitches)—are lost to urban development and transport infrastructure. With 75 percent of Europeans living in urban areas, it is a similar story across the continent. In developing countries around the world, increasing urbanization leads to megacities, which face severe health and safety challenges from uncontrolled land consumption and growing slums.

Strategies for soil protection and monitoring systems are urgently needed all over the world. An example is the joint initiative of the European Commission and European Space Agency, Global Monitoring for Environment and Security (GMES), which was established to address those issues by building a space- and ground-based infrastructure to provide reliable and timely EO information services.

Customers need to be provided with harmonized, high-quality spatial information across all environments, enabling them to compare different regions and cities of interest. The produced geospatial data must contain well-defined and standardized levels of precision and confidence levels to be a reliable basis for decisions. Finally, the service must be highly scalable, supporting all types of modern spaceborne and airborne sensors. As a key player in GMES, GeoVille Group aims to develop reliable, standardized, and affordable mapping and downstream services that provide harmonized, high-quality spatial information and support customers in the implementation of European directives and their national realization. To this end, GeoVille worked with longtime partner Definiens, the German company that specializes in analyzing and interpreting images on every scale. By integrating the Definiens Enterprise Image Intelligence platform with its existing

ESRI ArcGIS workflow, GeoVille created RegioCover, a highly automated, accurate, and reliable cross-border application for operational urban and regional land-use mapping to reveal detailed pictures of built-up areas. This solution allows mapping of land cover and land use over different biogeographic regions using terabytes of image data in an operational and cost-efficient way, covering specific image preprocessing tasks, rule-based image classification, postprocessing, and quality control. The processing chain consists of ArcGIS and Definiens software components that have been customized, extended, and integrated by GeoVille. The core of the processing chain—segmentation and classification applications—is based on the Definiens Enterprise Image Intelligence Suite.

The Definiens Extension for ArcGIS provides a complete set of GIS processing tasks. In addition, a range of ArcGIS models and macros was developed to establish a complete workflow for transforming large volumes of raw image data into reliable quality-controlled geoinformation. Large-area mapping projects not only require image classification tools but also need a set of powerful GIS tools to efficiently manage, process, and deliver meaningful geoinformation to customers. Typical tools and extensions comprise object-based change detection, flexible application of standardized geometric map properties (e.g., minimum mapping units), map generalization tasks, attribute table management, and rapid point- and object-based validation of land-cover/use maps directly within ArcGIS.

With RegioCover, GeoVille can focus on its mission to offer innovative and affordable geoinformation products with high levels of precision for its customers. In most cases, RegioCover achieves close to 90 percent accuracy in identifying land cover and land use. This is an average 20 percent improvement over pixel-based analysis systems. At the same time, GeoVille was able to reduce the cost of manual analysis by 30 to 40 percent.

“The bottom line is this: GeoVille customers can now make better and timelier business decisions,” says Jürgen Weichselbaum, head of the technical department at GeoVille. “The importance of this cannot be overestimated.”

The European Environment Agency (EEA) has recently recognized the important role that GeoVille plays in land-cover and land-use mapping. “Technology like the one developed and applied by GeoVille will in the future certainly help bridge the gap between regional, national, and European land-cover and land-use mapping,” says Chris Steenmans, EEA.



A quality control urban land-use map, which GeoVille generated with GIS.

### NEW OPPORTUNITIES

GeoVille sees many opportunities of further intensifying the future use of ArcGIS products in combination with Definiens technology. The aim is to offer object-based change detection, enabling customers to update maps and detect changes to the environment automatically. For example, it would be possible to examine land-use changes in a specific location or over a large area by comparing images, even if those images were taken under different conditions or by different imaging systems. Here, the availability of high-resolution SAR data from TerraSAR-X will open a new dimension, allowing rapid mapping of large areas in tropical and subtropical countries.

Currently, RegioCover involves a number of discrete software components. In the future, GeoVille plans to integrate these components so that the results produced by one component are automatically imported to the next component. The entire process chain would be controlled by a single interface, making the system even easier to use and giving people without specialized training or experience access to RegioCover's full capabilities. Here, ESRI's ArcGIS Image Server is ideally positioned to manage the data provisioning work. The planned integration of Definiens technology with ArcGIS Image Server will complete the workflow. This integration would, in turn, enable RegioCover to perform fully automated and enhanced batch processing, capable of producing complete land-use maps without any manual intervention.

### MORE INFORMATION

For more information on GeoVille, contact Jürgen Weichselbaum, GeoVille (e-mail: info@geoville.com), or visit www.geoville.com. For more information on Definiens, visit www.definiens.com.

<http://www.esri.com/news>



## DEDICATED TO SERVE OUR CUSTOMERS

**Chris Steenmanns** – Head of Data Access and Management Group;  
European Environment Agency; Copenhagen, Denmark

*“EEA acknowledges with great interest the Definiens/EU/ESA Innovation Award won by its European Topic Centre on Land Use and Spatial Information partner GeoVille. Technology like the one developed and applied by GeoVille will in future certainly help to address bridging the gap between regional, national and European land cover and land use mapping.”*

**Marco Antonio Gonzales P.** – Environmental Affairs Officer; Comisión Centroamericana de Ambiente y Desarrollo (CCAD)

*“En las reuniones de los usuarios del proyecto, en la verificación de campo desarrollada en Costa Rica y en el seguimiento que dan a las actividades y acuerdos, se nota la alta responsabilidad y experiencia de las personas de GeoVille. CCAD manifiesta su satisfacción por la atención al usuario que brinda GeoVille.”*

**Matthias Hatz** – Network Planner; WIMAX Telecom; Vienna, Austria

*“WIMAX Telecom requires very high quality clutter maps for its network planning. GeoVille’s clutter maps produced with RegioCover have convinced us through an excellent quality-price ratio, their rapid availability and flexibility of coverage.”*

**Neil McMahon** – Senior Research Analyst Global Integrated Oils;  
Sanford C Bernstein; London, UK & New York, USA

*“We sought out a research partner which lead us to GeoVille Information Systems, who are experts in the field of GIS, and more importantly are one of the few companies in the world capable of analyzing subsidence data based on past experience.”*

**Robert Hoft** – Environmental Affairs Officer;  
United Nations Secretariat on the Convention of Biological Diversity; Montreal, Canada

*“Since the selection of GeoVille as the contractor commissioned to carry out the analysis, regular contacts have taken place including a visit to the CBD Secretariat. The GeoVille team has thereby taken on board all the suggestions and concerns raised by the CBD Secretariat and provided explanations on the available options for delivering the final products. The CBD Secretariat has been extremely satisfied with the client orientation of the contractor.”*

**Dr. Marion Gunreben** – State Authority for Mining, Energy and Geology (LBEG); Hannover, Germany

*“Responsible for the protection of soils in Lower Saxony, the LBEG looked for a comprehensive land take monitoring service. The products generated by GeoVille through the ESA-GSE Land project fitted our needs but were limited to certain regions. Therefore we decided to order these geo-information products for the entire State as critical input to our soil information system.”*