

Urban Development – Looking back to the 1960s and forward to 2020

by Christian Hoffmann, GeoVille Group GmbH

- **What can Earth observation contribute?**

... the Danube Region accommodates 115 million people living in 14 countries

... satellite derived information offers an integrated portfolio in the urban domain

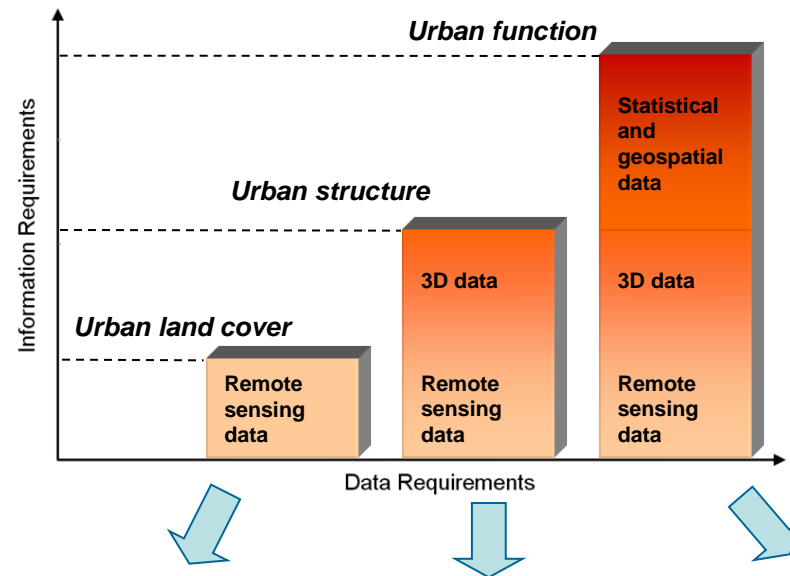
... accurate, up-to-date and cost-effective for

- **Base inventories**
- **Change monitoring**
- **Scenarios**

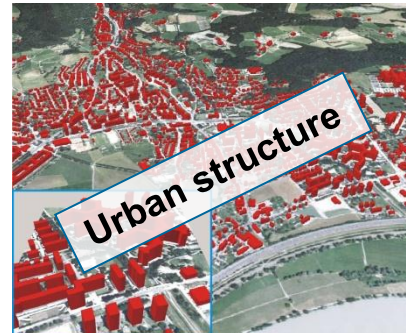


... putting urban development on the map!
... assisting policy making and implementation!

- Satellites deliver comparable data across nations ...



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16.06.11, NEREUS workshop, Brussels

• Long term data archives

Looking back to the 1960s...

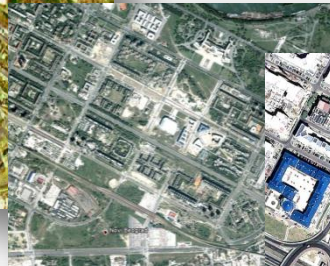
CORONA



SPOT



IKONOS



... and forth to the future

GEOEYE

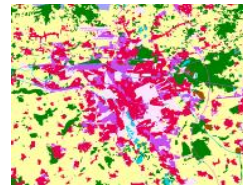
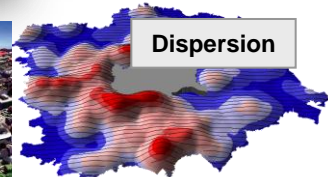


STAU-model

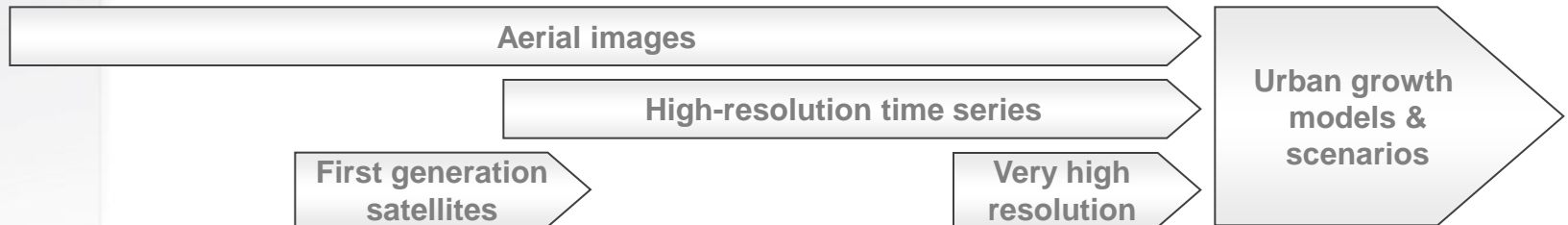
Densification



Dispersion



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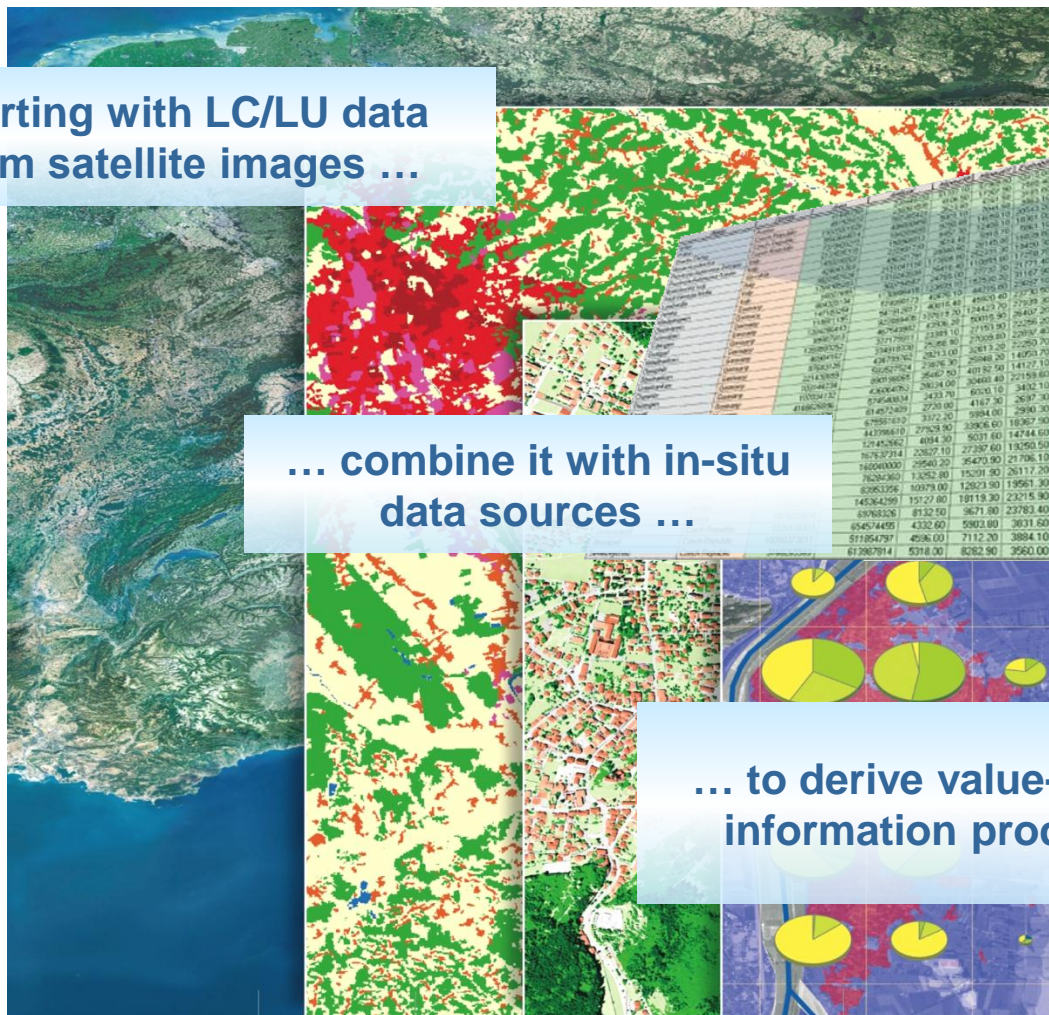


- **Satellite data are fully compatible with existing data and information sources**

Starting with LC/LU data from satellite images ...

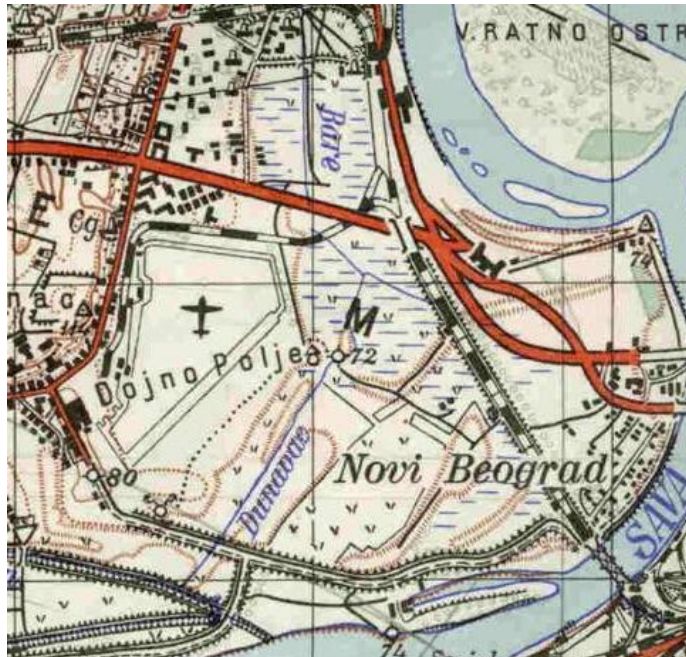
... combine it with in-situ data sources ...

... to derive value-added information products

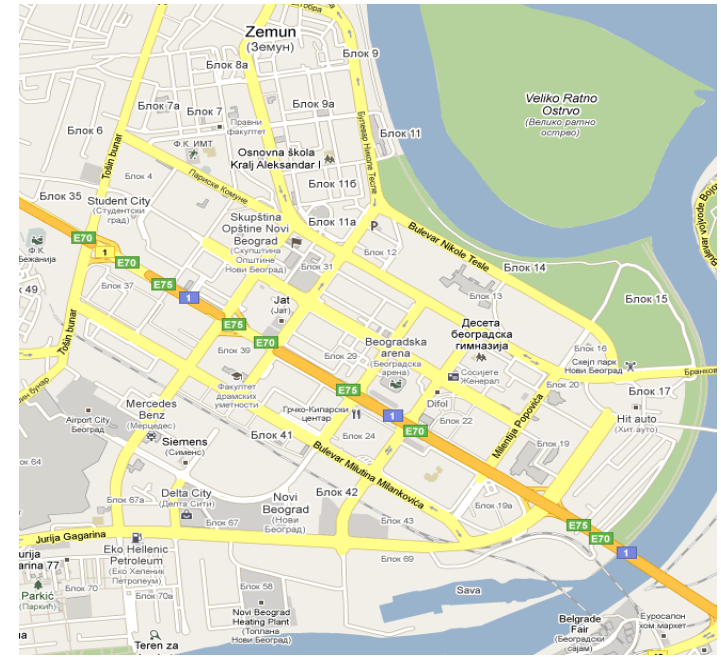


- City development monitoring along the Danube –
Beograd / Serbia

Novi Beograd 1965
(old airport)



Novi Beograd 2009
(fully redeveloped area)



Copyrights: Belgrade Town Planning Institute, GoogleMaps

- City development monitoring along the Danube –
Beograd / Serbia

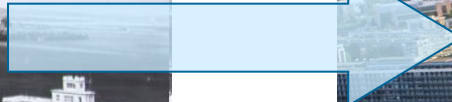
Novi Beograd 1965
(old airport)



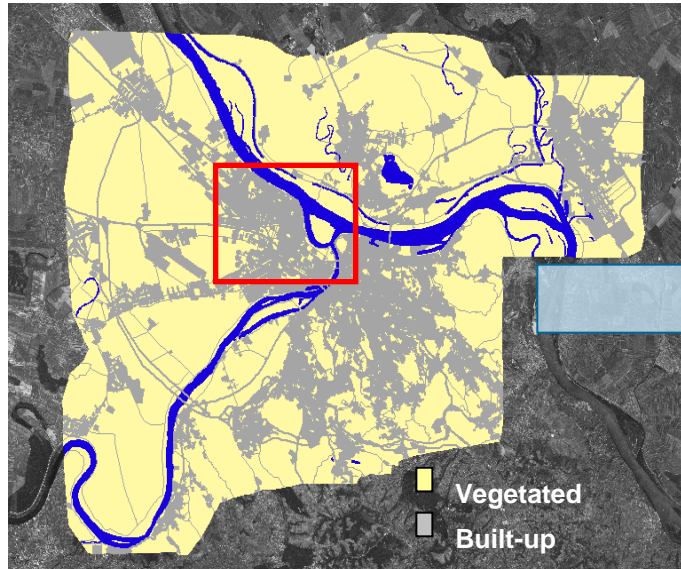
Novi Beograd 2009
(fully redeveloped area)



Satellites allow 45 years monitoring

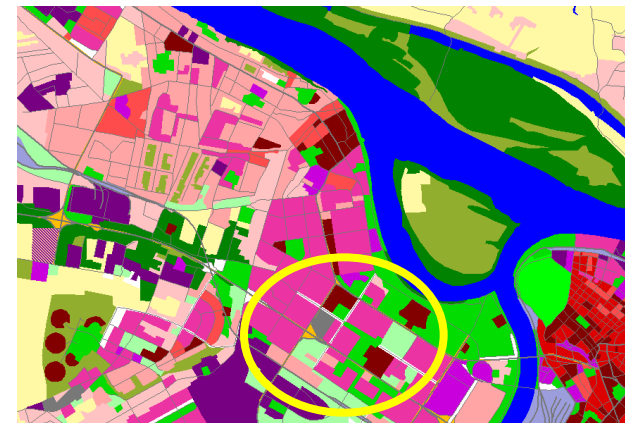
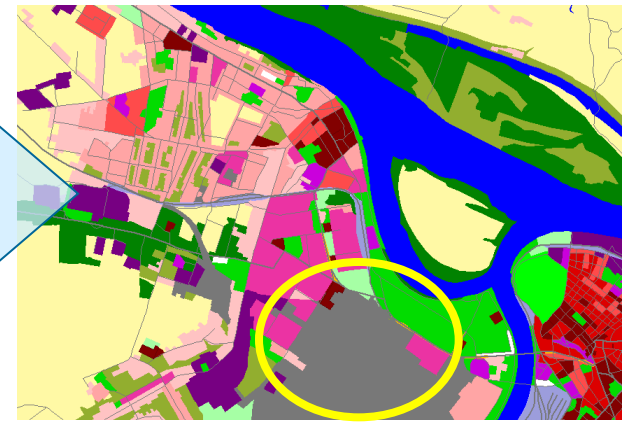


• City development monitoring along the Danube – Beograd / Serbia



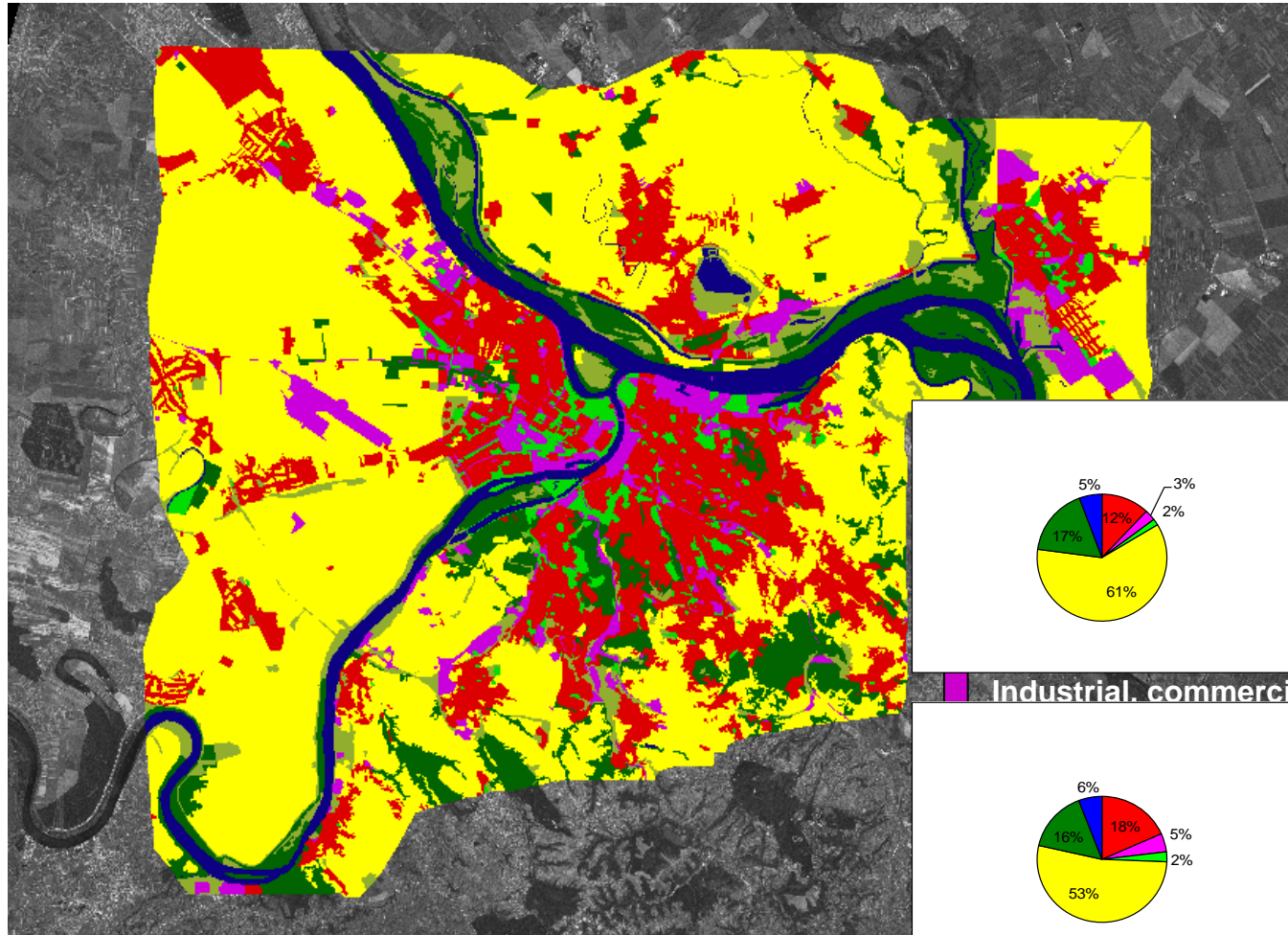
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Land use changes Novi Beograd



| | | | |
|--|--|--|--|
| | Residential continuous dense urban fabric | | Fast transit roads and associated land |
| | Residential continuous medium dense urban fabric | | Other roads and associated land, parking sites |
| | Residential discontinuous urban fabric | | Construction sites |
| | Residential discontinuous sparse urban fabric | | Abandoned land |
| | Residential urban blocks | | Green urban areas |
| | Industrial areas | | Agricultural areas |
| | Railways | | Forests |
| | Public and private services | | Coarse permanent grassland |
| | Restricted access services | | Rivers and canals |

• City development monitoring along the Danube –
Beograd / Serbia



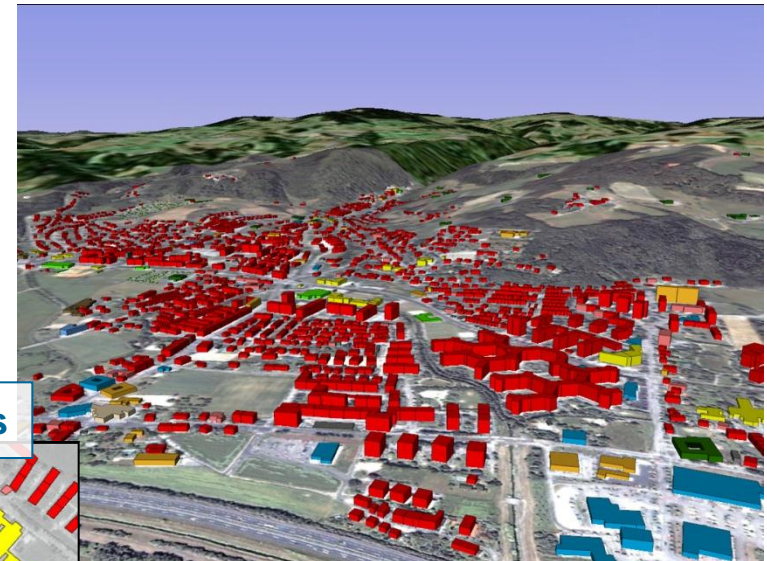
• 3d - building height & function – City of Linz / Austria

Satellite image with company locations



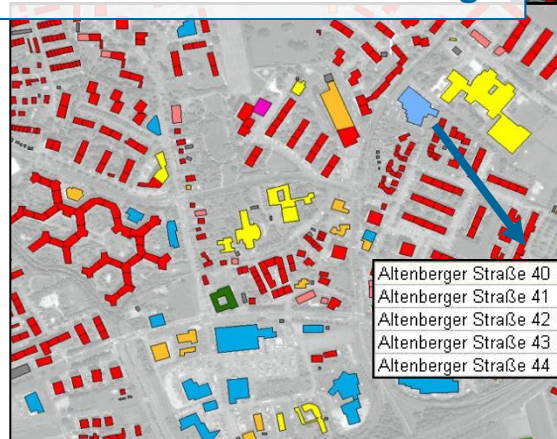
| Name | Adress | Address |
|---|--|---------------------------------|
| Österreichische Volkssparte - Disaggrage Auhof/Dornach, Volkshaus | Vereine, Organisationen und Anst. | Politische Parteien |
| Gemeinschaftsbund Österreichischer Papier-Bauw. | Vereine, Organisationen und Anst./Gewerkschaften | Gewerkschaften |
| Jugendberatern Verein Jugend & Freizeit Dornach | Gesundheit, Fürsorge und Arbeitsschutz | Jugendliche IT (reiner) Einsatz |
| Dornacher Stadtk. | Verwaltung und kommunale Dienstleistungen | Postämter |
| Volksschule 42 Magdalenschule | Unterricht und Forschung | Volksschulen |
| Walter Bayer | Metalle u. Metallwaren, Metallveredelung/Erzeugung | Metallbearbeitern u. -pressen |
| Marg. Dr. Andreas Fida-Tanner | Gesundheit, Fürsorge und Arbeitsschutz | Psychologen |
| Massage Energie Institut & Massage Praxis Spiess Toni&Abi | Gesundheit, Fürsorge und Arbeitsschutz | Massagen |
| Elisabeth Fahrenthay | Gesundheit, Fürsorge und Arbeitsschutz | Psychotherapeuten |
| ComPrint - Hans Englsbrecht | Druck- und Verlagswesen/Erzeugung | Druckereien/Druck |
| | | Dienstleistungen |

3d oblique view



Functional characterisation of buildings

- Residential
- Mixed use
- Allotments
- Garage
- Public service
- Public use
- Agriculture
- Leisure
- Commerce
- Production
- Trade
- Other



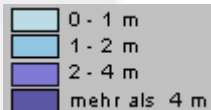
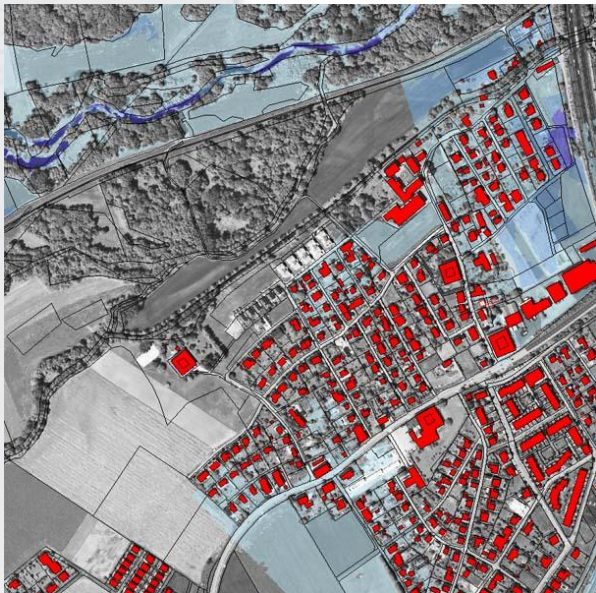
Copyrights: Linz Municipality, AIT, GeoVille



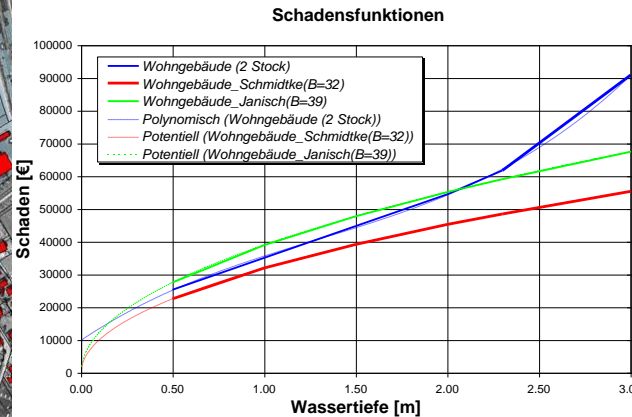
| | | |
|-----------------------|--|----------------------------|
| Altenberger Straße 40 | Gumpelmayr Dr. Augenoptik KG | Optiker |
| Altenberger Straße 41 | Apotheke Auhof | Apotheken |
| Altenberger Straße 42 | Buchhandlung Auhof | Buchhandlungen |
| Altenberger Straße 43 | Zimmermann Gabriele GmbH | Textilreinigung/gewerblich |
| Altenberger Straße 44 | Raiffeisenlandesbank Oberösterreich Aktiengesellschaft | Banken u. Sparkassen |

Economic impact assessment of flood damage – Greater Linz Area

Building footprints and flood extent / depth



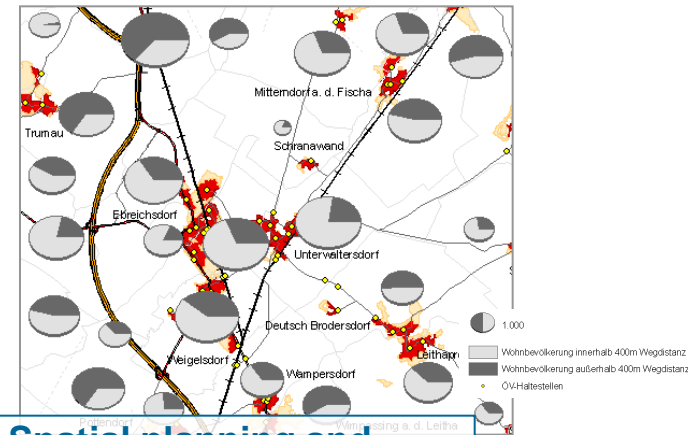
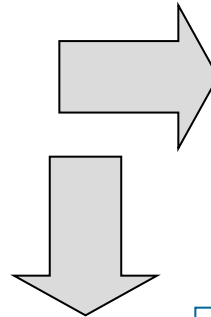
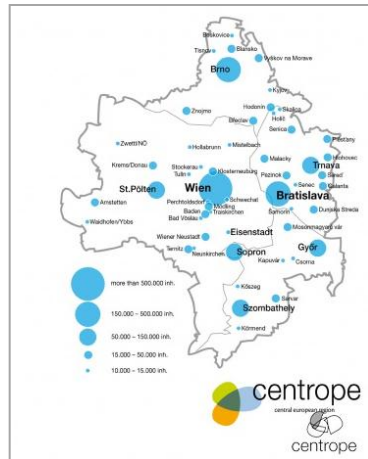
Damage potential assessment based on building types & flood depth



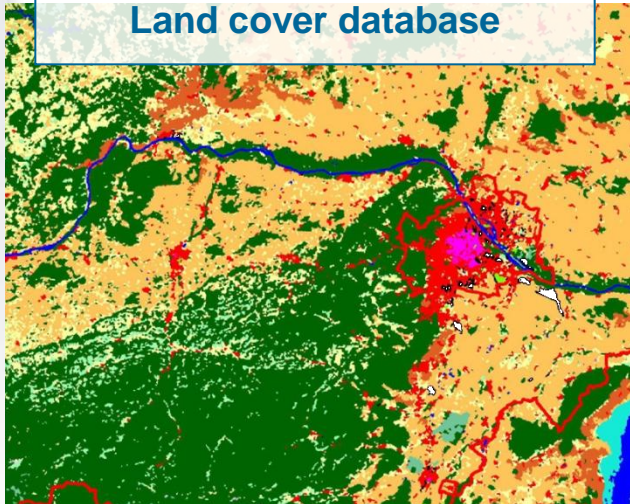
Copyright: State of Upper Austria;
Data processing & modelling: GeoVille;

| Census Tract | Damage potential (mio. €) |
|-------------------|---------------------------|
| Ansfelden | 2.96 |
| Audorf | 3.30 |
| Kremsdorf-Nord | 3.41 |
| Oberes Freindorf | 7.67 |
| Unteres Freindorf | 4.69 |
| Rapperswinkel | 0.28 |
| SUMME | 22.31 |

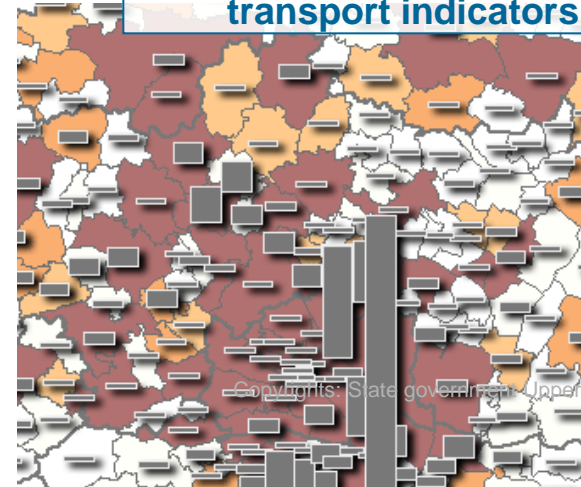
Spatial indicators on transport infrastructure and land take – Centrope Region



Land cover database

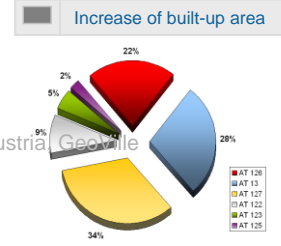


Spatial planning and transport indicators



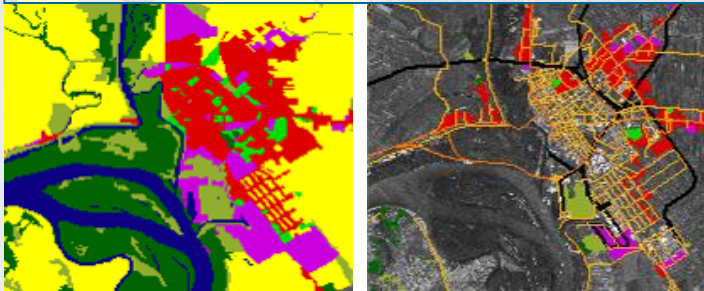
Total amount of soil built-up

| | |
|--------------|--------------|
| Dark Red | > 250 ha |
| Orange | 200 - 250 ha |
| Yellow | 150 - 200 ha |
| Light Orange | 100 - 150 ha |
| White | < 100 ha |

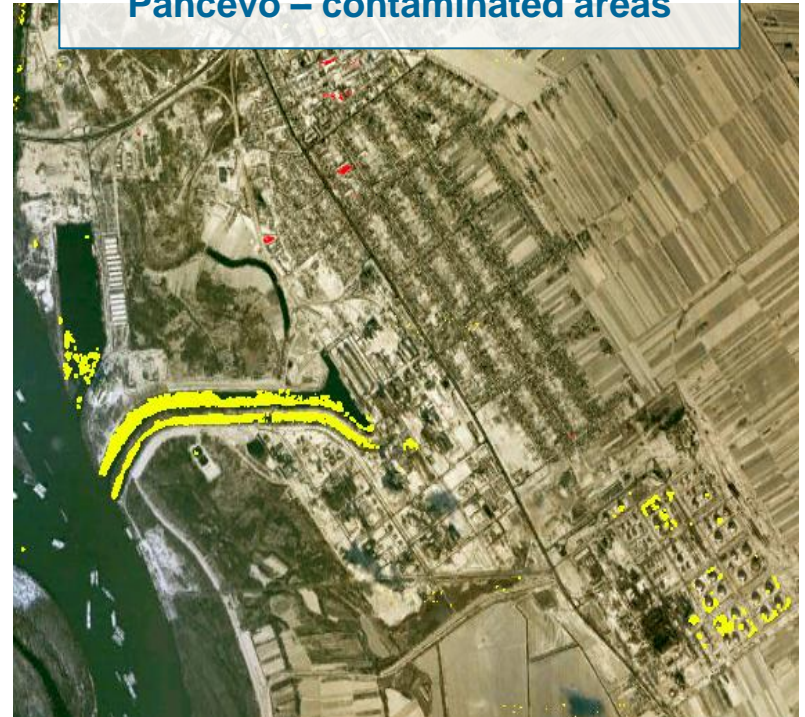


- Mapping of contaminated sites for brownfield remediation – Industrial Town Pancevo / Serbia

Land use & infrastructure



Pancevo – contaminated areas



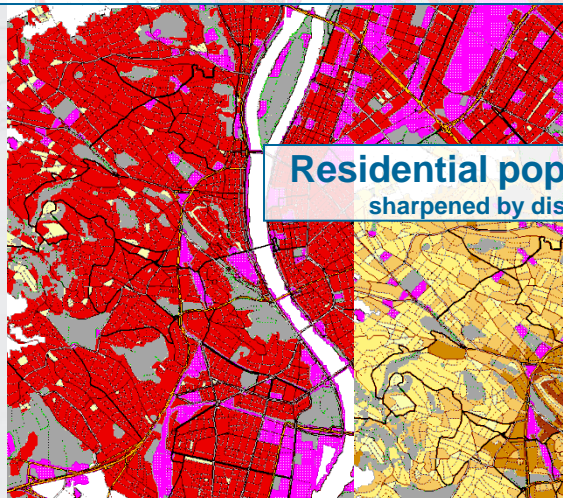
Oil spills

Copyright: World Bank; GeoVille

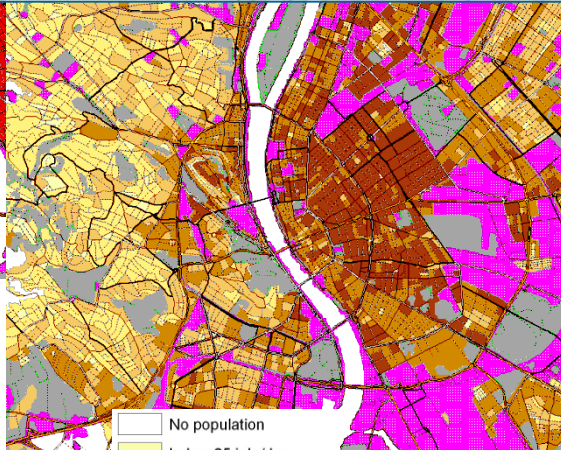


• Day- & night-time population distribution for urban planning – Budapest / Hungary

Urban land use map



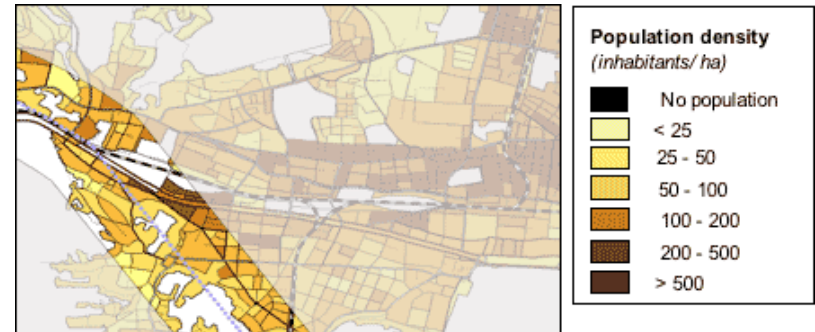
Residential population distribution sharpened by disaggregation modelling



- Residential areas
- Industr./comm./ transport units
- Mine/dump/construction sites
- Artificial vegetated areas

- No population
- below 25 inh / ha
- 25 to 50 inh / ha
- 50 to 100 inh / ha
- 100 to 200 inh / ha
- 200 to 500 inh / ha
- 500 inh / ha and above

How many people are affected by corridor?



- Population density (inhabitants/ ha)**
- No population
 - < 25
 - 25 - 50
 - 50 - 100
 - 100 - 200
 - 200 - 500
 - > 500

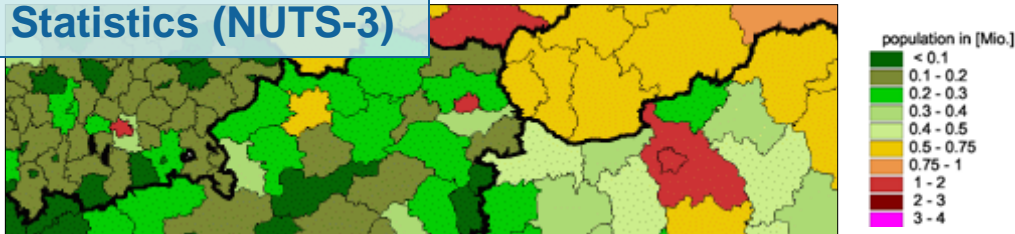


Copyright:
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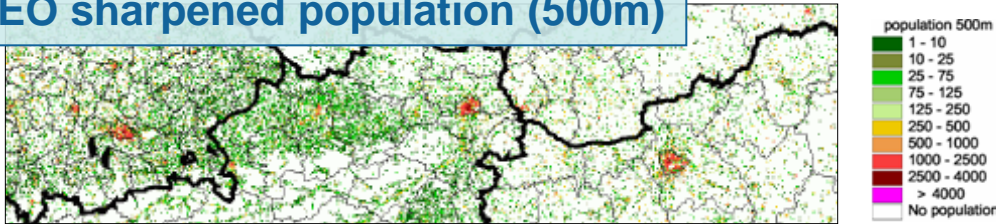


- Exposure to danger zones from nuclear power plants – Upper Danube region

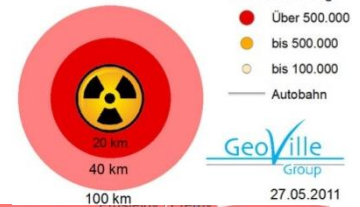
Statistics (NUTS-3)



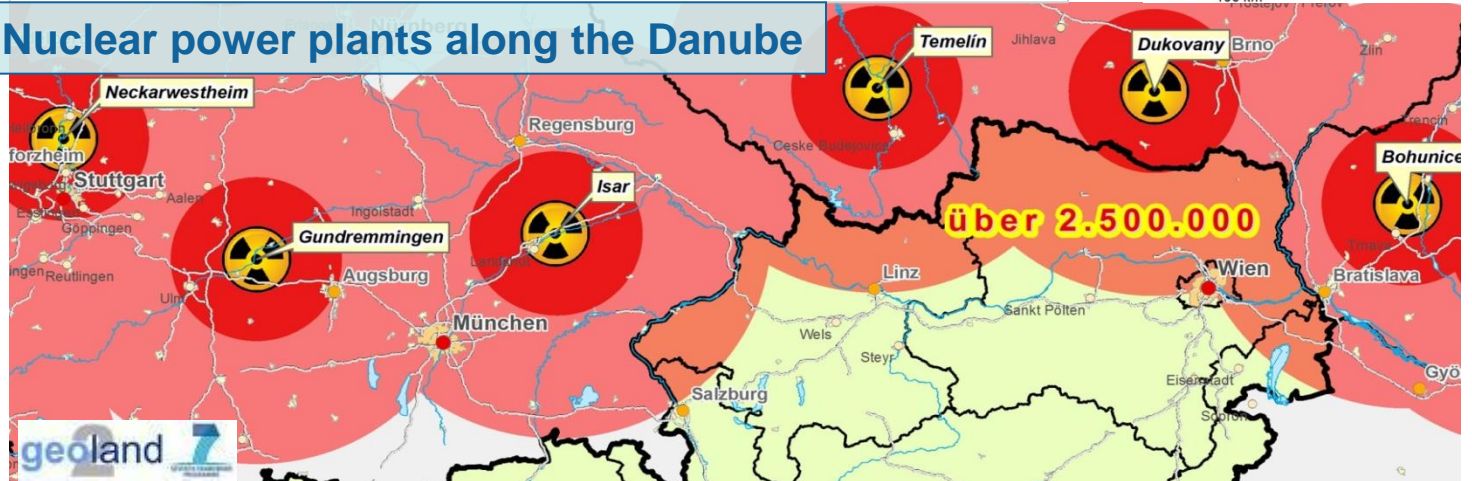
EO sharpened population (500m)



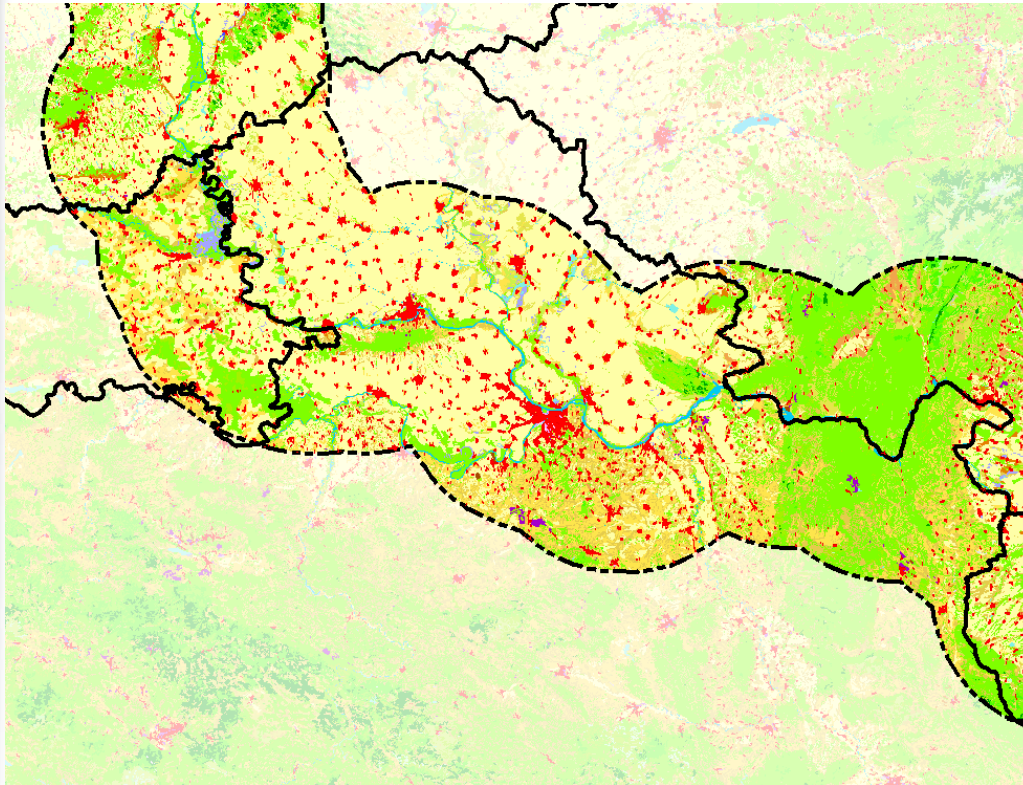
Gefahrenzone um AKW



Nuclear power plants along the Danube



• CORINE West Balkan Implementation

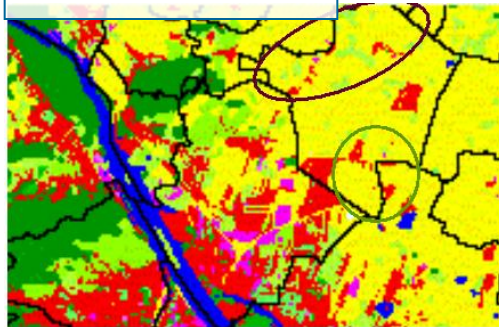


- Mapping
- Training
- Capacity building
- Quality control

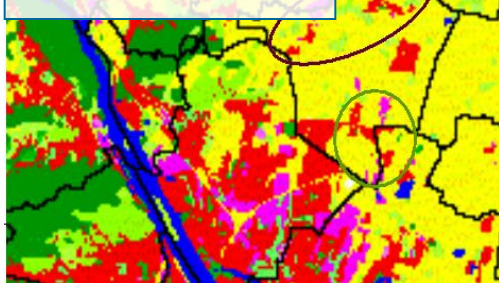
Copyrights: European Environment Agency, National Reference Centres for Landcover, GeoVille;

- Urban development scenarios until 2021 – Vienna / Austria

Observation 1968



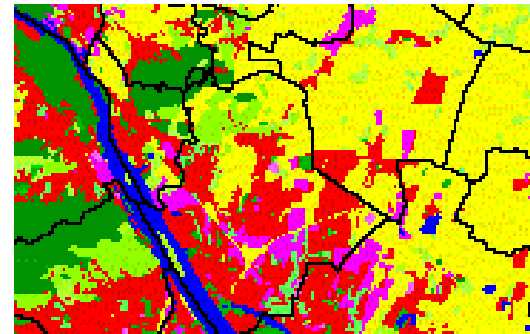
Observation 1999



- Residential housing
- Commercial/industrial areas
- Arable land
- Other farming area
- Forest
- Water bodies

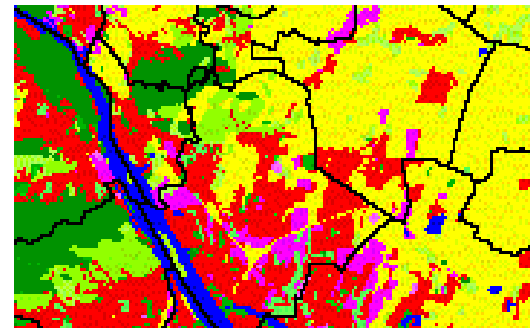
Simulation 2021

Scenario TREND



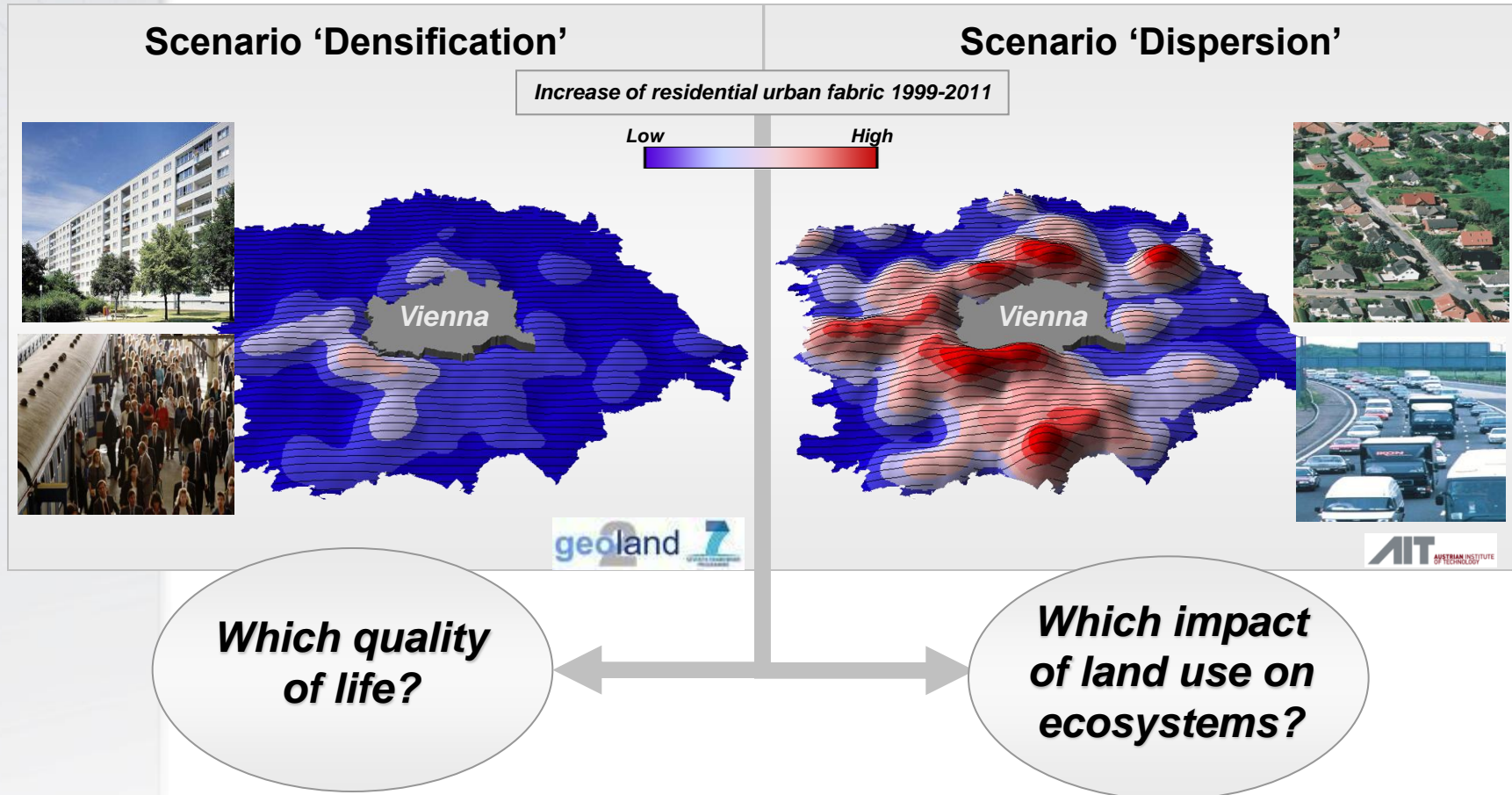
AIT
AUSTRIAN INSTITUTE
OF TECHNOLOGY

Scenario DISPERSION



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- Tools & information products for testing policy options



Thank you!



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