For a Space Based Information System for Environmental and Crisis Management Assessment of the Danube

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Context

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Danube Strategy

- designed to support sustainable development in the Danube region and to provide access for all relevant countries to EU funds dedicated to this goal
- must gather projects which fit with the key priorities of each country as expressed by them
- must allow and help a coordination between several countries, and promote an “harmonized” approach
- needs an active cooperation at all levels (EU, countries and regions) to be successful

A space based Geo-information system can…

- support the implementation of this Danube Strategy and monitor its benefits by providing a framework to structure and federate several priorities common to several countries

- be developed in full cooperation between different countries in order to support local / regional initiatives which all deal with environment matters around the Danube Basin

…can also manage multiple data sets for multiple applications

- Access to local (ground, airborne) and remote (satellites) sensors data – unlimited access for satellite over the region
  - Optical => maps, vegetation (IR)
  - Radar => maps, flood extend
  - LIDAR (airborne) => high accuracy digital elevation model (flood risk assessment)
  - Weather forecast => risk prevention, early warning

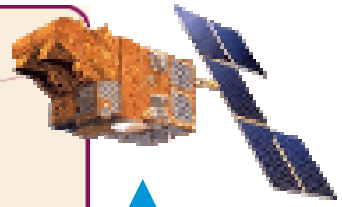
- merge different satellite data resolutions
  - Medium (20m+) => regional level
  - High (4m – 20m) => local level
  - Very high (0,5m – 4m) => detail

Aims and objectives

=> Set up a distributed spatial data infrastructure as a support to Danube sustainable development across countries, for the multiple benefit of:

- National planning
- Environment monitoring
- Water quality monitoring
- Risk prevention / early warning
- Crisis situation management
- Post crisis / damage assessment
- Irrigation prescription

Inter centres operations: satellites tasking



« Routine » images acquisition

« On purpose » Image Requests

Satellites programming facility (partner)

Optimized satellite(s) tasking

Illustration of Services

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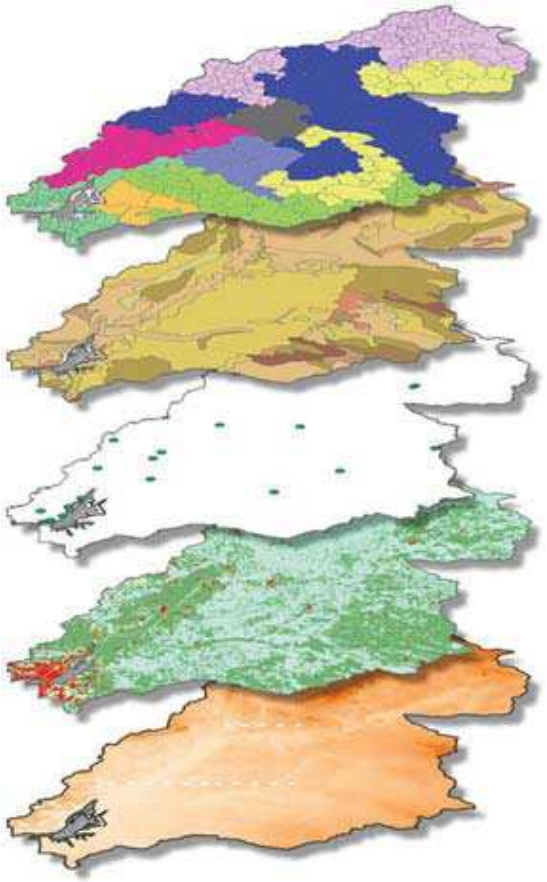
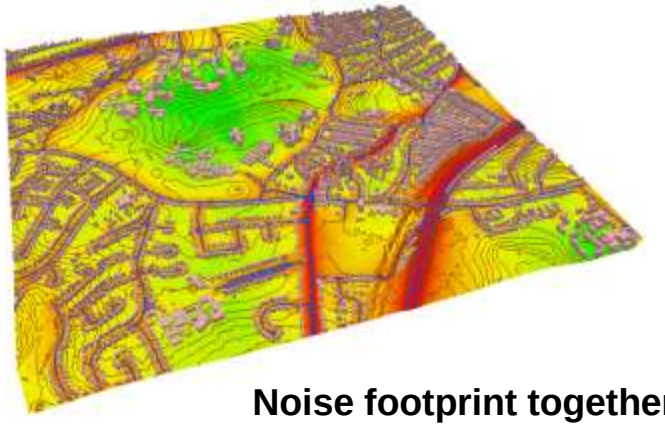
National Planning

- Build and periodically update basic geo-information layers
  - to use as basic maps for civil works or any other application
  - with areas classification (habitations, industrial, crops…) and identification of:
    - basic communication infrastructure (roads, railways…)
    - industry plants and critical assets, schools, hospitals…
  - made easily available to a wide institutional community
- Brings statistics and spatially explicit trends; projects these trends into future scenarios, supports decision making



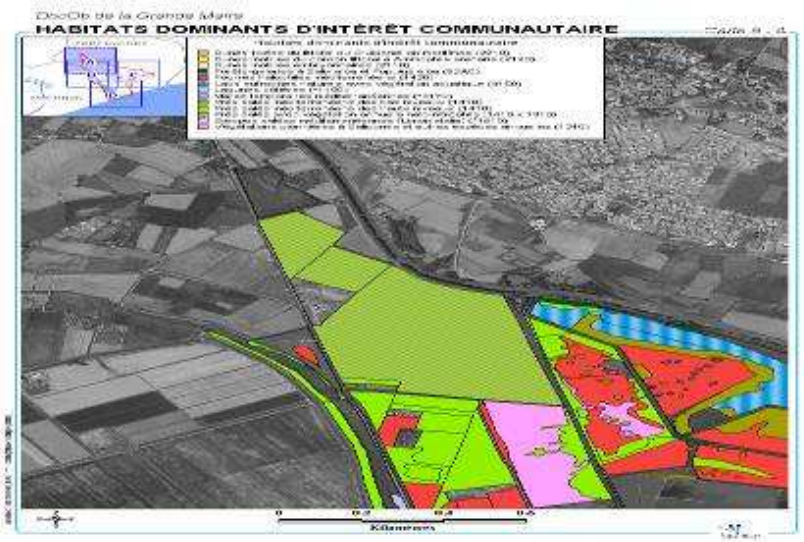
Environment Monitoring

- Long term monitoring of changes
  - natural vegetation
  - cropped areas
  - urban / rural areas



Noise footprint together with elevation model

- Assess environmental impact of human activity (ex: new infrastructure…)
  - carbon footprint
  - pollution risk
  - natural habitat and biodiversity



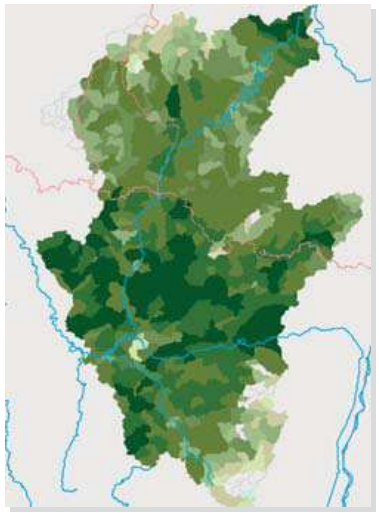
Natural habitat map (large scale)

Water Quality Management

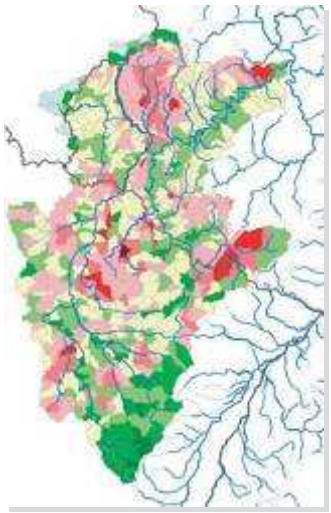
- Assess impact of farmers / industry activity in a given region (ex: restricting arable land use to minimize fertilization intensity and corresponding fertilizers discharge to water bodies)

- Designed for ecological/environmental units: pollution doesn't stop at administrative borders

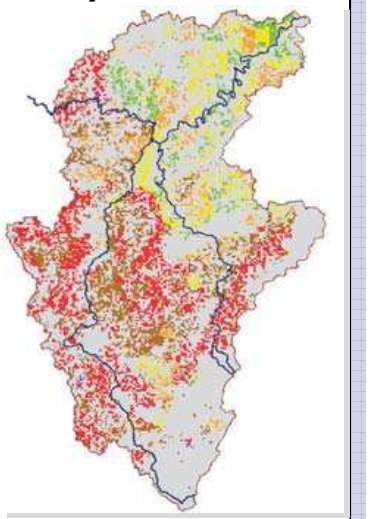
Nutrient and Pesticide Diffuse Pollution (Saar-Mosel catchment)



Generic modelling of Nutrient Surplus



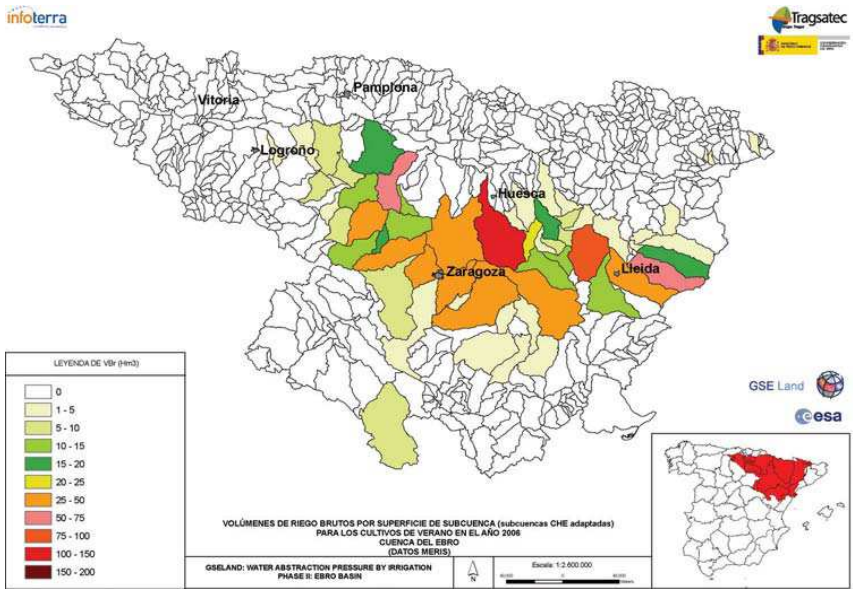
Nutrient input and concentration



Pesticide input and concentration

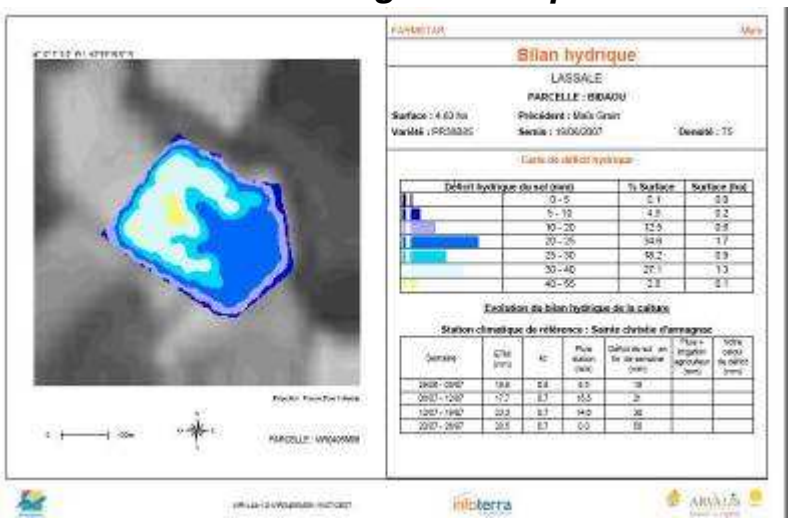
Irrigation Prescription

- Reliable and timely assessment of irrigation demand over a region
- Optimize water usage (detection of crops needs)



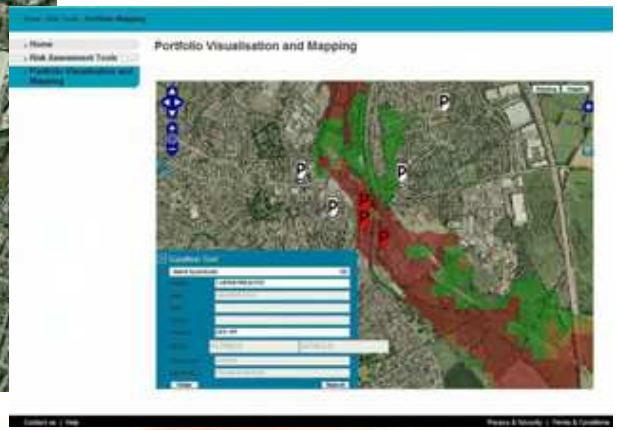
Regional irrigation demand assessment

In field irrigation map



Risk Prevention

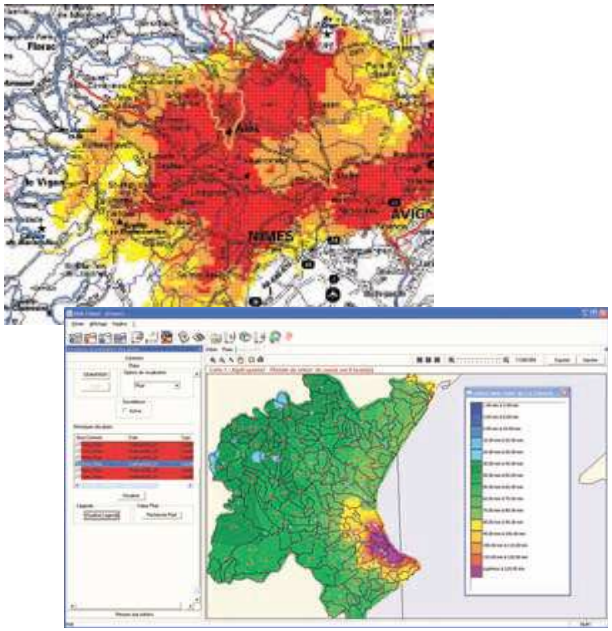
- Build risk maps for existing critical infrastructures and assess potential impact of flooding
- Help deciding new (critical) infrastructure location



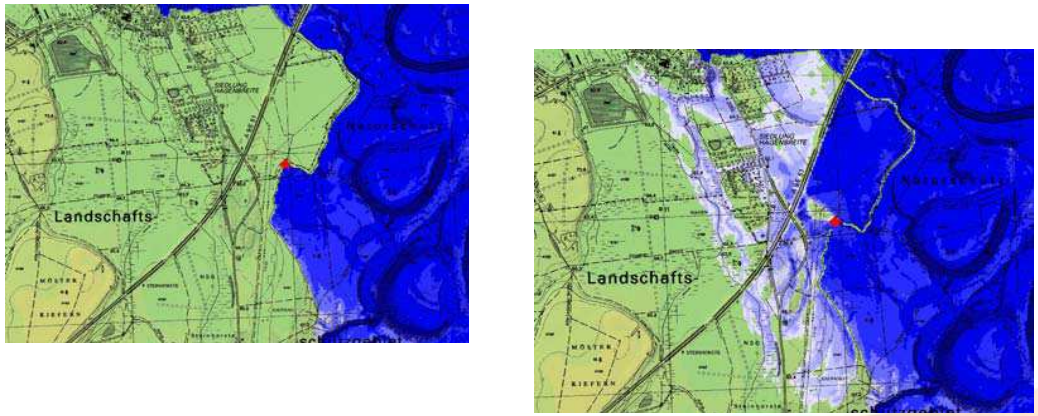
Property risk rating

Early Warning

- Anticipate flooding situation from:
  - current situation assessment (local + remote sensing)
  - weather forecast (meteorology)
  - knowledge of upstream situation
- Anticipate (modelling) flood footprint and set up emergency plan accordingly



Flash flood risk assessment

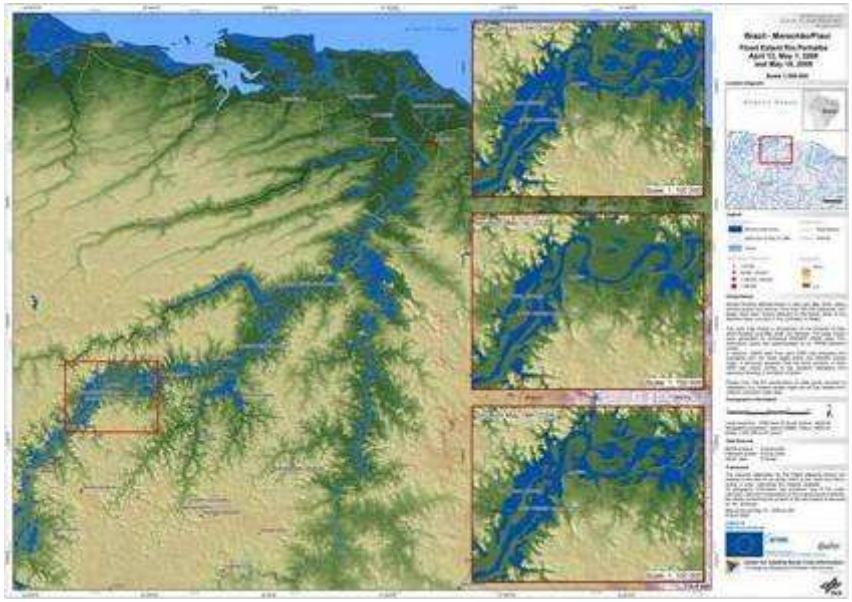


Simulated flooded area before and after dam failure

Crisis Situation Management

- Near real time acquisition of flooded area extension and analysis of situation criticality

- Help organising security operations (logistics…) – link with security forces coordination



Flood extent map

Rescue operations organization