Environmental Sensitivity Mapping

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Collaborative partners

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EPA STRIVE Research Programme & Ordnance Survey Ireland

EPA SEA Team
SEA and Spatial Planning

- Population and human health
- Biodiversity, flora, fauna
- Air and climate
- Soils and geology
- Water
- Landscape
- Cultural heritage
- Material assets
- Inter-relationships

Multiple considerations, spatial implications, consultation

Spatial evidence-base for SEA and planning decisions
- Assessment consistency and transparency
- Intrinsic environmental conditions > susceptible to change
- Early-warning of potential land-use conflicts

ESM Widget Methodology

Multi-criteria spatial analysis

- Weighted linear algorithm
- Aggregation of multiple criteria
- Incorporation of stakeholders concerns or importance values in the form of weights

\[
ES = \sum_{j=1}^{n} W_j V_j
\]

where \( ES \) = Environmental Sensitivity
\( W_j \) = Environmental susceptibility of factor \( j \) according to scientific scores
\( V_j \) = Environmental significance of factor \( j \) according to public/stakeholder opinion
### Over 100 SEA-relevant Geospatial datasets

**Air and Climate**
- Air zones
- Coal restricted areas
- Historical flood extents
- Soil carbon (eco serv)
- Vegetation carbon (eco serv)
- Water retention (eco serv)
- Wind speeds

**Biodiversity, Flora & Fauna**
- Ancient woodlands
- Annex I habitats (Habitats Direct)
- Birdwatch sensitivity (to windfarms)
- Coastal habitats – Saltmarshes
- Contributions to pot. ecological networks (eco serv)
- Forest inventory
- Legally protected and policy relevant species (eco serv)
- Margaritifera sensitive areas
- Natural Heritage Areas (NHAs)
- Proposed NHAs
- Salmonid waters
- Special Areas of Conservation (SACs)
- Special Protection Areas (SPAs)
- Terrestrial biodiversity (eco serv)

**Cultural Heritage**
- Irish landmark trust
- Museums, collections and archives
- NIAH
- Sites and Monuments Record
- Walled towns
- World Heritage Sites

**Landscape**
- Landscape character areas

**Material Assets**
- Active quarries
- Airfields and airports
- Broadband access
- Current wind farms
- Discharge licences
- Extractive industries register
- Historic mine districts
- IPPC licences
- Landfill sites
- Licensed waste facilities
- Ports
- Railway network
- Road network
- Settlements
- Waste water treatment plants and status

**Population and Human Health**
- Disability
- General health
- Pobal HP Deprivation Index
- Housing stock (vacant & holiday homes)
- Travel to work >30min and >1hr
- Labour force unemployed
- Population change (percentage and total)
- Population density per km²
- WFD RPA Drinking water (lakes, rivers and groundwater)

**Soils and Geology**
- Bedrock
- CORINE landcover
- Geoparks
- Geosites
- Landslide events and susceptibility
- Mineral locations
- Outcrops
- Peat bogs
- Soil permeability
- Soils

**Water**
- Aquifer vulnerability
- Bedrock aquifer
- Biological Q values
- Hydrometric areas
- Groundwater source protection areas
- Wetlands
- Water abstraction points
- WFD high status objectives
- WFD risk
- WFD status
- WFD RPA: Nutrient sensitive WFD RPA: Recreational waters
- WFD RPA: Shellfish areas
- WFD RPA: Water dependent habitats (SACs, SPAs)
- Water management Units

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### Scientific Scores

- **Based on conservation status, quality and risk**
- **Extensive consultation**
- **3 stakeholder workshops – development and testing of the webtool**
- **Over 40 stakeholders from government, local authorities, consultancies...SEAI, NPWS, NIEA, EirGrid...**
Contextualising Sensitivity

(a) biodiversity, flora and fauna and water sensitivities; (b) sensitivities associated biodiversity, water, cultural heritage and soils where all have the same weight/importance; (c) sensitivities associated with biodiversity, water, cultural heritage and soils where the biodiversity theme is given greater importance (i.e. a weight of 2); and (d) sensitivities associated with biodiversity, water, cultural heritage and soils where the biodiversity and water themes are given greater importance (i.e. a weight of 2).

ESM Output

Transparency
- Map creator
- Date
- Selected datasets
- Applied weights

Comparability
- Transboundary
- When selecting same criteria and weights
Quicker times  
No GIS expertise needed  
Better and comparable results  
Easier to analyse outputs

"The ESM output compares well and may actually be better than the in-house process undertaken for the County Development Plan SEA."

"The sensitivity identifies areas where development would need to be carefully considered and sensitively planned."

"Access to multiple datasets all in one platform is an excellent resource."

Data scale and availability (e.g. LCAs)  
Double counting  
Weight for full exclusion  
Assessment scope

"Helpful tool for overall visual appreciation - really depends on the datasets."

“(…) Scale and resolution would however remain issues.”

"I'm not sure it does anything more than what some local authorities do at this scale which is probably down to the detail of the datasets."

Real Life Applications: NPF & RSEs

"In preparing the NPF, an Environmental Sensitivity Mapping (ESM) tool was used in the SEA and environmental assessments. ESM is a method for identifying at a strategic level, environmentally sensitive areas and to help inform cumulative and in-combination effects on the environment. It also provides a visual overview of the relative sensitivity of areas, particularly where they overlap, in order to provide a more strategic and informed approach to planning" (NPF, Chapter 11.1, p.15).
Game changer?

• Publicly available
• Evidence-based assessments and decisions
• Efficiency...time and cost savings
• Good governance - consistency, transparency, comparability
• Exploratory rather than definitive answers...data limitations, subjective but not arbitrary weights influencing outputs

• Future developments
  • Offshore (marine data)...Northern Ireland
  • Support tool for the preparation of LARES (SEAI-funded)

SEA and planning support tool

ESM Webtool
Bringing environmental assessment to your fingertips

www.enviromap.ie