Anthropogenic Pressure on Coastal zones

Copernicus for Coastal Zone Management
Almost half of European population lives on coastal areas.
Introduction of problem

High impact on the natural evolution of coastline

Natural erosion of coastline become a problem

Impact on houses, economic activities and infrastructures
In order to understand the threats on coastal areas is important to monitor the evolution of urbanization in those areas.

**Use case 1:**

The Italian Imperviousness layer at 5/10 m spatial resolution for monitoring changes in sensible zones.

**Use case 2:**

Coastal anthropogenic pressure indicator for urban planner and coastal manager.
USE CASE 1
A very high resolution Imperviousness layer was product for Italy (2012, 2015)

Spatial resolution of 5 m for 2012 and 10 m for 2015 (Sentinel-2 data used)

Product for Italian National Institute for Environmental Protection and Research
With respect to the European scale (20 m), the better spatial resolution data allowed the classification of minor sealed soil elements (including small road and railway network).
Comparison HRL and 5 m layer

EEA imperviousness layer

5 m imperviousness layer

(the specifications are similar but not the same)
The changes on sensible coastal areas (300 m from coastline in Italy)

New impervious areas in sensible zone
Built-up map 2012 - 5 m spatial resolution

- **Impervious areas**
- **Cloud areas**
Built-up map 2012 - 5 m spatial resolution

- **Impervious areas**
- **Cloud areas**
Built-up map 2012 - 5 m spatial resolution

- Sicily map
- Coastal buffer (300 m)
- Resampled 10 m

- Impervious areas
- Cloud areas

Built-up map 2012 - 5 m spatial resolution

- Sicily map
- Coastal buffer (300 m)
- Resampled 10 m

Built-up map 2012 - 10 m spatial resolution

- Sicily map
- Coastal buffer (300 m)
- Built-up map 2015

**Impervious areas**

**Cloud areas**
Built-up map 2012 - 10 m spatial resolution

- Sicily map
- Coastal buffer (300 m)
- Built-up map 2015
Built-up map 2015 - 10 m spatial resolution

- Sicily map
- Coastal buffer (300 m)
- Built-up map 2012
- Change map

Impervious areas
Cloud areas

Source: [Sicily map](https://example.com)
New impervious areas
Unchanged impervious areas

Change map 2012-2015 - 10 m spatial resolution

Sicily map
Built-up map 2012
Built-up map 2015
Sentinel-2 image
Sentinel 2 - 10 m spatial resolution

Sicily map
Built-up map 2012
Built-up map 2015
Sentinel 2
Basemap + maps
Change image

2012 impervious areas
2016 impervious areas
USE CASE 2
Introduction of problem

Homogeneous time series of third part input data allow a consistent estimation of the human impacts through the years for an independent evaluation of them.
Introduction of use case

Coastal anthropogenic pressure indicator

Aim of indicator
- To quantify the urbanization on coastal areas
- It provides a measurement of the impact of the urbanization on coastal areas
- It provides information useful for urban planner and coastal manager
3 buffer areas are defined from coastline.
To compute the amount of impervious areas in these buffer zones for the entire region and for the administrative units (provinces)
**Input Data**

**HRL Imperviousness Time series**

- HRL Imperviousness degree 2006
- HRL Imperviousness degree 2009
- HRL Imperviousness degree 2012

**Shapefile of administrative units**
Any “good” GIS Software
Demonstration

- Interactive ppt
HRL Imperviousness 2006 - 20 m spatial resolution

- HRL Imperv. 2009
- HRL Imperv. 2012
- Zoom
- Step 1 - Recode
HRL Imperviousness 2009 - 20 m spatial resolution

- HRL Imperv. 2006
- HRL Imperv. 2012
- Zoom
- Step 1 - Recode
HRL Imperviousness 2012 - 20 m spatial resolution

- HRL Imperv. 2006
- HRL Imperv. 2009
- Zoom
- Step 1 - Recode
HRL Imperviousness 2009

- HRL Imperv. 2006
- HRL Imperv. 2012
- Cyprus Map 2006
- Step 1 - Recode
STEP 1 – Recode HRL Imperviousness to have Built-up map
HRL Imperviousness 2006 - 20 m spatial resolution

- HRL Imperv. 2009
- HRL Imperv. 2012
- Zoom
Built-up map 2006

- Built-up map 2009
- Built-up map 2012
- Step 2
Built-up map 2009

- Built-up map 2006
- Built-up map 2012
- Step 2
Create buffer zones
- 300 m buffer
- 10 km buffer
- All buffers
- Step 3
- 300 m buffer
- 1 km buffer
- All buffers
- Step 3
- 300 m buffer
- 1 km buffer
- 10 km buffer
- Step 3
Zonal statistics
Percentage of impervious areas respect the total area of the buffer:
- 0 - 3%
- 3 - 6%
- 6 - 9%
- 9 - 12%

Overall percentage of built-up series by coastal buffers:
Create new buffers

Administrative regions and built-up map 2012
Administrative regions and built-up map 2012
2006

Built-up percentage by Countries and coastal buffer

- <1%
- > 30%

2009

2012

End

100 m buffer

1 km buffer

10 km buffer
Thank you