Adaptation to flood risk in fragile art cities and cultural landscapes

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The origin of risk in Middle-Ages

Florentia in Roman times

Location of the Matilde Walls (1078 ca.)

Trace of river bank at roman time

A 1822 map of the city
A 1740 flood map
A 1966-like scenario:
14.5 Billion € expected damage + non tangible
Flood risk for art-works
A ‘tiny’ example of restoration costs: old books and manuscripts damaged in 1966

- Uffizi library (6 km of ‘filze’, 1/3 still to be repaired) 37.8 M€

- National library (24 km of shelves of the ‘historic archive’) 137 M€
Flood risk for vehicles and pedestrians
Support to regional flood alerting system
Assimilation of Meteosat Land Surface Temperature

Background

Soil saturation (%)

Analysis increment

Analysis

Predictions at streamflow stations, different initial soil moisture conditions

Peak discharge [m³/s]

Precipitation volume [10⁴ m³]
Natech issues: potential spread of pollutants due to floods

Hazard

Exposure

Vulnerability

Flood maps
Not Flooded
Flooded

Environmental vulnerability

Pollution potential of the source

+
# Pollution potential of the sources

## Wastewater treatment plants
- Area
- Population equivalent

## Waste facilities
- Type of activity
- Waste characteristics
- Mass handled per year

## Contaminated sites
- National/regional interest
- Contamination source
- Area

## Environmental susceptibility
- Land use
- Aquifer use
- Ecological status of water body
- Chemical status of water body
- Proximity to protected wetlands
- Natura2000 sites
- Hydraulic conductivity of the soil
- Terrain slope
Example: Contaminated sites (CSs) at risk
Lab-scale and numerical modeling on wood accumulation at bridge piers
Burrowing activity in channel levees: impact of the invasive red swamp crayfish *Procambarus clarkii*. Laboratory experiments and mathematical modeling.
Uprooting of flexible vegetation due to river flow and sediment transport
Salt marsh edge erosion due to wind-induced waves: field measurements in the Venice lagoon and mathematical modeling