DIRETTIVA 2000/60/CE
Piano di gestione

Water Scarcity and Flood Risk in the Northern Apennines River Basin District (Italy)

Europe - INBO 2011
9th International Conference
on the Implementation of the Water Framework Directive
Porto 27-30 September 2011

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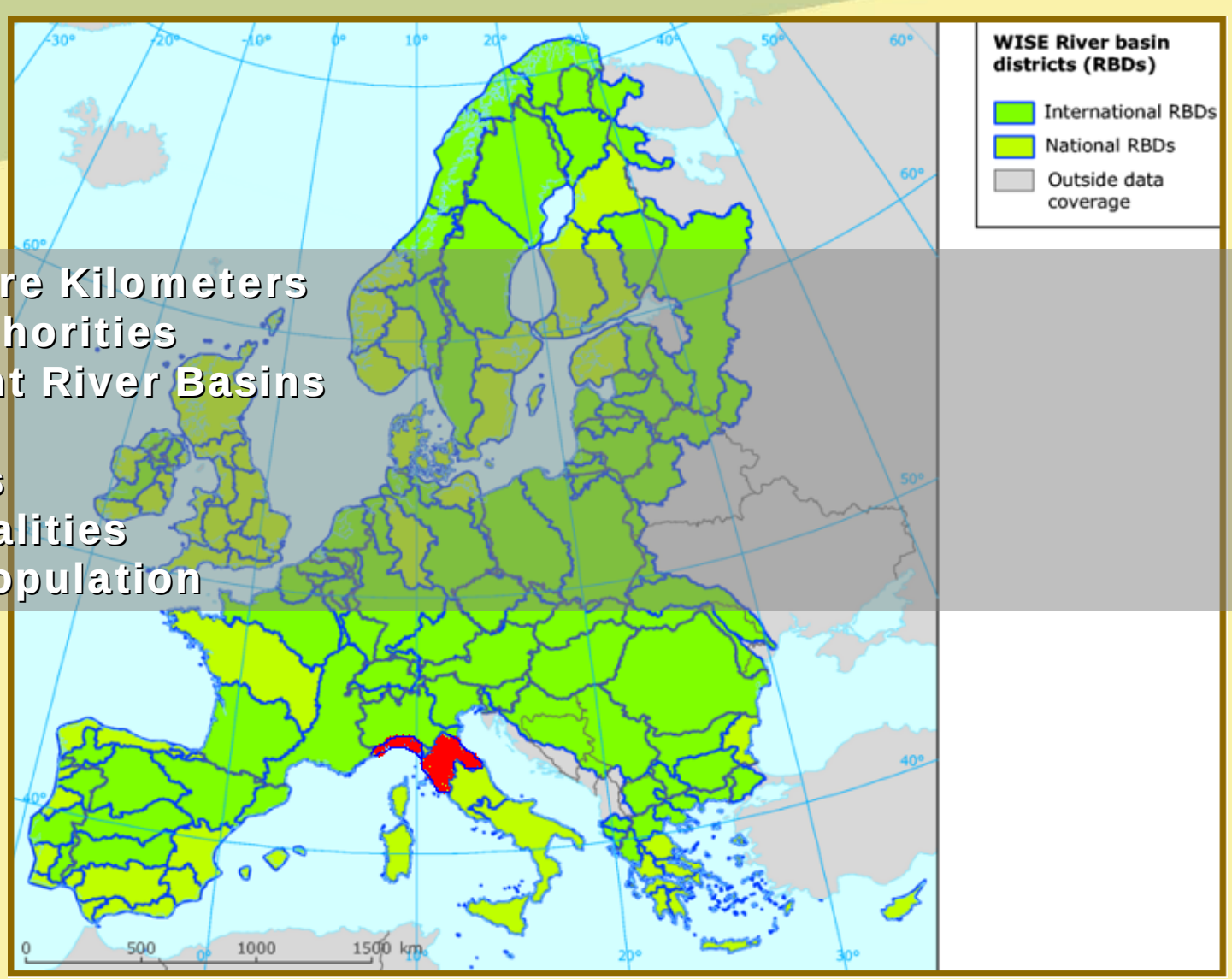
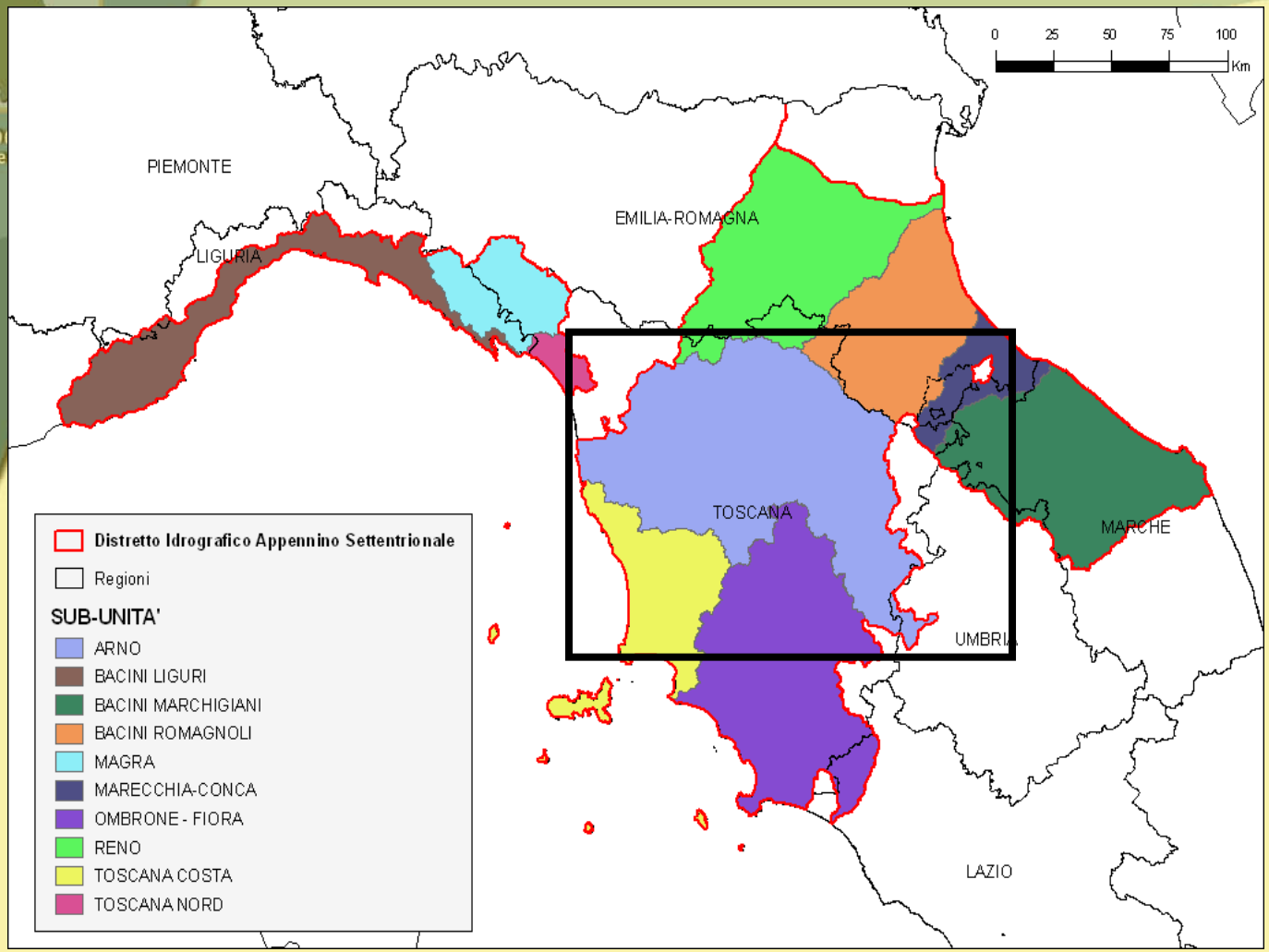
The Arno River Basin Authority



40.000 Square Kilometers
11 Basin Authorities
48 Significant River Basins
7 Regions
29 Provinces
800 Municipalities
7.000.000 Population

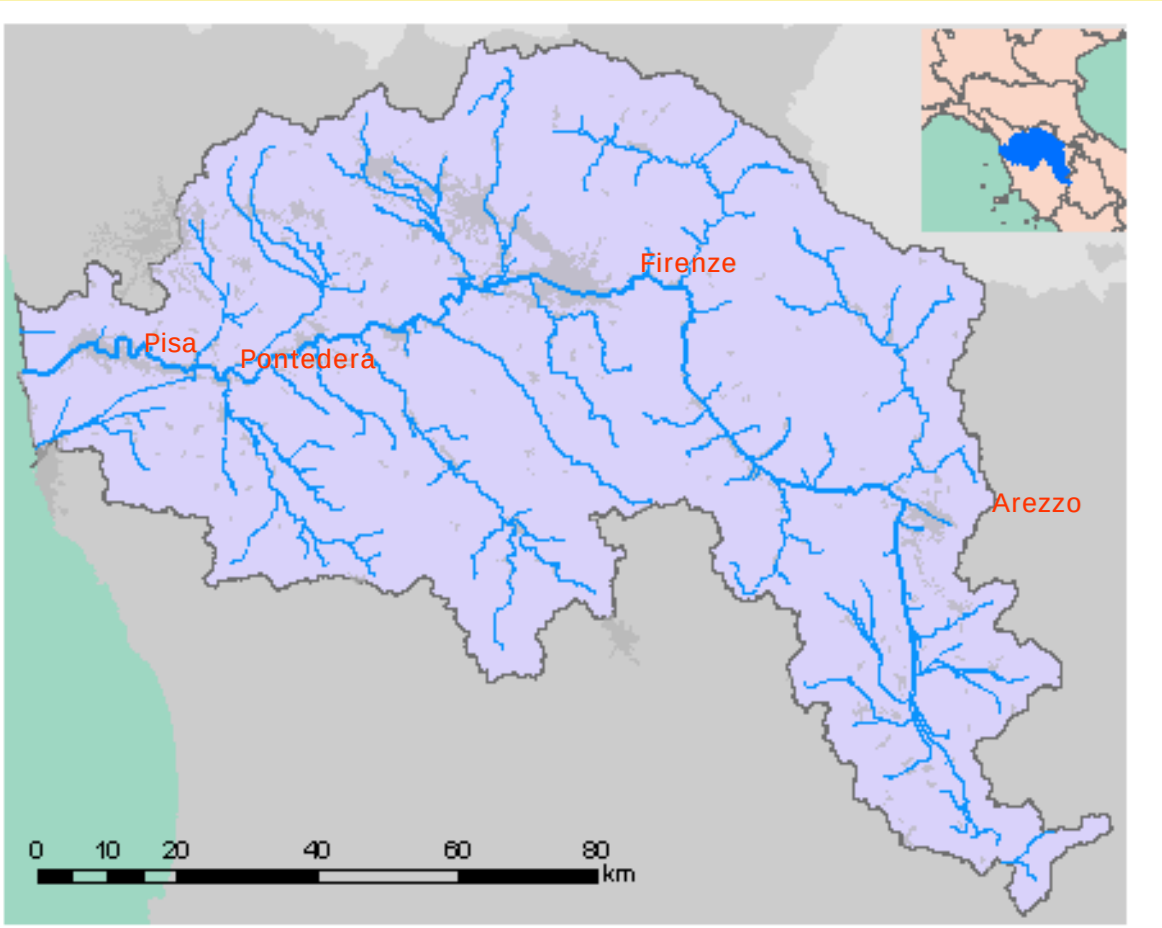
The Northern Apennines River Basin District



11 Sub-units: The case of the Arno River Basin

Basin Surface 9.100 sq km

The Arno River length: 241 km
Maximum discharge in Florence: 4100 cm/sec (1966)
Maximum discharge in Pisa: 2290 cm/sec (1966)
Minimum discharge in Florence : 0,56 cm/sec (1958)
Minimum discharge in Pisa: 2,2 cm/sec (1931)

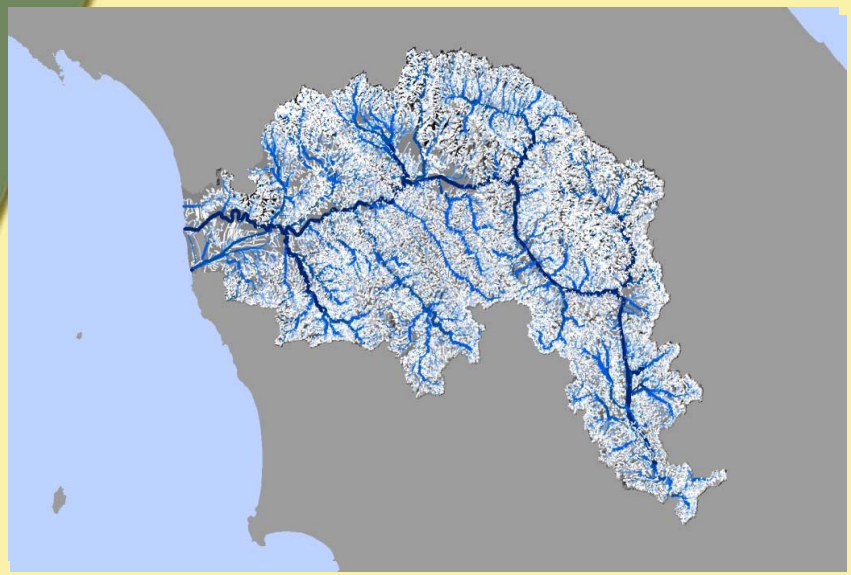


Bacino del fiume Arno - inquadramento generale

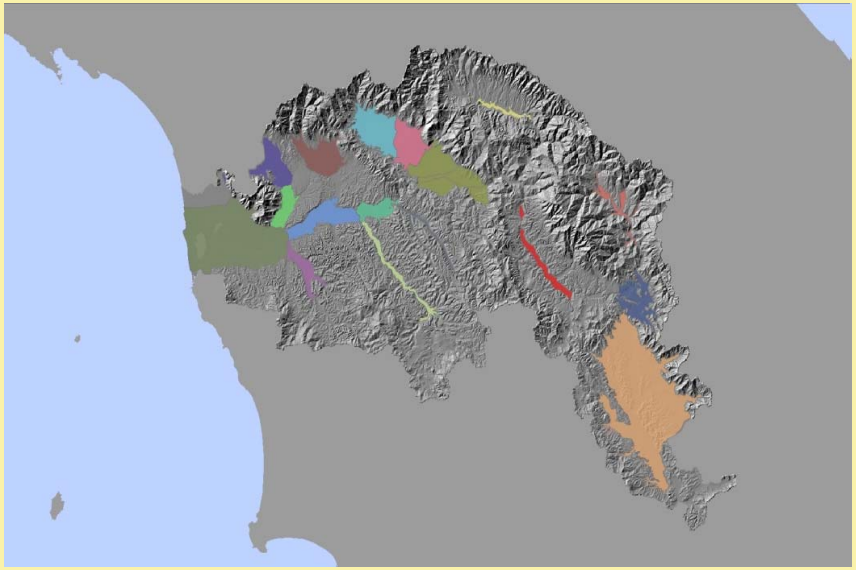
Water Scarcity and Flood Risk

Water Scarcity in the Arno River Basin: the *"Water Balance" Plan*

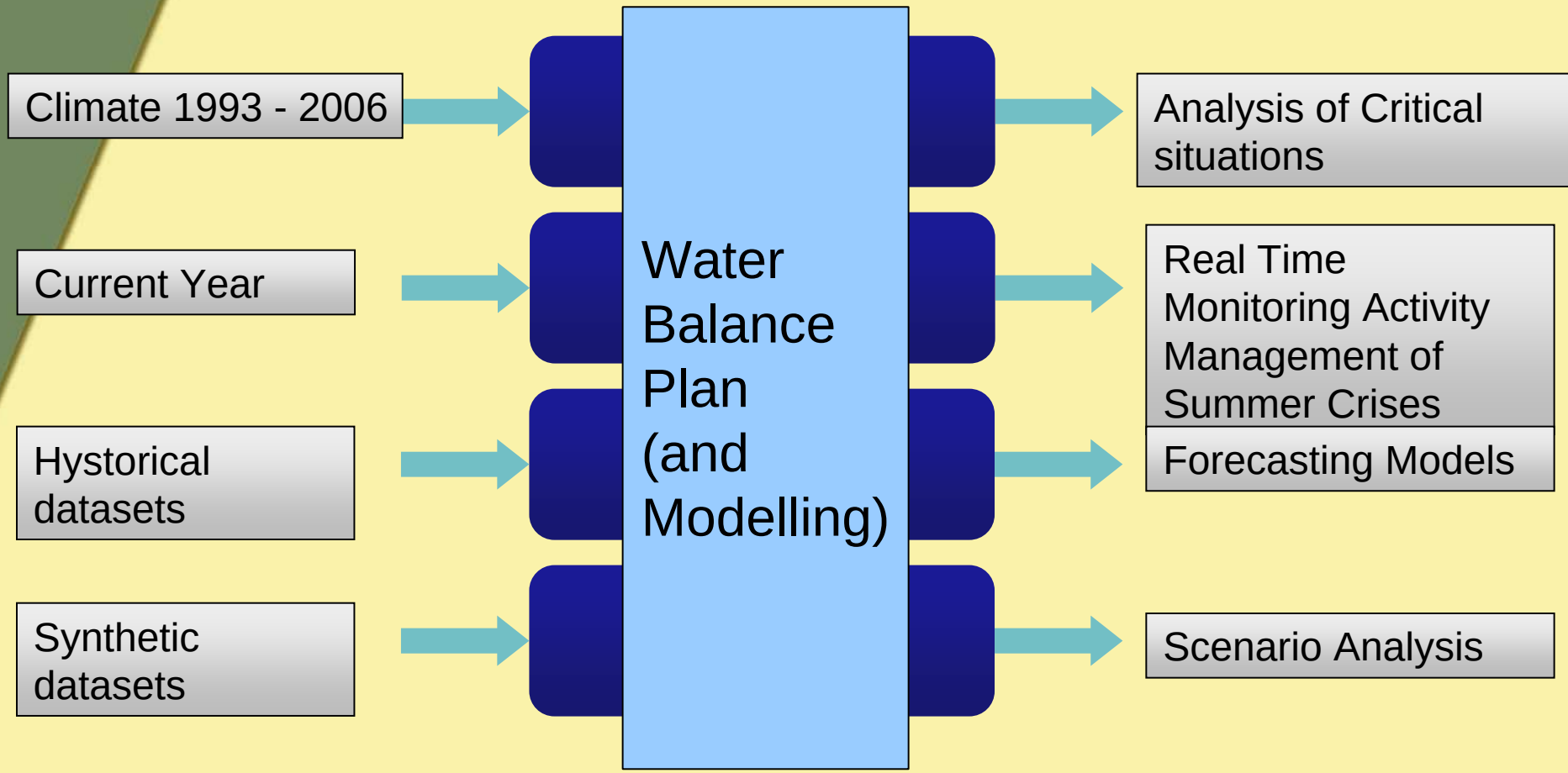
Surface Water Bodies
24.000 km of "*blue lines*"



Groundwater Bodies
17 phreatic and confined acquifers



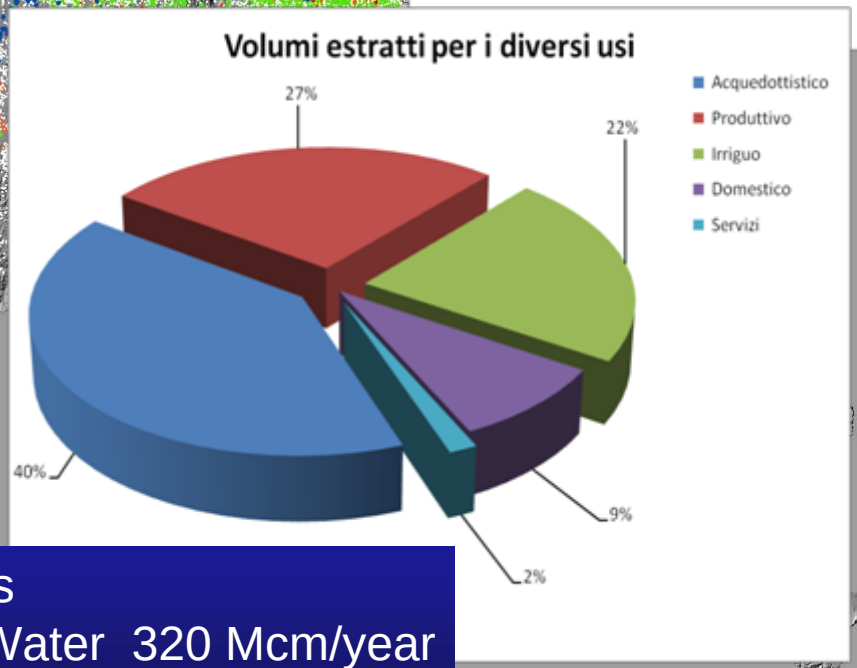
What are these data useful for?



Groundwater Bodies Balance

Data:

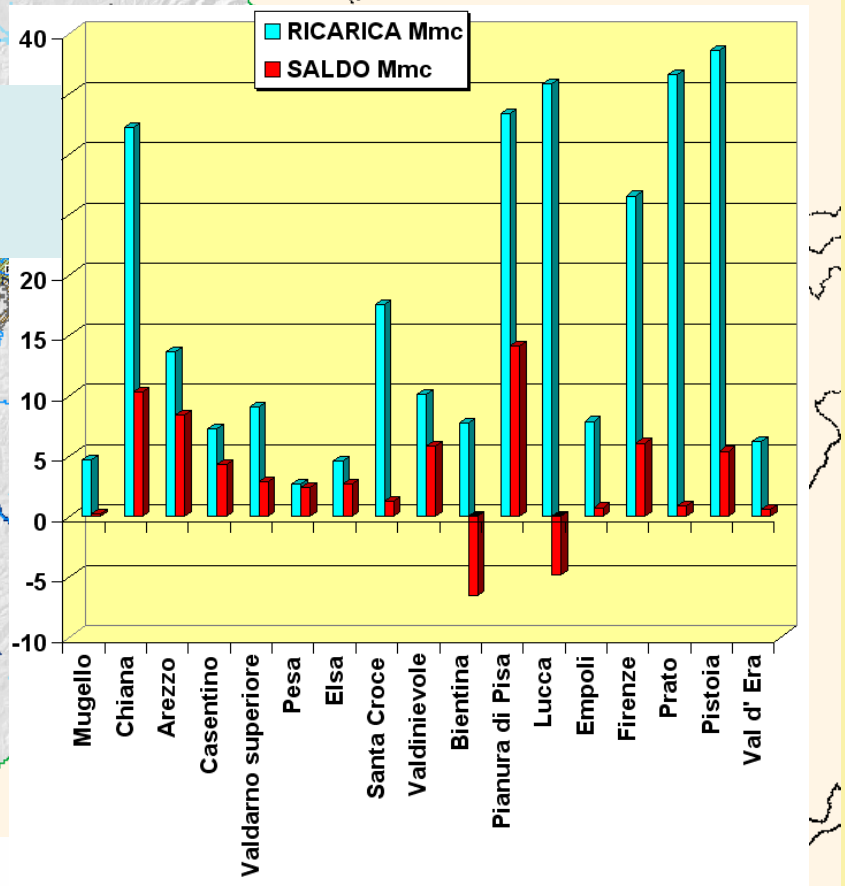
Geometrical Description
Hydrometeorological data
Abstractions
Other……

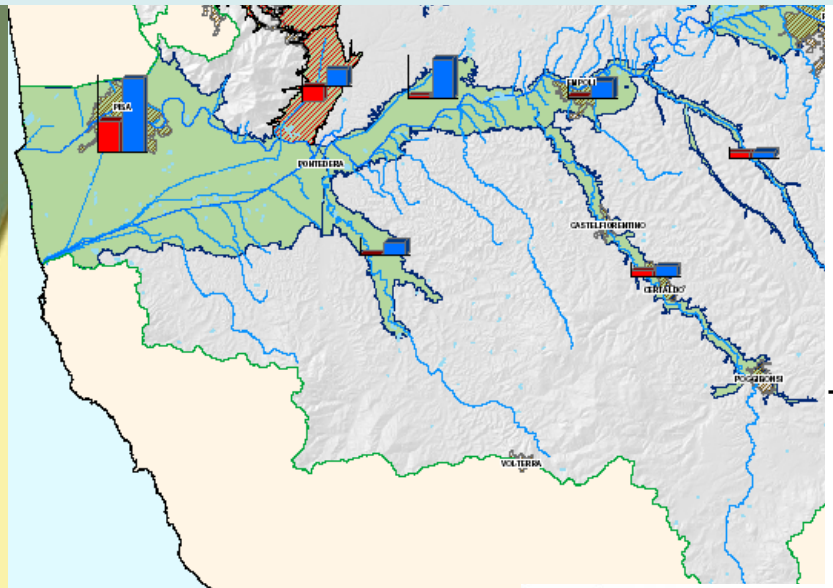


122.000 wells
Abstracted Water 320 Mcm/year

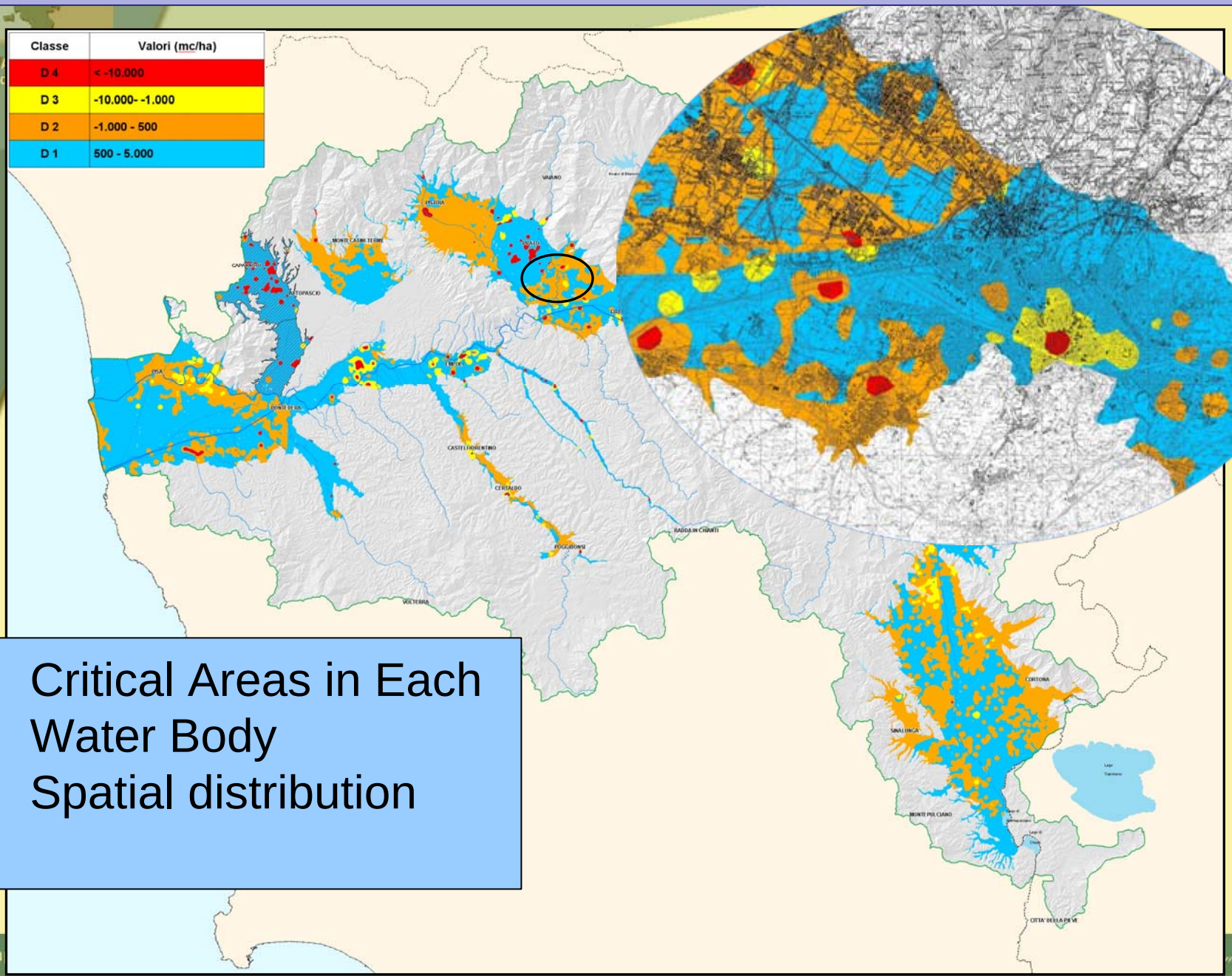
Groundwater Balance

Balance Analysis for Each Groundwater Body





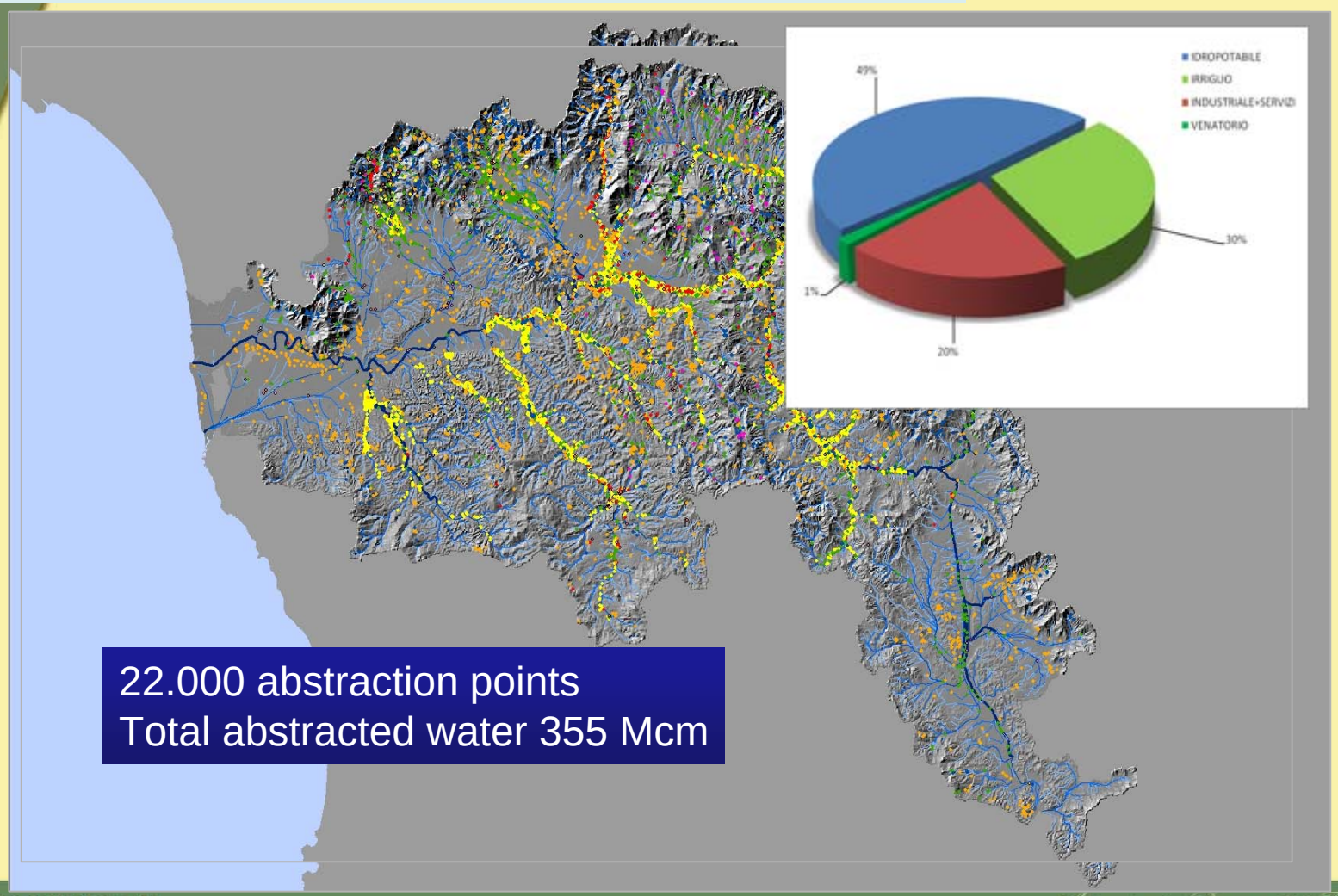
Groundwater Balance



Critical Areas in Each Water Body
Spatial distribution

Surface Water Bodies Balance

Data:
Hydrometeorological data
Abstractions
Other....

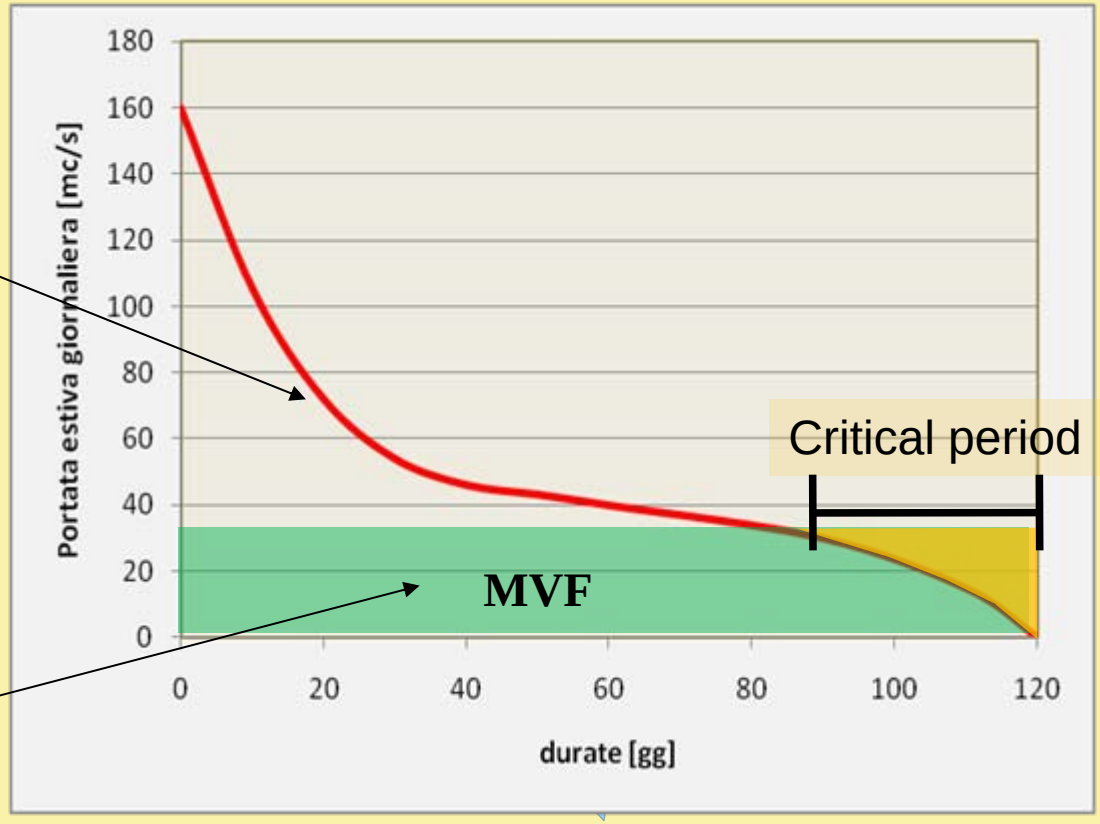


Surface Water Bodies Balance

Evaluation of Critical Conditions of each sub-basin through the comparison between the Discharge Curves and Minimum Vital Flow (MVF)

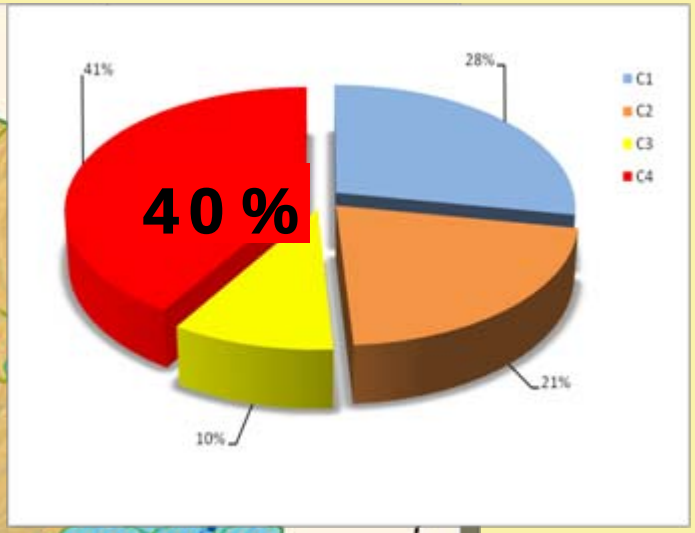
Discharge Curve

Minimum Vital Flow threshold



Surface Water Bodies Balance

Critical Areas Mapping



Class	Water deficit level	Days with negatives values of WB
C4	Extreme	> 60 dd
C3	Severe	30-60 dd
C2	Moderated	1-30 dd
C1	Null	0 dd

Water Scarcity and Flood Risk

Flood Risk in the Arno River Basin: Historical Floods, City of Florence

- Reliable historical documentation since 1177

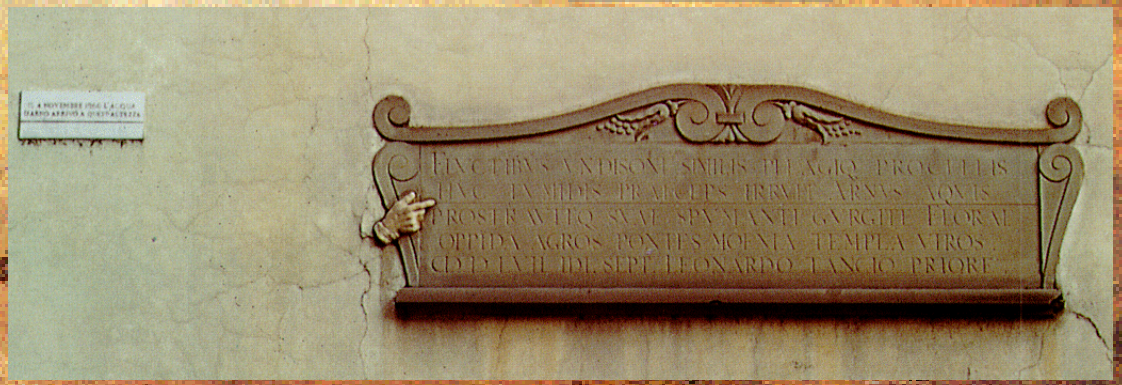
Florence was flooded

56

times

8

Main floods



4th November 1966







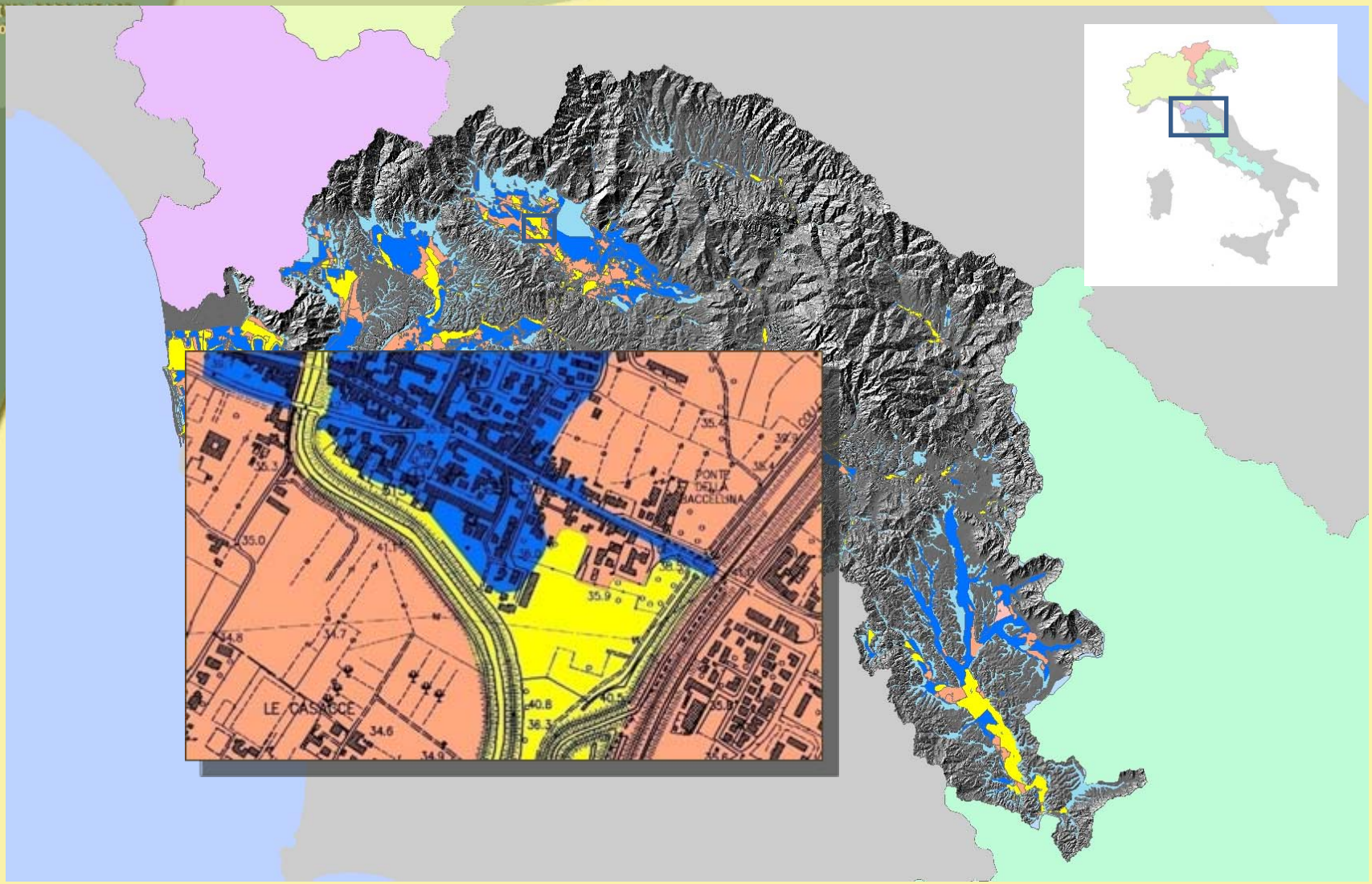


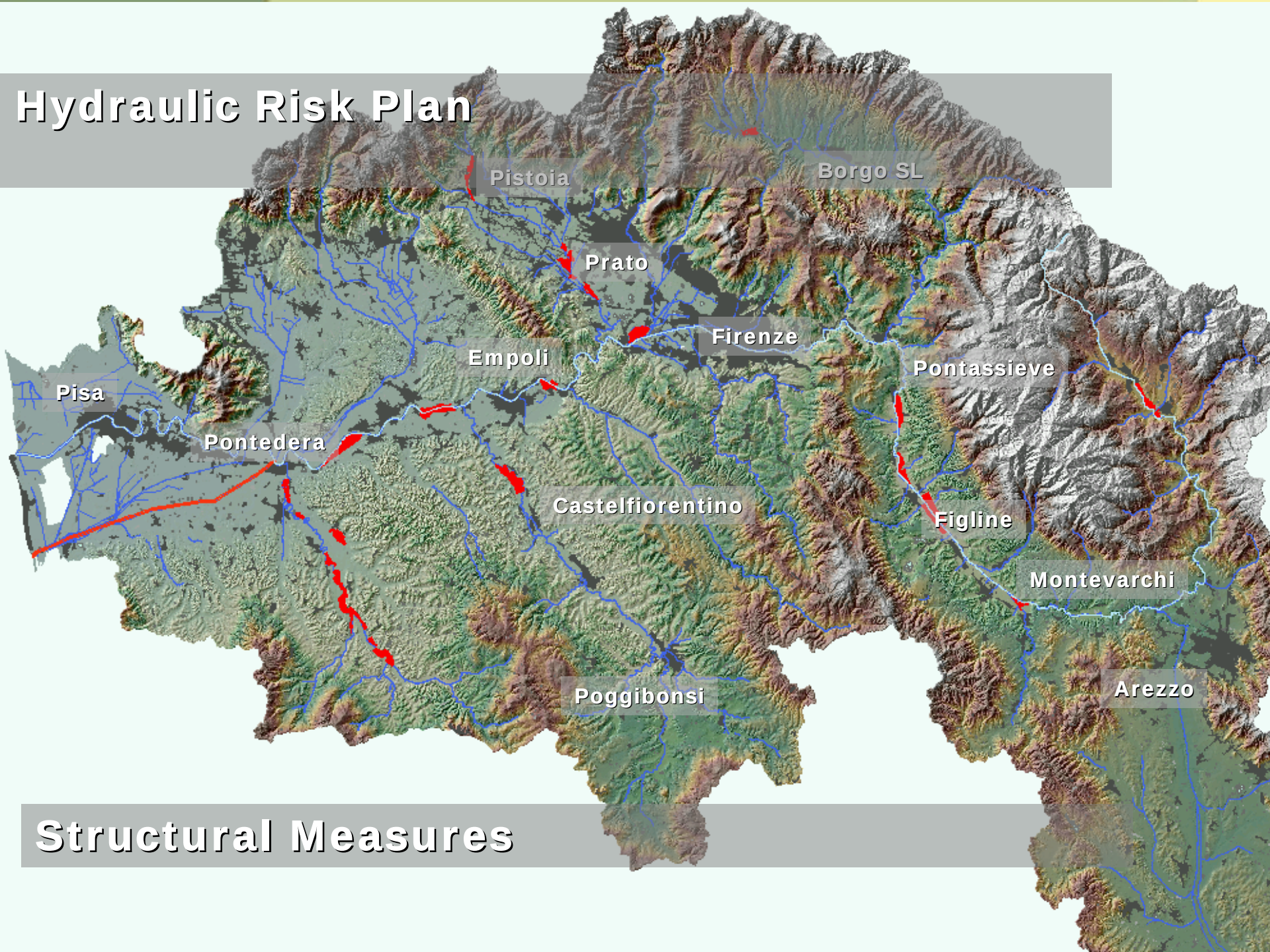



Pisa – November 2005

Pisa – December 2010

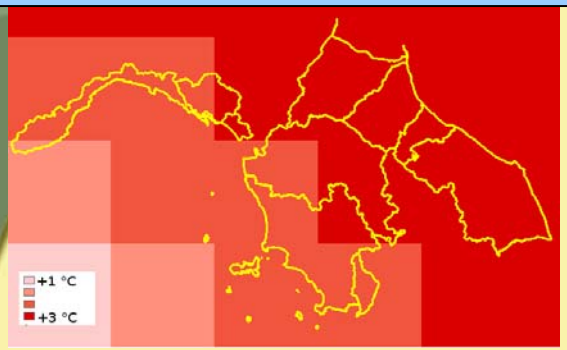
Flood Hazard Map



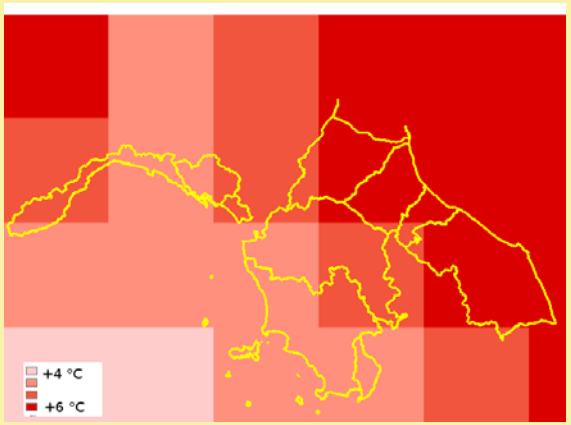

Hydraulic Risk Plan
Pistoia
Borgo SL
Prato
Firenze
Empoli
Pontassieve
Pisa
Pontedera
Castelfiorentino
Figline
Montevarchi
Poggibonsi
Arezzo
Structural Measures

Water Scarcity , Flood risk and Climate Change

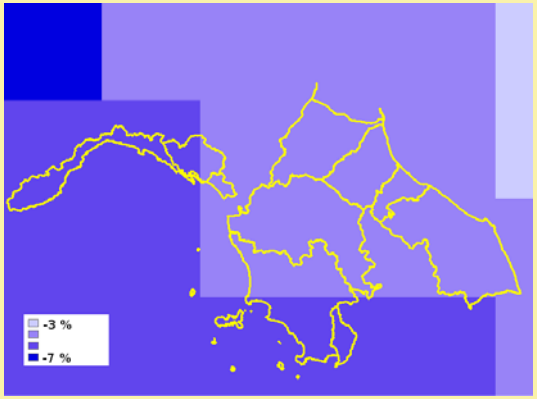
Temperature / Precipitation modeled series



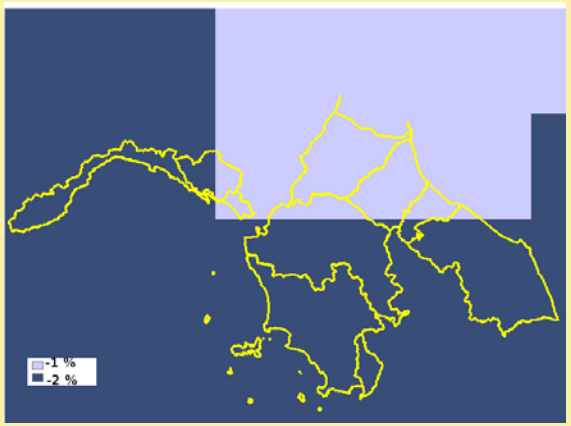
Scenario IPCC A2 – Winter Average Temperature Change (Dicember-January-February) – Time Span 1961:1990 - 2071-2100



Scenario IPCC A2 – Summer Average Temperature Change (June –July - August) – Time Span 1961:1990 - 2071-2100



Scenario IPCC A2 – Winter Average Rainfall Change (December-January - February) – Time Span 1961:1990 - 2071-2100



Scenario IPCC A2 – Summer Average Rainfall Change (June-July-August) – Time Span 1961:1990 - 2071-2100

Climate Change Effects Assessment

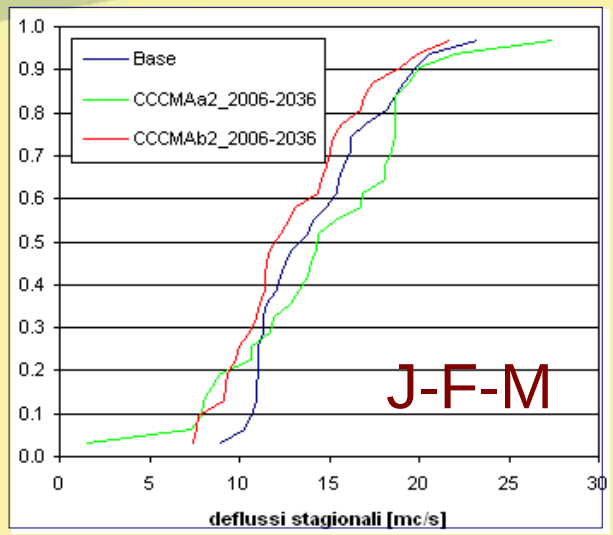
Casentino Sub-basin

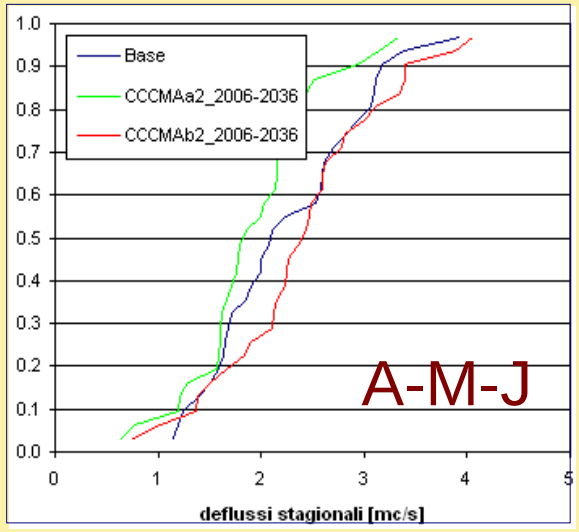
Simulation of Climate Change Scenarios:

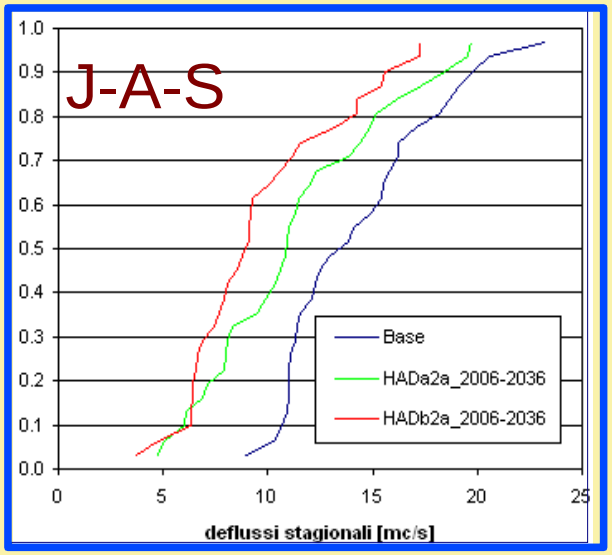
IPCC Special Report on Emission Scenarios

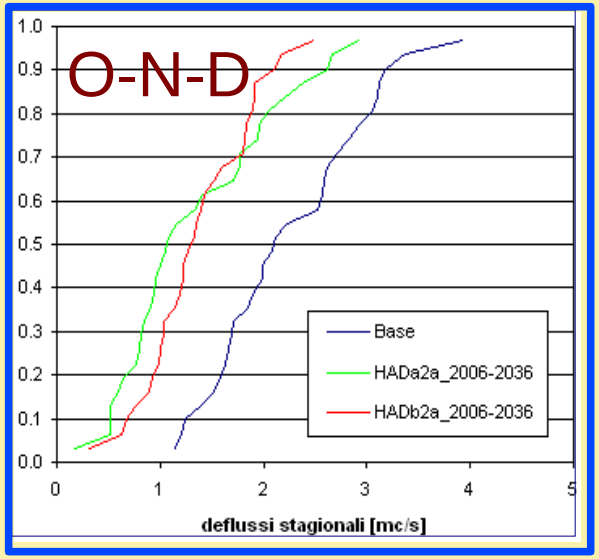
Seasonal analysis

CDF (Cumulative Distribution Function) of discharge

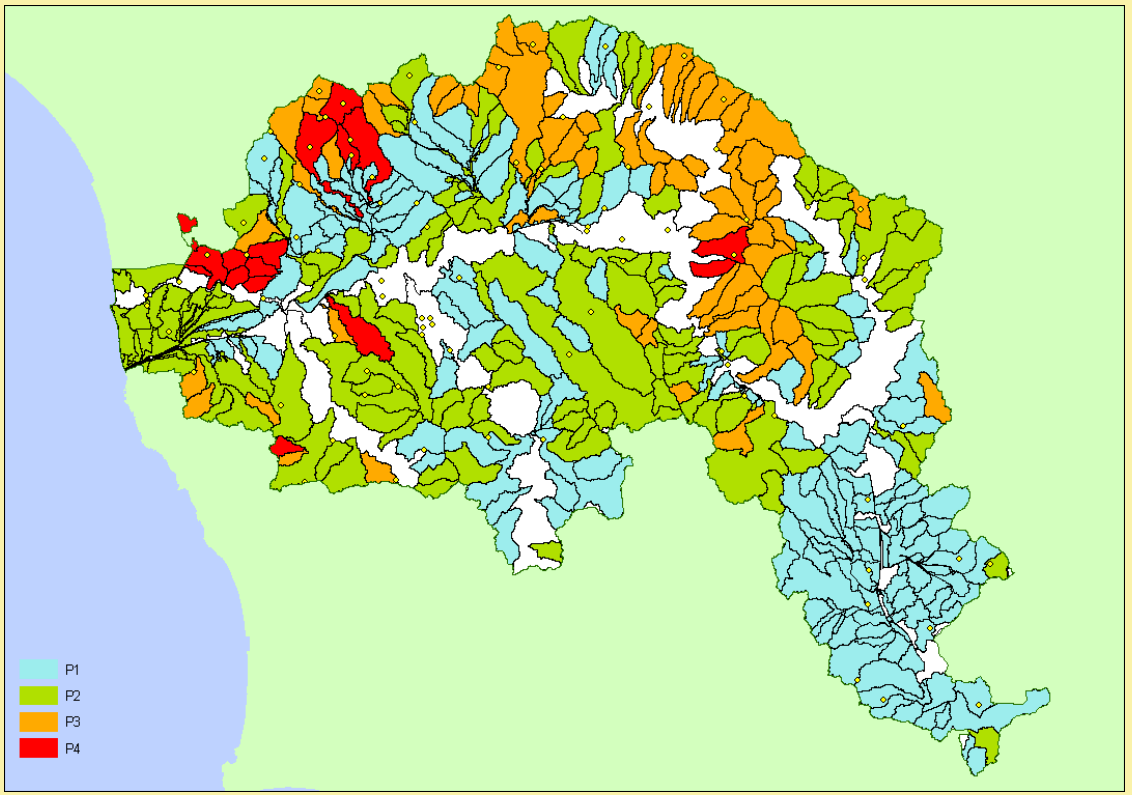








Climate Change Scenarios and Cross-compliance with the Floods Directive



Flash Floods Hazard in the Arno River Basin

An useful tool

WIZ-"WaterIZe" **is a LiFE+ project, that foresees the implementation of an IT platform to allow the assessment of environmental and infrastructural costs useful for land use planning, taking into consideration climate change factors.**

WIZ
LIFE 09 ENV/IT/000056

"WatersIZe" spatial planning:encompasse drinkwater management conditions to adapt to climate change

www.wiz-life.eu/

Conclusions

- In Italy natural risks are managed at the basin scale
- The Water Balance Plan highlights water criticality on the whole territory, mainly during he Summer months (June – September).
- Maps were drafted describing the different levels of criticality.
- The Water Balance Plan main aim is the sustainable management of water resources.
- The first, preliminary *Hazard and Risk* maps were produced in the nineties.
- Available flood hazard maps cover all flood prone areas in Italy

The above mentioned Plans are part of the River Basin District Management Plan.

Thanks for your attention!!