

New planning instruments for the environmental restoring and sustainable development of coastal areas: the case of the wide Venice lagoon area

Dr Pierpaolo Campostrini

Consortium for Managing Research Activities in the Venice Lagoon



**44° ISOCARP International Congress
Water Territory Planning session
Dalian, 22 September 2008**



SUMMARY

1. The European framework for maritime and marine policies

2. Safeguarding of Venice and its Lagoon

3. The new Morphological Plan for the Venice Lagoon

1 - The European framework for maritime and marine policies



Seas and coasts play a leading role in economic growth of Europe. However, sustainable development of the marine environment is a prerequisite for economic efficiency of activities related to it.



...Marine Spatial planning will play an important role!



The EU Integrated Maritime Policy

On 10 October 2007, the Commission presented an **Action Plan** (SEC(2007)1278/ 2) to the European Parliament, the Council, the Economic and Social Committee and the Committee of Regions on maritime policy for the European Union. This Action Plan issued together with a so-called "**Blue Book**" -COM 2007(575) is the result of one year of consultations following the Green Paper. The Action Plan sets out a series of actions that the European Commission has proposed to undertake as a first step towards the implementation of a new integrated maritime policy for the European Union.



On 17/7/2008 came into force the Directive 2008/56/EC, establishing a framework for community action in the field of marine environmental policy (**the Marine Strategy Framework Directive**). This Directive asks for the development of national strategies for achieving a good status of the marine environment in 2020. It is the **environmental pillar** of the Marine and Maritime Policy of the Union.

The **Water Framework Directive** 2000/60/EC requires that surface freshwater and groundwater bodies should achieve good ecological status by 2015. **The combined implementation of the two Directives will bridge the gap between environmental protection of inland waters and the open seas.**

(a) preparation:

- (i) an initial assessment, to be completed by 15 July 2012 of the current environmental status of the waters concerned and the environmental impact of human activities thereon, in accordance with Article 8;
- (ii) a determination, to be established by 15 July 2012 of good environmental status for the waters concerned, in accordance with Article 9(1);
- (iii) establishment, by 15 July 2012, of a series of environmental targets and associated indicators, in accordance with Article 10(1);
- (iv) establishment and implementation, by 15 July 2014 except where otherwise specified in the relevant Community legislation, of a monitoring programme for ongoing assessment and regular updating of targets, in accordance with Article 11(1);

(b) programme of measures:

- (i) development, by 2015 at the latest, of a programme of measures designed to achieve or maintain good environmental status, in accordance with Article 13(1), (2) and (3);
- (ii) entry into operation of the programme provided for in point (i), by 2016 at the latest, in accordance with Article 13(10).

The conceptual basis: the ecosystem approach

In all European legislation, it is becoming clearer that the ecosystem approach is proposed as the main conceptual instrument to implement a real sustainable development and to the effective protection of the environment. (e.g. Habitat Directive 92/43/EEC, Water Framework Directive 2000/60/EC, Integrated Coastal Zone Management Recommendation 2002/413/EC, Marine Strategy Directive 2008/56/EC)

It is based on concepts such as:

- “favorable status of conservation”
- “good ecological status”.

It should be applied to all areas, including coastal seas, territorial waters, exclusive economic zones or equivalent ones.

Strategic Environmental Assessment (SEA)

The European SEA Directive (2001/42/EC) requires in any territorial plan design:

- To consider the different environmental consequences and alternatives
- To implement a participatory approach, which is more than a public consultation

2 - Venice and its Lagoon



Artificial or Natural?



Venice

Italy

Alps



Venice is placed almost at the top North of the Adriatic sea, and experiences the tide with the largest excursion in the Mediterranean (1m)



Location: $45^{\circ}10' N$ $12^{\circ}40' E$,
Length: ab. **51km**. Width: ab.
12km. Perimeter: 157km.

Total surface: **540km²**, of which
8% land above sea level
(littorals, reclaimed areas,
islands, embankments) and
92% "water system": channels
(11,9%), shallows, mud flats
and salt marshes (80,1%).

Channels and open waters
(depth >150cm): 66km².

Shallows (depth between 150 e
40 cm): **243km²**.

Mud flats (inertial areas
between -0.40 and +0.24 on the
m.s.l.): 98km².

Salt marshes (areas higher than
+0.24m, but flooded by high
tide): **11km²**.

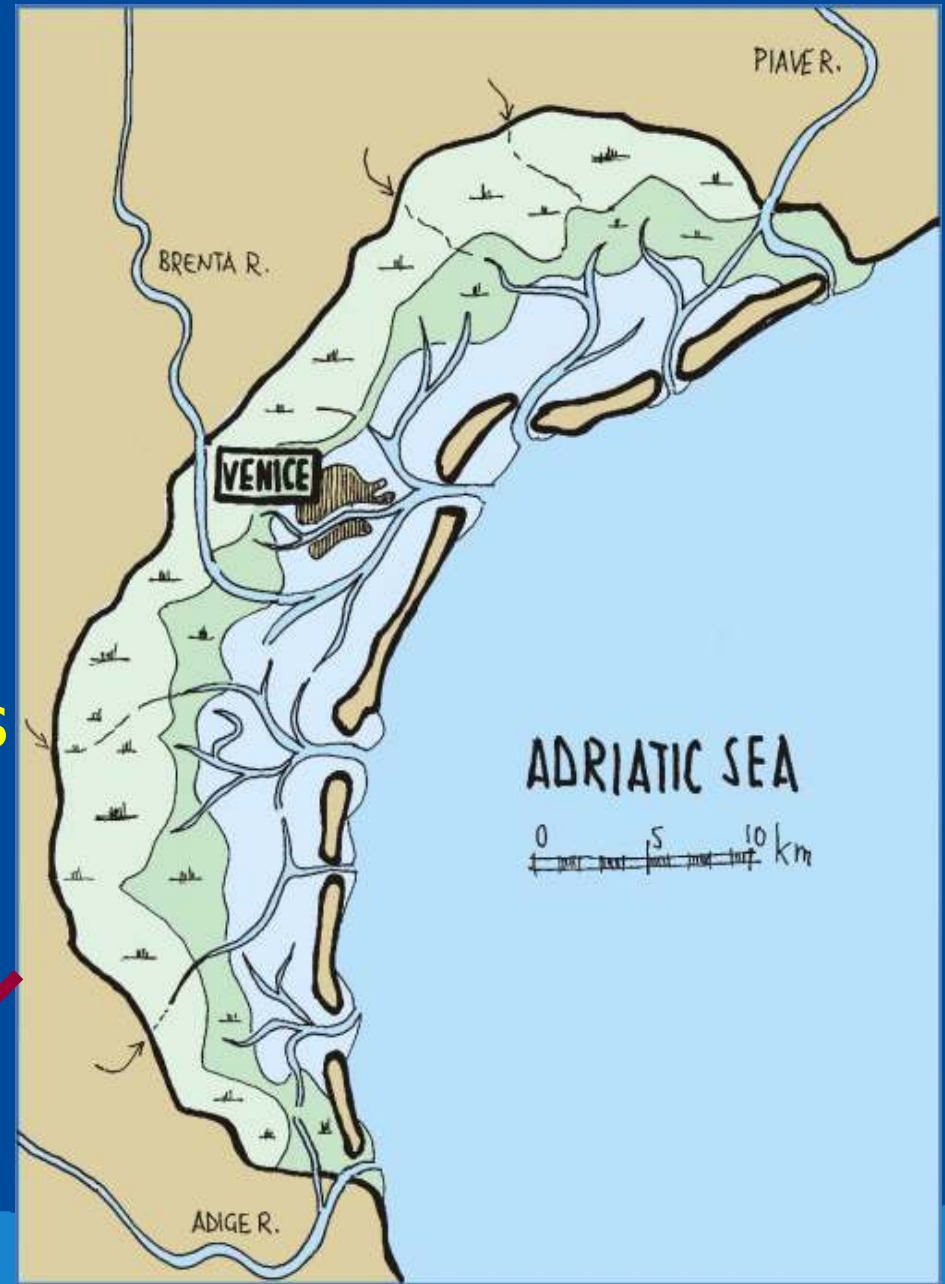
Embanked fish farms: 92km².

Islands: 29km².

In the XIV century, the lagoon of Venice was different from today:

- large rivers flowing into the lagoon
- 5 - 8 unstable inlets
- large extension of marshes
- tendency of tidal flats to become silted

risk of infilling of the lagoon



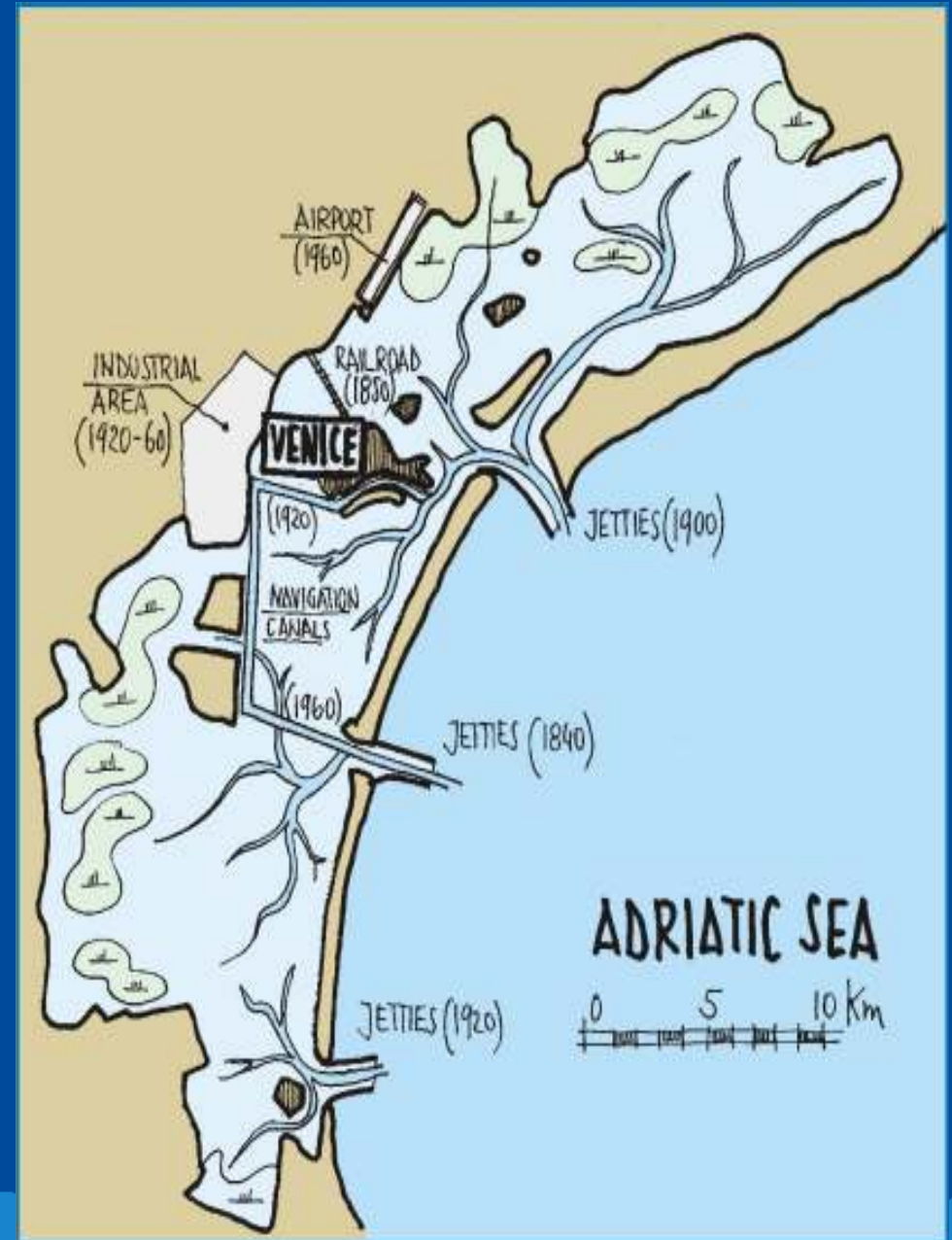
The survival of Venice (commercial, military and even physical) was put in jeopardy by the siltation of the lagoon

From the XIV to the XVIII century great care was taken by the *Serenissima Repubblica* to defend its lagoon "against sea, rivers and man"



Around the XIX century the political decadence of Venice brought to a halt the interventions in the lagoon

Over the past 150 years, by contrast, the lagoon was subject again to large modifications



Biodiversity



Lagoon fishing



50.000 tons/year *Tapes philippinarum* (peak)
(75 million Euro, 2000-3000 fishermen)



3.400 tons/yr other fishing (market data)

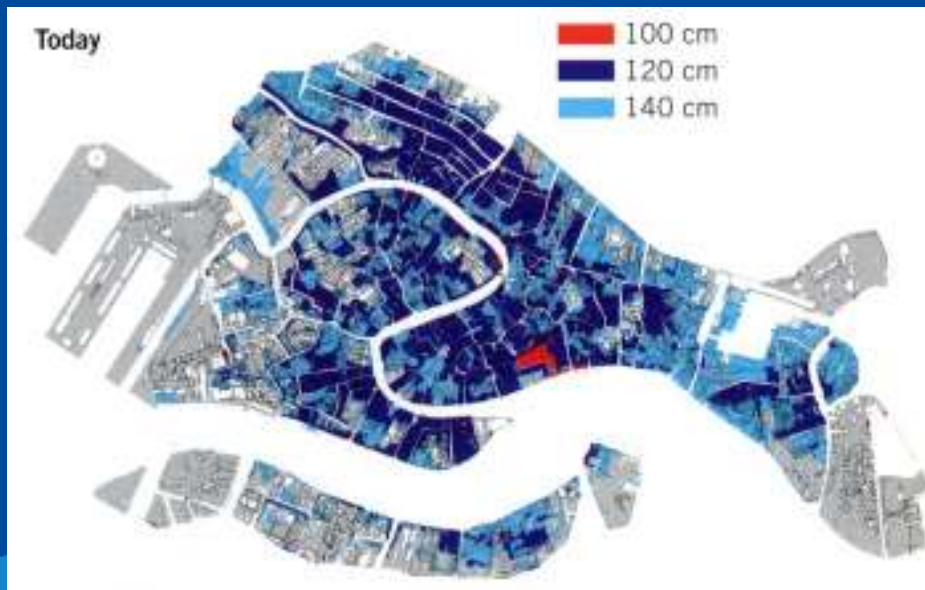
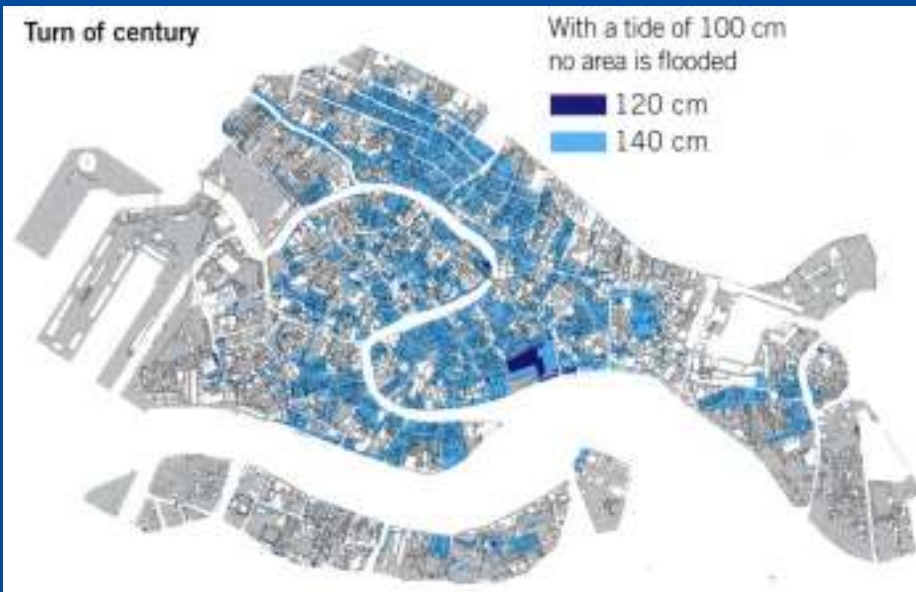
1.500 tons/yr in the lagoon, fish farming excluded

Tourism: love without borders

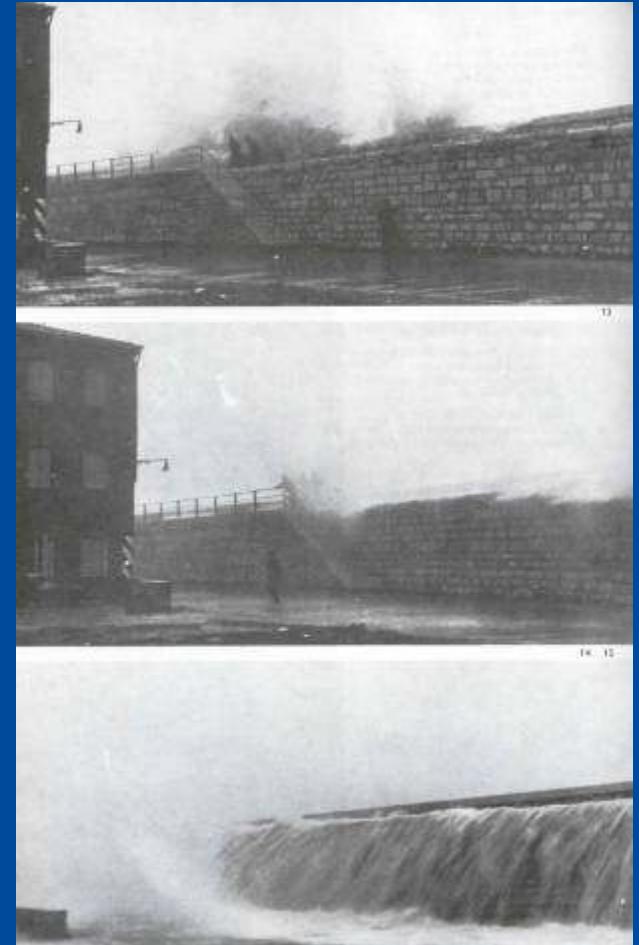
- **Almost 20 million** visitors per year (nights spent)
- More than **30 million** including the sea-resorts of the province.
- Population of historical centre: **60.000 (i.e. 21,9 million** nights spent per year)



An example of global change effect: the sea level rise (SLR). Venice as a world test-case city



**4th November
1966**



Italy's Special Law for Venice (1973)



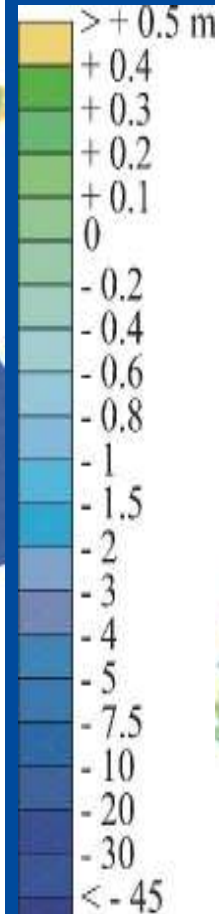
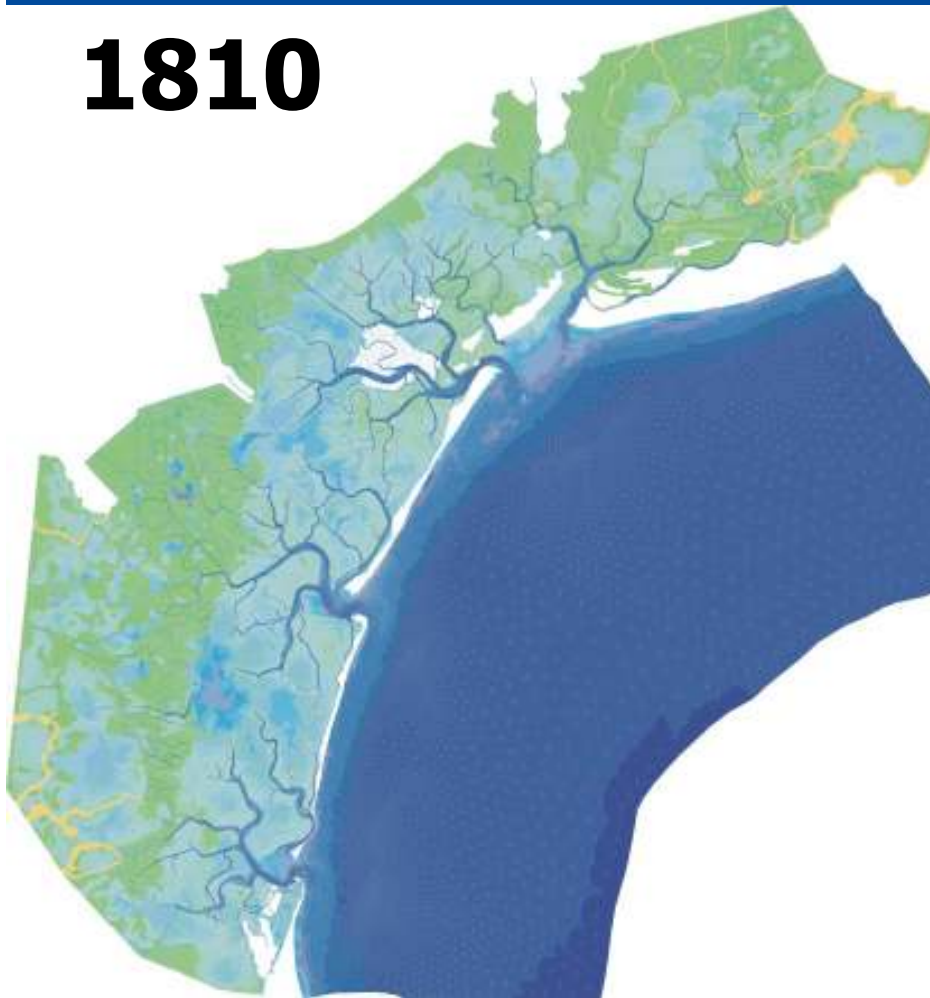
- Venice: Italy's national interest
- Almost 10 billion Euro in 30 years already spent
- To reach hydraulic equilibrium
- To preserve environment from pollution
- To reinforce socio-economic vitality
- To safeguard the architectural patrimony
- Different levels of administration involved (State, Region, Municipality)

3 – The new Morphological Plan for the Venice Lagoon

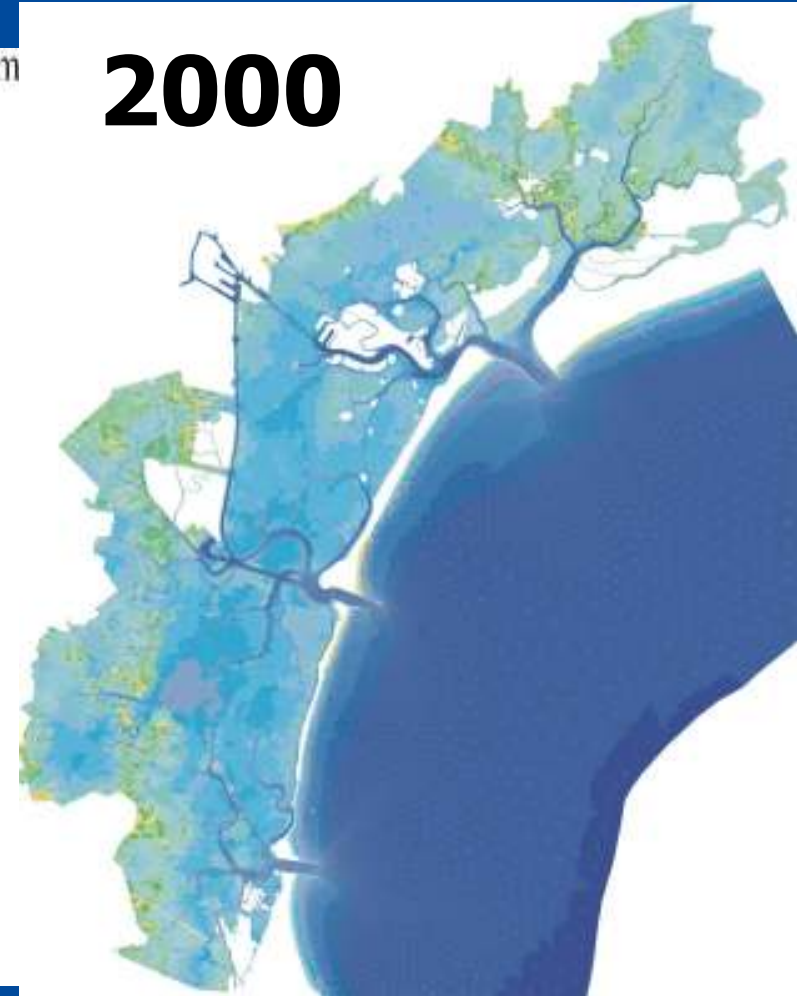


The erosion of lagoon morphology

1810



2000



MAIN CAUSES AND EFFECTS OF MORPHOLOGICAL DEGRADATION

c
a
u
s
e
s

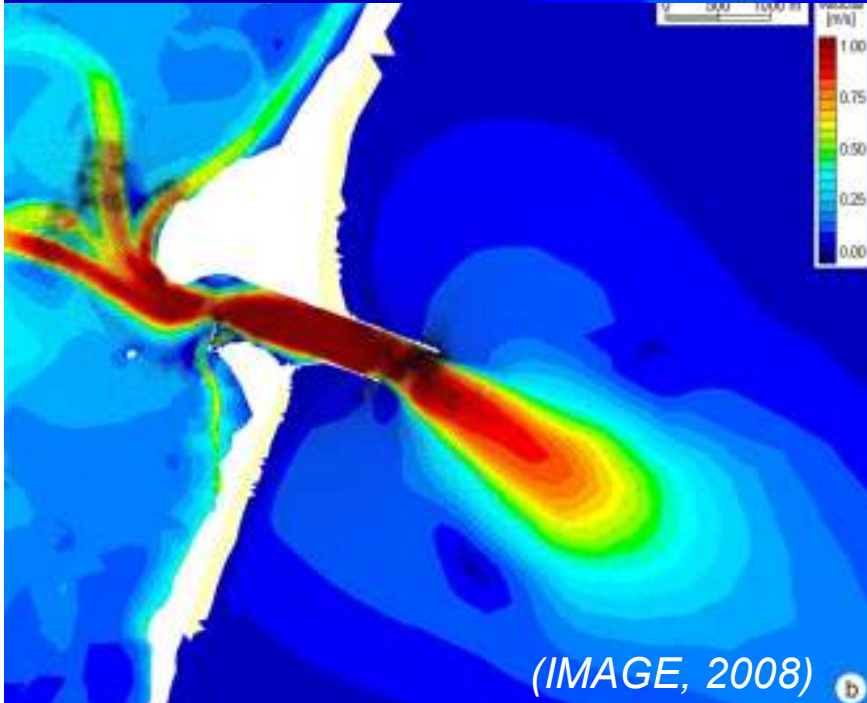
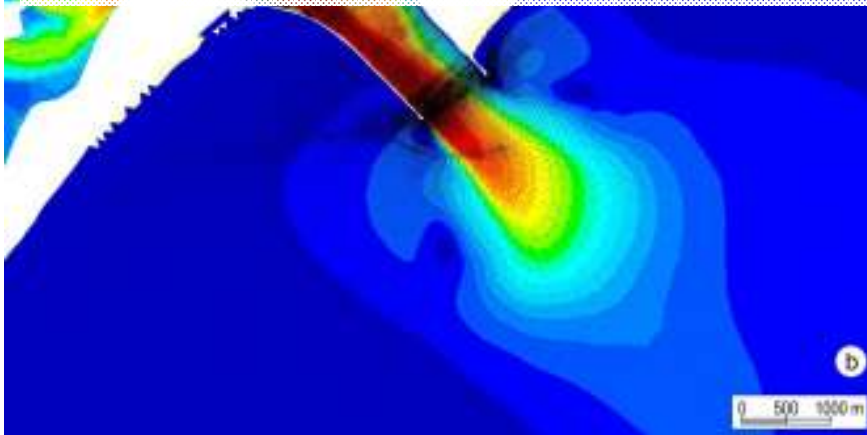
- Relative sea level rise (subsidence and eustatism)
- River mouth diversion (occurred in 1500-1700)
- Modification of inlets (occurred around 1900)
- Navigation artificial channels dredging (1920-1960)

e
f
f
e
c
t
s

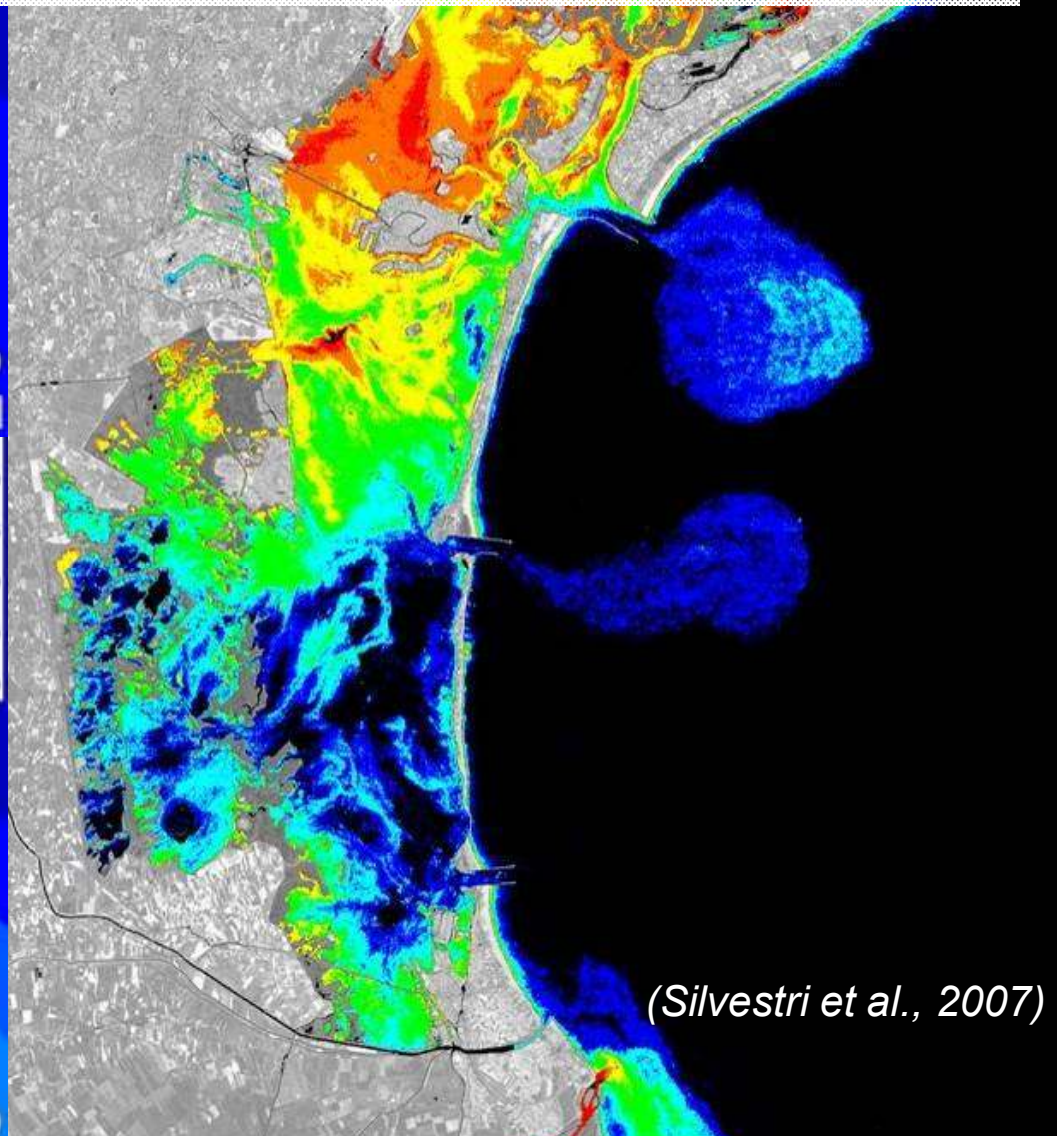
- Unbalance of sediment input-export: 0,2-2 million m³ per year
- Need to dredge internal channels for navigation
- Loss of intertidal habitats/biodiversity
(A more flat and uniform lagoon > a marine bay)

FORCING AND OBSERVED/EXPECTED EVOLUTION

Reduced supply of river sediments and increased flows of sediments to sea



(IMAGE, 2008)



(Silvestri et al., 2007)

A rapid phenomenon

1955



2002



The erosion of the intertidal and subtidal areas (salt marshes, mud flats and shallows) leads to the loss of habitat diversity and biodiversity.

The salt marshes are essential for lagoon life and biodiversity:

- ✓ Salt marshes are coastal wetlands rich in marine life. They occur in the zone between low and high tides.
- ✓ Hidden in salt marsh plants are animals in various stages of life. Young fish often find here a nursery, where it is easy to find food.
- ✓ During the winter season, more than 100.000 seawater birds homed in the lagoon, and many species find their home here all over the year



Waves

They are generated

a) by wind - energy related to:

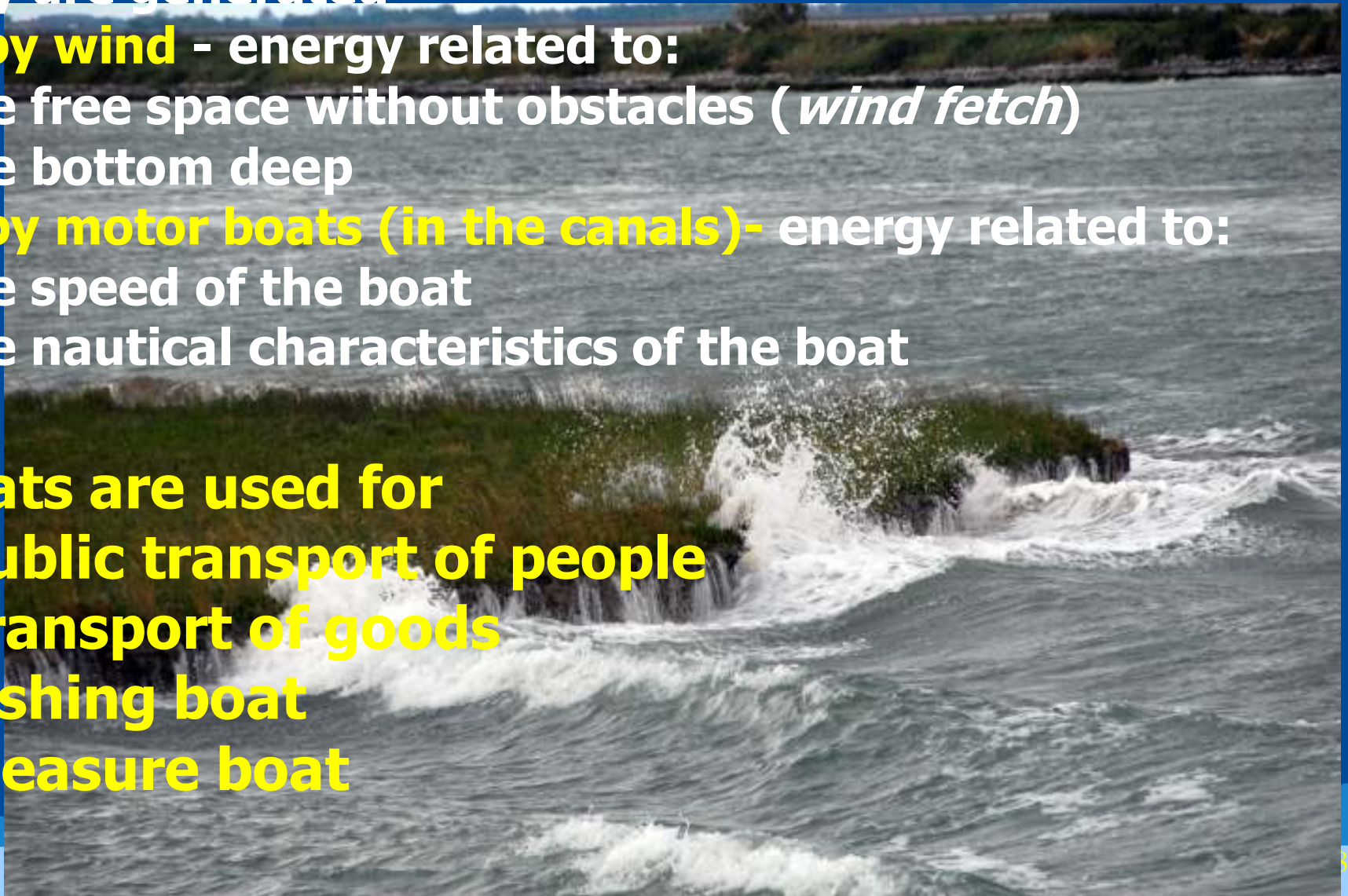
- the free space without obstacles (*wind fetch*)
- the bottom deep

b) by motor boats (in the canals)- energy related to:

- the speed of the boat
- the nautical characteristics of the boat

Boats are used for

- **Public transport of people**
- **Transport of goods**
- **Fishing boat**
- **Pleasure boat**



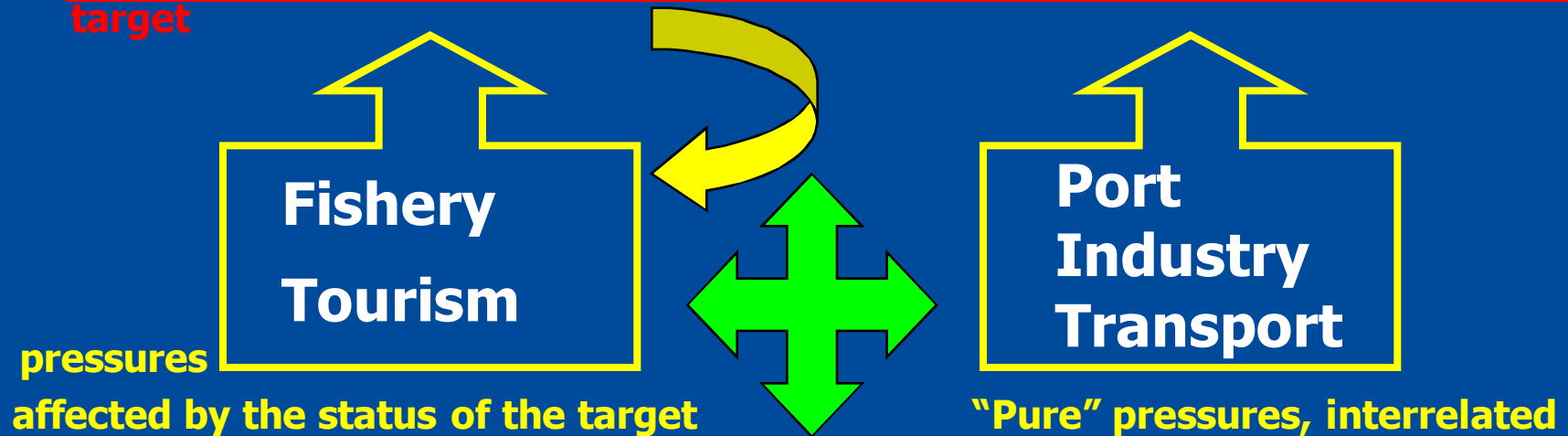
POSSIBLE INTERVENTIONS (some of them already undergoing)

- Re-construction of lagoon morphology (sediments is a scarce resource): in the past 20 years 1190 ha of salt marshes and of mudflat have been reconstructed, using suitable sediment coming from of about 168 km of channel dredging. Islands' borders have been restored, too.
- Limit to sediment export (e.g. use of the tide barriers, channels modifications, etc)
- Increase of sediment input (problem pollution)
- Regulation of uses (e.g. speed and size limits for ships, restricted area for navigation, urban plans, fishing areas, port, etc)

Paradigmatic case

Nature, landscape and cultural heritage conservation

target



social dimension ("city status" for Venice)

constraint

Impossible any self-regulation of the system (zero-option policy), due to:

- Natural processes already compromised
- Presence of no-market goods of large importance
- Complex cause-effect relationships at subsystem level

Jurisdiction on the Venice Lagoon

Italian model



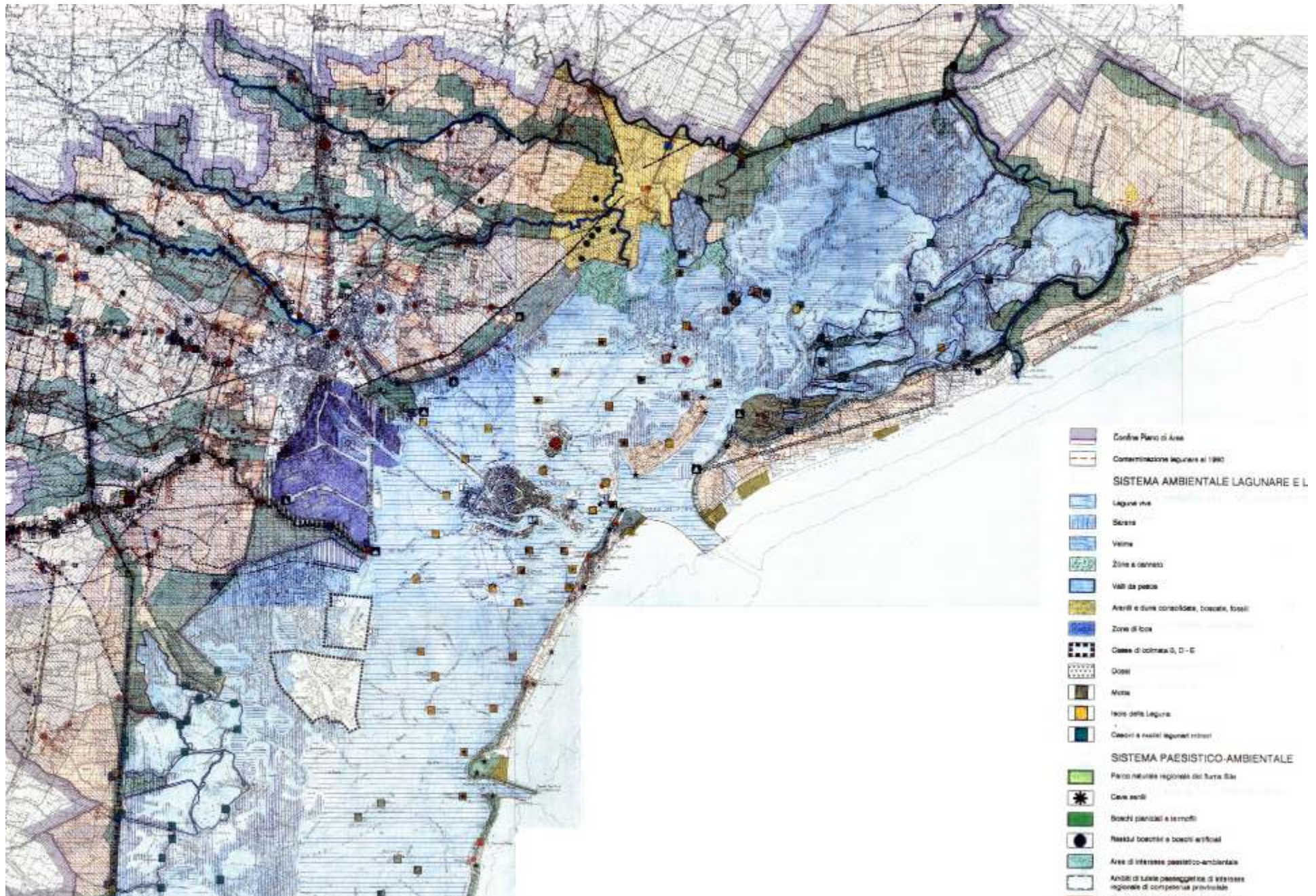
Legislation for environmental protection
"concorrente" between the State and the
Regions (*concurring or competing?*)

To the State: "Protection of
the environment, of
ecosystems and cultural
heritage"

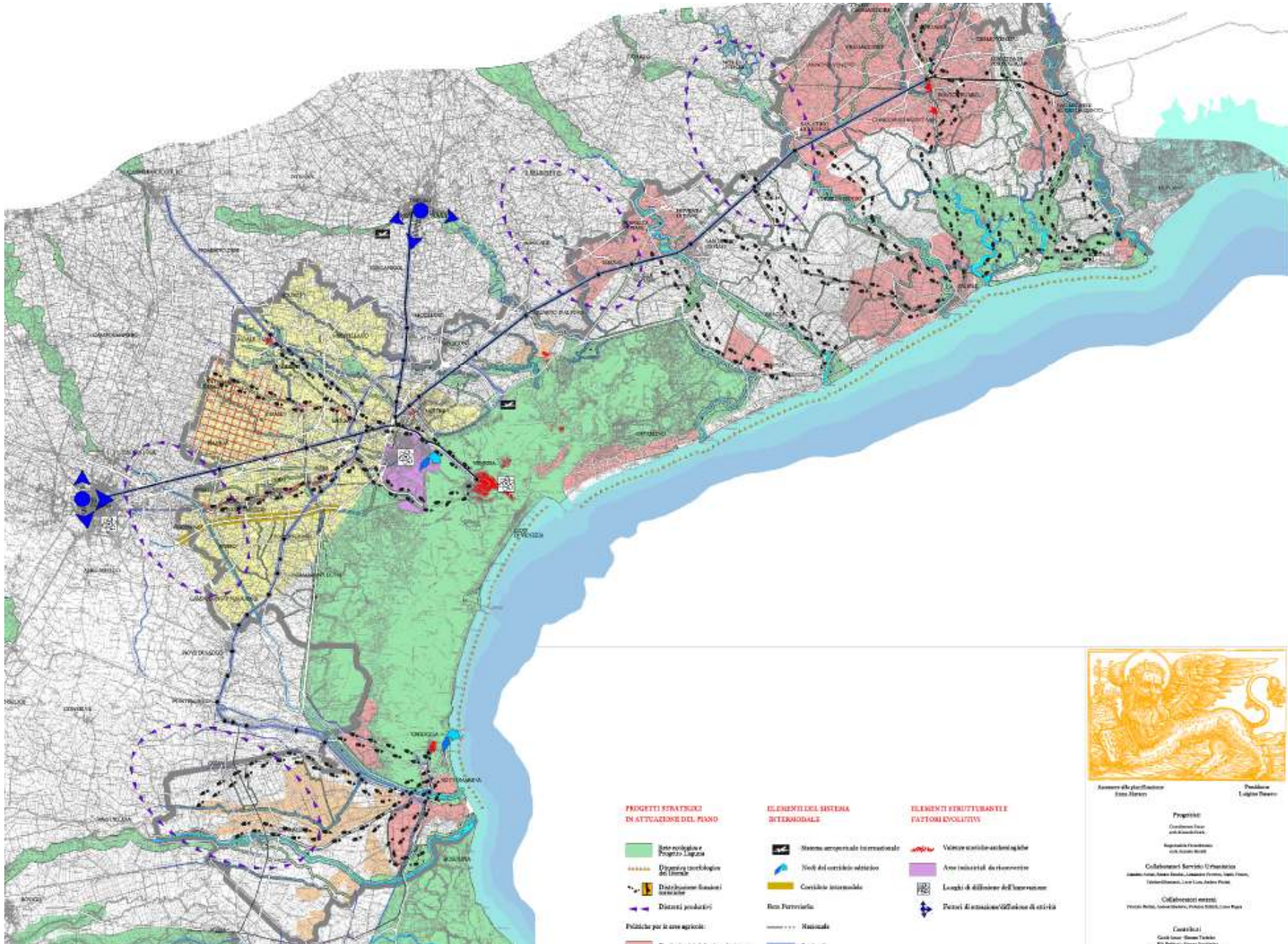
To the Regions the "govern of
the territory" and "valorisation of
environmental and cultural
heritage", but fundamental
principles to the State



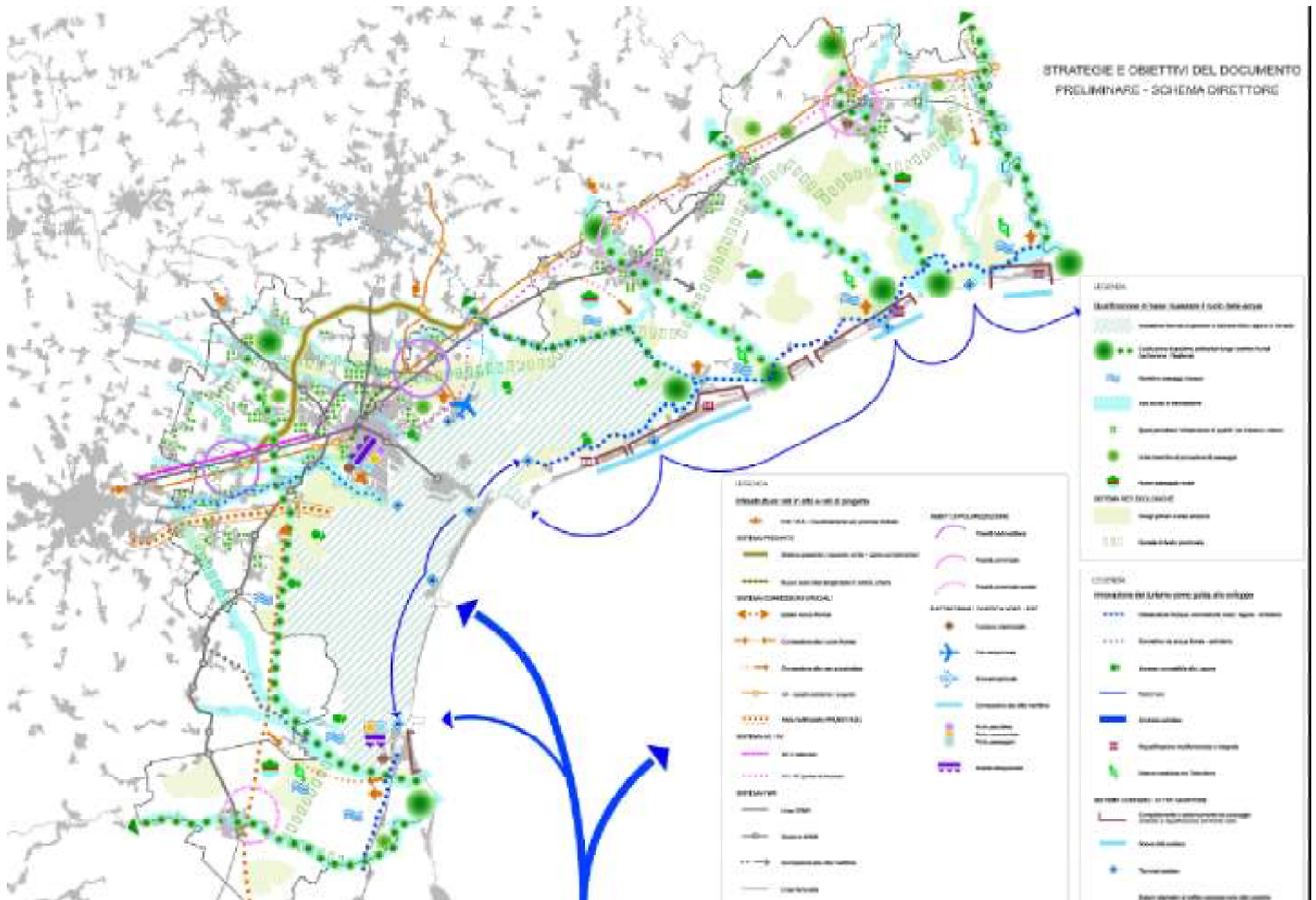
Special legislation for Venice: the State responsible for the
physical defense and environment restoration, the Region
for depollution, the Municipalities for urban maintenance
and social re-vitalization



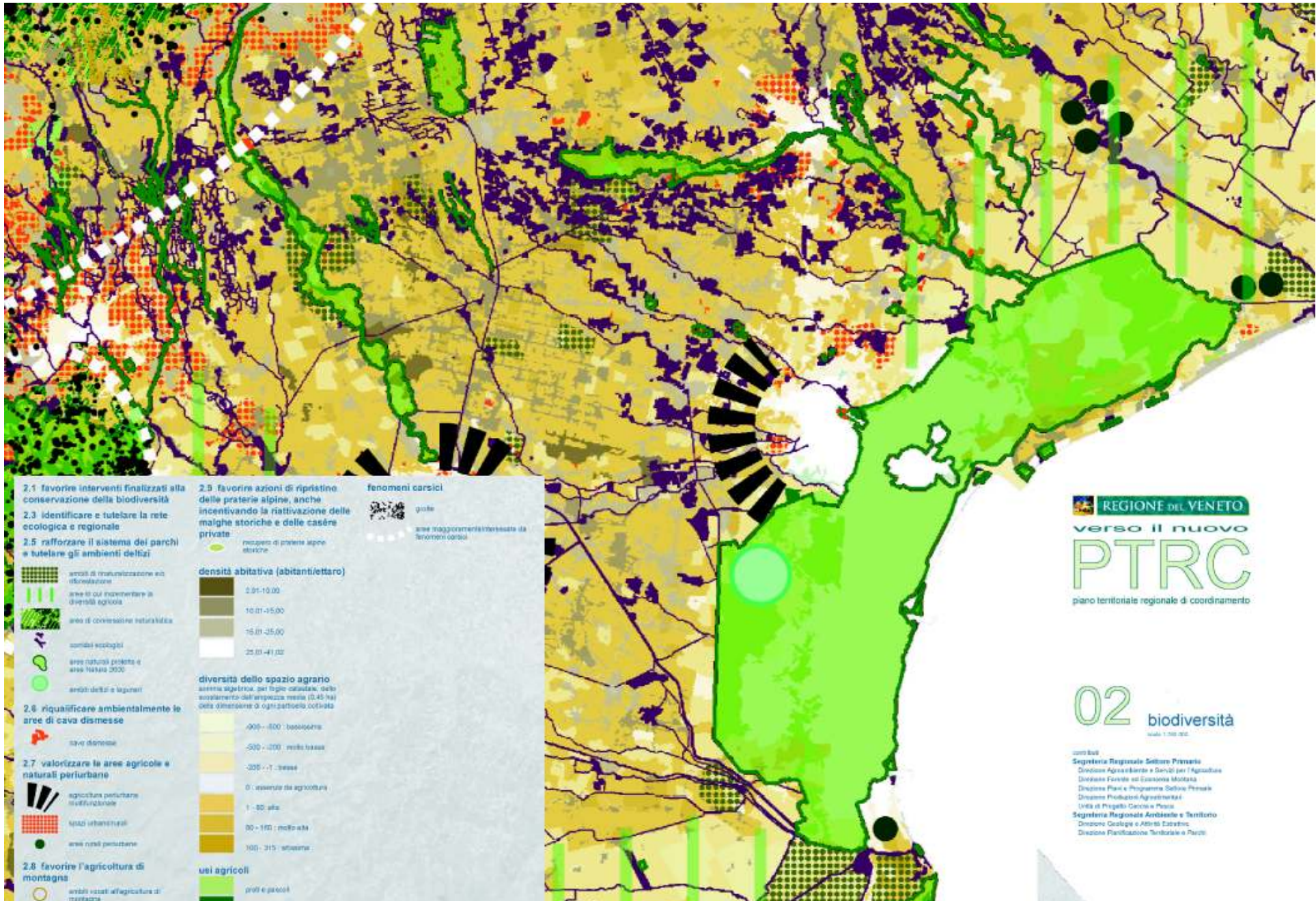
REGION PLANNING - PALAV



DISTRICT PLANNING - PCP



UPCOMING DISTRICT PLANNING - PTCP



2.1 favorire interventi finalizzati alla conservazione della biodiversità
 2.3 identificare e tutelare la rete ecologica e regionale
 2.5 rafforzare il sistema dei parchi e tutelare gli ambienti delicati

2.6 riqualificare ambientalmente le aree di cava dismesse
 2.7 valorizzare le aree agricole e naturali periurbane

2.8 favorire l'agricoltura di montagna

2.9 favorire azioni di ripristino delle praterie alpine, anche incentivando la riattivazione delle malghe storiche e delle casere private

densità abitativa (abitanti/ettaro)

0,01-10,00
10,01-15,00
15,01-25,00
25,01-41,00

diversità dello spazio agrario
 sistema agrario, per tipo colturale, dello sovrappiù dell'azienda media (0,45 ha) della dimensione di ogni parcella coltivata

-900 - -800 molto bassa
-500 - -200 medio bassa
-200 - -100 medio
0 elevato da agricoltura
1 - 50 alta
50 - 100 molto alta
100 - 315 altissima

usi agricoli

prati e pascoli

fenomeni carsici

- grotte
- aree maggiormente interessate da fenomeni carsici

REGIONE DEL VENETO
 verso il nuovo
PTRC
 piano territoriale regionale di coordinamento

02 biodiversità
 scala 1:100.000

contributi
 Segreteria Regionale Settore Primario
 Direzione Agricoltura e Servizi per l'Agricoltura
 Direzione Foreste ed Economia Montana
 Direzione Piani e Programmi Settore Primario
 Direzione Produzioni Agroalimentari
 Uffici di Progetto Carico e Pesca
 Segreteria Regionale Ambiente e Territorio
 Direzione Geologia e Attività Catastrali
 Direzione Pianificazione Territoriale e Paesaggio

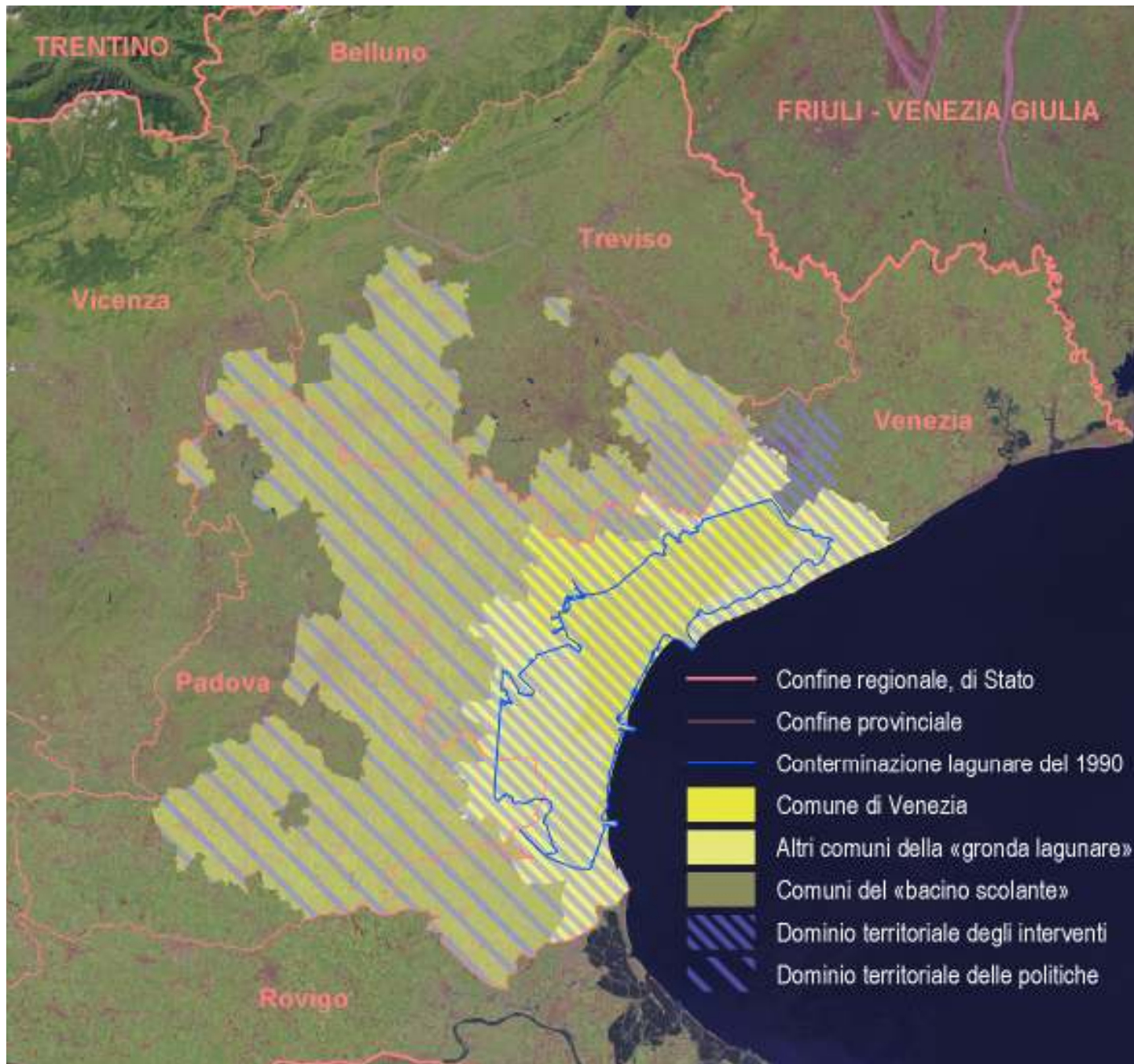
UNCOMING REGION PLANNING - PTRC

**THE ACTIONS
GOVERNANCE**

9 MUNICIPALITIES
2 DISTRICTS
1 REGION

**THE POLICIES
GOVERNANCE**

108 MUNICIPALITIES
4 DISTRICTS
1 REGION



BORDERS OF TERRITORIAL POLICIES AND ACTIONS GOVERNANCE

THE SEA STRATEGIC ENV.ASSESSMENT PROCEDURE

Screening

investigation whether the plan or programme falls under the SEA legislation

Scoping

defining the boundaries of investigation, assessment and assumptions required

Documentation of the state of the environment

effectively a *baseline* on which to base judgments

Determination of the likely (non-marginal) environmental impacts

usually in terms of "direction of changes" rather than exact figures

Informing and consulting the public

Influencing **Decision taking** based on the assessment

Monitoring of the effects

The New Integrated Morphological Plan

In May 2007, the Venice Water Authority (MAV) entrusted CORILA to produce within 36 months a new Morphological Plan of the Lagoon.

The main aims are to properly address the interventions (canals dredging, sediments supply and movement, regulations of uses) to the restoration of lagoon morphology, preserving habitat and biodiversity and considering the sustainable economic activities.

A wide group of experts in various disciplines from Universities and research centers has been organized into seven Operative Units, with specific tasks assigned.

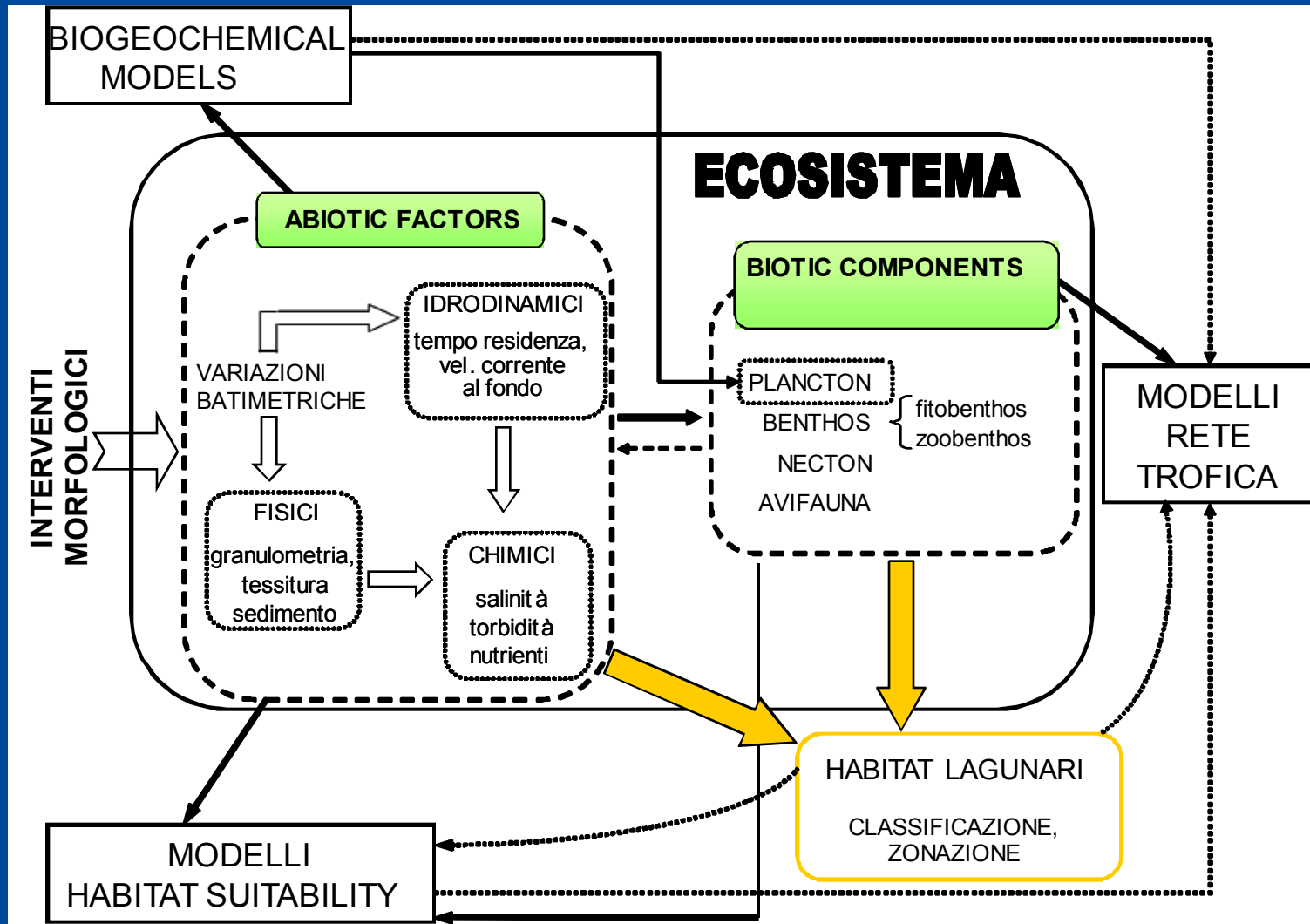
NOT ONLY PLANNERS, but: Ecologists, Biologists, Chemists, Engineers, Geologists, Economists and Planners

The activities

The work has several packages. Already done:

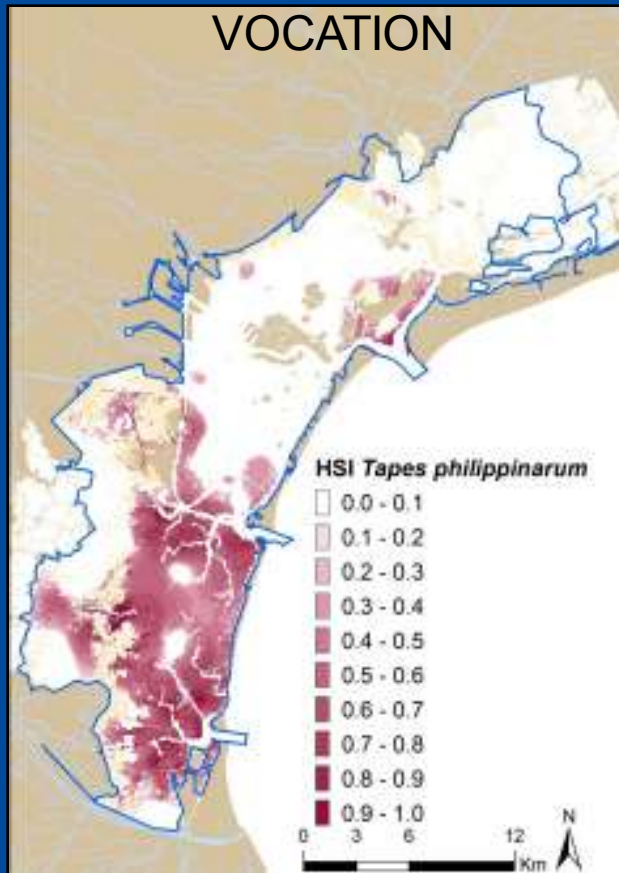
- the **status-of-the-art of the knowledge** (habitat conservation, pollution presence and treatment, sediment transport and morphology evolution, present economic activities and their possible evolution, cost/effectiveness of the interventions)
- the **reconstruction of the present lagoon status**, identifying the main cause-effect relationships
- the selection of a first wide **set of indicators** for each discipline
- the setting-up of idro-morphological and ecological **mathematical models**
- The "**coherence matrix**" of the present plans (urban, env., port, Natura 2000, etc)

Key elements

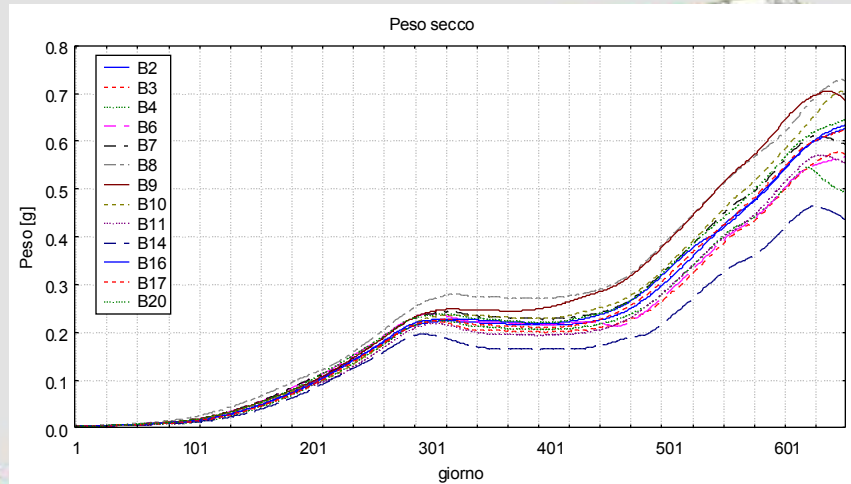


Mathematical models of ecological functioning

Activity line A: definition of habitats and ecological model

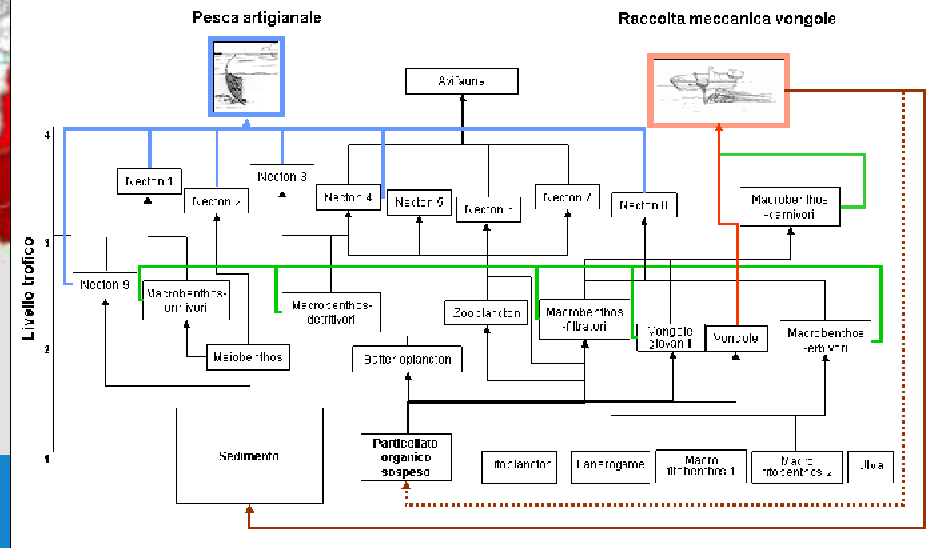


BIOGEOCHEMICAL



FOOD CHAIN

Comunità nectonica
Habitat tipici:



• dissolved oxygen

The habitats are the base for models study

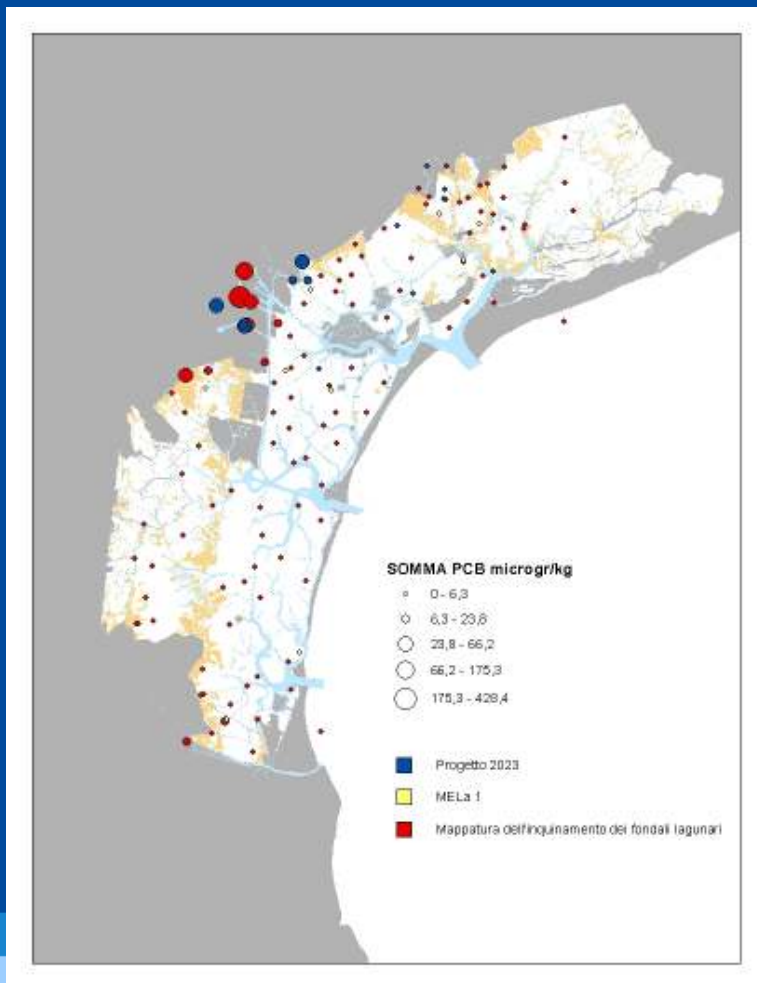
Activity line C: ecological objective

SELECTED INDICATORS FOR LAGOON COMMUNITIES and ECOTOXICOLOGICAL

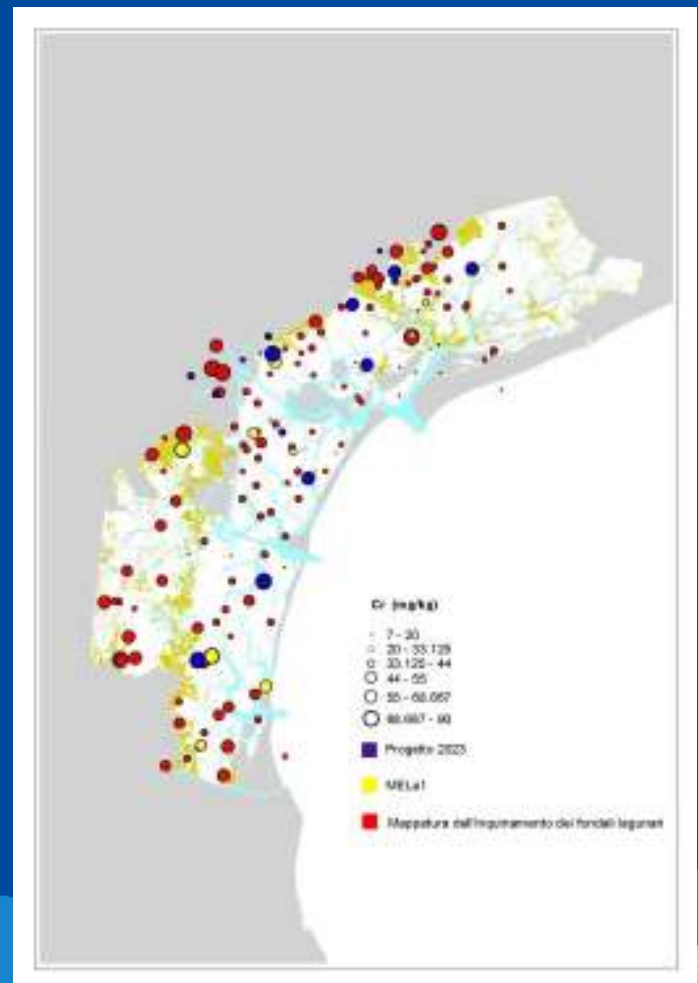
COMPARTO	TIPO INDICATORE	1	2	3	4
PLANCTON					
FITO BENTHOS					
ZOO BENTHOS					
NECTON	DIVERSITY	N. TOT TAXA	N. SPP RARE O IN PERICOLO	N. SPP TOLLERANTI	SPECIE ESOTICHE
	STATUS	N. TAXA CHE COPRONO IL 90% ABB. TOT.	GRADO SIMILARITA' CON COMUNITA' DI RIF.	N. INDIVIDUI CON ANOMALIE	
	TROPHISM	N. SPP CHE SI NUTRONO DI INVERTEBRATI BENTONICI	N. TAXA PISCIVORI		
AVIFAUNA					
ECOTOXICOLOGICAL					

FOR EVERY HABITAT

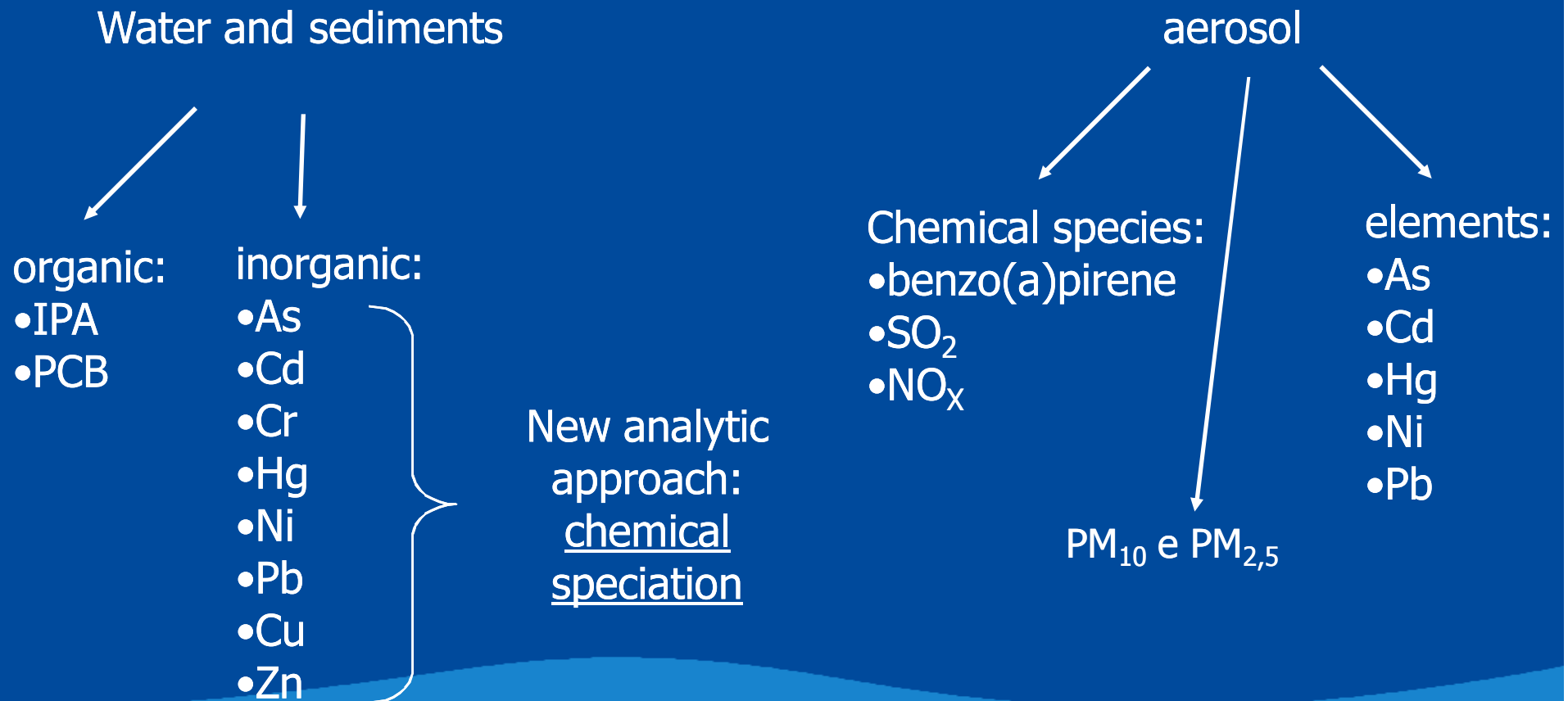
Chemical pollution aspects



Distribution
of sampling
sites



Definition of indicators describing state and dynamic of natural and anthropic lagoon environment



The result: an “optimum” Plan

- Different SCENARIOS, with internal coherence, for a restored lagoon looking forward 20-30 years will be provided, on the basis of with a restricted number of INDICATORS
- The participation process will involve Public Administrations and general public
- An “optimum” scenario, with a measured consensus index, will be proposed for adoption (May 2010)
- The overall direct cost for the interventions could be evaluated in some hundreds of million of Euro

CONCLUSIONS

The Morphological Plan of the Venice Lagoon is an innovative tool, in line with recent EU legislation. Its objective is to harmonize the strong demand of **economic development** of the city of Venice with the highest degree of **naturalness** and fragility characterizing the lagoon in which Venice is inserted. This Plan is going to be elaborated as an instrument of **integrated planning** and represents a great opportunity to effectively bind the terrestrial component with marine environment.

