Being Cost effective in preventing water stress

TerAGUA- The Castelo do Bode watershed approach

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Europe-INBO

d.gTerritório
Direção-Geral do Território

1. Main Goal

To reduce water stress increasing C/B eficiency

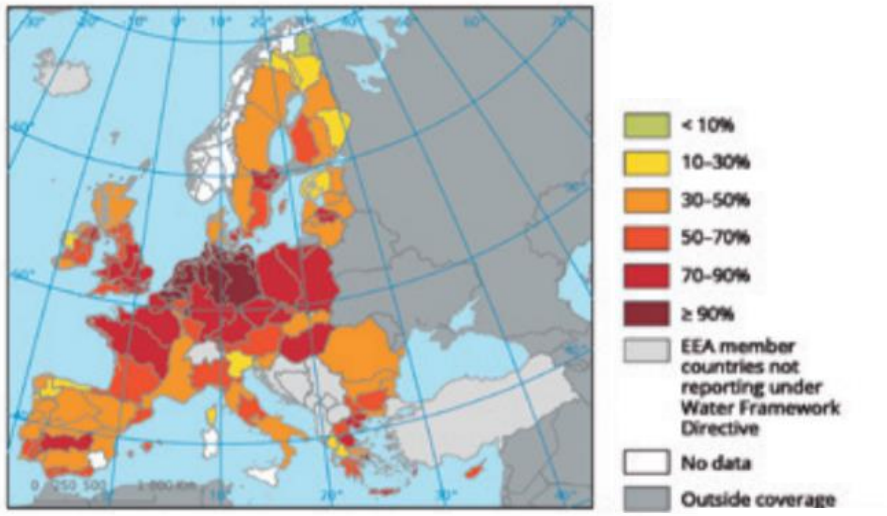
- Understand **water stress induced by human activities:** landuse - water intake . Water contamination
  - Align water with territorial management
  - Water cycle / Biogeoquimical Cycles - P, N, CQO, CBO / watershed intake in the context of human activities - **LOCATION**
  - Increase efficiency and equity regarding cost benefits allocation
- Build development plans, monitor their implementation, and enable review

To promote responsible collaboration

- **Align the different acting boards** Institutional, socioeconomic, environmental
- Combine **Circular Economy and Ecosystems Services perspectives**
- **Reduce risk of water scarcity-** Research and Innovation– the relevance of Location
- **Align economic growth with lower pressure over resources**
  - **Detail/ Priority – Drinking water preservation**

2. Preventing/reducing water stress preventing contamination risk- increasing B/C ratio

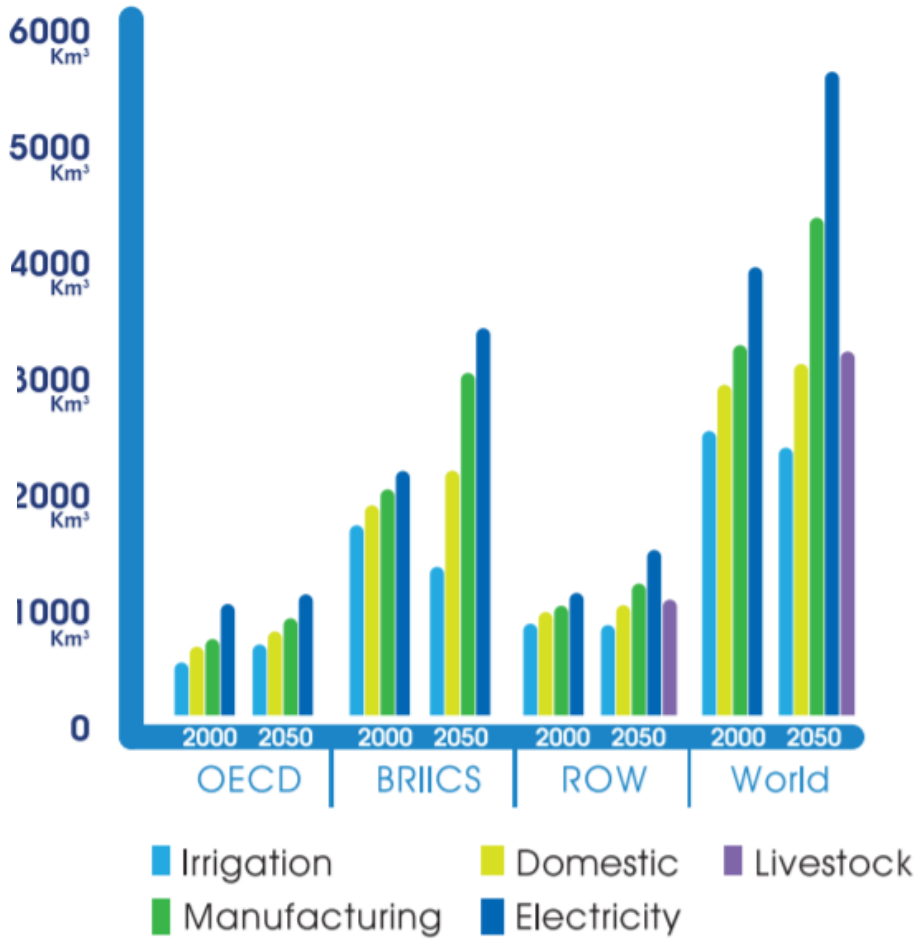
Business as usual… water demand increase and water quality decreases



Percentage of classified water Bodies with less than good ecological status or potential in rivers / lakes.

Source: Multiple Waters for Multiple Purposes and Users, Water Europe, (04/2020); EEA

Global water demand in 2000 and 2050

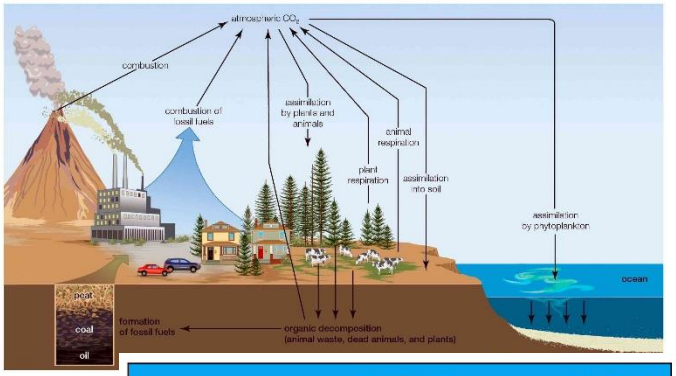


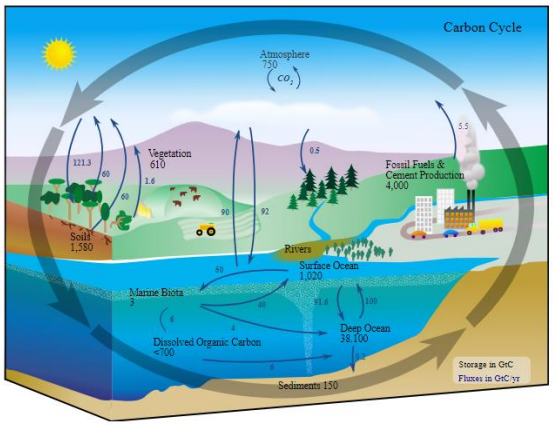
Source: water Europe, adapted from OCDE Environmental Outlook to 2050

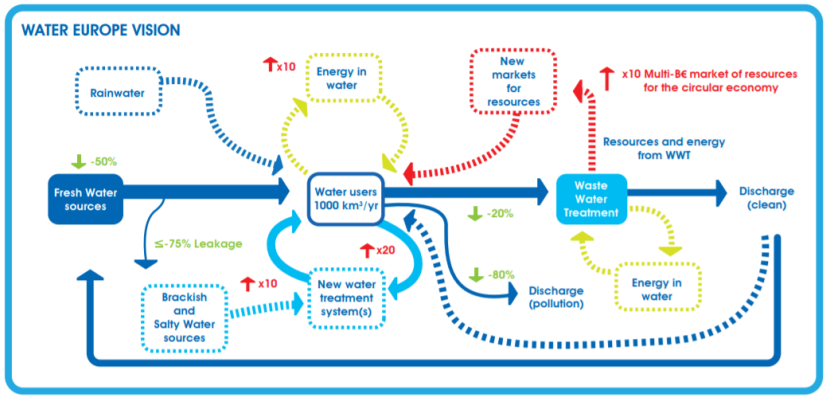
2. Preventing/reducing water stress - preventing contamination risk
Integrating BGQ cycles/ with water cycle/and ecosystem services

The water Cycle/ Biogeochemical cycles /human activities/circular economy integration

- an obvious need







An opportunity for Europe: Increasing water resource efficiency and circularity

Water/Nutrient/anthropogenic related consumption and discharge
Monitor , Integrate and Review

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Risk level = impact X occurrence probability

6x4 RISK MATRIX					
Probability	Frequent	24 Very High	18 Very High	12 High	6 high
	Probable	20 Very High	15 High	10 High	5 Moderate
	Possible	16 Very High	12 High	8 Moderate	4 Moderate
	Remote	12 High	9 Moderate	6 Moderate	3 Low
	Unlikely	8 High	6 Moderate	4 Moderate	2 Low
	Rare	4 Moderate	3 Moderate	2 Low	1 Low
		4 Catastrofic	3 Serious	2 Relevant	1 Low
		IMPACT			

Risk level	Definition
Low	Acceptable risk level. The control measures are suficiente.Require constant monitorement and review
Moderate	Not desirable. A plan of action should be developed, if possible, for the implementation of supplementary control measures in accordance with the risk priorities.
High	Tolerable with an organization's commitment at the highest level and after cost / benefit assessment. It implies the development of a scheduled action plan for the implementation of reasonable measures required to reduce risk.
Very Hight	Not acceptable. It implies the suspension of the activity / process until effective control measures are implemented that reduce the level of risk.

Adapted de: Shuttleworth, (2017).

This isolated approach can fail in evaluating risk

Therefore it must integrate and be combined with a broader perspective

3. Approach - TerAgua Collaborative platform for Water contamination risk assessment

Collaborative Spatial Data Infrastructure in order to:

- Integrate different Biogeochemical and water cycles, combining scales, in line with human activities- **time and space**
- Monitor water bodies and adjust water monitoring networks to prevent/reduce water stress
- Integrate uses and activities related to water use or discharge
- Plan activities considering the BGQ/W Cycles at the watershed scale, using the ecosystems services perspective and water use priorities

  - **drinking water assessment to all citizens**
- Perform territorial analysis at local scales, integrating EU sustainable development perspectives- the relevance of location in data analytics.
- Cost and benefit allocation among private or public sector and general population integrating environmental and social criteria into C/B analysis.

3. Approach - TerAgua Collaborative platform to assure C/B evaluation and water management efficiency

Problem: How to integrate water sustainability and contamination risk prevention
Combining BGQ cycles-Water cycle-human activity cycle
in order to assure cost benefit efficiency in resources management

Drinking water protection

- WFD-Watershed management framework Land use & Water
- Water caption location
- Drinking water suply Water Security Plan
  - Plans Programs Measures
  - Implement adatp and review
  - Monitoring

Digital Transformation

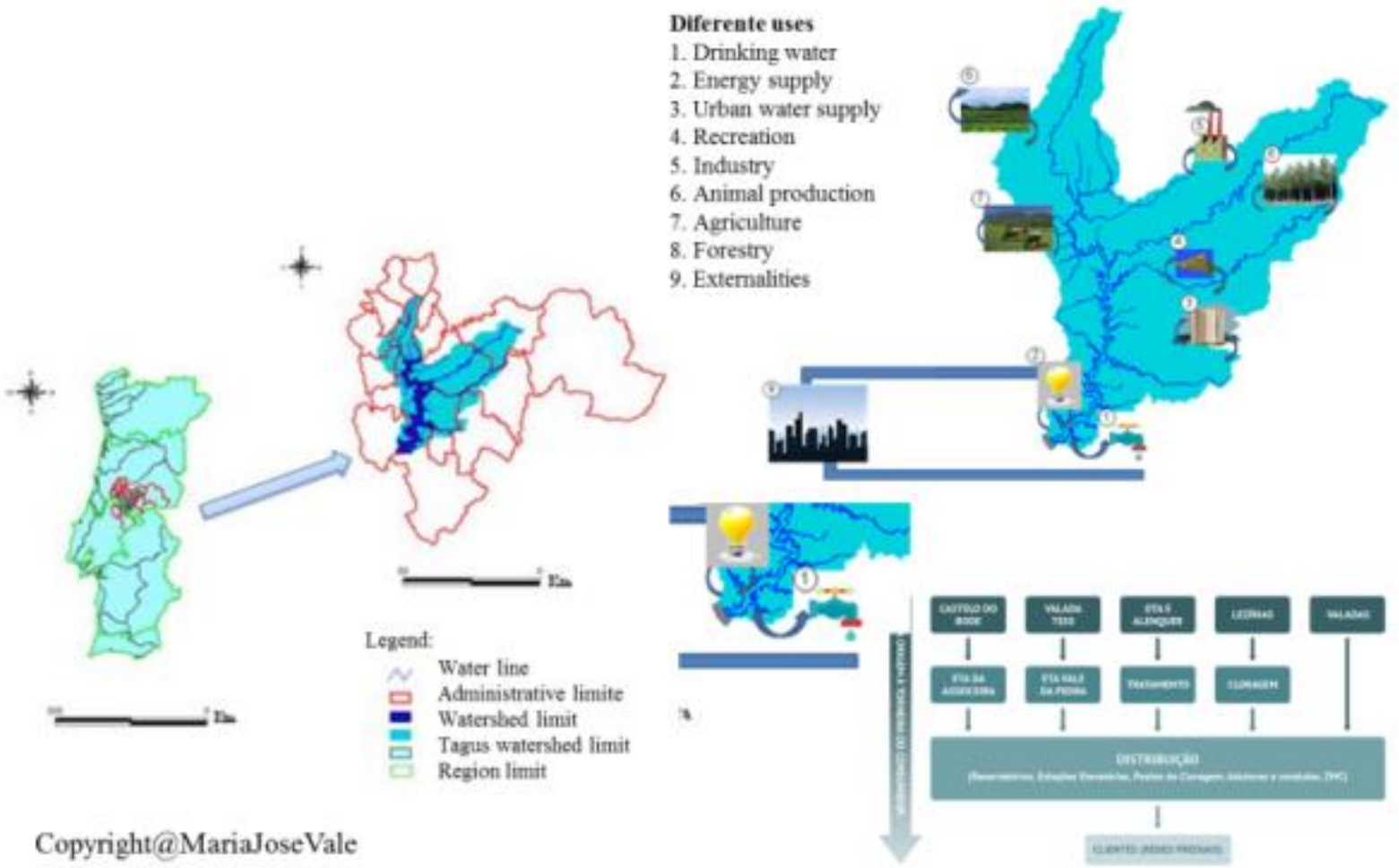
- Comunication/ network/knowledge
  - data
  - Users network
  - Fóruns
  - Search engines
  - Distributed working
- Integration/ analisys
  - Location
  - WEBGIS
  - Digital network

Colaborative Platform to support risk analisys and drinking water preservation

Data	Quality validation	Decision flowcharts	Structure/ access	Integration Analisis	Comunication
Datasets	**Metadata**	**Decision**	**Seach engines**	**SA/WEBGIS**	**Fóruns e Mailing Lists**

…cooperation: understanding BGQ/Water combined cycles, contamination Risks…identify best solutions and reduce pressures

Drinking water Risk analysis- Integrated perspective



The Castelo do Bode example:

Diferente uses

1. Drinking water
2. Energy supply
3. Urban water supply
4. Recreation
5. Industry
6. Animal production
7. Agriculture
8. Forestry
9. Externalities

Externalities

Significative anthropogenic related issues:

1. Pressures according to different human activities in the Tagus river watershed (including the west region)

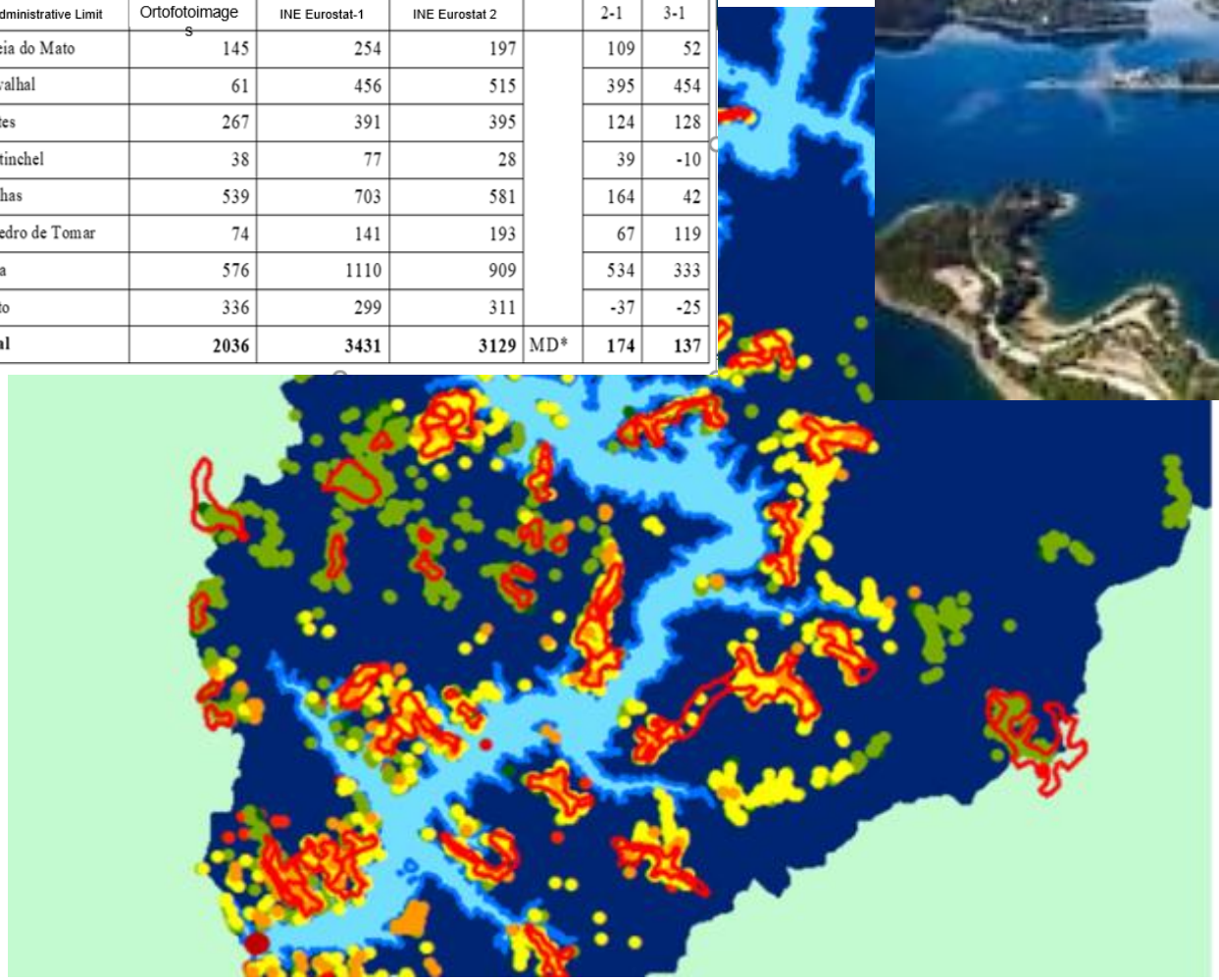
the COST of URBAN related Water Stress

CBO5 Discharge estimates – RH5 - Tagus river watershed

Setor	CBO_5	CQO	P_{total}	N_{total}
Urbano	78 936	43 221	4 038	12 935
Industrial	21 718	7 776	89	1 297
Pecuária	22 768	9 088	866	2 526
Agricultura	-	-	805	6 492
Golfe	-	-	-	-
TOTAL	123 422	60 085	5 798	16 757

4. Using TerAgua to prevent water stress and assure water management efficiency: The Castelo do Bode watershed example

Urban Sprawl- Housing increase – evaluation 1				Estimative differences		
Administrative Limit	Ortofotoimages	INE Eurostat-1	INE Eurostat 2		2-1	3-1
Aldeia do Mato	145	254	197		109	52
Carvalhal	61	456	515		395	454
Fontes	267	391	395		124	128
Martinchel	38	77	28		39	-10
Olalhas	539	703	581		164	42
S. Pedro de Tomar	74	141	193		67	119
Serra	576	1110	909		534	333
Souto	336	299	311		-37	-25
Total	**2036**	**3431**	**3129**	MD*	**174**	**137**

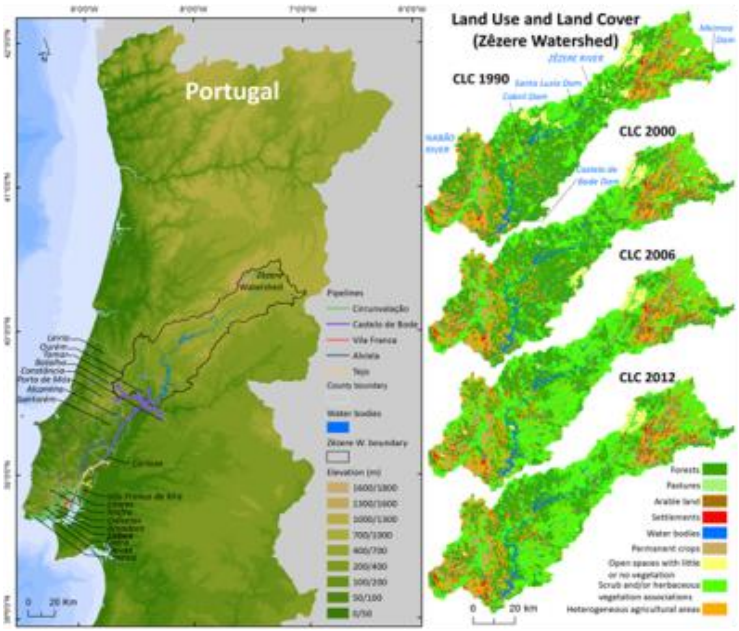


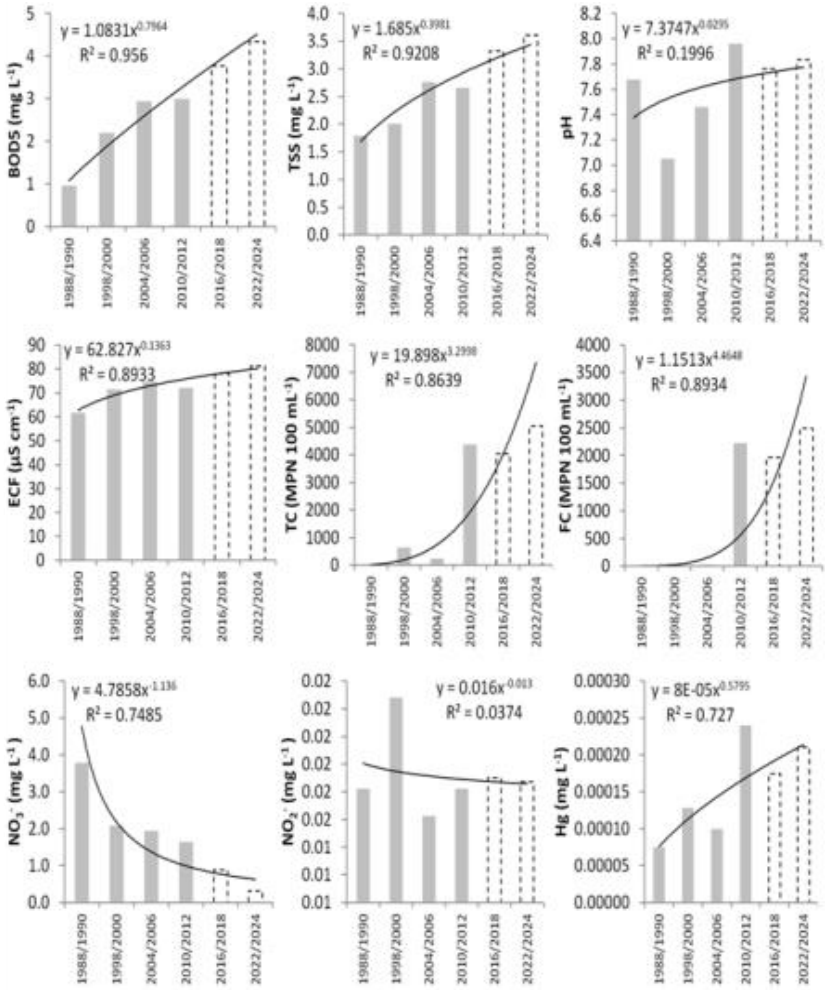
Legend:

- Water caption
- Urban area
- Buildings (2010)
- Buildings i(1998)
- Water front
- Watershed delimitation

Urban sprawl evolution and potential CBO5, urban related impact in water quality, (Source: Ter-Agua, Vale et al, 2019)

Land cover change and its potential Impact on water quality (Ter-Agua, Bruno M., Vale, M. Reis, R. 2019)





5. Discussion and main conclusion: new insights

The relevance of TERAGUA– taking advantage of Digital Transformation

1. Identify/Understand /prevent water stress problems at local, regional, national and European scales – define priorities- assure supply at affordable fair prices - **drinking water**
2. Integrate territorial analysis and land use planning, BGQ and water cycles, environmental and socioeconomic perspectives- within allocation of resources
3. Improve Water regulations - adapt and review- promote effectiveness
4. Review and update water monitoring networks – adjust sampling stations location
5. Identify significative issues, measures to be implemented considering water stress and scarcity in time and space. Acting locally but bearing in mind the regional, national and international concerns
6. Being cost effective- Price- sustainability- governance efficiency**…. Fair distribution C/B**

Work together and dissociate economical growth from the growing pressure over water resources: water abstraction and quality decline.

… facing challenges with innovative approaches

promoting C/B EFFICIENCY and effective

RESPONSIBLE COOPERATION

Muito obrigada
Thank you

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