azti tecnalia

Coast Bordeaux 2017

Restoration effects on socio-ecosystems: perception of beach users on ecosystem services provision

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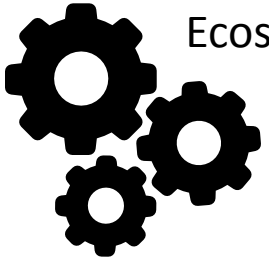
Ecosystem services: the ecological characteristics, functions or processes that directly or indirectly contribute to human well-being (Costanza et al. 1997, 2017; MEA, 2005).

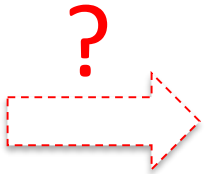
PROVISIONING	REGULATION & MAINTENANCE	CULTURAL
		
Materials (Food)	Processes (crop pollination)	Enjoyment (recreation)

Cultural ecosystem services provide recreational, aesthetic, spiritual and educational benefits to society (Hernández-Morcillo et al., 2013)

Example in coastal environments: **Bathing waters** in beaches



Ecosystem processes & functions



Human benefits

1) **Better functioning** ecosystem (restoration) a **higher capacity** to provide **services**

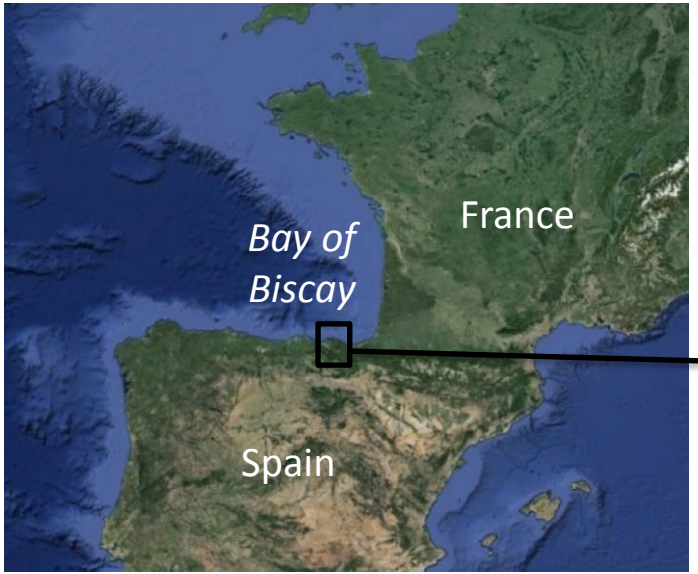
2) To **value cultural ecosystem services**, we need to **measure** recreational, aesthetic, spiritual and educational **benefits**.

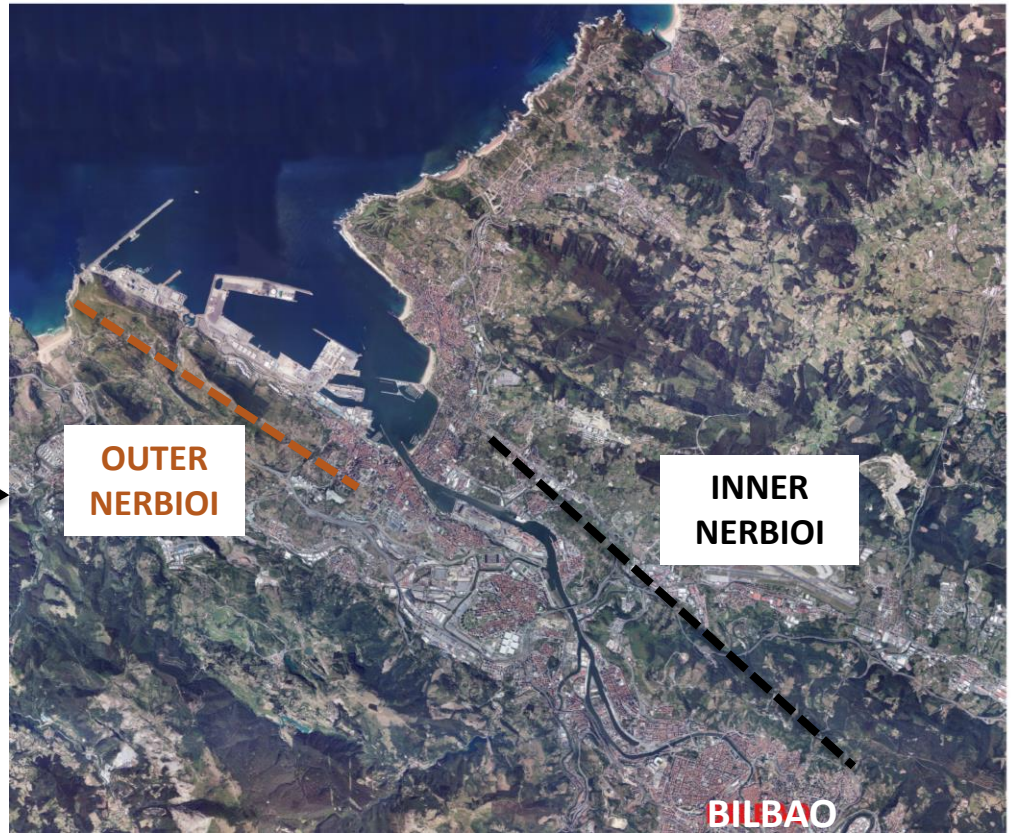
AIM

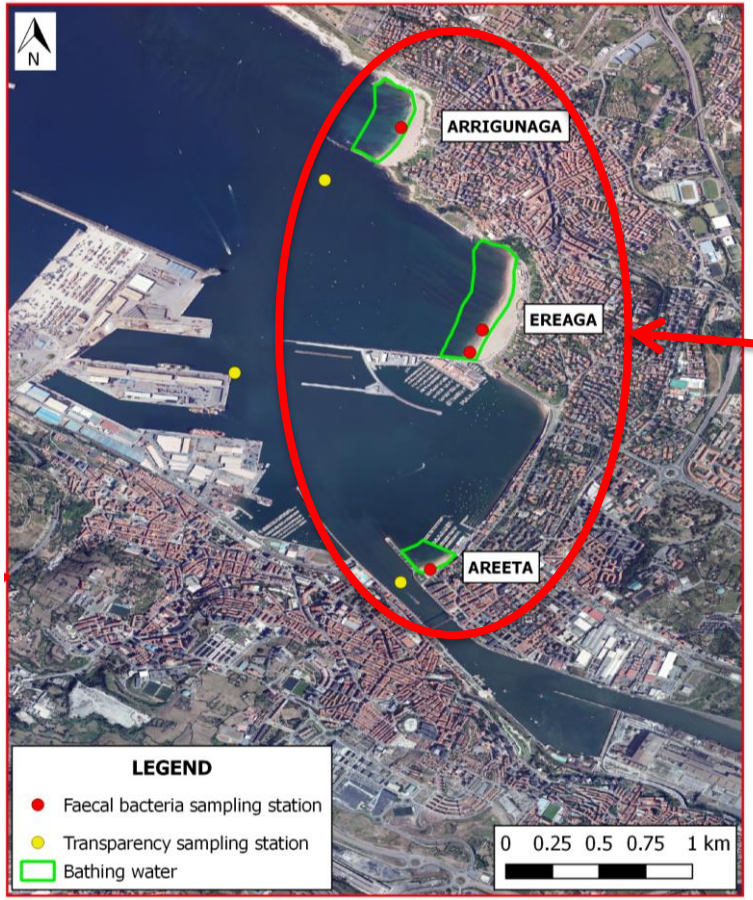
To clarify if **recovery** of **ecological** conditions **resulted** in an increase of **cultural ecosystem services**, focusing on **bathing waters** at beaches and from **user´s** point of **view**

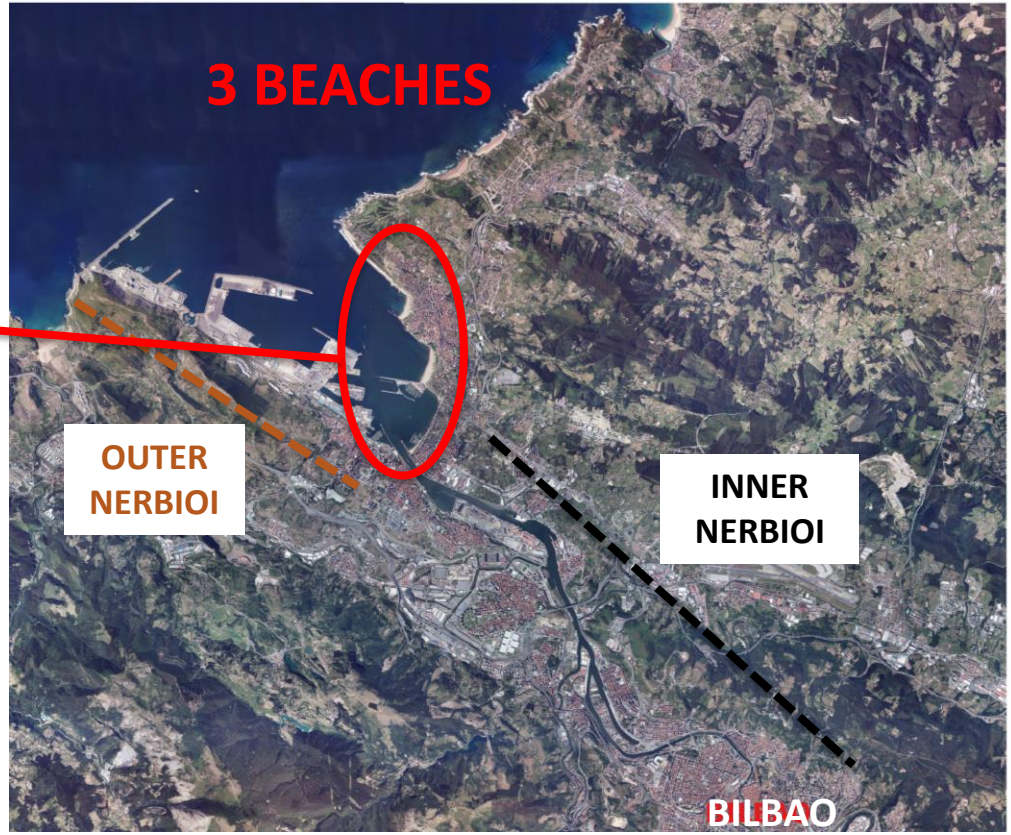
1	To check the **environmental changes** potentially affecting bathing waters
2	To check if **visitors´ behaviour** changed in response to environmental changes
3	To check if there is a **correspondence** between visitors´ perceptions of changes and environmental data

CASE STUDY: NERBIOI ESTUARY






N
ARRIGUNAGA
EREAGA
AREETA
LEGEND
Faecal bacteria sampling station
Transparency sampling station
Bathing water
0 0.25 0.5 0.75 1 km


3 BEACHES
OUTER NERBIOI
INNER NERBIOI
BILBAO

PHOTOS: Turismo Euskadi

20th century — **The most polluted estuary in northern Spain**

1990 → WWTP started with physico-chemical treatment

1996 → Closure of steel-industry *Altos Hornos de Bizkaia*

2001 → Biological treatment in the WWTP

Progressive recovery of the estuary…

…and of cultural ecosystem services? (bathing waters)

1976

2005

PHOTOS: Bilbao-Bizkaia Water Consortium

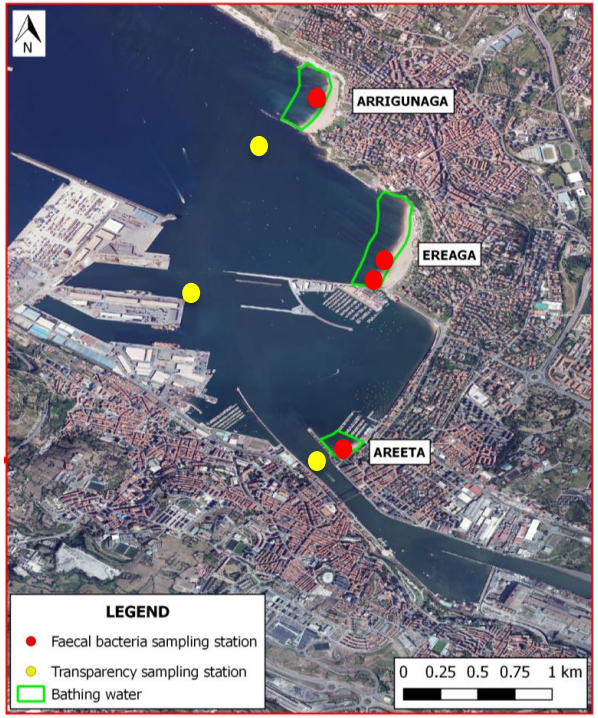
1	To check the **environmental changes** potentially affecting bathing waters

Water transparency (Secchi disk depth)

1999-2016

Faecal coliforms & *Escherichia coli*

1985-2016

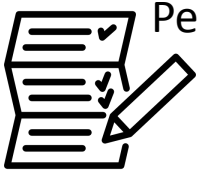


2	To check if **visitors´ behaviour** changed in response to environmental changes

Questionnaire

July-August 2016
Visits the three beaches

3	To check if there is a **correspondence** between visitors´ perceptions of changes and environmental data



Perceptions of changes on water quality

VS.

Water transparency (Secchi disk)

Logistic GLM

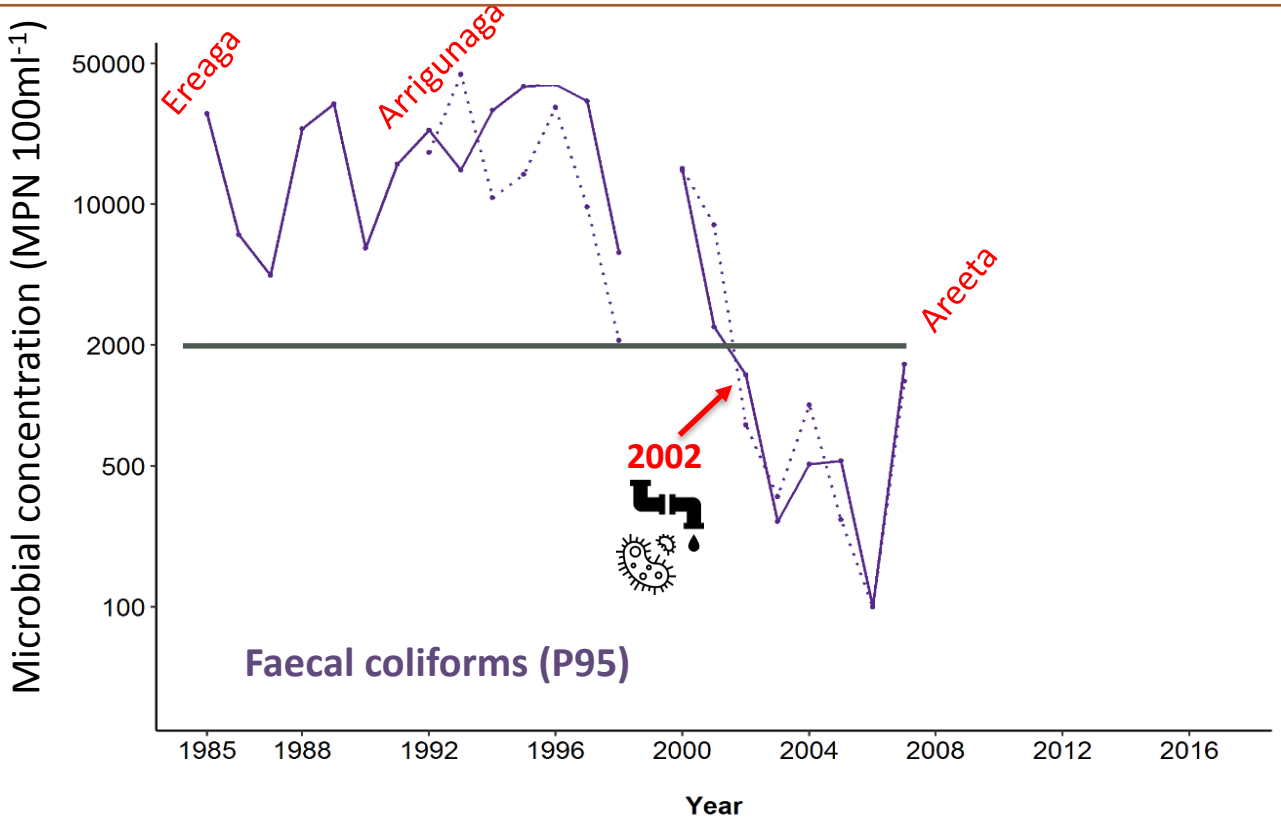
DEPENDENT VARIABLE

Perception vs change in transparency
1= match / 0= no match

INDEPENDENT VARIABLES

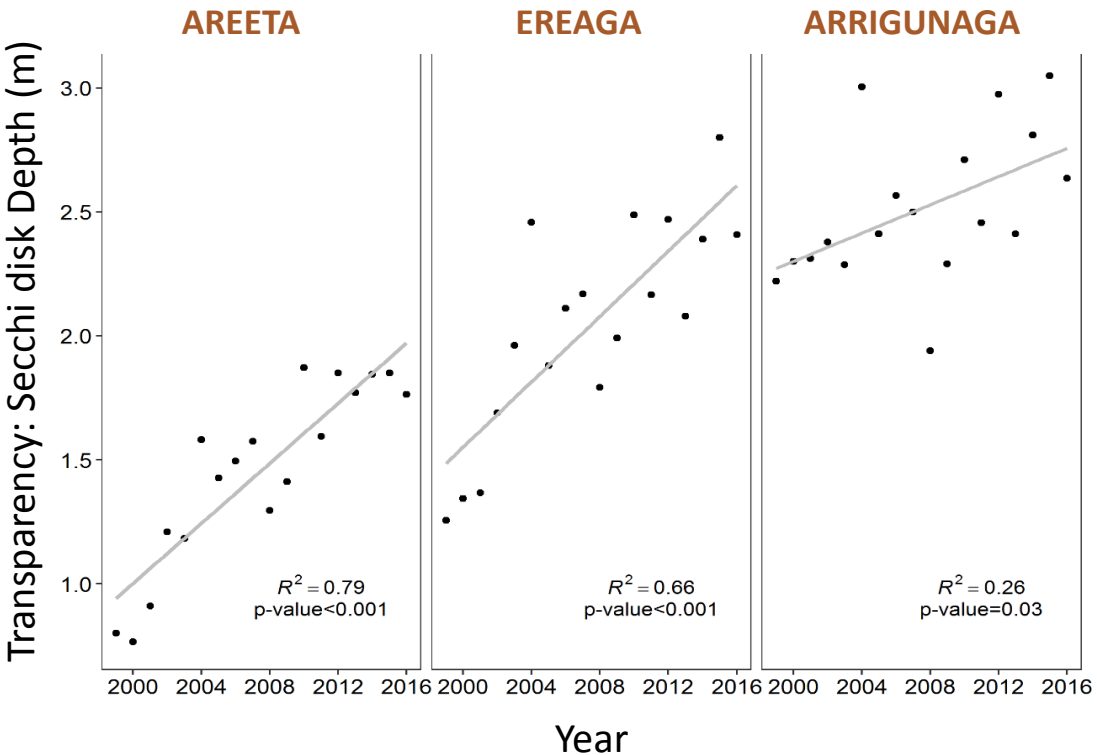
Gender, education, years visiting Nerbioi beaches, etc.

1	To check the **environmental changes** potentially affecting bathing waters



1	To check the **environmental changes** potentially affecting bathing waters

inner → outer



2	To check if **visitors´ behaviour** changed in response to environmental changes

- 426 questionnaires (91% response rate)

- Profile: a **local** (84% living in towns surrounding the estuary), **middle-aged** (42±16 years), **educated** (81% completed secondary or higher education), **woman** (74.4%).
- 62% of visitors practice aquatic activities in Nerbioi beaches (decreases from the outer to the inner beaches)

Visitors who did not practice aquatic activities in Nerbioi:

due to the negative perception on quality of the bathing waters

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2	To check if **visitors´ behaviour** changed in response to environmental changes

Perception of changes on quality of bathing waters, n (%):

	NEW VISITORS	EXPERIENCED VISITORS			Chi squared
	2010-2015	2001-2009	1996-2000	≤ 1995	X^2
+	40 (42.1%)	53 (70.7%)	35 (74.5%)	147 (90.7%)	71.256***
−	8 (8.4%)	6 (8.0%)	0 (0.0%)	11 (6.8%)	
=	44 (46.3%)	11 (14.7%)	10 (21.3%)	3 (1.9%)	
TOTAL	**92**	**70**	**45**	**161**	

2	To check if **visitors´ behaviour** changed in response to environmental changes

Visitors who perceived an **improvement** on water quality:

- **Key to decide to come** to these beaches (increasing pattern from the innermost beach (79.6%) to the outermost (93.3%)).
- **Improvement** on water quality **linked to** 1st Estuary water sanitation 2nd Tightening of laws and 3rd Higher investment in beaches

3	To check if there is a **correspondence** between visitors´ perceptions of changes and environmental data

Logistic GLM: **Accuracy** of visitor´s **perception on water quality** depends mostly on the level of experience (i.e. **years coming to Nerbioi beaches)**

CONCLUSIONS

- Bathing **waters conditions improve** in the beaches as a **consequence** of **ecological recovery** in the estuary.
- The **improvement of ecological conditions** caused **positive changes** in visitors´ **behaviour** and **perceptions**.
- **Perceptions** and **behaviour** on **water quality** parameters follow a **pattern** from the inner to the outer beach, **matching the ecological recovery** pattern in the estuary.
- The **level of experience** is the **most important** social characteristic **determining** the **accuracy** of visitors´ **perception** on water.
- **Further improvement** is possible so the **recovery of ecosystem services** can be **valued by all users.**

ACKNOWLEDGEMENTS

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MARS PROJECT
Managing Aquatic ecosystems and water Resources under multiple Stress

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Information:

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Bilbao Bizkaia Ur Partzuergoa
Consorcio de Aguas Bilbao Bizkaia

Special thanks to all the beach visitors who agreed to participate in the survey

THANKS! Merci beaucoup! Eskerrik asko!

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