

L'Observatori

MONITORING SOCIOECOLOGICAL INDICATORS IN MEDITERRANEAN RIVER BASINS

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TORDERA AND BESÒS RIVER BASINS OBSERVATORY

L'Observatori is an interdisciplinary and long-term monitoring project that was established in 1996 as a joint project of the Catalan Water Agency (ACA), Sant Celoni Council and the Autonomous University of Barcelona's (UAB) Institute of Environmental Science and Technology (ICTA). The Besòs Tordera Consortium, the *Diputació de Barcelona* and the councils of Sant Celoni, Hostalric, Arbúcies, Santa Maria de Palautordera and Malgrat de Mar all currently form part of and contribute to the project.

Over the past two decades, L'Observatori has also received support from many other municipalities in the basin and both local and regional organisations. These organisations, governmental bodies and private foundations include *the Consell Comarcal de la Selva*, the SELWA project, the Department of Economy and Knowledge of the Generalitat de Catalunya, the *Fundació Territori i Paisatge*, *L'Obra Social "la Caixa"* and the AGBAR Foundation.

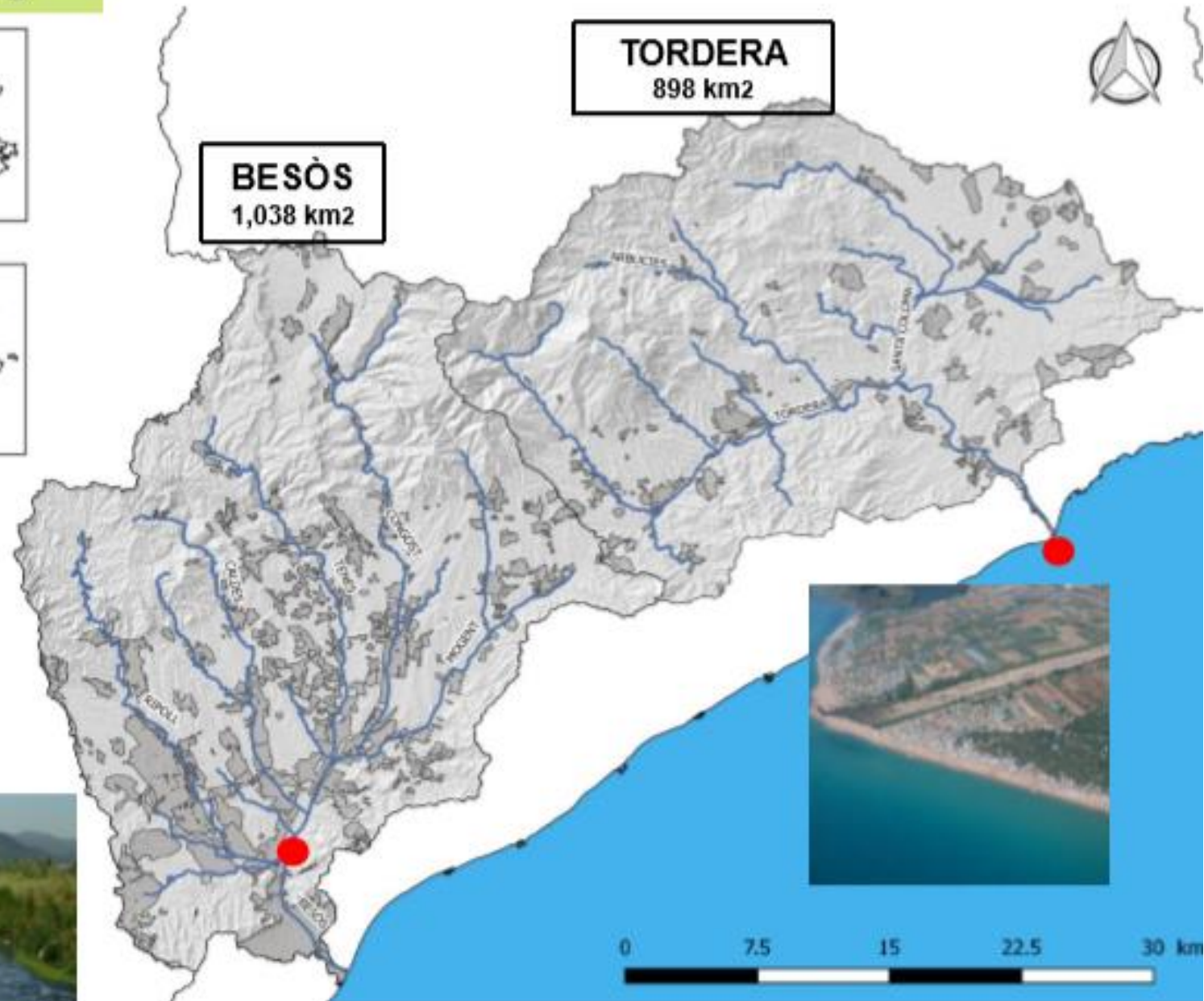
TORDERA AND BESÒS RIVER BASINS OBSERVATORY

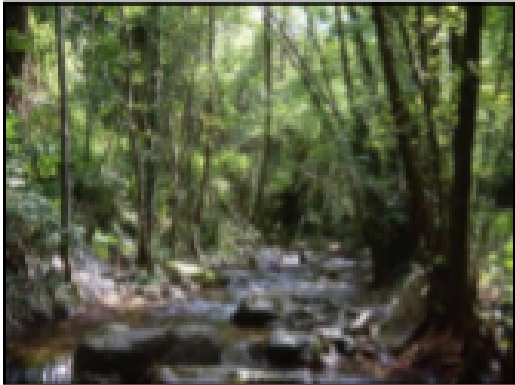
Main goals

L'Observatori's main objective is to assess ecological status indicators through long term monitoring. The research focuses on the monitoring and continued registration of biological, hydrological and hydromorphological and physicochemical indicators. The data obtained facilitates the systematic assessment of the quality status in accordance with the European Water Framework Directive (WFD), as well as evaluating processes of change in the dynamics of fluvial ecosystems.

The Observatori research team is composed of researchers from the Autonomous University of Barcelona (UAB), the University of Girona (UdG) and the University of Barcelona (UB). The research team also collaborates with a wide range other institutions.

Study area

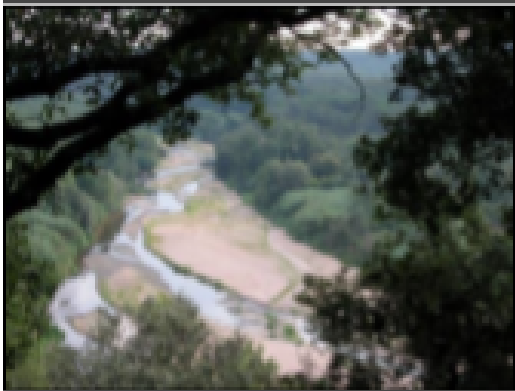




UPPER STREAM COURSE

Protected areas

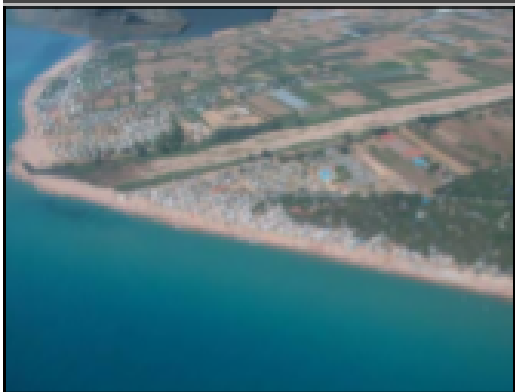
Spread population



MEDIUM STREAM COURSE

Infrastructures corridor

Industries

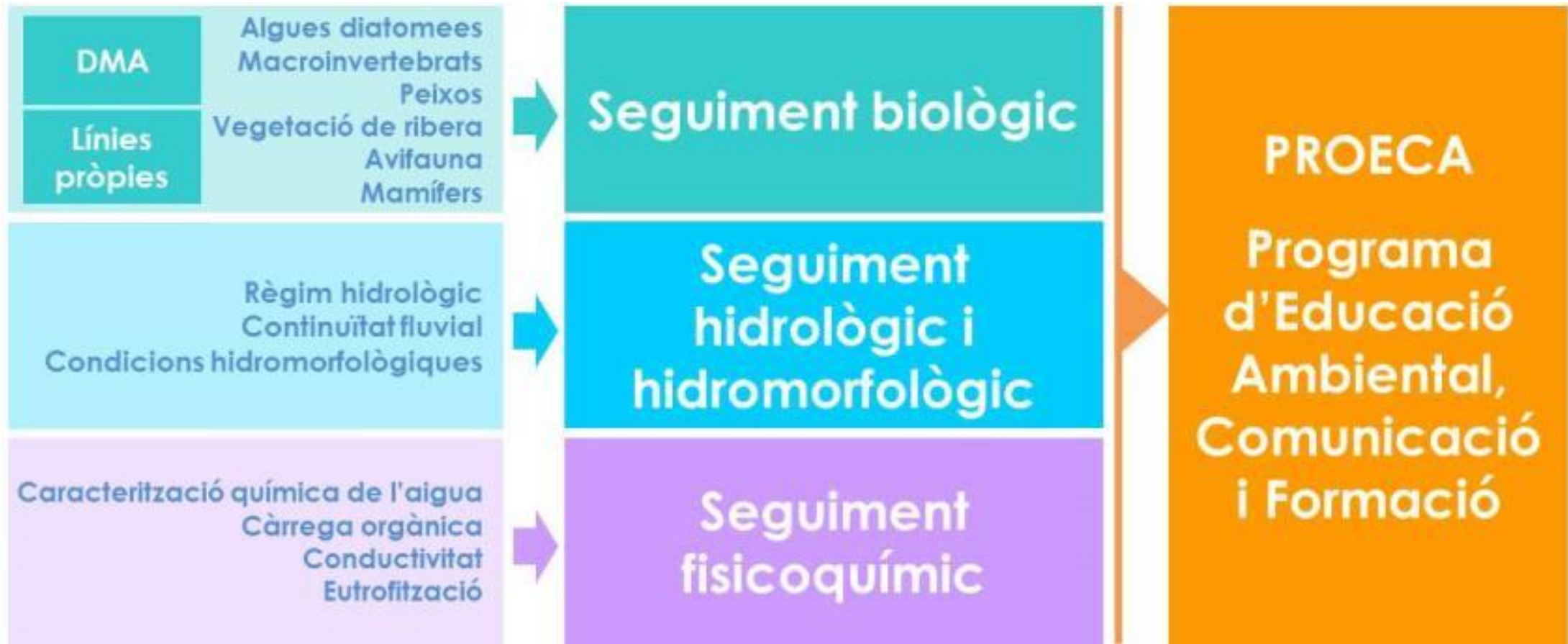


LOWER STREAM COURSE

Intensive tourism

Agricultural area

The diversity of pressures and impacts generate socioecological conflicts in terms of water resources management



L'Observatori's organizational structure highlighting PROECA as the key tool for knowledge transfer and dissemination.

PROECA, the environmental education, communication and training program was launched in 2004. The aim of the program is to communicate the research results obtained at L'Observatori in an accessible manner to the public, academics and policy makers alike.

Biological monitoring

(in brackets, main indicator used)

Macroinvertebrates (FBILL, BMWPC. Qualitative recount at Family taxonomic level)

Diatoms (IPS. Species recount)

Riparian vegetation (QBR. Analysis of diversity and exotic species monitoring).

Fishes (IBICAT. Structure of the community: species, sizes, parasitology...).

Amphibians (IQA)

Ornithofauna (IQA, IDF) Recount of individuals (bird census) and classification of species into groups depending on its main habitat: strictly fluvial, riparian forest, forest, open spaces and anthropophil species.

Mammals: Chiroptera: Presence/absence. Hunting activity. **Otter monitoring** (*Lutra lutra*)



**Participative
census**



- Riparian vegetation**

The riparian vegetation research area carries out vegetation inventories and monitors exotic flora, with a special emphasis on invasive flora. In addition, monitoring the quality of riparian forest (QBR) assessment is performed in the context of the hydromorphological parameters within the framework of the WFD.



Hidromorphological
assessment (QBR)



QUALITAT (QBR)

1999: 6 trams
2002: 7 trams
Curs principal de la Tordera



1999: inici de l'avaluació biennal de l'index QBR seriat a la conca de la Tordera

2004-2006-2008-2010
10 trams
Curs principal de la Tordera i
riera d'Arbúcies



Incorporació de la riera d'Arbúcies i del Tram 0 (capçalera de la Tordera) a partir de 2004

2012
2 trams
Curs mitjà de la Tordera



Trams 3 i 4

2014
4 trams
Curs mitjà de la Tordera i riera
d'Arbúcies



Trams 3, 4, 4b i 8

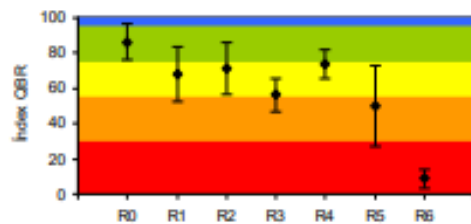
2016
5 trams
Curs mitjà de la Tordera i riera
d'Arbúcies



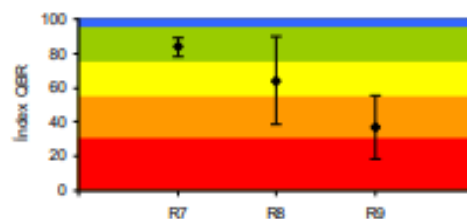
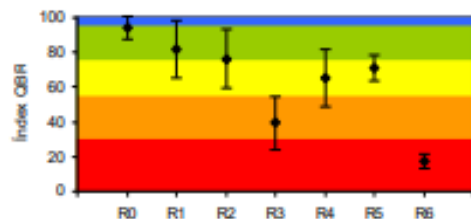
Trams 2, 3, 4, 4b i 8

QBR results in the period 2002-2010

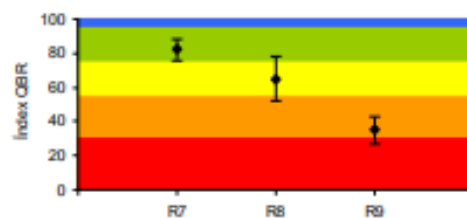
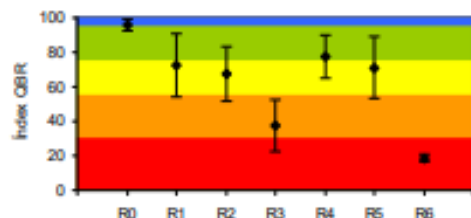
2002



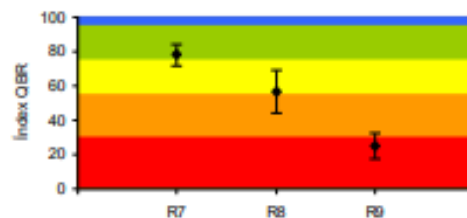
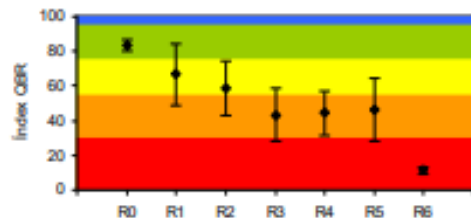
2004



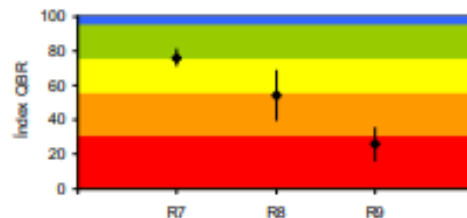
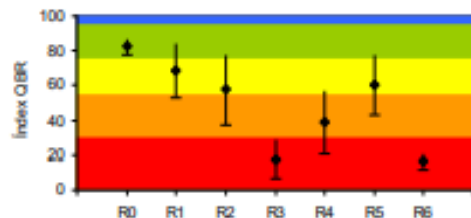
2006



2008



2010



La Tordera

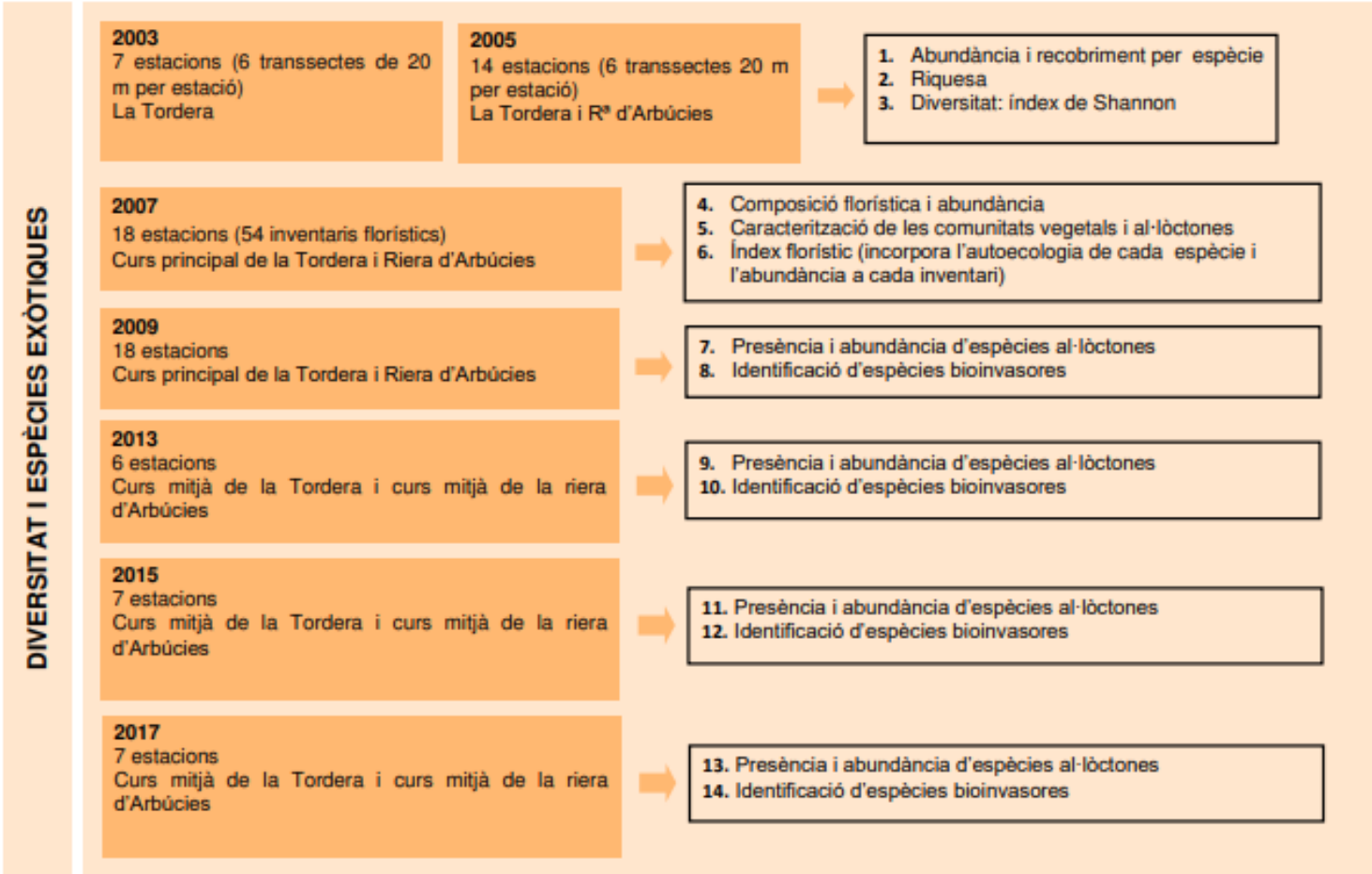
Riera d'Arbúcies

Riparian vegetation

The riparian vegetation research area carries out vegetation inventories and monitors exotic flora, with a special emphasis on invasive flora. In addition, monitoring the quality of riparian forest (QBR) assessment is performed in the context of the hydromorphological parameters within the framework of the WFD.



Flora diversity and abundance



Taula 5.1 Classes de recobriment per a la determinació de l'abundància

| Escala de recobriment | Percentatge de recobriment | |
|---------------------------------------|----------------------------|---------|
| | Rang | Mitjana |
| + Tàxon escàs amb un baix recobriment | 0,1 – 0,9 | 0,5 |
| 1 Tàxon molt escàs | 1 – 9,9 | 5,0 |
| 2 Tàxon escàs | 10 – 24,9 | 17,5 |
| 3 Tàxon poc abundant | 25 – 49,9 | 37,5 |
| 4 Tàxon abundant | 50 – 74,9 | 62,5 |
| 5 Tàxon molt abundant | 75 – 100 | 87,5 |

Font: Braun-Blanquet (1979) i Vigo (2003).

Taula 5.3 Classes de recobriment per a la determinació de l'abundància.

| Percentatge de recobriment | Escala Braun-Blanquet | Codificació |
|----------------------------|-----------------------|-------------------------|
| < 1 | + | Recobriment molt baix |
| 1 – 10 | 1 | Recobriment baix |
| 10 – 25 | 2 | Recobriment moderat |
| 25 – 50 | 3 | Recobriment elevat |
| 50 – 100 | 4 i 5 | Recobriment molt elevat |

Taula 5.4 Paràmetres d'estudi proposats.

| Paràmetre d'estudi | Periodicitat | Àmbit d'aplicació |
|--|--------------|-------------------|
| Abundància d'espècies al·lòctones per unitat de mostreig | Bianual | Estacions |
| Número d'espècies al·lòctones per unitats de mostreig | Bianual | Estacions |
| Freqüència d'aparició de cada tàxon | Bianual | Estacions |

Flora diversity and abundance: exotic species

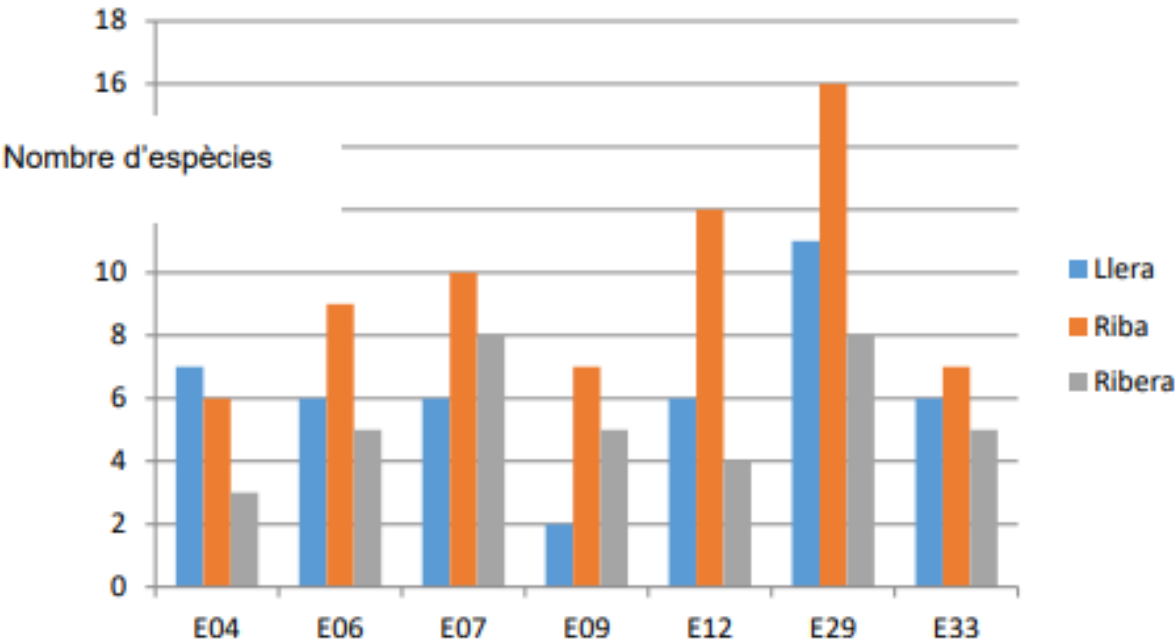


Figura 5.3 Nombre d'espècies al·lòctones per estació i zonificació.

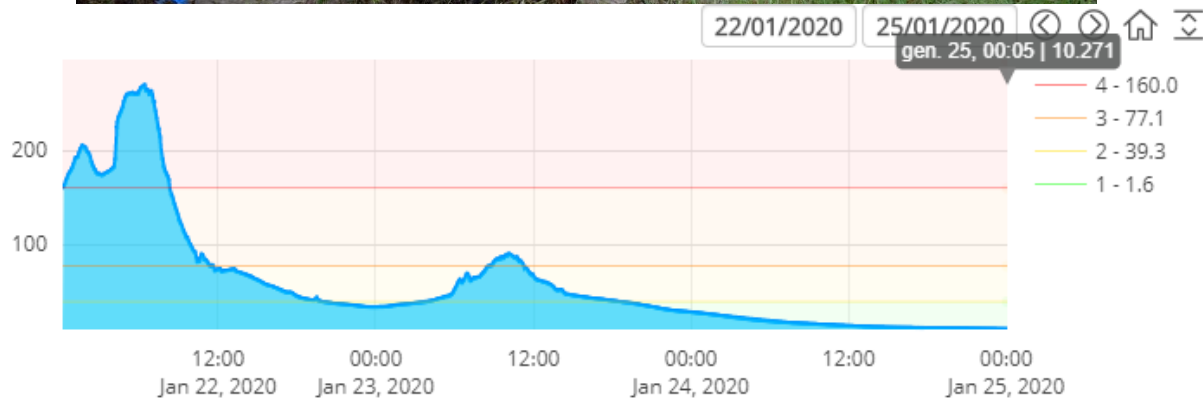
La canya (*Arundo donax*), el donzell bord (*Artemisia verlotiorum*) i la robínia (*Robinia pseudoacacia*) són les espècies que s'han identificat com les més freqüents i alhora les més abundants, és a dir, apareixen a un major nombre d'estacions i són les que assoleixen una major abundància allà on s'estableixen. Tot i no ser tant freqüents al llarg de totes les estacions, la vinya verge (*Parthenocissus quinquefolia*) i *Cyperus eragrostis* mostren una elevada abundància; mentre que el raïm de moro (*Phytolacca americana*) esdevé la més freqüent.

A nivell de zonificació, l'àrea de la riba és on es localitza un major nombre d'espècies exòtiques, així com una major abundància d'aquestes, seguit de la llera i la ribera. Tal i com s'ha comentat anteriorment, corresponen a la part més dinàmica del riu en el sentit de proximitat a la làmina d'aigua i, per tant, on les condicions són més variables al llarg de l'any i el factor de dispersió és major.

Taula 5.7. Interpretació de valors d'abundància d'espècies al·lòctones.

| Estació | La Tordera | | | | | | R. Arbúcies |
|------------------------------------|------------|----|----|----|-----|-----|-------------|
| | E4 | E6 | E7 | E9 | E12 | E29 | E33 |
| LLERA | | | | | | | |
| <i>Ambrosia coronopifolia</i> | 2 | | | + | | | |
| <i>Araujia sericifera</i> | + | | | | | | |
| <i>Artemisia verlotiorum</i> | + | 1 | 1 | | + | 2 | |
| <i>Arundo donax</i> | 1 | 1 | | | + | 2 | |
| <i>Aster pilosus</i> | | | | | | + | |
| <i>Bidens frondosa</i> | | 1 | + | | 3 | 1 | 1 |
| <i>Bidens subalternans</i> | | 1 | | | | + | |
| <i>Chenopodium ambrosioides</i> | + | | + | | | | + |
| <i>Conyza canadensis</i> | | | | | + | 2 | |
| <i>Cyperus eragrostis</i> | | 2 | 3 | 4 | 1 | 3 | |
| <i>Datura stramonium</i> | | | + | | | | |
| <i>Helianthus tuberosus</i> | 1 | 1 | + | | 2 | | |
| <i>Parthenocissus quinquefolia</i> | | | | | | 3 | 3 |
| <i>Phytolacca americana</i> | + | | | | | + | + |
| <i>Platanus x hispanica</i> | | | | | | + | 2 |
| <i>Robinia pseudoacacia</i> | | | | | | + | 1 |
| RIBA | | | | | | | |
| <i>Acer negundo</i> | | + | + | | + | + | + |
| <i>Ailanthus altissima</i> | | | | | | + | |
| <i>Ambrosia coronopifolia</i> | | | 4 | | | | |
| <i>Artemisia verlotiorum</i> | 2 | 2 | 3 | | 1 | 2 | 1 |
| <i>Arundo donax</i> | 1 | 2 | 2 | 1 | 1 | 2 | |
| <i>Aster pilosus</i> | | 1 | + | + | | 2 | |
| <i>Bidens frondosa</i> | + | | | | 4 | 3 | |
| <i>Bidens subalternans</i> | | | | | | 2 | |
| <i>Buddleja davidii</i> | | + | | | | | |
| <i>Chenopodium ambrosioides</i> | | | | | | 1 | |
| <i>Conyza canadensis</i> | | | | 1 | | 1 | |
| <i>Cortaderia selloana</i> | | | | + | | | |
| <i>Cyperus eragrostis</i> | | 2 | 2 | 1 | 1 | 1 | |
| <i>Helianthus tuberosus</i> | 1 | 1 | | | 1 | | |
| <i>Lunaria annua</i> | | | | | | | 1 |
| <i>Mirabilis jalapa</i> | | | 1 | + | | | |
| <i>Parthenocissus quinquefolia</i> | | | | | 2 | 4 | 4 |
| <i>Phytolacca americana</i> | 2 | + | 3 | + | + | 1 | 1 |
| <i>Platanus x hispanica</i> | | | | | + | 1 | 4 |
| <i>Robinia pseudoacacia</i> | 1 | | 1 | | 1 | 1 | 2 |
| <i>Senecio pterophorus</i> | | | | | | + | |
| <i>Solanum lycopersicum</i> | | | | | + | | |
| <i>Verbena litoralis</i> | | 1 | 2 | | + | 1 | |
| RIBERA | | | | | | | |
| <i>Ambrosia coronopifolia</i> | | | 2 | 2 | | | |
| <i>Artemisia verlotiorum</i> | | 2 | 1 | | | 1 | |
| <i>Arundo donax</i> | | 3 | 2 | 1 | | 3 | |
| <i>Aster pilosus</i> | 1 | | | | | 2 | 1 |
| <i>Bidens frondosa</i> | | | | | 2 | 3 | |
| <i>Parthenocissus quinquefolia</i> | | | 1 | | 2 | 3 | 3 |

Next steps: to evaluate interannual changes in riparian vegetation structure and composition and in habitats, especially after flood events in non-regulated mediterranean rivers



Recent flood at la Tordera (torderada) during “Gloria” phenomena last week