



Photos : Laurent Magnoux

## French approach on GEP establishment :

# A TYPOLOGY OF THE HMWB

A focus on agriculture and flood defence

WFD & HMWB  
CIS WS

12-13 March 2009



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RÉPUBLIQUE FRANÇAISE



Ministère  
de l'Écologie, de l'Énergie,  
du Développement durable  
et de l'Aménagement  
du territoire



Présent  
pour  
l'avenir

# Presentation structure

## 1. French approach on GEP setting :

### A typology of the HMWB

## 2. The concept of Compulsory Technical Constraints

## 3. Case studies on flood defence & agriculture



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# 1. Typology of the HMWB



# Methodological principles

A double entrance table of HMWB types :

- **Infrastructures (dams, impoundment, dykes, water abstraction or derivation) or/and main types of morphological modifications.**
- **Natural surface water body types (rivers or reservoirs)**



# Typology of the HMWB

| Main use<br>cf.WFD<br>art 4,3   | navigation | hydropower | Water storage :<br>drinking water, irrigation | Flood protection | Drainage | HMWB TYPES   | N° |            |
|---|------------|------------|---|------------------|----------|--|----|------------|
|   |            |            |   |                  |          |  |    |            |
| navigation  |            |            |   |                  |          | Large navigated river with small navigation section  | 1  | Rivers     |
|   |            |            |   |                  |          | Small lowland canalized river with small navigation section  | 2  |            |
|   |            |            |   |                  |          | Large river with large navigation section  | 3  |            |
|   |            |            |   |                  |          | Alpine large river with equipments for navigation and hydropower   | 4  |            |
| storage<br>(drinking<br>water,<br>hydropower,<br>irrigation) and<br>water<br>regulation |            |            |   |                  |          | Reservoir with an important water level fluctuation (> 3m) and annual cycle<br>(often for hydropower or to support uses during low-flow period in downstream section of river) | 5  | Reservoirs |
|   |            |            |   |                  |          | Reservoir with small water level variation and short frequency (daily)   | 6  |            |
|   |            |            |   |                  |          | Reservoir with small water level variation and annual cycle  | 7  |            |
|   |            |            |   |                  |          | Dowstream section of dams<br>(significant deviation, abstraction, flow modification, hydropeaking)   | 8  | Rivers     |
|   |            |            |   |                  |          | Dowstream section of dams ( flow modification, hydropeaking)   | 9  |            |
| flood<br>protection<br>and drainage   |            |            |   |                  |          | Closely (narrow) embankment, river with high energetic potential (braiding)  | 10 | Rivers     |
|   |            |            |   |                  |          | Closely (narrow) embankment, river with low energetic potential (meandering)   | 11 |            |
|   |            |            |   |                  |          | Wide embankment (longitudinal dyke), river with high energetic potential (braiding)  | 12 |            |
|   |            |            |   |                  |          | Wide embankment (longitudinal dyke), river with low energetic potential (meandering)   | 13 |            |
|   |            |            |   |                  |          | small straightened and/or canalized river in lowland (wetland)   | 14 | Rivers     |

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# Some examples

## Type 10 : “closely”embankment, rivers with high energetic potential

(flood protection)

urbanisation



agriculture

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Réseau Géodésique Français 1993 - coordonnées géographiques  
Longitude : 04° 07' 30" E Latitude : 44° 44' 07" N





# Type 11 : closely embankment, rivers with low energetic potential (flood protection)

agriculture



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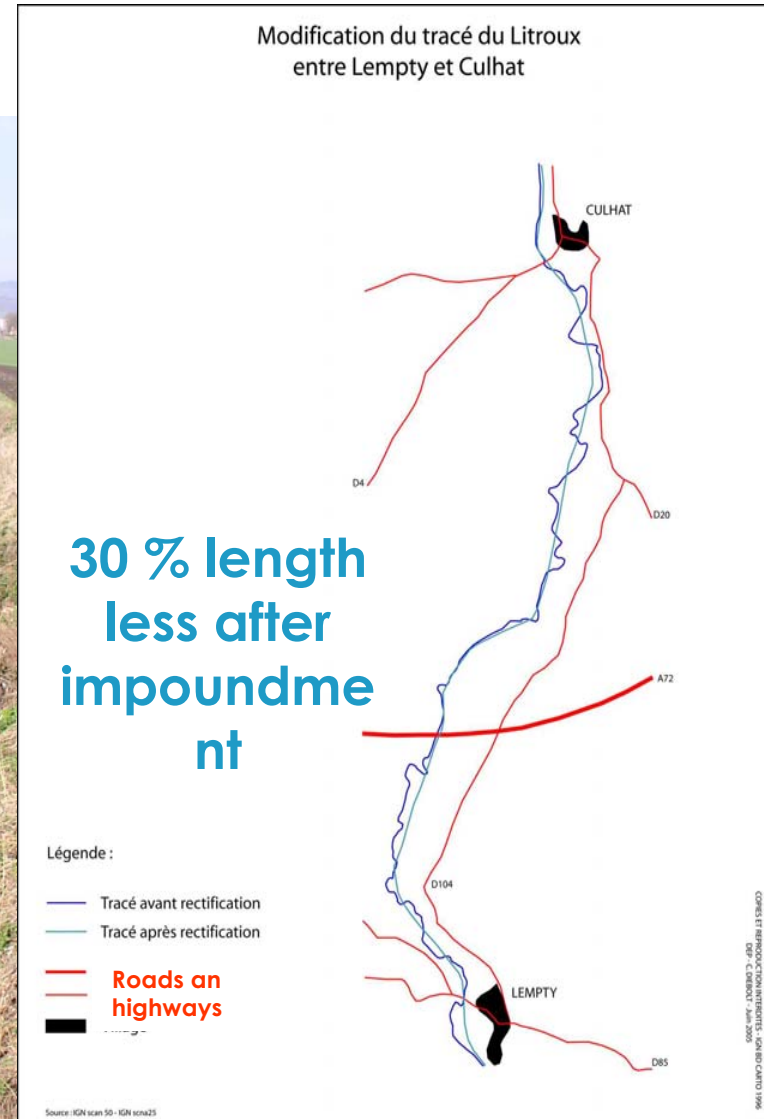
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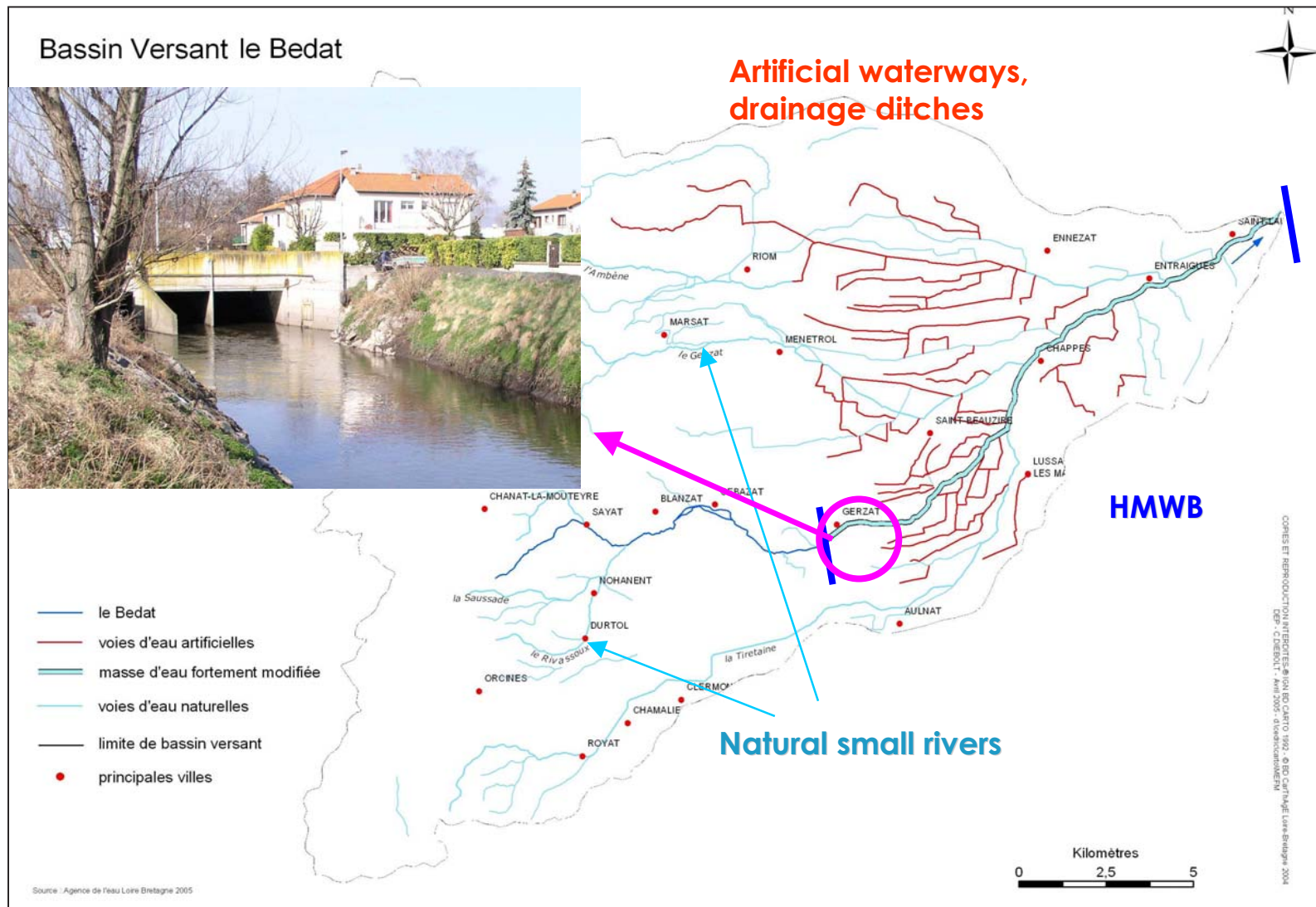


# Type 14 : small straightened river in lowland

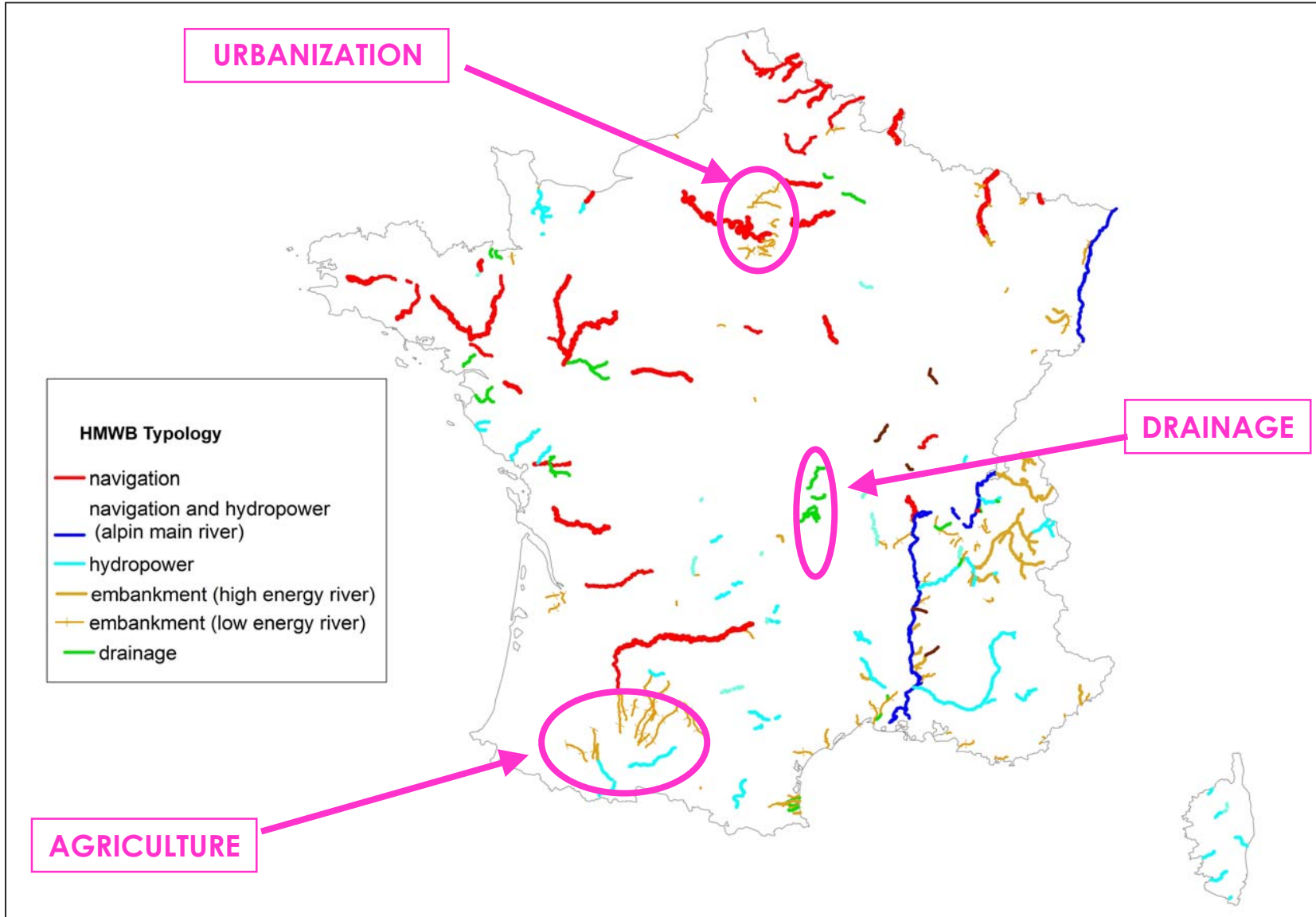
(land drainage & flood protection)



# Type 14 : small straightened river in lowland (land drainage & flood defence in villages)



# French types map (river types)



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## 2. The definition of compulsory technical constraints



## For each types of HMWB

➤ **Compulsory (Obligatory) Technical Constraint(s) (CTO in French)** are defined as the unavoidable physical or structural modification(s) to ensure use

➤ **Examples :**

- minimum depth for navigation in river
- volume of water usable in reservoir for hydropower or drinking water
- limitation of floodplain extension for flood defence

**except the above restrictions (CTO)  
all mitigation measures are possible**

# Why this approach

➤ **WFD article 4.3** *“(a) the changes to the hydromorphological characteristics of that body which would be necessary for achieving good ecological status would have significant adverse effects on...”*

➤ **WFD Annex V 1.2.5. & according to CIS guidance N°4**, the MEP for HMWBs relates to the values of BQE after all mitigation measures have been implemented that do not have a significant adverse effect on the use.



|  |  |  |  |  | Compulsory Technical Constraints  |            |  |                  |          |            |                                       |   |  |  |                             |                            |                                    |
|--|--|--|--|--|---|------------|--|------------------|----------|------------|---------------------------------------|---|--|--|-----------------------------|----------------------------|------------------------------------|
|  |  |  |  |  | navigation  | hydropower | Water storage : drinking water, irrigation | Flood protection | Drainage | HMWB TYPES | minimum depth for navigation of river | important flow and height fall (hydropower) | important water level variation in an annual cycle | small water level variation in a daily cycle | small water level variation | usable volume in reservoir | downstream flow restitution regime |
|  |  |  |  |  | Large navigated river with small navigation section   | 1          | X  |                  |          |            |                                       |   |  |  | X                           | X                          |                                    |
|  |  |  |  |  | Small lowland canalized river with small navigation section   | 2          | X  |                  |          |            |                                       |   |  |  | X                           | X                          |                                    |
|  |  |  |  |  | Large river with large navigation section   | 3          | X  |                  |          |            |                                       |   |  |  | X                           | X                          |                                    |
|  |  |  |  |  | Alpine large river with equipments for navigation and hydropower  | 4          | X  | X                |          |            |                                       | X   |  |  | X                           | X                          |                                    |
|  |  |  |  |  | Reservoir with an important water level fluctuation (> 3m) and annual cycle (often for hydropower or to support uses during low-flow period in downstream section of river) | 5          |  | X                | X        |            |                                       | X   |  |  |                             |                            |                                    |
|  |  |  |  |  | Reservoir with small water level variation and short frequency (daily)  | 6          |  | X                |          | X          |                                       | X   |  |  |                             |                            |                                    |
|  |  |  |  |  | Reservoir with small water level variation and annual cycle   | 7          |  |                  |          |            | X                                     | X   |  |  |                             |                            |                                    |
|  |  |  |  |  | Dowstream section of dams (significant deviation, abstraction, flow modification, hydropeaking)   | 8, 9       |  |                  |          |            |                                       |   | X  |  |                             |                            |                                    |
|  |  |  |  |  | Dowstream section of dams ( flow modification, hydropeaking)  |            |  |                  | X        | X          |                                       |   | X  |  |                             |                            |                                    |
|  |  |  |  |  | Closely (narrow) embankment, river with high energetic potential river (braiding)   | 10         |  |                  |          |            |                                       |   |  |  | X                           | X                          |                                    |
|  |  |  |  |  | Closely (narrow) embankment, river with low energetic potential (meandering)  | 11         |  |                  |          |            |                                       |   |  |  | X                           | X                          |                                    |
|  |  |  |  |  | Wide embankment (longitudinal dyke), river with high energetic potential river (braiding)   | 12         |  |                  |          |            |                                       |   |  |  |                             |                            | X                                  |
|  |  |  |  |  | Wide embankment (longitudinal dyke), river with low energetic potential (meandering)  | 13         |  |                  |          |            |                                       |   |  |  |                             |                            | X                                  |
|  |  |  |  |  | small straightened and/or canalized river in lowland (wetland)  | 14         |  |                  |          |            |                                       |   |  |  | X                           | X                          | X                                  |

# Management plan and programme of measures : a pragmatic approach

- For the first round (2010-2015) : mitigation measures and objectives setting are defined by each river basin district (local conditions are taken into account)
- GEP definition is based actually on :
  - phytoplankton and physical-chemical elements (only relevant quality elements at this moment ?)
  - importance of hydro-morphological alterations (except alterations due to the CTO)

|  |                  | Classes d'état selon les indicateurs biologique et physico chimiques mentionnés ci dessus |             |          |          |         |
|--|------------------|---|-------------|----------|----------|---------|
|  |                  | Très bon  | Bon         | Moyen    | Médiocre | Mauvais |
| Pressions hydromorphologiques non imposées par les CTO | Nulles à faibles | Bon et plus   | Bon et plus | Moyen    | Médiocre | Mauvais |
|  | Moyennes         | Moyen   | Moyen       | Médiocre | Mauvais  | Mauvais |
|  | Fortes           | Médiocre  | Médiocre    | Mauvais  | Mauvais  | Mauvais |

# Classification of ecological potential

For each type

## MEP : reference conditions

- select the relevant quality elements
- set the values of MEP in adjusting the values,
  - ⇒ refer to the most comparable natural WB type
  - ⇒ take into account the CTO

## GEP : determine the values of the relevant quality elements

### Advantages of this approach

- The process of establishing GES and GEP are comparable
- The national typology of HMWB is available, shared and accepted by stakeholders.



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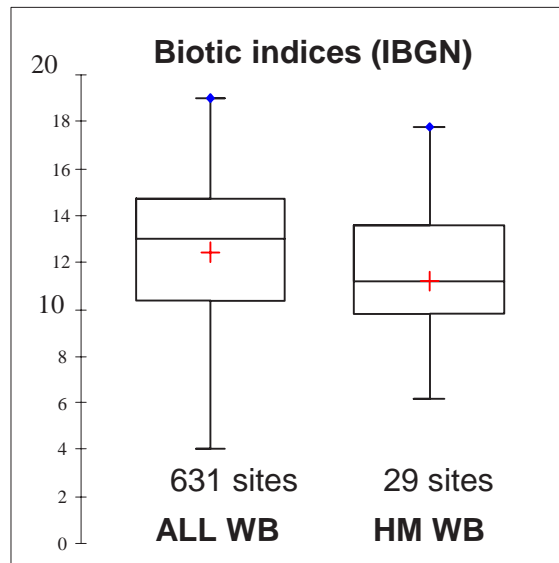
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# 3. Case studies on flood defence & agriculture



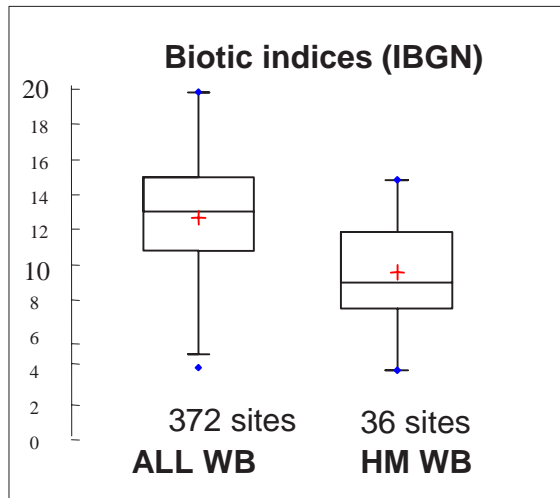
# Type 10 : “closely”embankment, rivers with high energetic potential (flood protection)



## Current conclusions

- **MEP** should be near to **HS**
- macro-invertebrates seems relevant
- in addition : fishes an diatoms

# Type 11 : closely embankment, rivers with low energetic potential (flood protection)



## Current conclusions

➤ **MEP < HS**

- **Minv relevant**
- **Fishes probably relevant**
- **Diatoms depends more than physical-chemical**



# Work in progress...

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