

An overview of the **ecological** status of freshwater and coastal ecosystems in Spain

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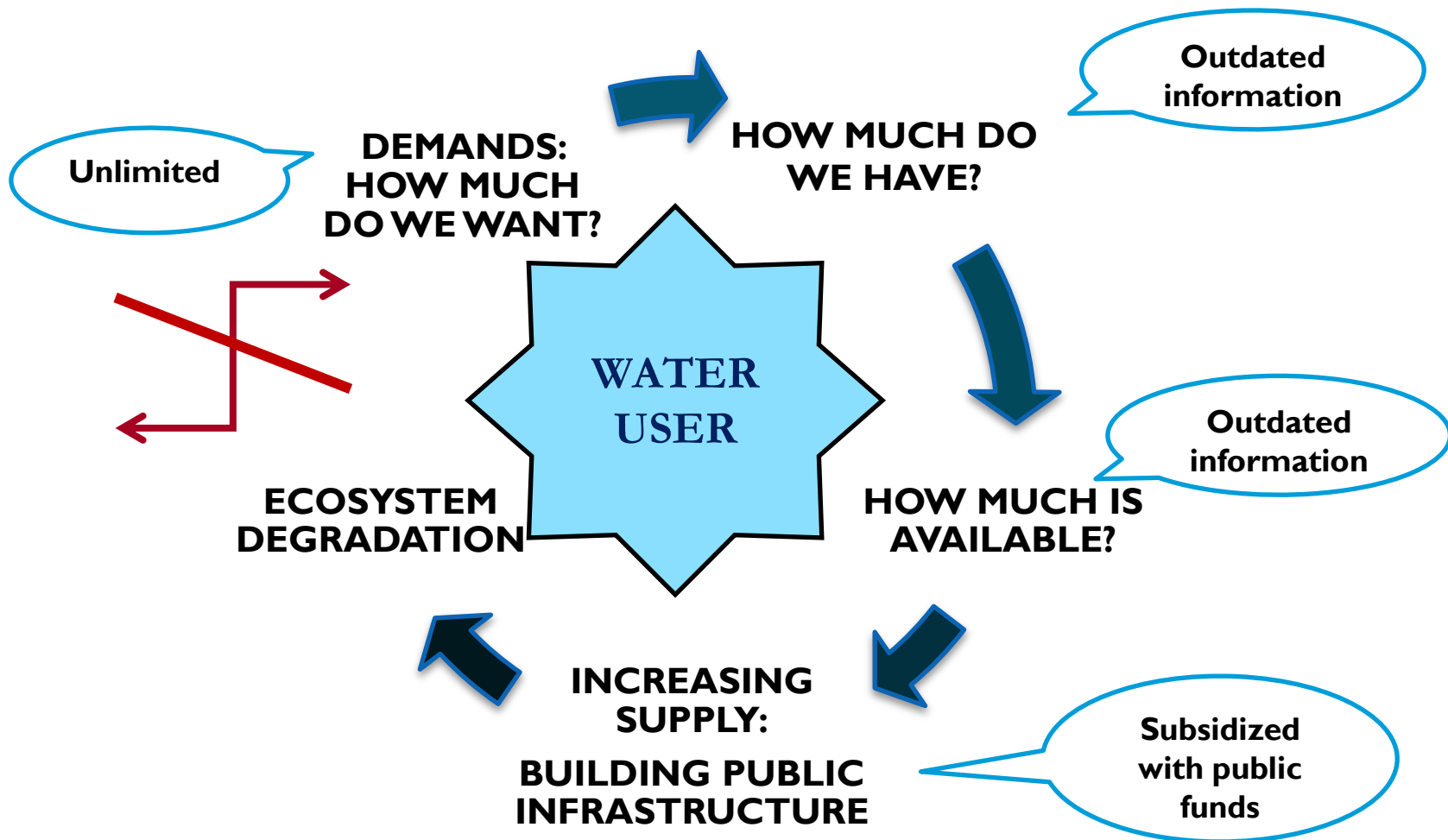
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Outline

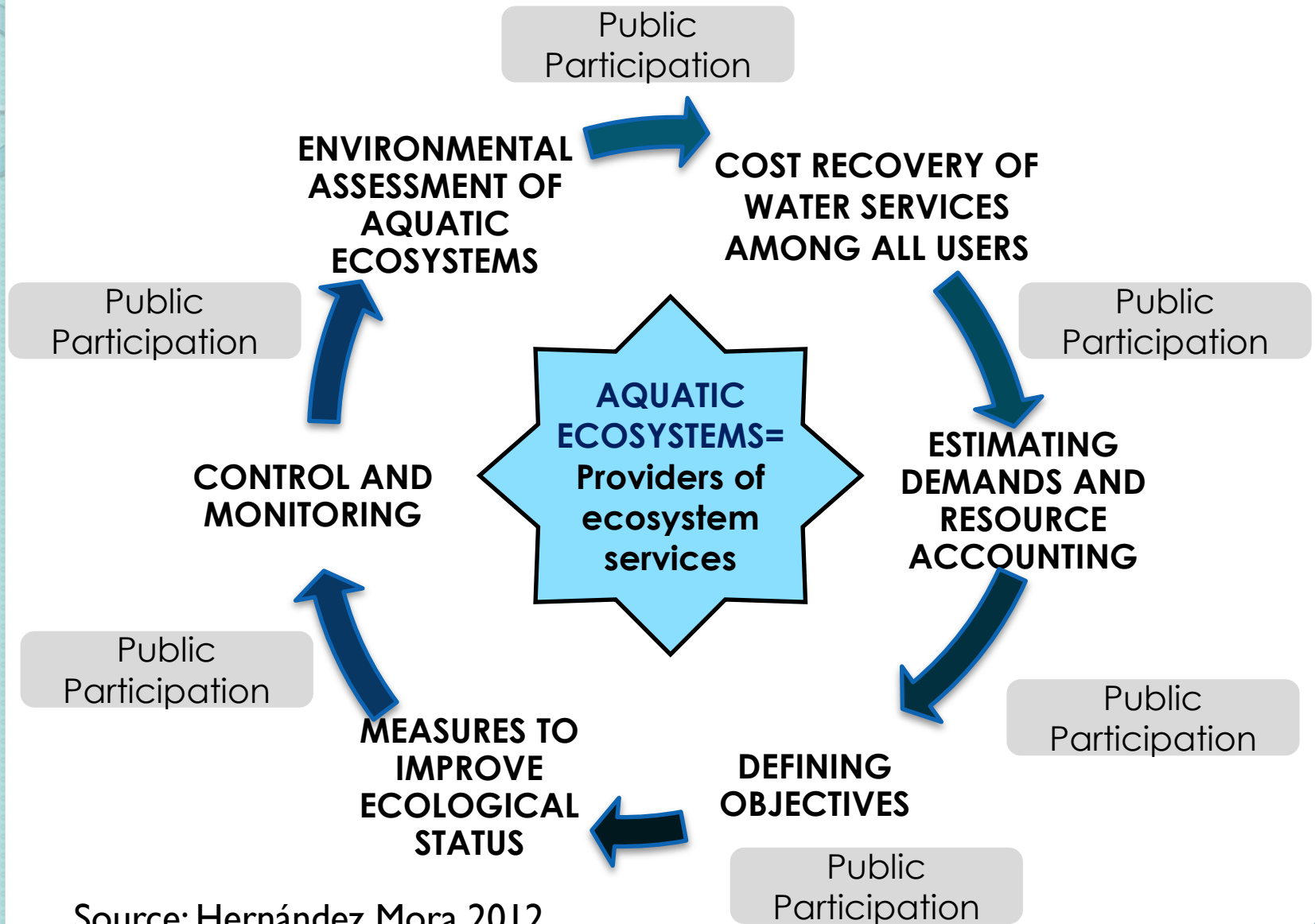
- ✓ The Water Framework Directive: a changing paradigm to manage water resources and the roadmap towards IWRM
- ✓ Ecological status of freshwater & coastal ecosystems in Spain: What is their status? Where are the hotspots? What are the main pressures?
- ✓ Technical & management challenges to improve the environmental status

Water planning in Spain before the WFD



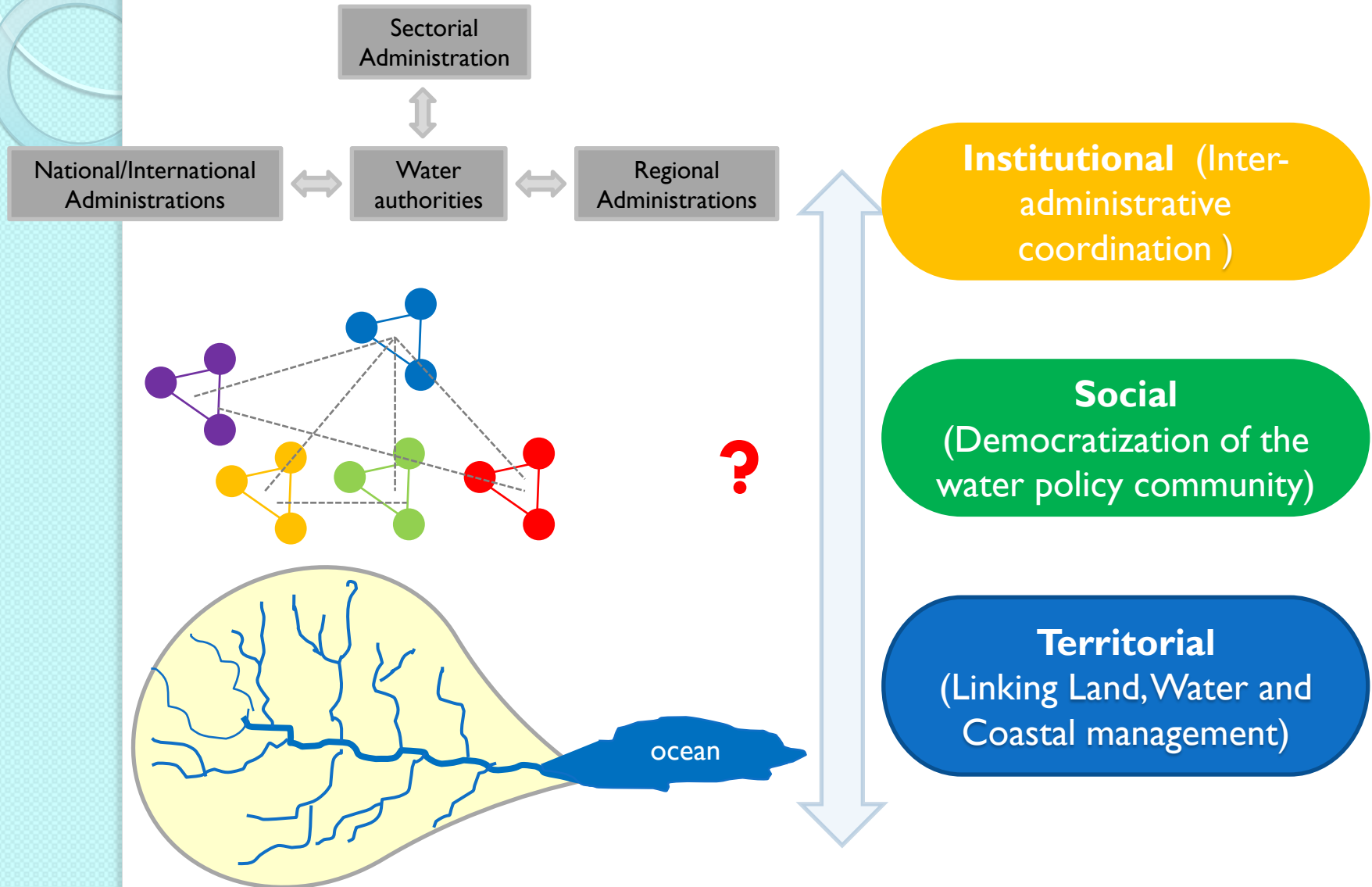
Source: Hernández Mora, 2012

The water planning cycle under WFD

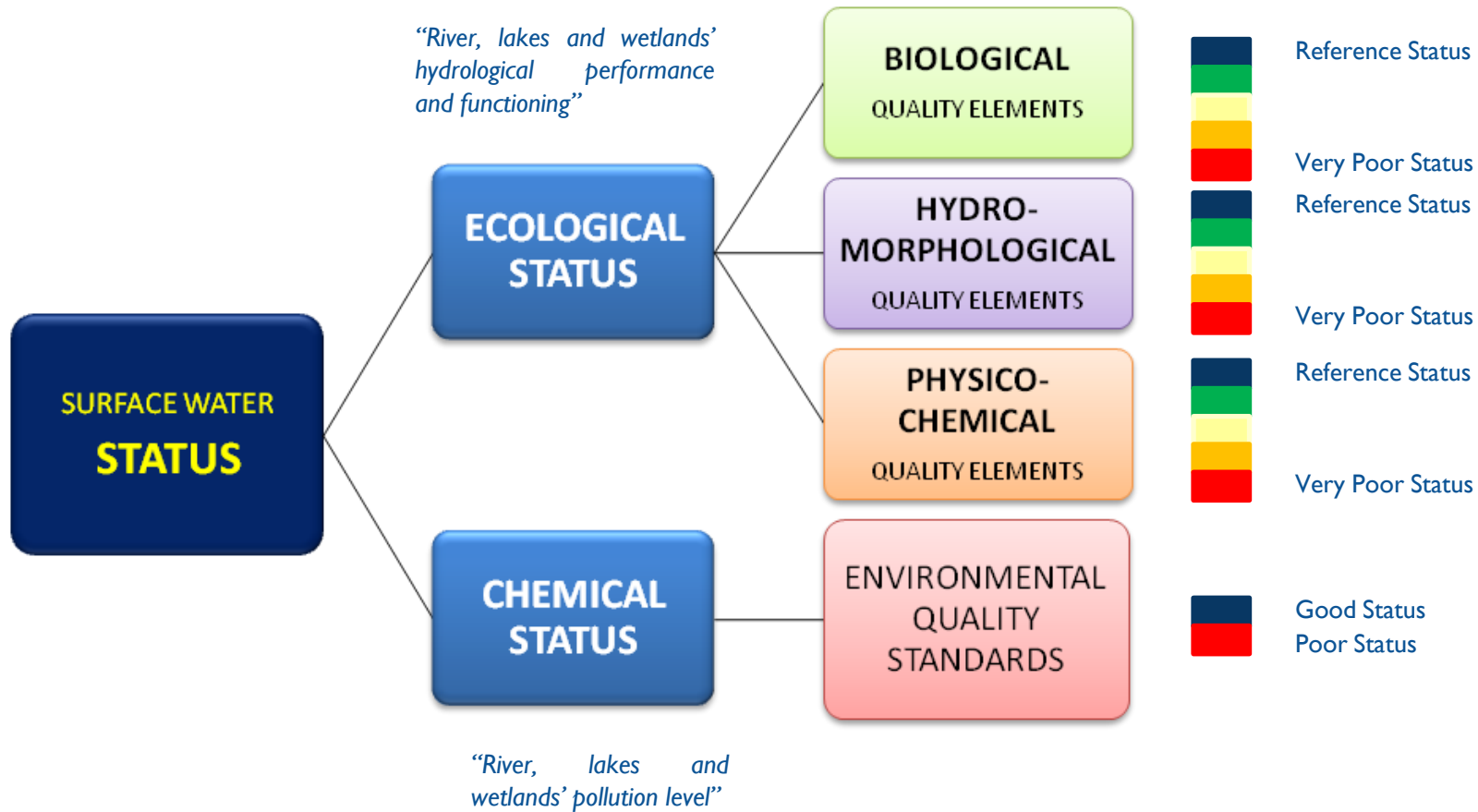


The WFD: The first real trial towards IWRM

Integration across 3 levels



Environmental Assessment of surface water bodies (SWB)



Source: IPH (2007) adapted from WFD (2000)

Criteria used to assess ecological status of SWB

	ELEMENTOS DE CALIDAD	INDICADORES			
		Ríos (naturales y artificiales o muy modificados)	Lagos (naturales y artificiales o muy modificados)	Aguas de transición (naturales y muy modificadas)	Costeras (naturales y muy modificadas)
BIOLÓGICOS	Fitobentos	Índice de Poluosensibilidad específica (IPS) Multimétrico de diatomeas (MDIAT)	-	-	-
	Invertebrados bentónicos	Iberian Biomonitoring Working Party (IBMWP) Multimétrico específico	Índice de Shannon Riqueza taxonómica	-	Multivariate-AZTI's Marine Biotic Index (MAMBI) para fondos blandos MEDOC para fondos blandos
	Peces	Proporción de individuos de especies autóctonas	Proporción de individuos de especies autóctonas	-	-
	Fitoplancton	-	Clorofila a Biovolumen Índice de Grupos Algales (IGA)	Clorofila a	Clorofila a Recuento de células por taxones
	Macrófitos	-	Presencia de macrófitos introducidos Porcentaje de cobertura de vegetación típica	-	-
	Macroalgas	-	-	Recubrimiento	Calidad de los Fondos Rocosos (CFR) CARLIT/Benthos (para fondos rocosos) Recubrimiento
	Angiospermas	-	-	Recubrimiento	Posidonia oceanica multivariate index (POMI) Recubrimiento
HIDROMORFOLÓGICOS	Régimen hidrológico	Caudal ecológico Índices de alteración hidrológica Conexión con las aguas subterráneas	Requerimiento hídrico ambiental Fluctuación del nivel Aporte de caudal medio	-	-
	Continuidad fluvial	Longitud media libre de barreras artificiales Tipología de las barreras	-	-	-
	Condiciones morfológicas	Índice de vegetación de ribera (QBR) Índice de hábitat fluvial (IHF)	Variación media de la profundidad Índice de vegetación de ribera	Variación de la profundidad Porcentaje superficie con sustrato blando Superficie de la zona intermareal	Profundidad máx. y mín. (BMVE) Pendiente media, granulometría (D50) Anchura zona intermareal
	Régimen mareas	-	-	Caudal ecológico o necesidades hídricas Tiempo de residencia Exposición al oleaje	Grado de exposición al oleaje Velocidad y dirección de las corrientes dominantes
FISICOQUÍMICOS	CG: Transparencia	-	Profundidad (disco de Secchi)	Profundidad (disco de Secchi) Sólidos en suspensión Turbidez (NTU)	Profundidad (disco de Secchi) Sólidos en suspensión Turbidez (NTU)
	CG: C. Térmicas	Temperatura media del agua	Temperatura media del agua	Temperatura media del agua	Temperatura media del agua
	CG: C. Oxigenación	Oxígeno disuelto Tasa de saturación del oxígeno DBO5	Oxígeno disuelto Tasa de saturación del oxígeno	Oxígeno disuelto Tasa de saturación del oxígeno	Oxígeno disuelto Tasa de saturación del oxígeno
	CG: Salinidad	Conductividad eléctrica a 20°C	Conductividad eléctrica a 20°C	Salinidad UPS Conductividad eléctrica a 20°C	Salinidad UPS
	CG: Estado acidificación	pH	pH Alcalinidad	-	-
	CG: Nutrientes	Amonio Nitratos Fosfatos	Amonio Nitratos Fosfatos	Amonio Nitrógeno Fósforo	Amonio Nitrógeno Fósforo
	Contam. especif. NO	Contaminantes no sintéticos del anexo II del RDPH y sustancias no sintéticas de la Lista II Preferente del anexo IV del RPH, para los que no existan normas europeas de calidad.	-	Contaminantes no sintéticos del anexo II del RDPH y sustancias no sintéticas de la Lista II contenidas en la disposición adicional novena de la Ley 22/1988, de 28 de julio, de Costas para los que no existan normas europeas de calidad.	-
	Contam. especif. sint.	Contaminantes sintéticos del anexo II del RDPH y sustancias sintéticas de la Lista II Preferente del anexo IV del RPH, para los que no existan normas europeas de calidad.	-	Contaminantes sintéticos del anexo II del RDPH y sustancias sintéticas de la Lista II contenidas en la disposición adicional novena de la Ley 22/1988, de 28 de julio, de Costas para los que no existan normas europeas de calidad.	-

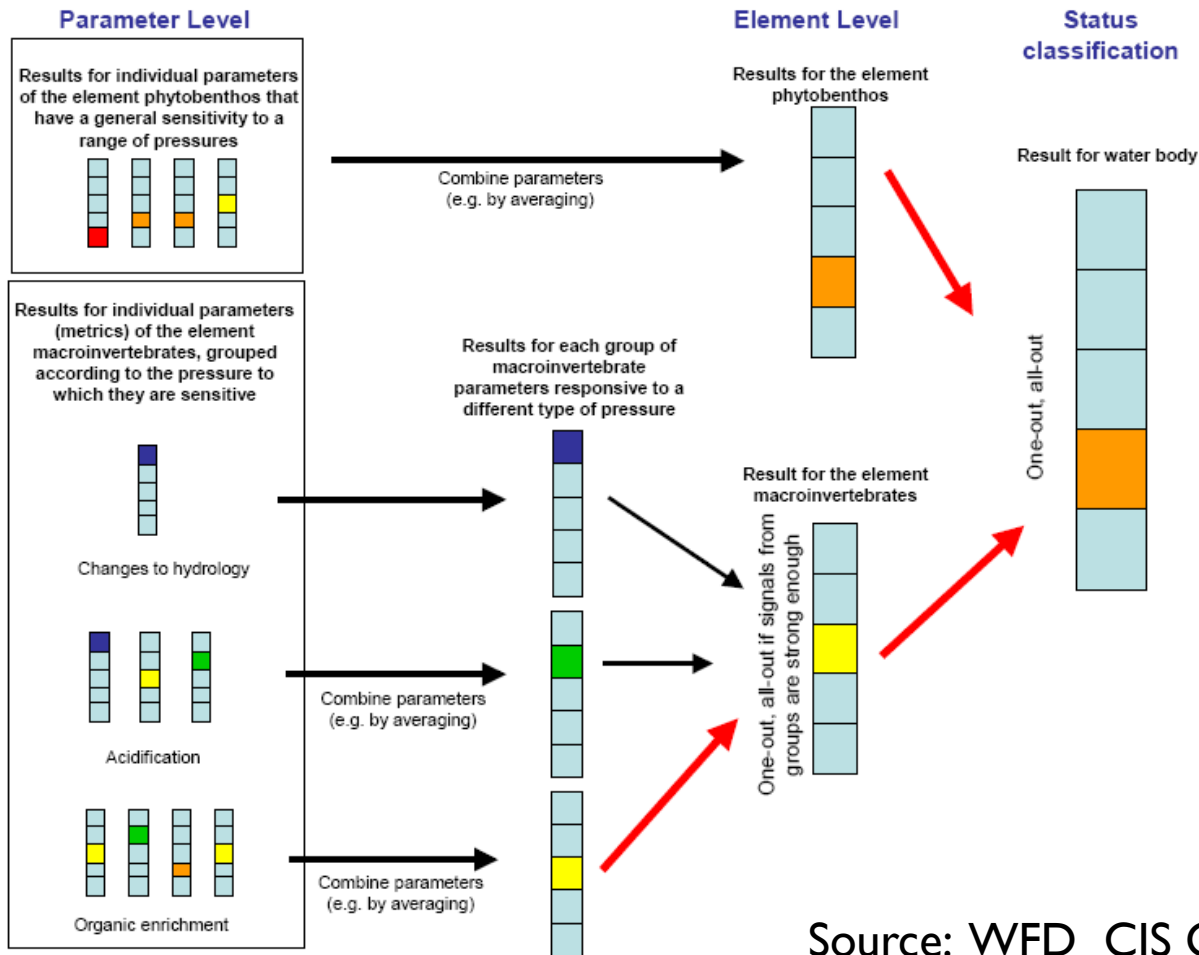
A massive effort has been done to assess the status of SWB taking into account their environmental variability

Determining the Good Ecological Status (GES) of SWB: the “one out, all out” criteria

Example of Biological Status.

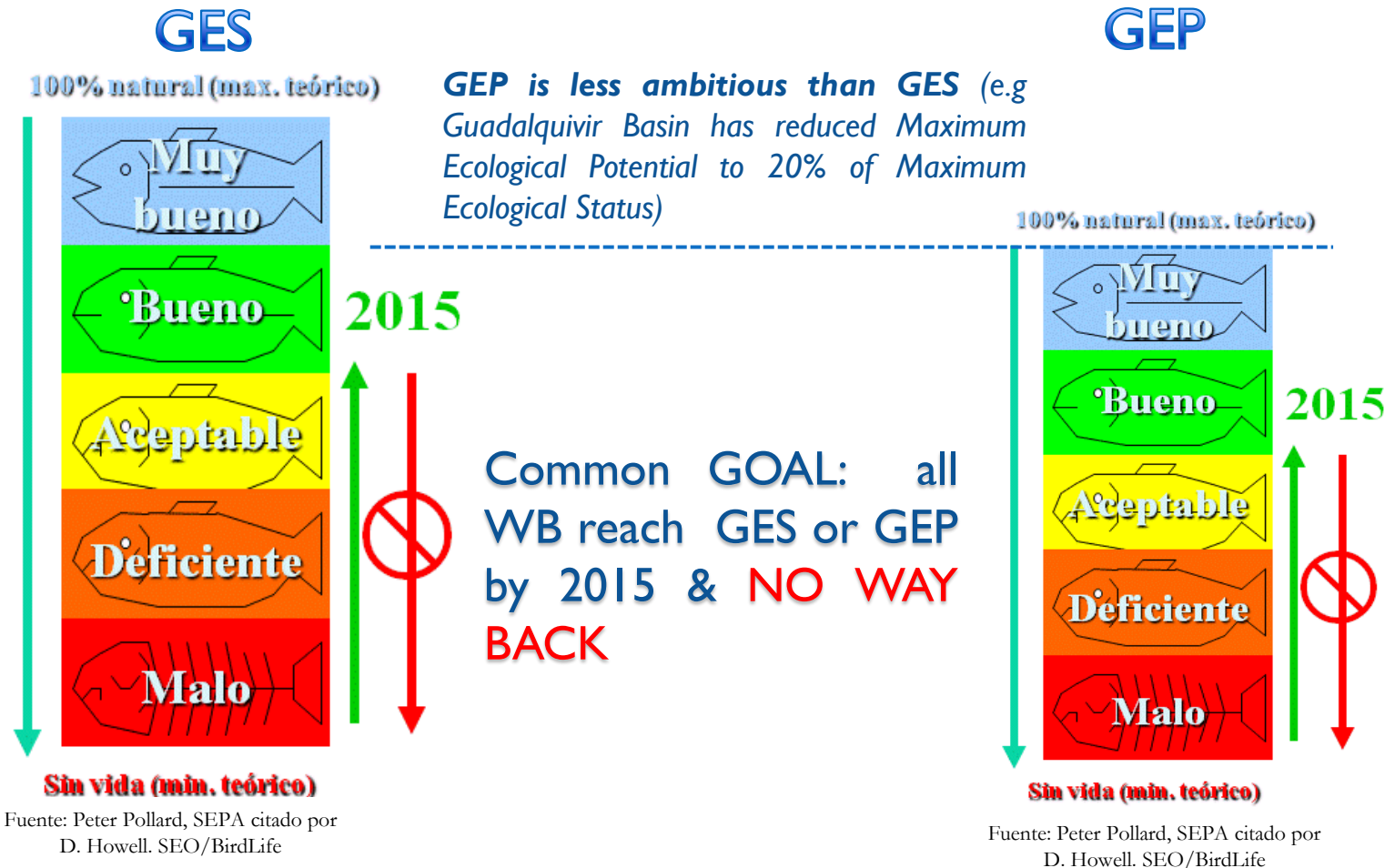
PHYTOBENTHOS

MACROINVERTEBRATES



Source: WFD CIS Guidance Doc 13

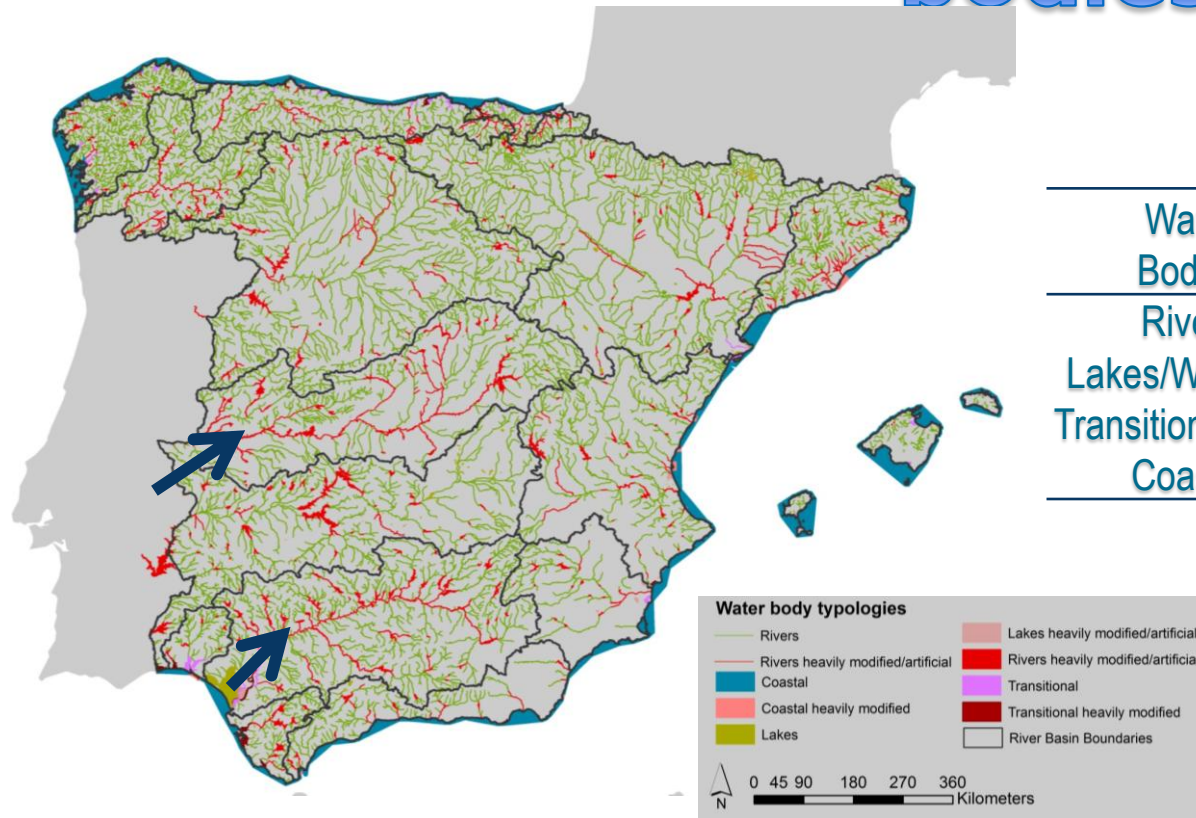
Good Ecological Status/Potential (GES, GEP) & environmental objectives for surface waters



GES applies for WB with little or no human modification (rivers, lakes and wetlands)

GEP applies for all heavily modified or artificial- HMWB (eg. reservoirs, canals, harbours)

Tipology of surface water bodies in Spain



Water Bodies	Km/ Km2	% of HMWB
Rivers	77.055	8
Lakes/Wetlands	1.202	16
Transitional water	962	34
Coastal	17.711	2

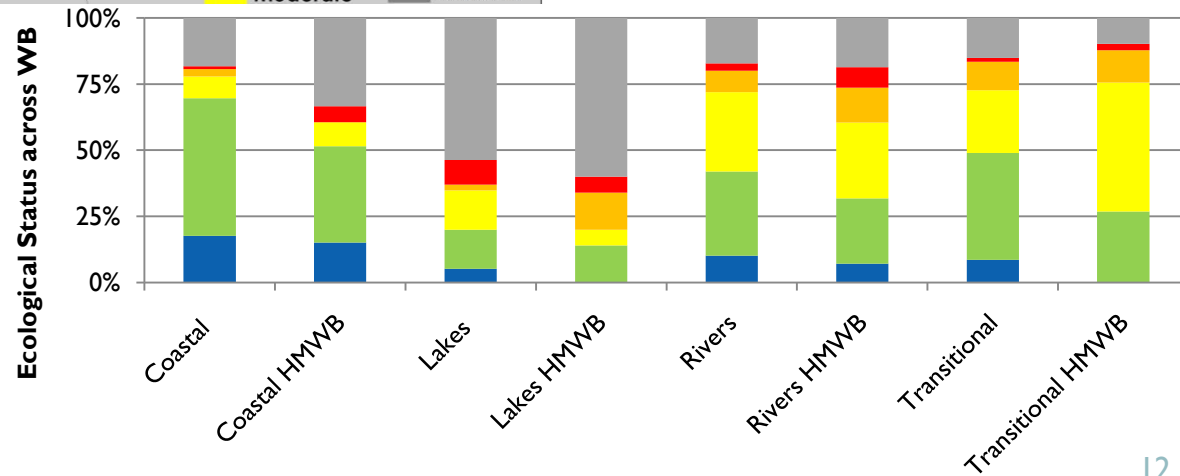
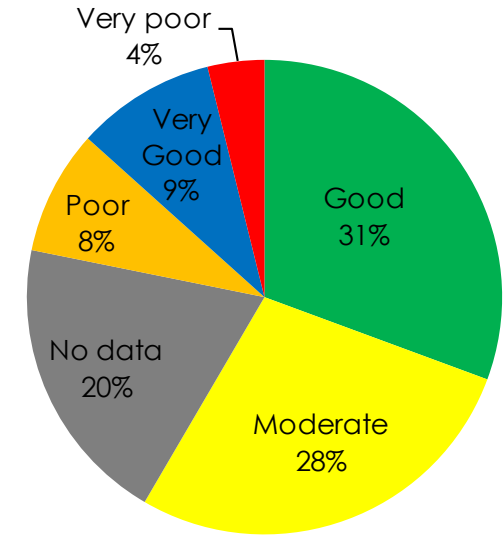
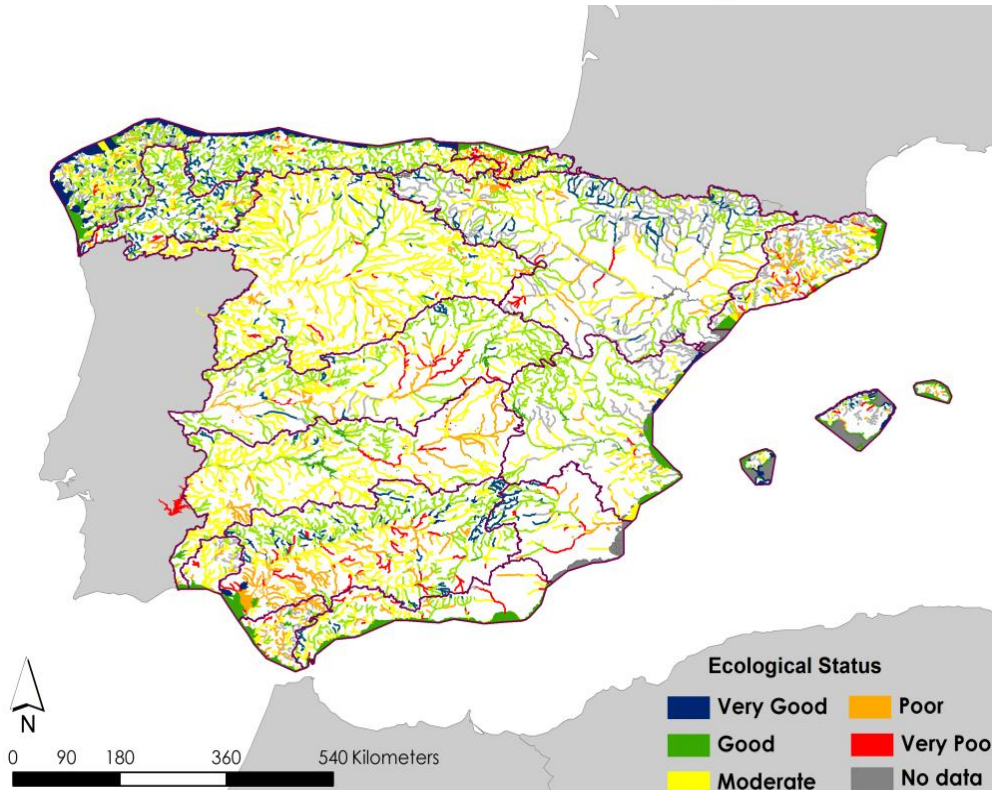
- 34% of the HMWB “rivers” are located in two basins: Tagus (1.100km) and Guadalquivir (1075 Km)
- Greater number of HMWB evidences ↑ pressure on water bodies now and ↑ potential risk of lower compliance with environmental objectives (particularly if GEP is less ambitious than GES)

Our study

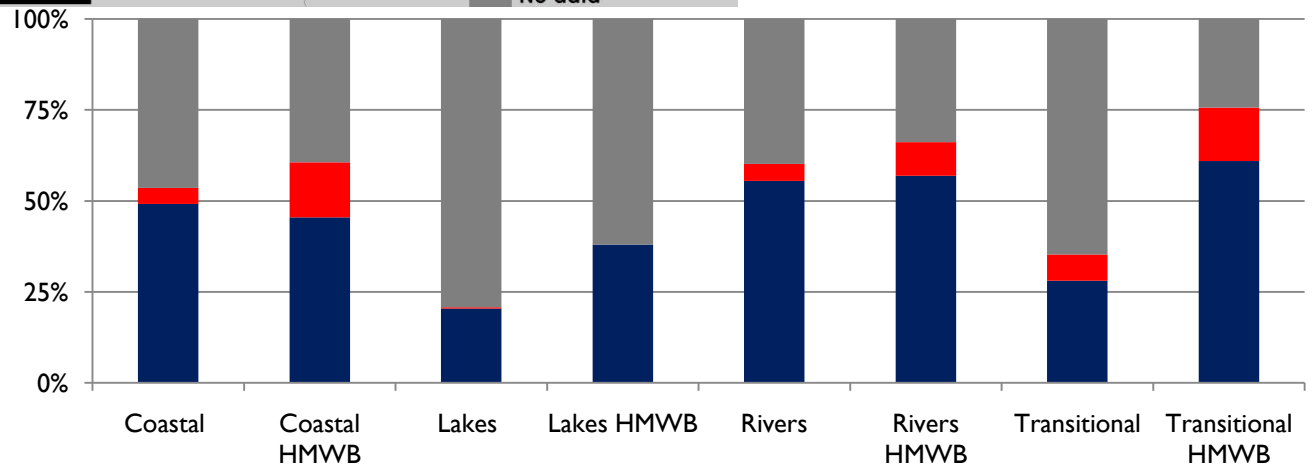
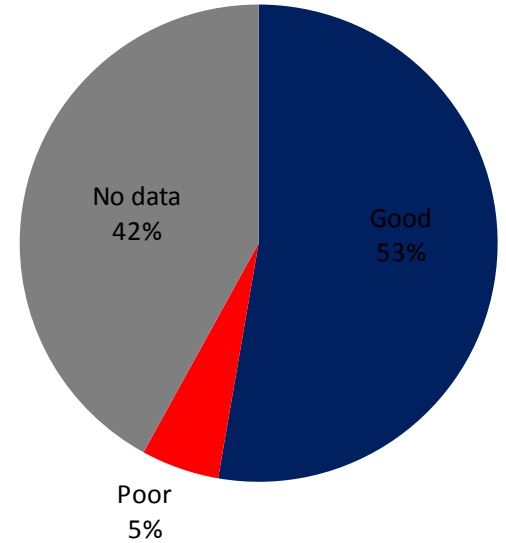
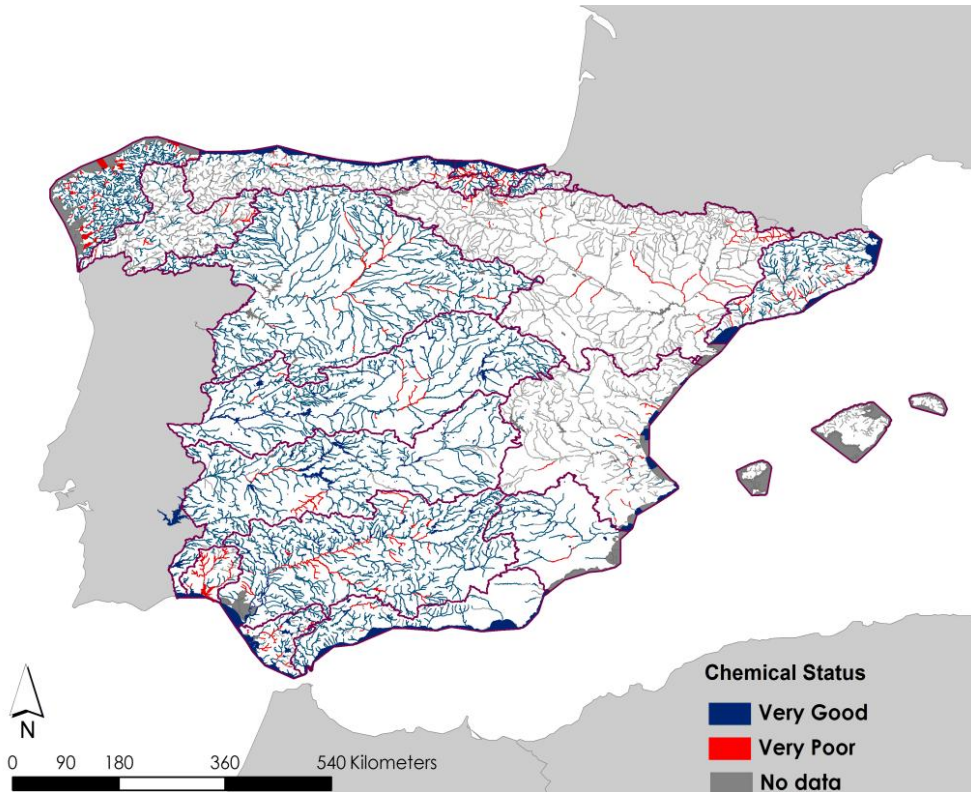
A national overview of the environmental status of surface water bodies (SWB) to:

1. Identify where are the hotspots and what are the main pressures and drivers
2. Assess the consistency of the environmental assessment performed across basins to detect potential gaps and limitations that need to be address in the following planning cycle

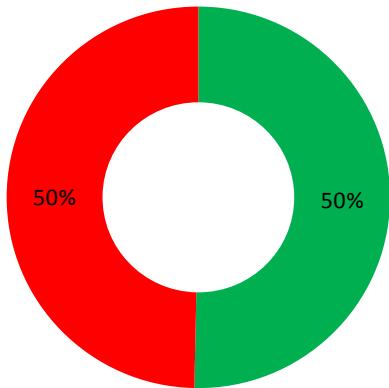
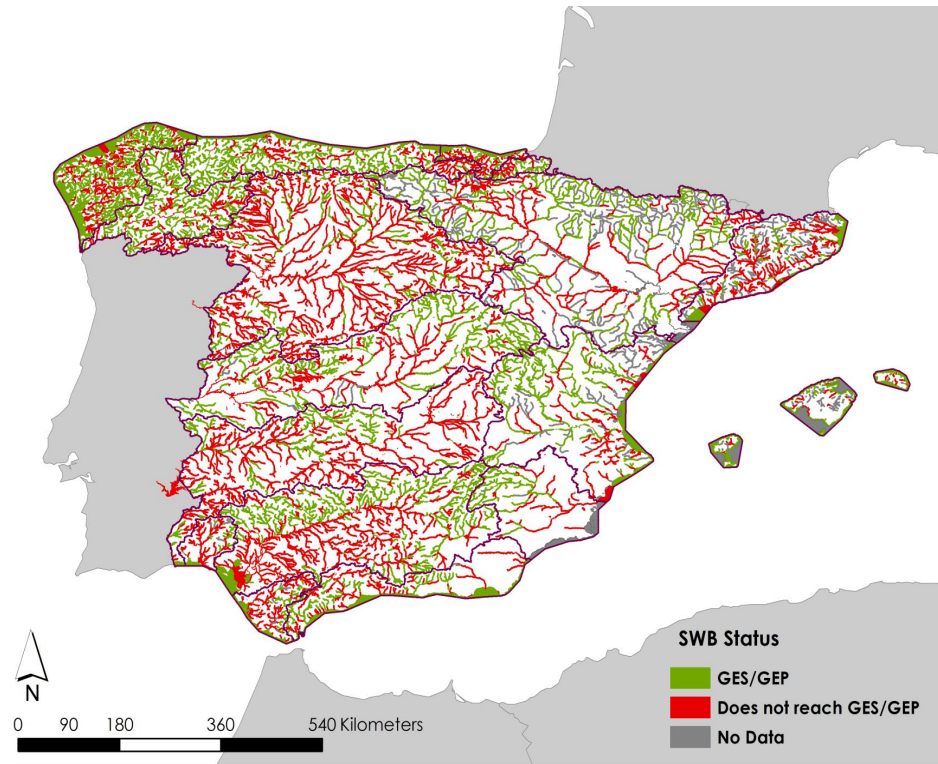
Ecological Status of SWB



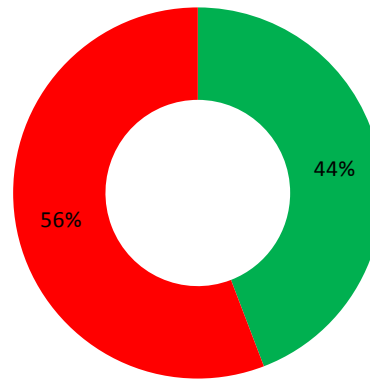
Chemical Status of SWB



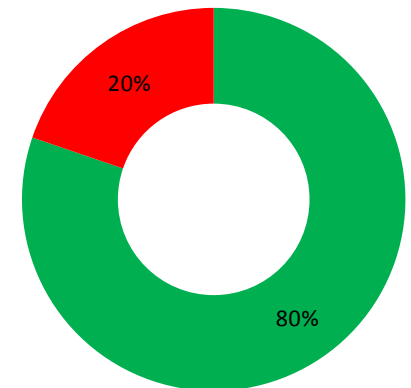
Surface Water Status



Number of WB in poor Status (%)



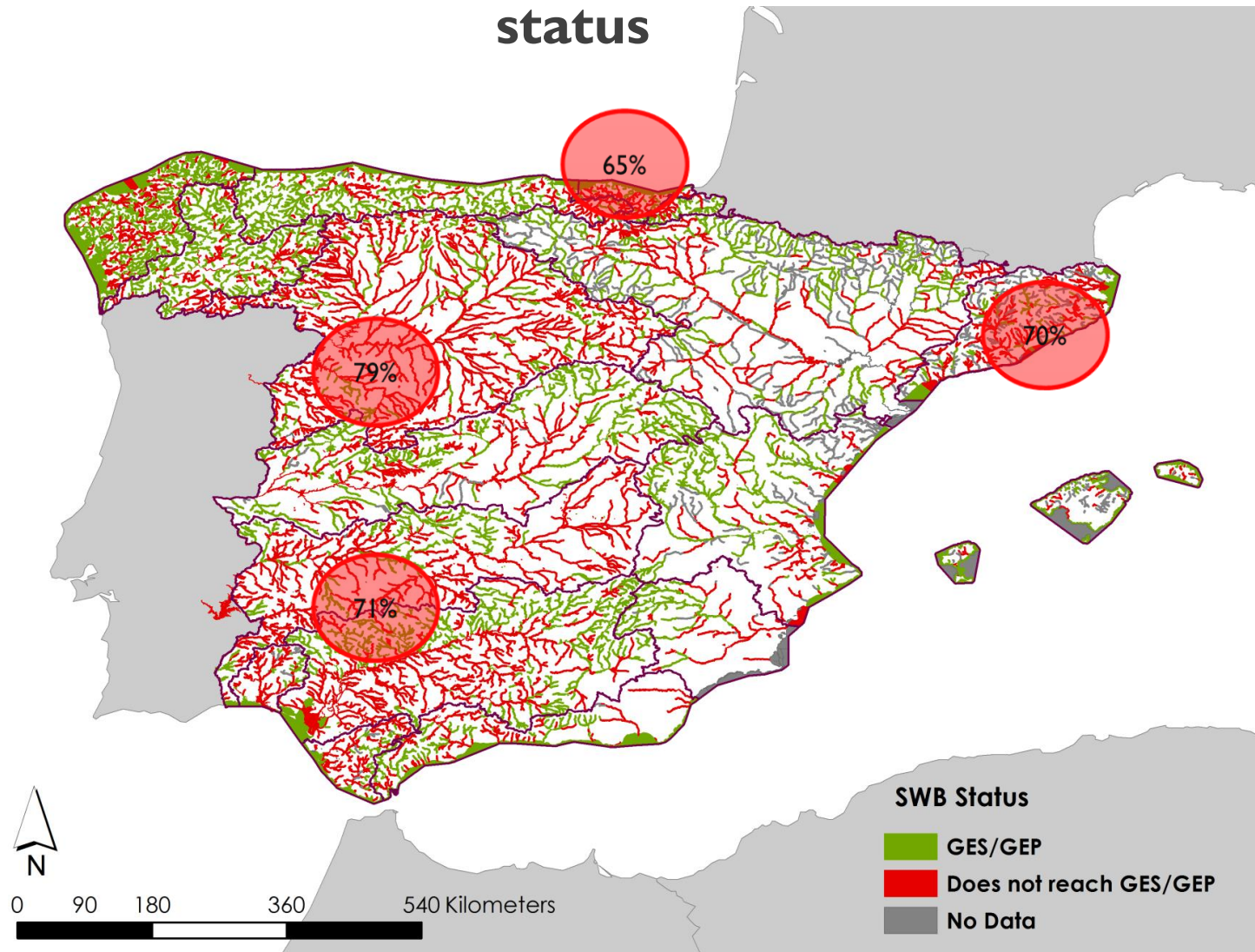
Km of rivers in poor Status (%)



Km2 of SWB in poor Status (%)

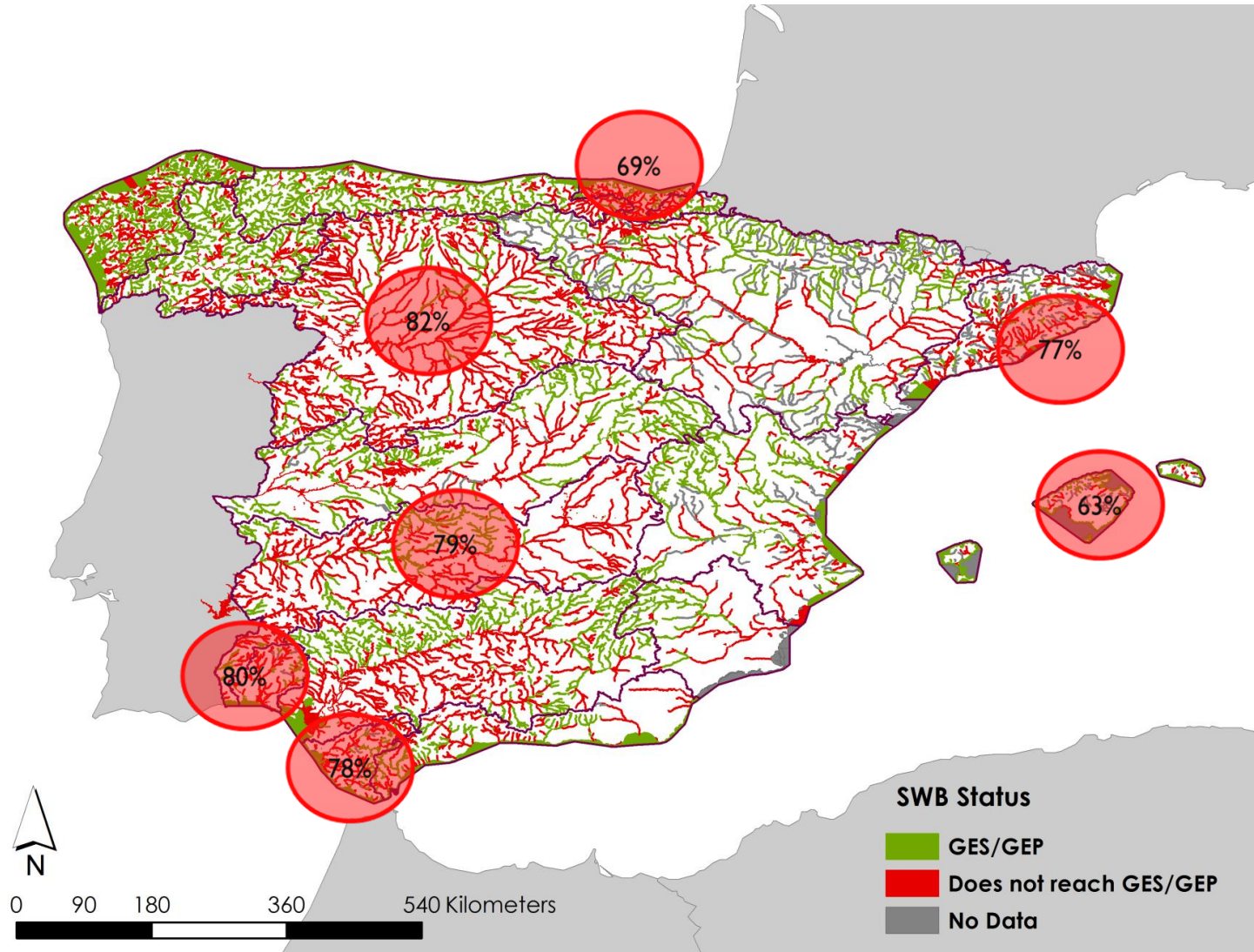
Surface Water Status

HOTSPOTS: basins with 60% of WB in poor status



Surface Water Status

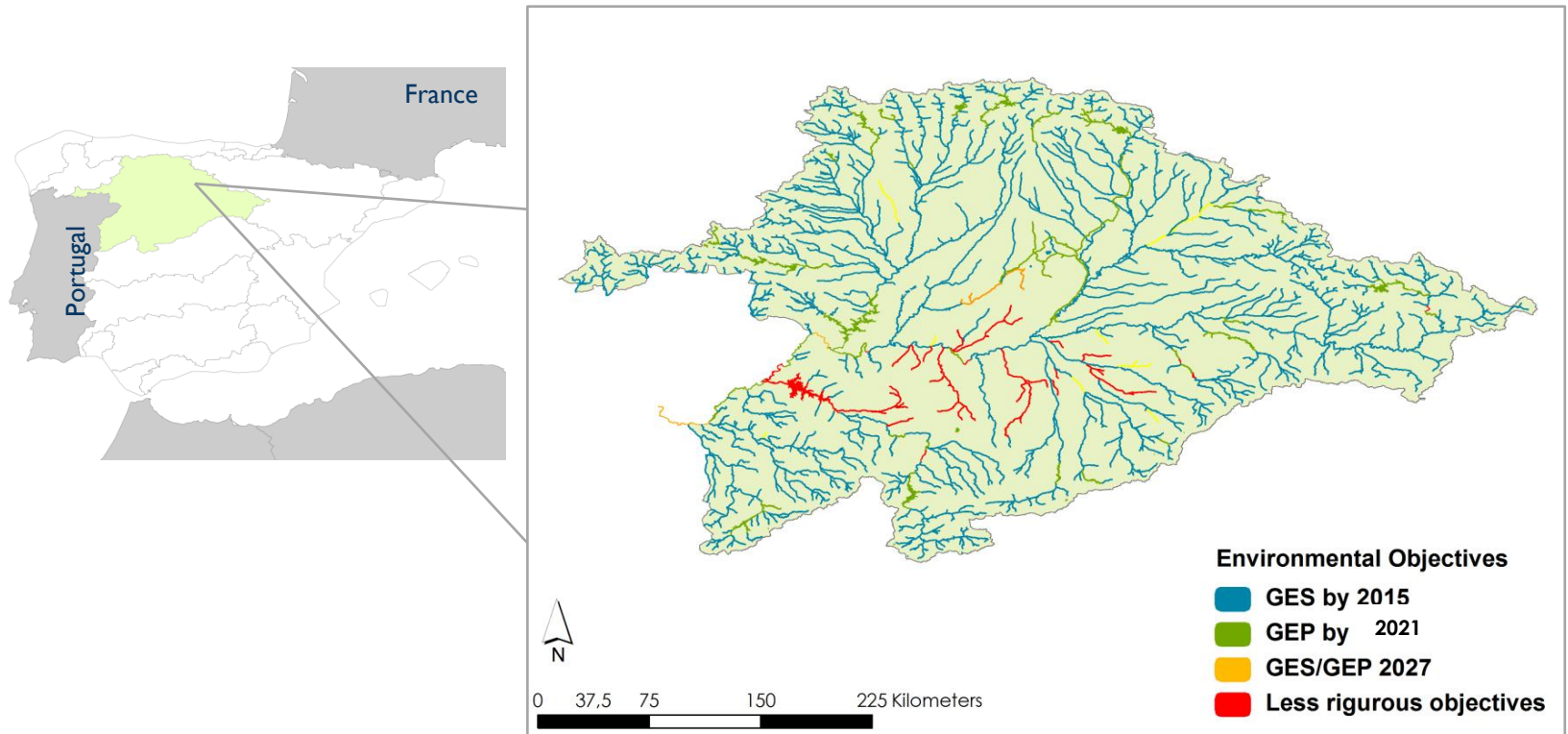
HOTSPOTS: basin with 60% of the total area or river length WB in poor status



Summary of Surface Water Bodies Status in number or length/area

Range of WB in poor status	Number of RB	Km or ha of RB
0-25	2	0
25-50	11	9
50-75	3	6
75-100	1	2
RB with no data	7	7

Expected trends in hotspots



Water Bodies	Number	GOOD status today	GOOD status 2015	GOOD status 2021	GOOD status 2027
Rivers	696	147 (21%)	641 (92%)	651 (94%)	655 (94%)
Lakes	14	0	14 (100%)		

Is it realistic the 2015 objective given the current socio-economic context?

Different assessment approaches make comparison across basins difficult

BIOLOGICAL ASSESSMENT

Out of 7 criteria, RB mostly have assessed only 3-4

Most RB left out FISH indicators

HYDROMORFOLOGICAL ASSESSMENT

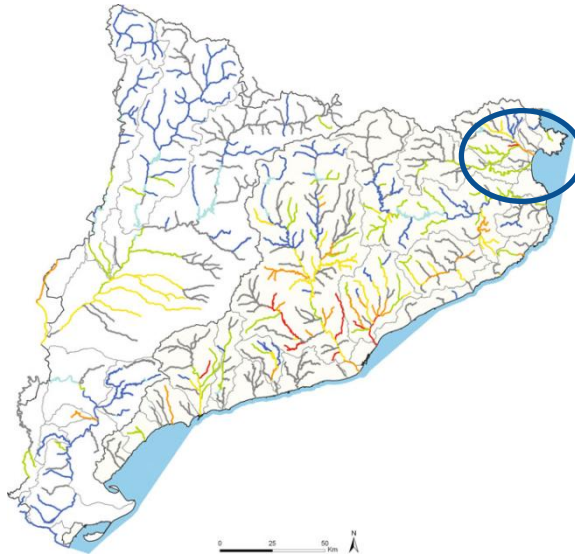
Out of 4 criteria, RB mostly have assessed only 1-2

PHYSICO-CHEMICAL ASSESSMENT

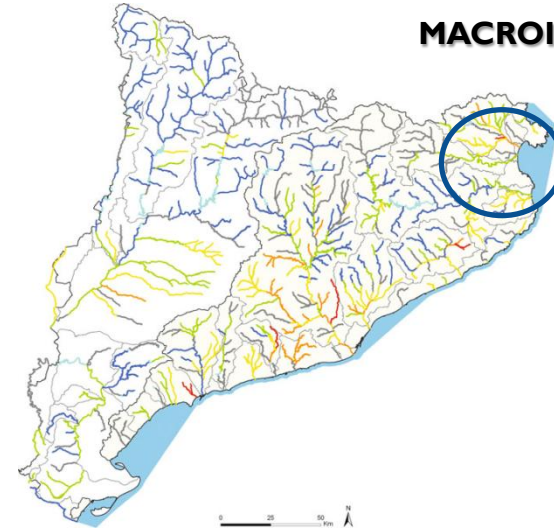
Most RB have assessed multiple criteria (up to 8)

Catalan internal basins: different results when using different indicators

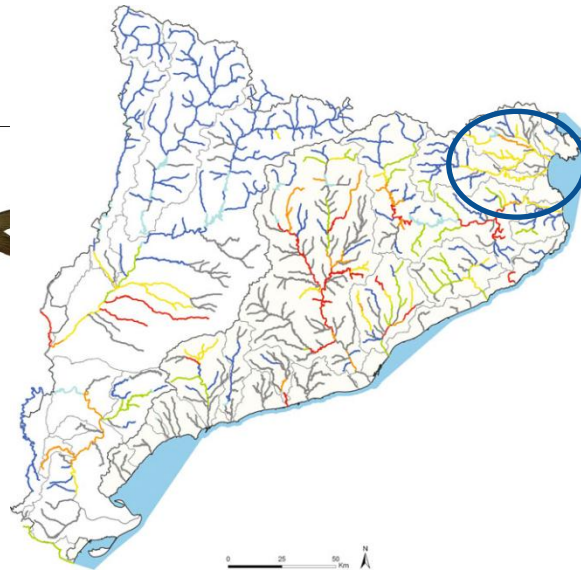
DIATOMS



MACROINVERTEBRATES



FISH FAUNA



BIOLOGICAL STATUS



Concluding remarks:

Since 2005 the volume of ecological information generated has been spectacular, but current analysis shows important technical gaps.

Bad status of SWB is due to poor ecological status and apparently not much because of pollution. At this stage, is difficult to ascertain the real drivers behind poor water status, since many basins do not offer disaggregated evaluations for the different ecological status indicators.

Less than 50% of SWB have good ecological conditions and it seems difficult to reach the 2015 objective under current circumstances.

Concluding remarks: Technical and management gaps

Comparing environmental results of WB across all basins is not possible yet. Mostly because:

- ✓ Hydromorphological indicators have not been fully considered since we are missing reference conditions for most indicators.

- ✓ Among biological indicators, fishes represent a highly sensitive bioindicator, but it has not been included in most assessments due to the lack of reference conditions.

Clearer criteria is needed to define HMWB. It seems that some basins have chosen to reduce the environmental goals by using a “backdoor” and declaring a large number of WB as HMWB.

