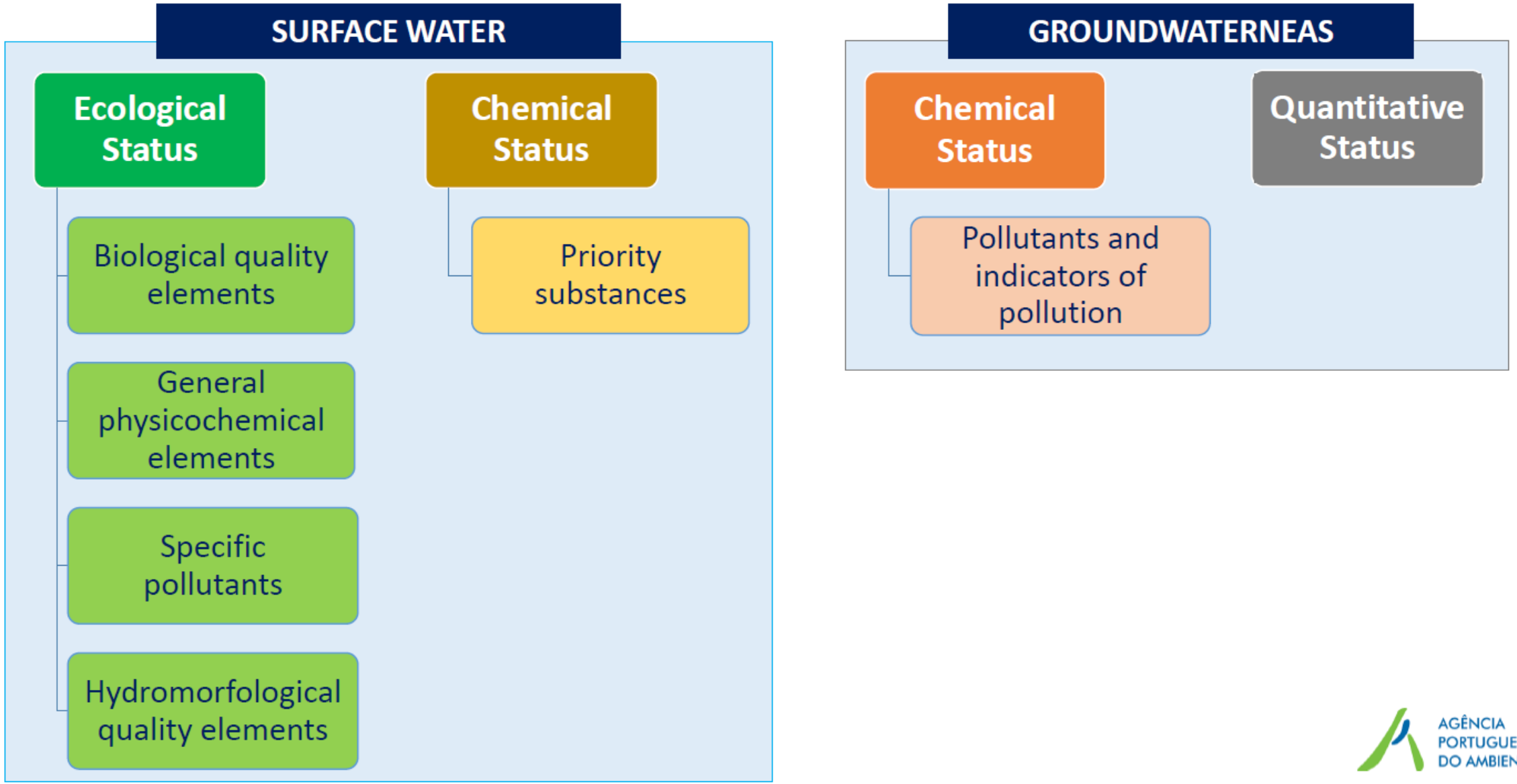
Qualidade química no âmbito da DQA
(baseado em informações de Susana NUNES, Sofia BATISTA e Maria Felisbina QUADRADO)

AGÊNCIA PORTUGUESA DO AMBIENTE

Surface water and Groundwater Status in the scope of WFD



AGÊNCIA PORTUGUESA DO AMBIENTE

Legislative framework – Water Framework Directive/Quality

Water Framework Directive (WFD) – Diretive 2000/60/EC of 23/10

(National) Water Law - Law no. 58/2005 of 29/12

Amended by several legal acts

Decree-Law no. 77/2006 of 30/03

Amended by DL no. 103/2010 of 24/9, and by DL no. 218/2015 of 7/10

Chemical Status of surface water

Priority Substances Directive - Diretive 2008/105/EC of 16/12

Amended by Diretive 2013/39/EU of 12/8

Decree-Law no. 103/2010 of 24/09

Amended by DL no. 83/2011 of 20/6, and by DL no. 218/2015 of 7/10

Chemical Status of groundwater

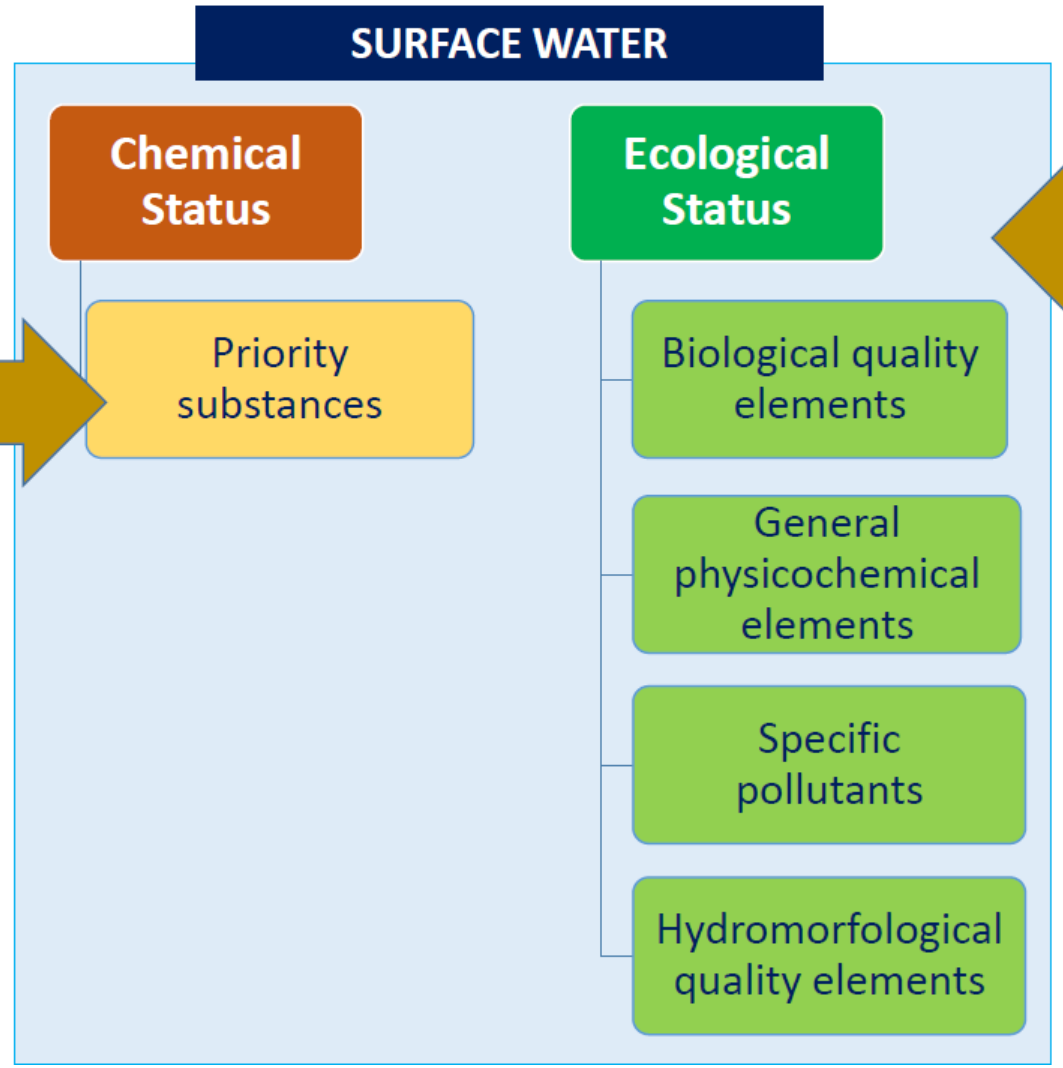
Groundwater Diretive – Diretive 2006/118/EC of 12/12

Amended by Diretive 2014/80/EU of 20/6

Decree-Law no. 208/2008 of 28/10

Amended by DL no. 34/2016 of 28/06

Evaluation of surface water status



Regular Review

- ✓ **Prioritization exercises of priority substances**
- ✓ **Watch List Mechanism**

River Basin Management Plans

Priority Substances Diretive
(Diretive 2008/105/EC of 16/12, amended by Diretive 2013/39/EU of 12/8, transposed by DL 103/2010 of 24/09, amended by DL n.º 218/2015 of 7/10)

AGÊNCIA PORTUGUESA DO AMBIENTE

Priority Substances and Other Pollutants List

DYNAMIC LIST WHICH IS REGULARLY UPDATED

alacloro	endossulfão	tricloroetileno**
antraceno	fluoranteno	Compostos de tributilestanho (Catião tributilestanho)
atrazina	hexaclorobenzeno	triclorobenzenos
benzeno	hexaclorobutadieno	triclorometano (clorofórmio)
éteres difenílicos bromados (PBDEs)	hexaclorociclohexano/ lindano	trifluralina
cádmio e compostos de cádmio	isoproturão	dicofol *
tetracloreto de carbono**	chumbo e compostos de chumbo	ácido perfluorooctanossulfónico e seus derivados (PFOS)*
cloroalcanos C10-13	mercúrio e compostos de mercúrio	quinoxifena*
clorfenvinfos	naftaleno	dioxinas e compostos semelhantes a dioxinas*
clorpirifos	níquel e compostos de níquel	aclonifena*
Pesticidas ciclodienos (aldrina, dieldrina, endrina, isodrina)**	Nonilfenol (4-Nonilfenol)	bifenox*
DDT total**	Octilfenol (4-(1,1',3,3'-tetrametilbutil)-fenol)	cibutrina*
p,p'-DDP**	pentaclorobenzeno	cipermetrina*
1,2-dicloroetano	pentaclorofenol	diclorvos*
diclorometano	hidrocarbonetos aromáticos policíclicos (PAH)	hexabromociclododecano (HBCDD)*
Ftalato di(2-etil-hexilo) (DEHP)	simazina	heptacloro e heptacloro epóxido*
diurão	tetracloroetileno**	terbutrina*

* New Priority Substances (Diretive 2013/39/EU of 12/8)

** Other Pollutants (already designated as dangerous substances before WFD)

luation of Priority Substances - Matrices

- Evaluation of priority substances in different matrices:

Water

EQS for inland waters and
EQS for coastal and transitional waters

Biota - Fish and shellfish

NQA for biota

Sediments

Trends

EQS for Priority Substances concerning evaluation of Chemical Status

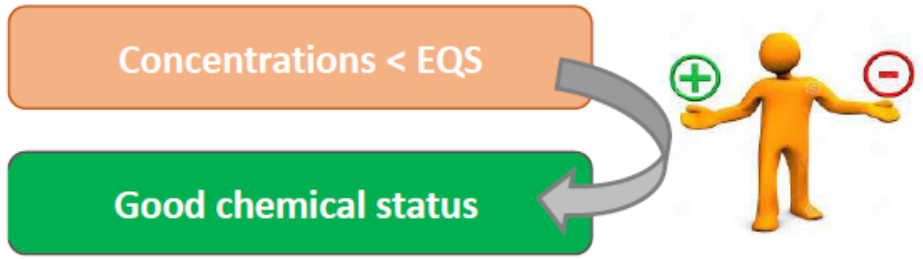
Environmental Quality Standard (EQS)
defined by the Directive 2008/105/EC (amended by Directive 2013/39/EC)

AA: annual average.

MAC: maximum allowable concentration.

Unit: [µg/l] for columns (4) to (7)

[µg/kg wet weight] for column (8)



(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
No	Name of substance	CAS number (1)	AA-EQS (2) Inland surface waters (3)	AA-EQS (2) Other surface waters	MAC-EQS (4) Inland surface waters (3)	MAC-EQS (4) Other surface waters	EQS Biota (12)
(1)	Alachlor	15972-60-8	0,3	0,3	0,7	0,7	
(2)	Anthracene	120-12-7	0,1	0,1	0,1	0,1	

(...)

AGÊNCIA PORTUGUESA DO AMBIENTE

Watch List Mechanism

Diretive 2013/39/EU of 12/8 (which amends Directive 2008/105 /EC of 16/12), **transposed by DL no. 218/2015 of 7/10** (which amends DL no. 103/2010 of 24/09)

The European Commission establishes the lists of substances for which **monitoring should be performed across the EU** in order to **increase the knowledge on the occurrence of these substances or groups of substances in the surface water as a basis for future prioritization exercises of priority substances.**

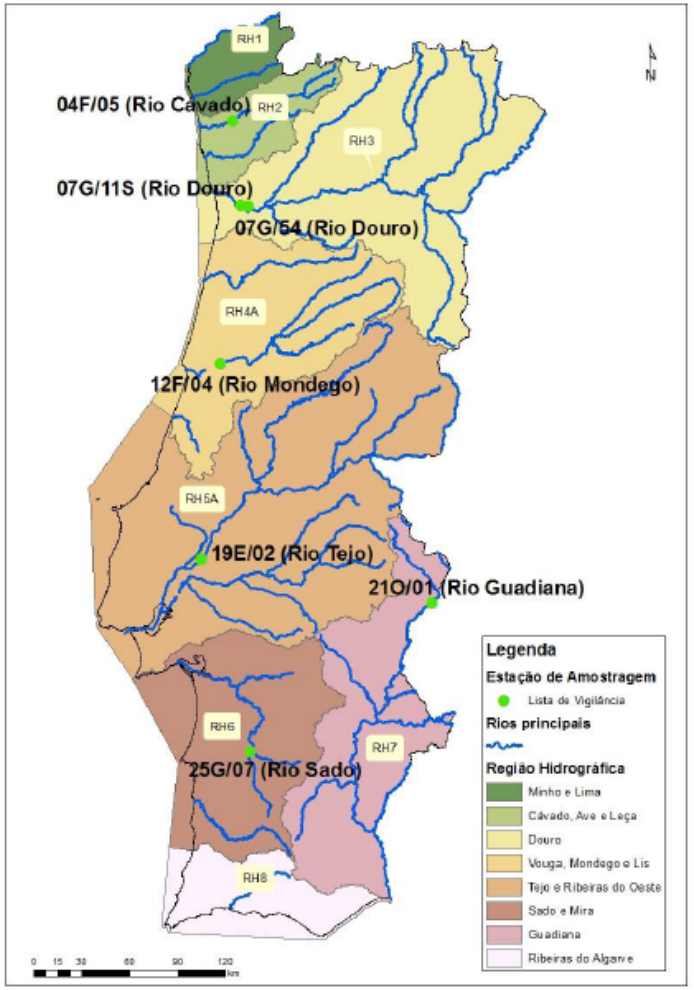
Inclusion of substances on Watch List:

- Available information indicates that the substance may represent a significant risk at EU level for the aquatic environment, or through it; and
- Insufficient monitoring data (maximum of 3 MS with monitoring results).

PEC/PNEC and MEC/PNEC Risk Quocientes

MEC - Measured Environmental Concentration.
PNEC - Predicted No-Effect Concentration.
PEC – Predicted Environmental Concentration.

Maximum period to remain on the Watch List: 4 years.
Risk analysis (based on MEC / PNEC) and prioritization of substances will determine if they will be included in the List of Priority Substances.



Number of stations to be monitor in PORTUGAL: 6

AGÊNCIA PORTUGUESA DO AMBIENTE

1st WATCH LIST

Name of substance/ group of substances		Source/ Pressure	Indicative analytical method	Maximum acceptable DL of the method (ng/l)
17-alpha-ethinylestradiol (EE2)	Synthetic sex hormone derived from 17β-estradiol, used in the contraceptive pill	Urban areas - urban WWTPs and rural areas - livestock	grande-volume SPE-LC-MS-MS	0.035
17-beta-estradiol (E2), Estrone (E1)	Natural/ synthetic hormone used as contraceptive pill; oxidation product is Estrone (E1)		SPE-LC-MS-MS	0.4
Diclofenac	Anti-inflammatory	Urban areas - urban WWTPs	SPE - LC-MS-MS	10
2,6-ditert-butyl-4-methylphenol	Anti-oxidant: food - E321; cosmetics - HMDB33826	Urban areas - urban WWTPs	SPE-GC-MS	3160
2-Ethylhexyl 4-methoxycinnamate	Sunscreen - UV filter (it is also present in paints, packages, interior of automobiles)	Inland and coastal bathing waters and Urban areas - urban WWTPs	SPE - LC-MS-MS or GC-MS	6000
Antibiotics from the macrolide family: Erythromycin Clarithromycin, Azithromycin	Antibiotics for human and veterinary use	Urban areas - urban WWTPs and rural areas - livestock	SPE-LC-MS-MS	90
Methiocarb	Insecticide/ acaricide authorized in Portugal	Rural areas – plant production	SPE - LC-MS-MS or GC-MS	10
Neonicotinoids: Imidacloprid, Thiacloprid, Thiamethoxam, Clothianidin, Acetamiprid.	Insecticide/ acaricide authorized in Portugal	Rural areas – plant production and livestock production	SPE-LC-MS-MS	9
Oxadiazon	Herbicide authorized in Portugal	Rural areas – plant production	LLE/SPE-GC-MS	88
Tri-allate	Herbicide non-authorized in Portugal/ Biocide	Rural areas – plant production; Non agricultural use of herbicide; industrial areas	LLE/SPE-GC-MS or LC-MS-MS	670

POSEUR-03-2013-FC-000001 Project – "Improvement of evaluation of water bodies status"

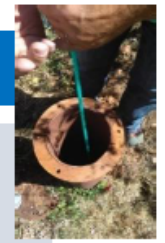
Component 3: Application of innovative methods for the evaluation of priority substances, watch list substances and specific pollutants in surface water bodies and emerging compounds in surface and ground water bodies - 2016-2018

SURFACE WATERS

Water matrix:
Quantitative evaluation of
priority substances, substances from the 1st watch list e specific pollutants

GROUNDWATERS

Quantitative evaluation of (targeted)
pesticides and
pharmaceutical substances



Biota matriz – Fish and Mussels:
Quantitative evaluation of
priority substances

Use of **passive samplers**:
Qualitative evaluation - screening of known and unknown substances, i.e. detection and identification of target compounds and emerging compounds, namely pharmaceutical substances and pesticides

Projeto cofinanciado por:
POSEUR
PORTUGAL 2020
UNIÃO EUROPEIA
Fundo de Coesão
AGÊNCIA PORTUGUESA DO AMBIENTE

Passive samplers – Surface water and Groundwater

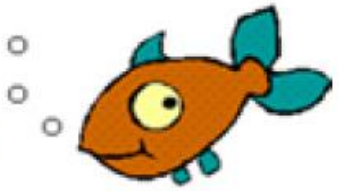
Surface water

Groundwater

Exposure time in the aquatic environment: 1 month

Lipophilic (non-polar) substances aggregation to organic matter

=



SPMD – Semipermeable Membrane Devices.
Trioleína (lípido)

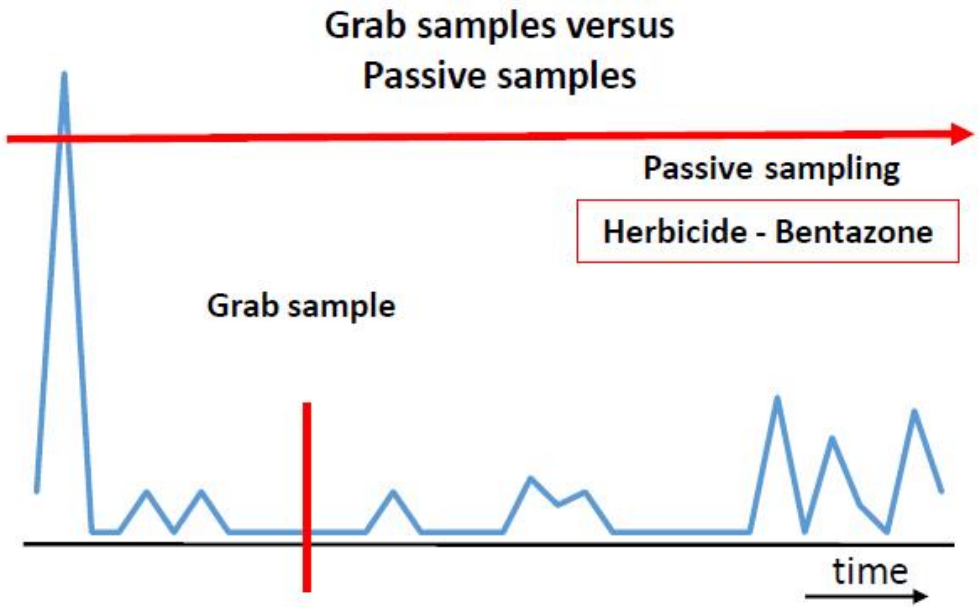
Virtual fish

Hydrophilic (polar) substances – dissolved in water

POCIS – Polar Organic Chemical Integrative sampler
(HLB – polímero de divinylbenzene e vinylpyrrolidinone).

AGÊNCIA PORTUGUESA DO AMBIENTE

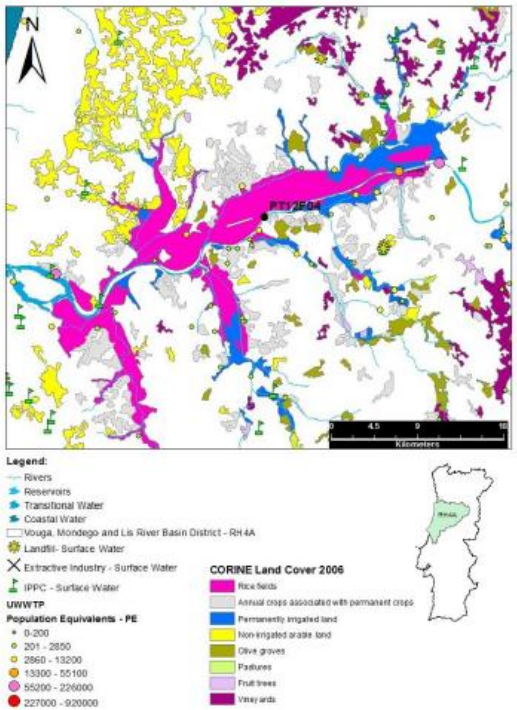
Grab sampling *versus* Passive sampling

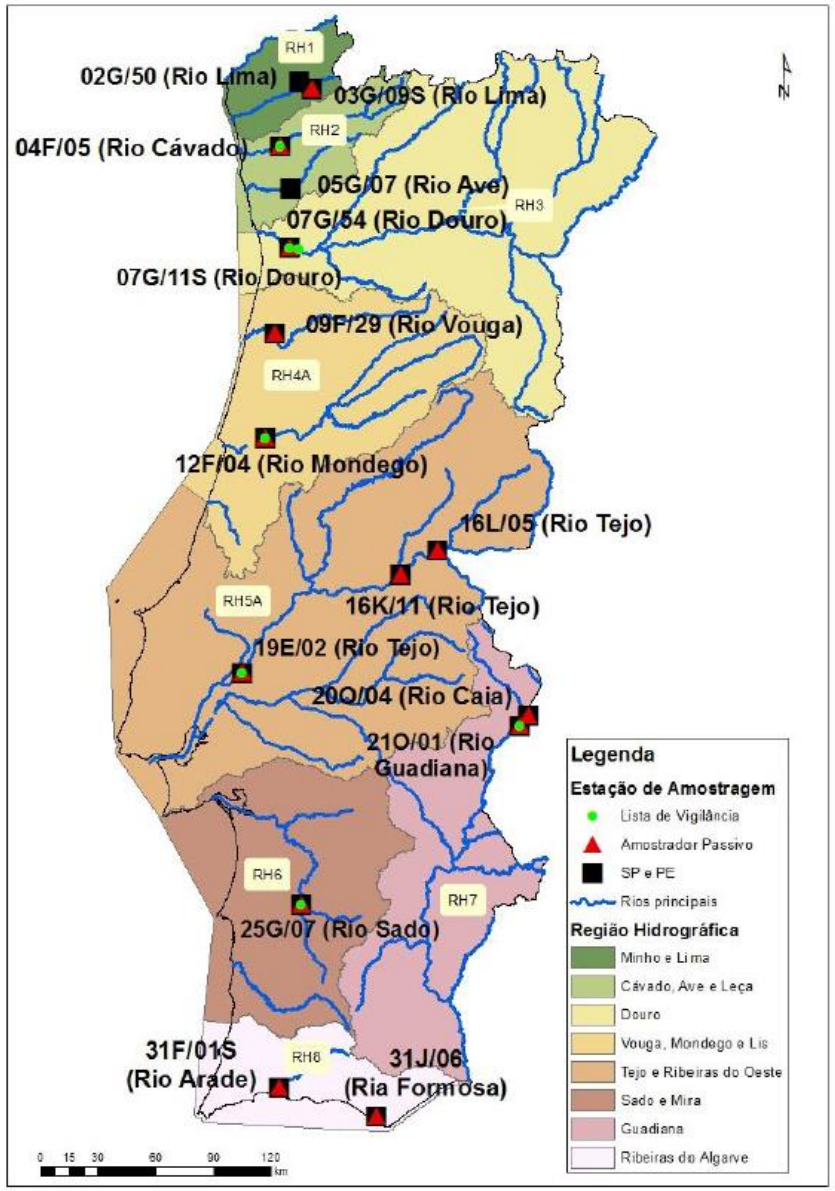


AGÊNCIA PORTUGUESA DO AMBIENTE

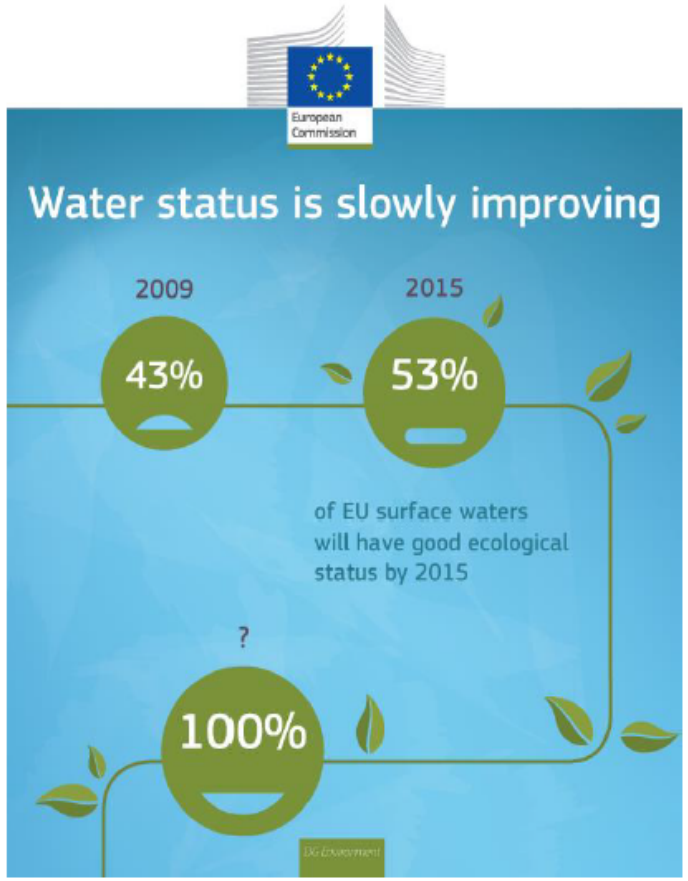
Monitoring stations – 2016 e 2017

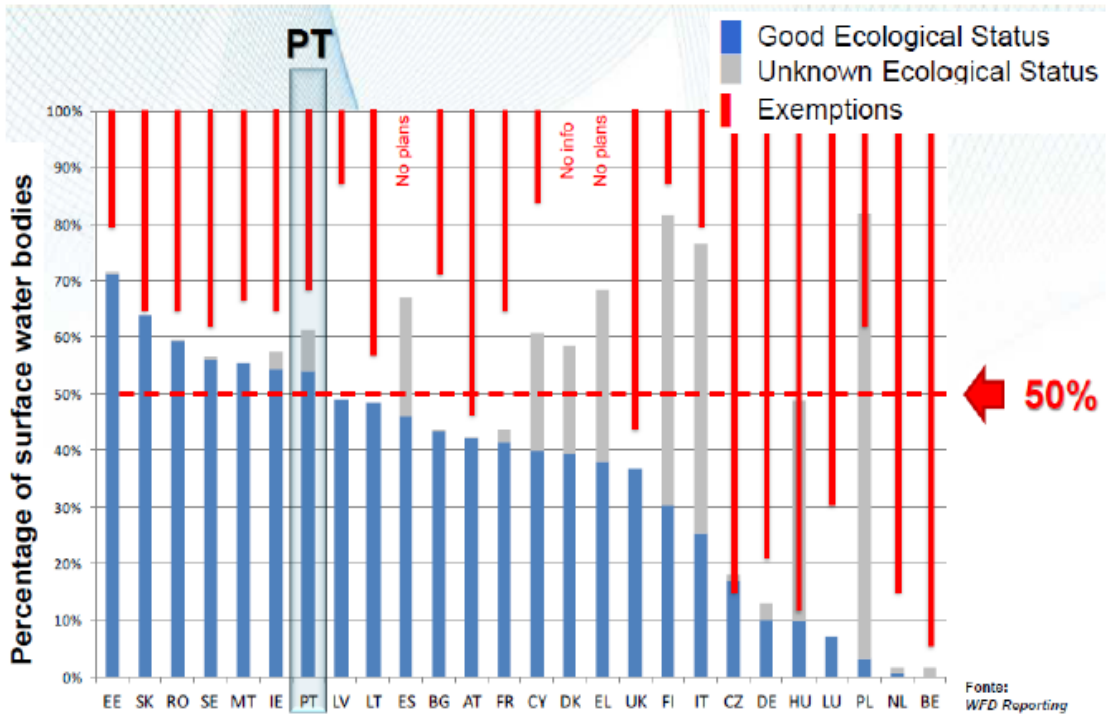
16 stations (in rivers, reservoirs, transitional and coastal waters) - selected taking into account the **pressures (agricultural, livestock, urban, industrial)** and considering, in general, hot spot areas





EU water bodies status – 1st cycle RBMP assessment





Good Ecological Status (1st cycle):

PT: 52%

UE: 43%

AGÊNCIA PORTUGUESA DO AMBIENTE

Sistemas de Classificação e Avaliação do Estado Ecológico das Massas de Água de Transição e Costeiras no âmbito da DQA (baseado em informações de Susana NUNES, Sofia BATISTA e Maria Felisbina QUADRADO)

AGÊNCIA PORTUGUESA DO AMBIENTE

CLASSIFICAÇÃO DO ESTADO ECOLÓGICO

AGÊNCIA PORTUGUESA DO AMBIENTE

- Elementos **físico-químicos e químicos** de suporte aos biológicos
- Elementos **hidromorfológicos** de suporte aos biológicos
- Elementos **biológicos (EQB)**

EQB Águas Costeiras

- Fitoplâncton
- Outras Plantas: Macroalgas, Sapais e Ervas Marinhas
- Macroinvertebrados bentónicos

EQB Águas de Transição

- Fitoplâncton
- Outras Plantas: Macroalgas, Sapais e Ervas Marinhas
- Macroinvertebrados bentónicos
- Peixes

TIPOS DE MASSAS DE ÁGUA

A1 - Estuário mesotidal estratificado

A2 - Estuário mesotidal homogéneo com descargas irregulares de rio

A3 - Lagoas costeiras semi-fechadas

A4 - Lagoas costeiras abertas

A5 - Costa atlântica mesotidal exposta

A6 - Costa atlântica mesotidal moderadamente exposta

A7 - Costa atlântica abrigada

ELEMENTOS FISICO-QUIMICOS E QUÍMICOS DE SUPORTE AOS BIOLÓGICOS

- **Foram desenvolvidos Critérios de Classificação para os Nutrientes**

Nitratos+Nitritos, Azoto amoniacal e Fosfato

Os **valores de referência** foram definidos com base no tratamento estatístico dos dados disponíveis. No caso dos estuários os valores de referência são definidos por classe de salinidade

- **Foram definidas normas de qualidade (NQA) para os poluentes específicos**

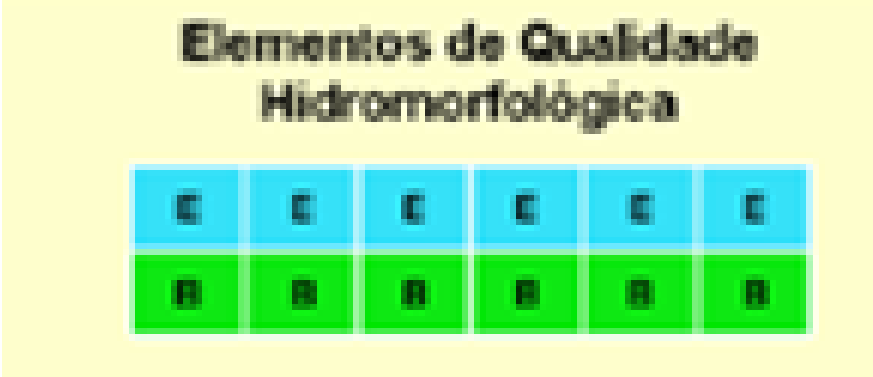
Poluentes específicos relevantes são substâncias químicas enquadradas nos pontos 1 a 9 do Anexo VIII da Diretiva Quadro da Água que não estão incluídos na lista de substâncias prioritárias.

ELEMENTOS HIDROMORFOLÓGICOS DE SUPORTE AOS BIOLÓGICOS

Na classificação dos elementos **hidromorfológicos** de suporte aos elementos biológicos, considera-se que uma massa de água não alcança o estado excelente **quando está sujeita a pressões hidromorfológicas significativas**.

Alterações hidromorfológicas e pressões significativas:

- Dragagens e deposição de dragados
- Retenções marginais
- Aterros
- Assoreamentos
- Erosões litorais
- Infraestruturas portuárias
- Vegetação invasora
- Açudes, moinhos e armadilhas
- Quebra-mares
- Esporões
- Emissários submarinos



Bibliografia:

- PGRH. Anexos da Parte 2 – Caracterização e Diagnóstico

EQB - FITOPLÂNCTON

Métrica: clorofila-a (biomassa, parâmetro indicador da produtividade fitoplanctónica)

Estatística: percentil 90 (variabilidade natural e sazonal do fitoplâncton)
É calculada a razão entre o percentil 90 e o valor de referência

As **condições de referência** são determinadas por tipo de massa de água. No caso dos estuários, as condições de referência foram definidas para três gamas de salinidade, que correspondem a comunidades fitoplanctónicas distintas.

	Índice	Excelente	Bom	Razoável	Medíocre	Mau
A1	Biomassa (Chl a)	≥ 0.67	[0,44 - 0,67[	[0,30 - 0,44[	[0,20 - 0,30[	[0 - 0,20[

Bibliografia:

- Brito *et al.,* (2012a). *Ecological Indicators*: 5-14.
- Brito *et al.,* (2012b). *Estuarine, Coastal and Shelf Science* 110: 147-156.
- Coutinho, *et al.,*(2012). *Estuarine, Coastal and Shelf Science* 110: 134-146
- PGRH. Anexos da Parte 2 – Caracterização e Diagnóstico.
- www.apambiente.pt

EQB - MACROALGAS

Índice **p-MarMAT – *Portuguese Marine Macroalgae Assessment Tool***

Métrica 1: Riqueza taxonómica
Métrica 2: Proporção de *taxa* de Clorófitos (Lista reduzida de taxa)
Métrica 3: Número de *taxa* de Rodófitos (Lista reduzida de taxa)
Métrica 4: Rácio de Grupo de Estado Ecológico (Lista reduzida de taxa)
Métrica 5: Proporção de *taxa* oportunistas (Lista reduzida de taxa)
Métrica 6: Cobertura de *taxa* oportunistas em percentagem
Métrica 7: Descrição do local de amostragem (Tabela preenchida no campo)

Condições de Referência – definidas para os tipos A5, A6 e A7

Tabela de pontuações – define a pontuação a atribuir a cada métrica, face ao desvio das condições medidas em relação às condições de referência

p-MarMAT	EQR	Qualidade Ecológica
0-7	0-0.27	Má
8-14	0.28-0.45	Medíocre
15-21	0.46-0.60	Razoável
22-28	0.61-0.79	Boa
29-36	0.80-1	Excelente

Bibliografia:

•Neto *et al.,* (2012). *Ecological Indicators* 19: 39-47.
•PGRH. Anexos da Parte 2 – Caracterização e Diagnóstico.
•www.apambiente.pt

EQB – MACROALGAS OPORTUNISTAS

Índice **BMI – *Blooming Macroalgae Index***

Métrica 1: área intertidal disponível para os florescimentos, i.e., excluindo as áreas ocupadas por vegetação e/ou substrato duro
Métrica 2: área ocupada pelos florescimentos
Métrica 3: percentagem de cobertura dos florescimentos.

Tipo Nacional		Índice	Excelente	Bom	Razoável	Medíocre	Mau
Estuário mesotidal estratificado	A1	BMI	≥ 0,80	[0,60 - 0,80[	[0,40 - 0,60[	[0,20 - 0,40[	[0 - 0,20[
Estuário mesotidal homogéneo com descargas irregulares de rio	A2	BMI	≥ 0,80	[0,60 - 0,80[	[0,40 - 0,60[	[0,20 - 0,40[	[0 - 0,20[

Bibliografia:

• Patrício, *et al.,* (2003). *Marine Pollution Bulletin* 54: 1887-1896
• PGRH. Anexos da Parte 2 – Caracterização e Diagnóstico
• www.apambiente.pt

EQB - SAPAIS

Índice **AQuA-Index - *Angiosperm Quality Assessment Index***

Métrica 1: Diversidade de Shannon
Métrica 2: Diversidade Máxima de Shannon
Métrica 3: Índice de Equitabilidade de Pielou
Métrica 4: Índice de Diversidade de Margalef
Métrica 5: Número total de espécies

AquA-Index	Qualidade Ecológica
0.00-0.19	Má
0.20-0.39	Medíocre
0.40-0.59	Razoável
0.60-0.79	Boa
0.80-1.00	Excelente

Aplicando a formulação definida em Caçador *et al.,* (2013) é calculado o valor do índice

Bibliografia:

• Caçador et al., (2013). *Ecological Indicators* 25: 141-148.
• PGRH. Anexos da Parte 2 – Caracterização e Diagnóstico.
• www.apambiente.pt

EQB – ERVAS MARINHAS

Índice SQI – *Seagrass Quality Index*

Índice	Excelente	Bom	Razoável	Medíocre	Mau
SQI	≥ 0,80	[0,60 - 0,80[	[0,40 - 0,60[	[0,20 - 0,40[	[0 - 0,20[

Métrica 1 – composição taxonómica
Métrica 2 – abundância
- 2.1 área intertidal ocupada
- 2.2 densidade de indivíduos/meristemas foliares
- 2.3 % cobertura média e/ou distribuição de classes de cobertura

As **condições de referência** são estabelecidas por massa de água, tendo em consideração dados históricos e a avaliação de peritos

A partir da formulação descrita em Neto *et al.,* (2013), é calculado o valor do índice

Bibliografia:

- Neto, *et al.,* (2013). *Ecological Indicators* 30, 130-137.
- PGRH. Anexos da Parte 2 – Caracterização e Diagnóstico.
- www.apambiente.pt

EQB – MACROINVERTEBRADOS BENTÓNICOS

Índice **BAT – *Benthic Assessment Tool*** (macroinvertebrados de substrato móvel)

Métrica 1: Índice de Margalef – Riqueza especifica
Métrica 2: Índice de Shannon-Weaver - Abundância
Métrica 3: AMBI - AZTI's Marine Biotic Index – Grupos ecológicos

Após o cálculo dos índices, os valores dos mesmos são normalizados e submetidos a análise fatorial de acordo com a metodologia proposta por Bald *et al*., (2005) e Muxika *et al*., (2007)

Tipo Nacional		Índice	Excelente	Bom	Razoável	Medíocre	Mau
Estuário mesotidal estratificado	A1	BAT	≥ 0,79	[0,58 - 0,79[	[0,44 – 0,58[	[0,27 - 0,44[	< 0,27
Estuário mesotidal homogéneo com descargas irregulares de rio	A2	BAT	≥ 0,79	[0,58 - 0,79[	[0,44 – 0,58[	[0,27 - 0,44[	< 0,27

Bibliografia:

- Teixeira *et al.,*. (2009). *Marine Pollution Bulletin* 58 (10), 1477-1486.
- PGRH. Anexos da Parte 2 – Caracterização e Diagnóstico.
- www.apambiente.pt

EQB - PEIXES

Índice ***EFAI - Estuarine Fish Assessment Index***

EFAI	EQR	Qualidade Ecológica
6-8	0.20	Má
9-12	0.30	Medíocre
13-17	0.43	Razoável
18-25	0.60	Boa
26-30	0.86	Excelente

- **Métrica 1:** Riqueza especifica
- **Métrica 2:** Percentagem de indivíduos que utilizam o estuário como viveiro
- **Métrica 3:** Percentagem de indivíduos de espécies residentes
- **Métrica 4:** Espécies piscívoras
- **Métrica 5:** Espécies diádromas
- **Métrica 6:** Espécies sensíveis a perturbações

Condições de Referência – definidas para estuários (estuário hipotético) e massas de água oligohalinas, mesohalinas e polihalinas

Tabela de pontuações – define a pontuação a atribuir a cada métrica, face ao desvio das condições medidas em relação às condições de referência

Bibliografia:

- Cabral *et al.*, (2012). *Ecological Indicators:* 144-153.
- PGRH. Anexos da Parte 2 – Caracterização e Diagnóstico.
- www.apambiente.pt

AGÊNCIA PORTUGUESA DO AMBIENTE

SISTEMAS DE CLASSIFICAÇÃO - RESUMO

	Tipos MA	Elementos biológicos					
		Fitoplâncton	Macroalgas	Sapais	Ervas marinhas	Bentos	Peixes
Estuários	A1	Clorofila-a	BMI	Aqua-Index	SQI	BAT	EFAI
	A2						
Lagoas costeiras	A3	Clorofila-a	BMI	Aqua-Index	SQI	BAT	---
	A4						
Costa aberta	A5	Clorofila-a	Mar-MAT	---	SQI	BAT	---
	A6						
	A7						

Mediterranean GIG River BQEs Intercalibration Exercise

Macroinvertebrates, diatoms and macrophytes

General Coordinator: Teresa Ferreira

Coordinator benthic macroinvertebrates: Maria João Feio

Coordinator benthic microflora: Salomé Almeida

Coordinator macrophytes: Francisca Aguiar

Coordinator Fish: Pedro Segurado

WFD CIS Ecostat Meeting, Brussels, October 2011

- 7 countries participating: Portugal, France, Spain, Cyprus, Slovenia, Greece (only macrophytes) and Italy
- 42 experts and country representatives
- 21 international meetings, of which 7 General Med GIG meetings

Overview of Methods to be intercalibrated

Benthic macroinvertebrates

Member State	Method	Status	Reported in Wiser
Portugal	Rivers Biological Quality Assessment Method-Benthic Invertebrates (IPtIN, IPtIS)	1	**Yes**
Spain 1	Iberian Biological Monitoring Working Party (IBMWP)	1	**Yes**
Spain 2	Iberian Mediterranean Multimetric Index—using quantitative data (IMMi-T)	1	**Yes**
France	Global biological normalized index (IBGN)	1	**Yes**
Cyprus	STAR Intercalibration Common Metric Index (STAR-ICMi)	1	**Yes**
Slovenia	Slovenian Ecological Status assessment system for rivers using benthic invertebrates	1,2	**Yes**
Italy	Based on STAR_ICM index calculation (MacrOper)	1,2	**Yes**

National method descriptions

MS	National method	Reference conditions setting at National level
Portugal	Rivers Biological Quality Assessment Method-Benthic Invertebrates (IPtIN, IPtIS) Method used in 1st IC. Described in: Annex 2.4.1e from Intercalibration Technical Report - Rivers and J. Ferreira, J.M. Bernardo, M.H. Alves (2008). Exercício de intercalibração em rios no âmbito da Directiva-Quadro da Água. Acta do 9º Congresso da Água, Lisboa. Multimetric indices based on the following metrics: number of taxa, number of EPT families, eveness, IASPT, log (sel. ETD+1), log (sel. EPTCD+1)	Reference conditions followed the guidelines and pressure screening criteria provided by the Working Group 2.3 – REFCOND and described on CIS WFD Guidance Document N° 10 - Rivers and Lakes – Typology, Reference Conditions and Classification Systems. The applied methodology included spatial analysis, historical data analysis and expert judgment. Semi-quantitative analysis was used in order to assess the magnitude of 9 pressure variables (Land Use, Riparian Zone, Sediment Load, Hydrological Regime, Acidification and Toxicity, Morphological Condition, Organic Matter Contamination and Nutrient Enrichment, River Continuity) a procedure adapted from European Project FAME - Development, Evaluation and Implementation of a Fish-based Assessment Method for the Ecological Status of European Rivers. A Contribution to the Water Framework Directive (Contract EVK1-CT-2001-00094). This procedure was applied according to the specificities of the different river types and lack of true reference sites in some river types lead to the selection of "best available sites". A final biological screening was also made in order to exclude sites with communities typical of degraded sites.

National method descriptions

MS	National method	Reference conditions setting at National level
Portugal	Rivers Biological Quality Assessment Method-Benthic Invertebrates (IPtIN, IPtIS) Method used in 1st IC. Described in: Annex 2.4.1e from Intercalibration Technical Report - Rivers and J. Ferreira, J.M. Bernardo, M.H. Alves (2008). Exercício de intercalibração em rios no âmbito da Directiva-Quadro da Água. Acta do 9º Congresso da Água, Lisboa. Multimetric indices based on the following metrics: number of taxa, number of EPT families, eveness, IASPT, log (sel. ETD+1), log (sel. EPTCD+1)	Reference conditions followed the guidelines and pressure screening criteria provided by the Working Group 2.3 – REFCOND and described on CIS WFD Guidance Document Nº 10 - Rivers and Lakes – Typology, Reference Conditions and Classification Systems. The applied methodology included spatial analysis, historical data analysis and expert judgment. Semi-quantitative analysis was used in order to assess the magnitude of 9 pressure variables (Land Use, Riparian Zone, Sediment Load, Hydrological Regime, Acidification and Toxicity, Morphological Condition, Organic Matter Contamination and Nutrient Enrichment, River Continuity) a procedure adapted from European Project FAME - Development, Evaluation and Implementation of a Fish-based Assessment Method for the Ecological Status of European Rivers. A Contribution to the Water Framework Directive (Contract EVK1-CT-2001-00094). This procedure was applied according to the specificities of the different river types and lack of true reference sites in some river types lead to the selection of "best available sites". A final biological screening was also made in order to exclude sites with communities typical of degraded sites.

National method descriptions

MS	National method	Reference conditions setting at National level
Portugal	Rivers Biological Quality Assessment Method-Benthic Invertebrates (IPtIN, IPtIS) Method used in 1st IC. Described in: Annex 2.4.1e from Intercalibration Technical Report - Rivers and J. Ferreira, J.M. Bernardo, M.H. Alves (2008). Exercício de intercalibração em rios no âmbito da Directiva-Quadro da Água. Acta do 9º Congresso da Água, Lisboa. Multimetric indices based on the following metrics: number of taxa, number of EPT families, eveness, IASPT, log (sel. ETD+1), log (sel. EPTCD+1)	Reference conditions followed the guidelines and pressure screening criteria provided by the Working Group 2.3 – REFCOND and described on CIS WFD Guidance Document Nº 10 - Rivers and Lakes – Typology, Reference Conditions and Classification Systems. The applied methodology included spatial analysis, historical data analysis and expert judgment. Semi-quantitative analysis was used in order to assess the magnitude of 9 pressure variables (Land Use, Riparian Zone, Sediment Load, Hydrological Regime, Acidification and Toxicity, Morphological Condition, Organic Matter Contamination and Nutrient Enrichment, River Continuity) a procedure adapted from European Project FAME - Development, Evaluation and Implementation of a Fish-based Assessment Method for the Ecological Status of European Rivers. A Contribution to the Water Framework Directive (Contract EVK1-CT-2001-00094). This procedure was applied according to the specificities of the different river types and lack of true reference sites in some river types lead to the selection of "best available sites". A final biological screening was also made in order to exclude sites with communities typical of degraded sites.

National method descriptions

MS	National method	Reference conditions setting at National level
Portugal	Rivers Biological Quality Assessment Method-Benthic Invertebrates (IPtIN, IPtIS) Method used in 1st IC. Described in: Annex 2.4.1e from Intercalibration Technical Report - Rivers and J. Ferreira, J.M. Bernardo, M.H. Alves (2008). Exercício de intercalibração em rios no âmbito da Directiva-Quadro da Água. Acta do 9º Congresso da Água, Lisboa. Multimetric indices based on the following metrics: number of taxa, number of EPT families, eveness, IASPT, log (sel. ETD+1), log (sel. EPTCD+1)	Reference conditions followed the guidelines and pressure screening criteria provided by the Working Group 2.3 – REFCOND and described on CIS WFD Guidance Document Nº 10 - Rivers and Lakes – Typology, Reference Conditions and Classification Systems. The applied methodology included spatial analysis, historical data analysis and expert judgment. Semi-quantitative analysis was used in order to assess the magnitude of 9 pressure variables (Land Use, Riparian Zone, Sediment Load, Hydrological Regime, Acidification and Toxicity, Morphological Condition, Organic Matter Contamination and Nutrient Enrichment, River Continuity) a procedure adapted from European Project FAME - Development, Evaluation and Implementation of a Fish-based Assessment Method for the Ecological Status of European Rivers. A Contribution to the Water Framework Directive (Contract EVK1-CT-2001-00094). This procedure was applied according to the specificities of the different river types and lack of true reference sites in some river types lead to the selection of "best available sites". A final biological screening was also made in order to exclude sites with communities typical of degraded sites.

National method descriptions

MS	National method	Reference conditions setting at National level
Portugal	Rivers Biological Quality Assessment Method-Benthic Invertebrates (IPtIN, IPtIS) Method used in 1st IC. Described in: Annex 2.4.1e from Intercalibration Technical Report - Rivers and J. Ferreira, J.M. Bernardo, M.H. Alves (2008). Exercício de intercalibração em rios no âmbito da Directiva-Quadro da Água. Acta do 9º Congresso da Água, Lisboa. Multimetric indices based on the following metrics: number of taxa, number of EPT families, eveness, IASPT, log (sel. ETD+1), log (sel. EPTCD+1)	Reference conditions followed the guidelines and pressure screening criteria provided by the Working Group 2.3 – REFCOND and described on CIS WFD Guidance Document Nº 10 - Rivers and Lakes – Typology, Reference Conditions and Classification Systems. The applied methodology included spatial analysis, historical data analysis and expert judgment. Semi-quantitative analysis was used in order to assess the magnitude of 9 pressure variables (Land Use, Riparian Zone, Sediment Load, Hydrological Regime, Acidification and Toxicity, Morphological Condition, Organic Matter Contamination and Nutrient Enrichment, River Continuity) a procedure adapted from European Project FAME - Development, Evaluation and Implementation of a Fish-based Assessment Method for the Ecological Status of European Rivers. A Contribution to the Water Framework Directive (Contract EVK1-CT-2001-00094). This procedure was applied according to the specificities of the different river types and lack of true reference sites in some river types lead to the selection of "best available sites". A final biological screening was also made in order to exclude sites with communities typical of degraded sites.

Compliance checking of national methods

3. **All relevant parameters** indicative of the biological quality element are covered (see Table 1 in the IC Guidance)[2]. A **combination rule** to combine parameter assessment into BQE assessment has to be defined. If parameters are missing, Member States need to demonstrate that the method is sufficiently indicative of the status of the QE as a whole.	PT-yes SP- abundance and diversity are not used; SP2-yes FR- abundance class in progress (see wiser) IT-yes SI-yes CY-yes

[2] Diversity is used by the common metric (ICMi), which is also the IT and CY method. PT method uses equitability as a metric, which is also derived from Shannon-Wiener diversity. FR includes the total number of taxa and SP2 the total number of families. All methods are highly correlated with the common metric (except SP with a lower correlation), which is fully compliant and has reliable responses to pressures.

Compliance checking of national methods

7. Sampling procedure allows for **representative** information about water body quality/ ecological status **in space and time**[3]	PT- sampling done in 1 occasion in the year: February-June SP- 1 occasion: Spring; SP2: 1 occasion FR- 1 occasion June-September IT- 2 (temporary rivers, Spring and Winter) or 3 occasions (Spring, Winter and Autumn/Summer) SI - 1 occasion: June to September CY- 3 occasions: Winter, Spring and Autumn

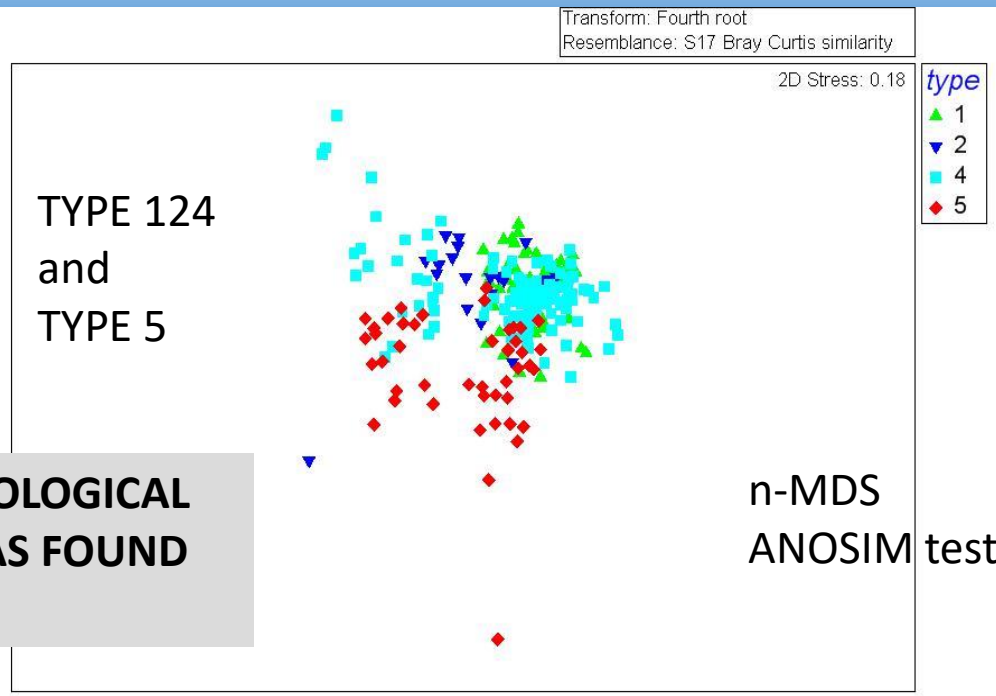
[3] Sampling takes place 1-3 times depending on the MS. Spring (month varies according to geographical location) is common to all MS. Testing with the present data set suggests that the time variability is not relevant in terms of EQR variability, even in Mediterranean conditions (please refer to Section 6.1).

Common intercalibration types

Common IC type	Type characteristics	MS sharing IC common type
RM1	catchment <100 km^2; mixed geology (except non-siliceous); highly seasonal	France, Italy, Portugal, Slovenia, Spain
RM2	catchment 100-1000 km^2 ; mixed geology (except non-siliceous); highly seasonal	France, Greece, Italy, Portugal, Slovenia, Spain
RM3 - insufficient reference sites for intercalibration purposes, and some methods were not comparable		
RM4	non-siliceous streams; highly seasonal	Cyprus, France, Greece, Italy, Spain
RM5	temporary rivers	Cyprus, Italy, Portugal, Slovenia, Spain

Common intercalibration types

Note: The borders of the types were redefined for a better adjustment to the ecological reality. The redefinition was based on ordination data treatment, and presented, discussed and agreed in the General Mediterranean GIG meetings. The biological analysis furthermore revealed a poor segregation between types RM1, 2 and 4. Therefore these types were treated together throughout the IC process.

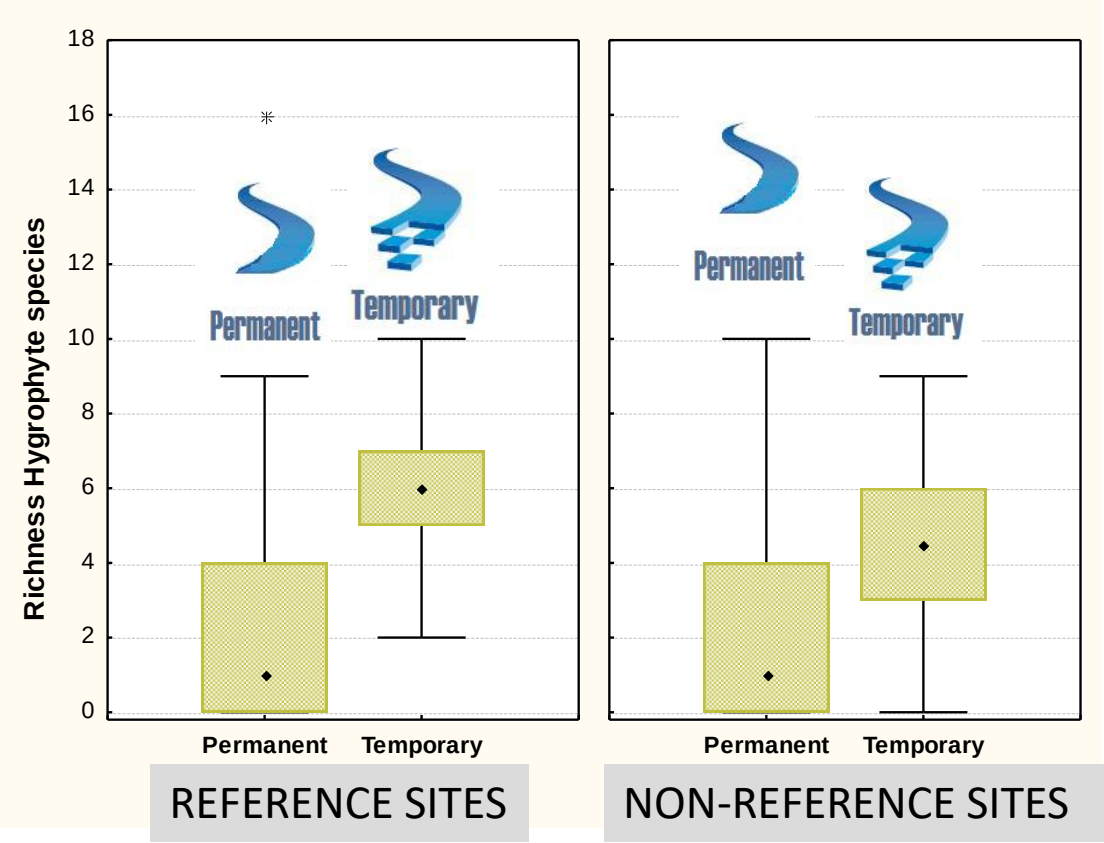


TYPE 124
and
TYPE 5

THE SAME TYPOLOGICAL SIMILARITY WAS FOUND FOR ALL BQE

n-MDS
ANOSIM testing

Biological concordance for the 2 types used



RM5

RM1,2,4

intermittency = helophytes ↑ hygrophytes ↑ hydrophytes ↓

▬ mosses, liverworts, pterophytes, supra-aquatic bryophyta

Overview of Methods to be intercalibrated

Macrophytes

MS	Method	Abb.	Appropriate to types
Cyprus	Multimetric Macrophyte Index	MMI	RM5
	Biological Macrophytes Index for Rivers	IBMR	RM4
France	Biological Macrophytes Index for Rivers	IBMR	RM1, 2, 4
Greece	Biological Macrophytes Index for Rivers	IBMR	RM2
Italy	Biological Macrophytes Index for Rivers	IBMR	RM1, 2, 4 and RM5
Portugal	Biological Macrophytes Index for Rivers	IBMR	RM1,2,4 and RM5
Slovenia	River Macrophyte Index	RMI	RM1,2,4 and RM5
Spain	Biological Macrophytes Index for Rivers	IBMR	RM1, 2, 4 and RM5

Multimetric Macrophyte Index

Metrics: Number of nitrophyllous species, log (No of Gramineae), Number of Helophytes_herb, species richness, mean cover of green algae (categorical)

Papastergiadou E., P. Manolaki. 2011. MedGIG Report: R-M5 IC river types of Cyprus. Developing an Assessment system of R-M5 river types for Cyprus. Patras University, Greece, 21 pp. (not published)

Kuhar, U., Germ, M., Gaberščik,A., Urbanič, G. 2011. Development of a River Macrophyte Index (RMI) for assessing river ecological status. Limnologica 41:235-243.

Overview of Methods to be intercalibrated

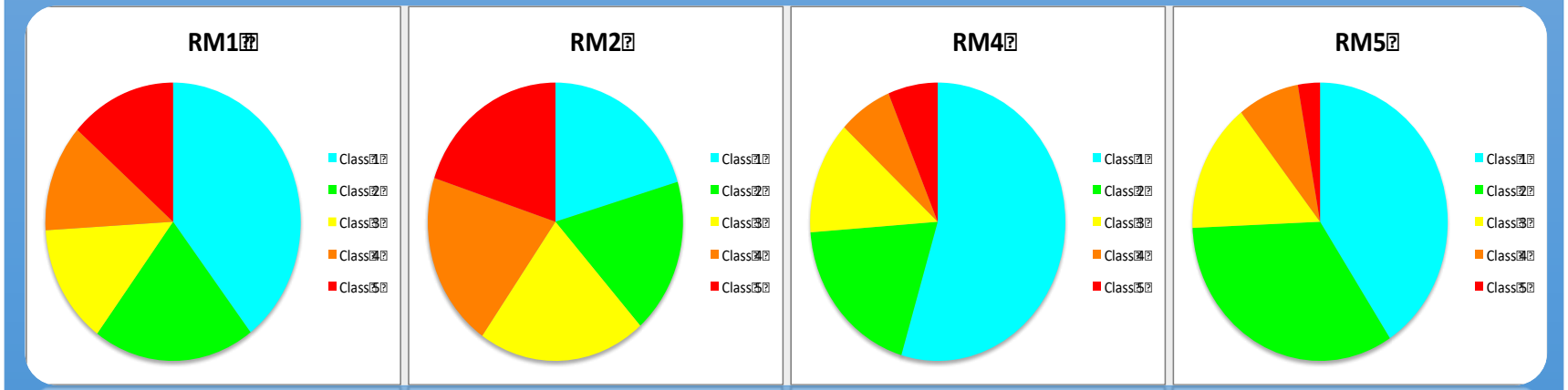
Diatoms

Member State	Method	Status	Reported in Wiser
Cyprus	IPS (Coste in Cemagref, 1982)	1, 2	**Yes**
France	IBD 2007 (Coste et al, Ecol. Ind. 2009) (AFNOR NF-T-90-354, December 2007)	1, 2	**Yes**
Italy	ICMi (Intercalibration Common Metric) Index (Mancini & Sollazzo, 2009)	1, 2	**No**
Portugal	IPS (Coste in Cemagref, 1982)	1, 2	**Yes**
Slovenia	Slovenian Ecological Status assessment system for rivers using phytobenthos based on the Saprobic index (Rott et al. 1997) and the Trophic index (Rott et al. 1999)	1, 2	**Yes**
Spain	IPS (Coste in Cemagref, 1982)	1, 2	**Yes**

Ecological status assessment system for rivers using phytobenthos
Uradni list Republike Slovenije stran (pp) 832, št. (no) 10, 9.2.2009.
Metrics: Saprobic index (SI = Sum of (Indicator Taxa Abundance * Saprobic value * Indicator weight) / Indicator Taxa Abundance* Indicator weight), Trophic index (TI = Sum of (Indicator Taxa Abundance * Trophic value* Indicator weight) / Indicator Taxa Abundance* Indicator weight).

Collection of IC dataset

Distribution of samples by quality class (example from invertebrates)



Do we have a good expression of the disturbance gradient?

Reference conditions approach (Med GIG)

Conditions of acceptance

	References are accepted if	
Pressure variables	**RM1+RM2+RM4**	**RM5**
Channelization (classes 1-4)		
Bank alteration (classes 1-4)		
Connectivity (classes 1-4)		
Local habitat alteration (classes 1-4)		
Stream Flow (classes 1-4)	≤ 2	
Upstream dams influence (classes 1-4)		
Hydropeaking (classes 1-4)		
Riparian Vegetation (classes 1-4)		
DO (mg/L) [1]	6,39-13,70	
O_2 (%)	73,72-127,92	60,34-127,92
N-$NH4^+$ (mg/L)	≤0,09	
N-NO_3^- (mg/L)	≤1,15	
P-Total (mg/L)	≤0,07	
P-PO_4^{3-} (mg/L)	≤0,06	
% Artificial areas (catchm)	≤1	
% Intensive agriculture (catchm)	≤11	
% Extensive agriculture (catchm)	≤32	
% Semi-natural areas (catchm)	≥68	
% Urbanisation (reach) [2]	≤1	
% Land use (reach) [2]	≤20	
% Agriculture (reach) [2]	≤20	

[1] for macrophytes only, instead of O_2 (%)
[2] for diatoms only, instead of land use in the catchment

Step 1- Only sites with 1 categorical pressure were sorted from the 919 RS
Step 2- Reference thresholds were calculated
Step 3- Final screening and values

Reference conditions approach (Med GIG)

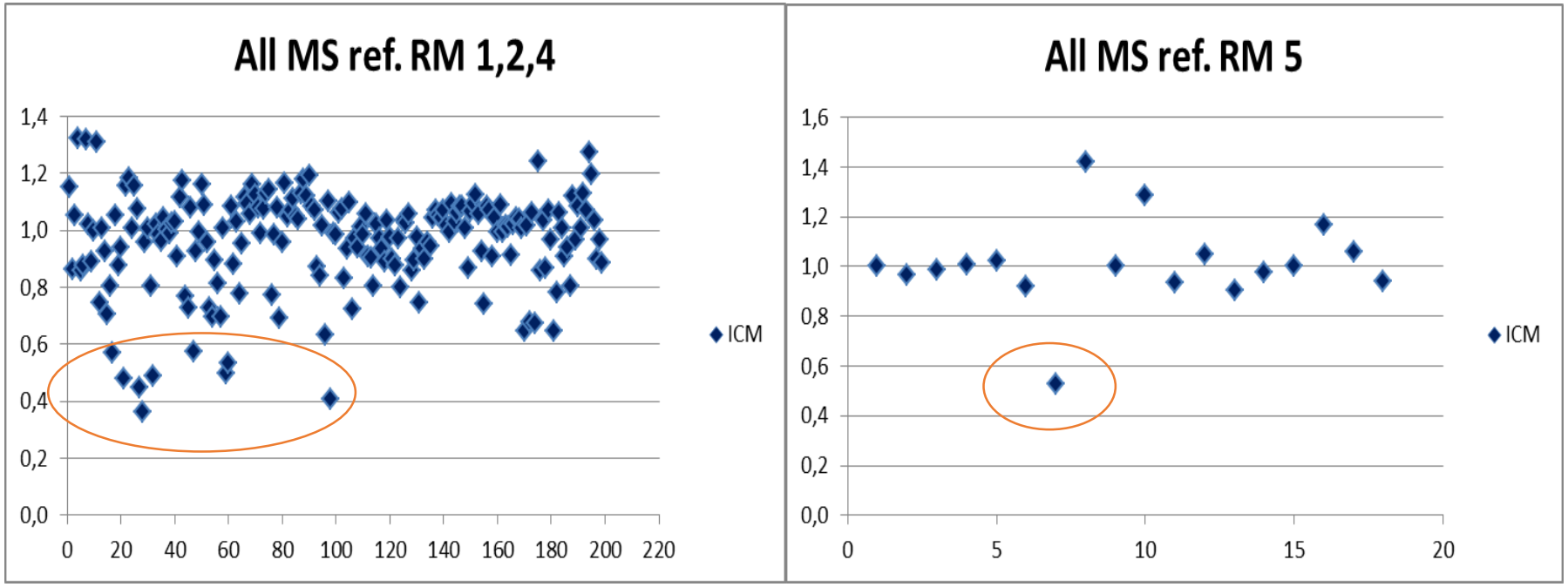
Checking Med reference sites (macroinvertebrates)

	Reference sites ICMi (rho, p, n)
Channelization (class)	*-0.023, p> 0.05, 234*
Bank alteration (class)	*0.016, p> 0.05, 234*
Connectivity (class)	**-0.145, p<0.05, 236**
Local habitat alteration (class)	*-0.023, p> 0.05, 128*
Stream flow (class)	*-0.112, p> 0.05, 236*
Upstream dams influence (class)	*0.000, p> 0.05, 236*
Hydropeaking (class)	*0.080, p> 0.05, 236*
Riparian vegetation (class)	*-0.015, p> 0.05, 234*
O2 (%)	*-0.100, p> 0.05, 227*
N-NH4+ (mg/l)	*-0.035, p> 0.05, 226*
N-NO3- (mg/l)	*-0.103, p> 0.05, 229*
P-Total (mg/l)	0.182, p<0.05, 164
P-PO4 (mg/l)	*-0.028, p> 0.05, 217*
BOD5 (mg/l)	-0.145, p<0.05, 210
Artificial areas (%)	**-0.224, p<0.001, 236**
Intensive agriculture (%)	**-0.216, p<0.001, 236**
Extensive agriculture (%)	*-0.079, p> 0.05, 236*
Semi-natural areas (%)	**0.155, p<0.05, 236**

The IC benchmark sites include sites with small changes at the connectivity level and land use, which was the accepted level for common thresholds.

Reference conditions approach (Med GIG)

Checking Med reference sites (diatoms)



Samples with ICM values below 0.6 (circled in red) were considered outliers/extremes and removed from subsequent analyses

Collection of IC reference dataset: macrophytes

Member State	RM1	RM2	RM4	RM5	Total
Cyprus	-	-	3	8	11
France	10	-	17	-	27
Greece	-	13	1	-	14
Italy	5	0	12	0	17
Portugal	10	10	-	9	29
Slovenia	0	0	-	0	0
Spain	10	1	28	0	39
Sum	35	24	61	17	137

432 sites were provided by MS (25 to 108 at country level)

Reference data set was subjected to screening using Mediterranean reference conditions

Member State	RM1		RM2		RM4		RM5		TOTALI	
Cyprus	-	-	-	-	3	100%	5	63%	8	73%
France	6	60%	-	-	10	59%	-	-	16	59%
Greece	-	-	9	69%	1	100%	-	-	10	71%
Italy	4	80%	-	-	11	92%	-	-	15	88%
Portugal	8	80%	5	50%	-	-	3	33%	16	55%
Slovenia	0	-	0	-	-	-	0	-	-	-
Spain	5	50%	0	0%	16	57%	0	0%	21	54%
Sum	23	66%	14	58%	41	67%	8	47%	86	63%

For RM5 the number of available reference sites can be insufficient (8 sites for the overall database).

Response to pressures: macrophytes

Method	Pressure
RMI (Slovenia)	**Catchment land use, Eutrophication**
IBMR (Cyprus, Greece, France, Italy, Portugal, Spain)	**Cyprus –hydrological, morphological, land-use and physico-chemical degradation.** **Greece - hydrological, morphological, land use and physico-chemical degradation.** **France - Eutrophication, General degradation, Hydromorphological degradation;** **Italy –Eutrophication, General degradation, Pollution by organic matter;** **Portugal – Eutrophication, General degradation.** **Spain - Eutrophication, General degradation.**
MMI (Cyprus)	**Cyprus – hydrological, morphological, land use and physico-chemical degradation.**

the Mediterranean GIG database was used to test the response of each metric to: individual types of pressures and to a general degradation gradient (obtained from PCA axes scores)

HARMONIZATION IN MED GID

MACROPHYTES

INTERCALIBRATING FOR THE FIRST TIME

IC MedGIG macrophytes steps

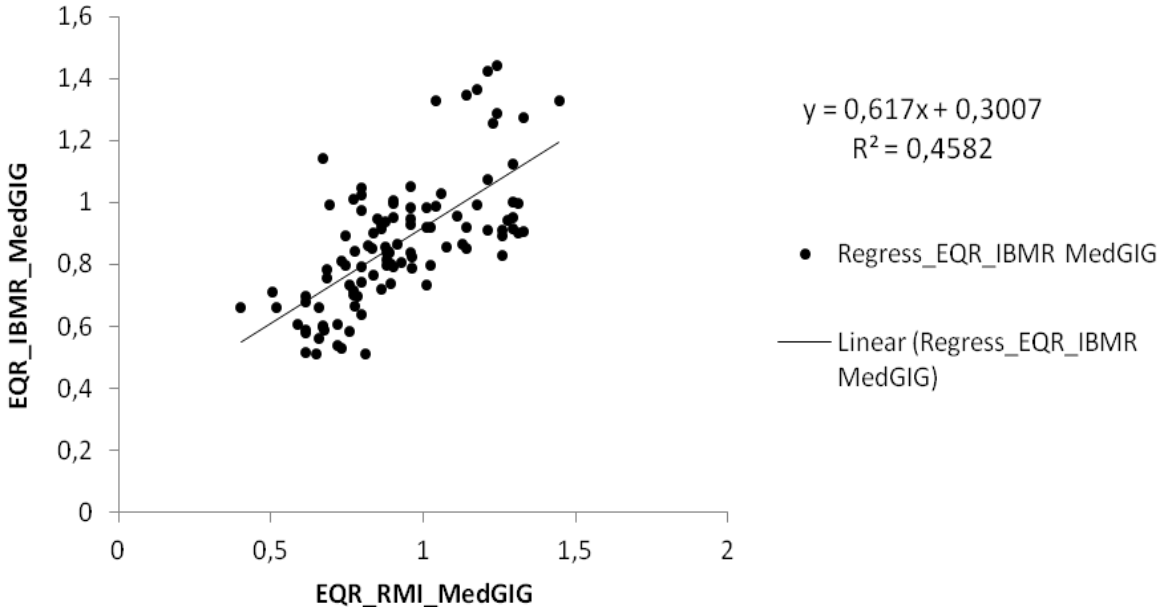
1. Whenever possible, **River Macrophyte Index**, **RMI** (Slovenian National Method) **was computed** in the entire database. The IBMR was also computed for the Slovenian sites.
2. **The IBMR was regressed against RMI** in order to check the relatedness of indices and to convert RMI boundaries into the IBMR scale. Only sites from Greece, Italy, Portugal and Slovenia were used in the regression (Spain, Cyprus and France were not considered because the RMI was computed for too small number of sites).

Results RM1,2,4

6 countries – national method IBMR (same data acquisition, method and calculation)

1 country – Slovenia RMI

1) IC Option 1 – 6 countries/ all dataset



2) IC Option 3 – Slovenia

r=0,677 OK
p=0.000001 OK
slope of regression OK

RM1,2,4 – preliminary steps

Calculate the EQR site values for Mediterranean GIG (MedGIG EQR), using the IBMR absolute values divided by the median of the IBMR values of MedGIG reference sites (previously screened with MedGIG criteria).

Convert boundaries to IC EQR using regression analyses per MS: MedGIG EQR *vs*. National EQR IBMR reference sites.

MS	Regression equations
CY	y = 0.5275x + 0.4837
FR	y = 0.7939x + 0.1794
GR	y = 0.6316x + 0.5124
IT	y = 0.9889x - 0.0395
PT	y = 1.0833x - 4E-05
SP	y = 0.9614x - 0.0056

	CY	FR	GR	IT	PT	SP
H/G	0.9031	0.9177	0.9861	0.8505	0.9966	0.9077
G/M	0.7981	0.8066	0.8661	0.7516	0.7474	0.6770
M/P	0.6931	0.7034	0.7461	0.6033	0.4983	0.4463
P/B	0.5881	0.5922	0.6324	0.4550	0.2491	0.2251

RM1,2,4 – Option 1

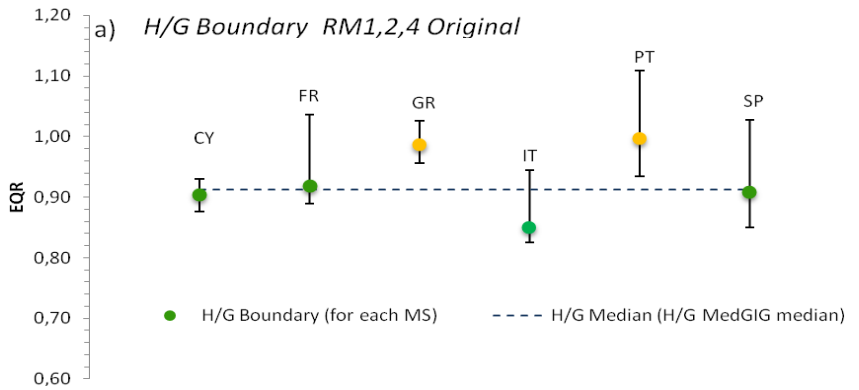
Boundary harmonization using IC Option 1: all countries except Slovenia (national method IBMR)

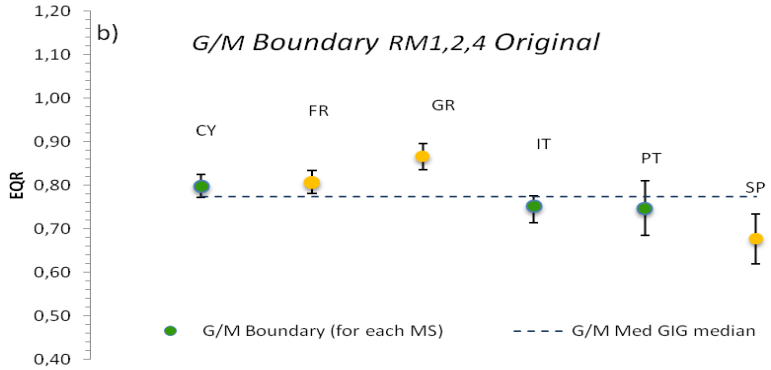
The boundary bias criterion was used: boundary bias should be less than a quarter of the width of a class. We used the median of the boundaries to compute the boundary bias. We changed iteratively the values of the boundaries that did not meet the criteria until the median of the boundaries was included within the quarter of the class (High or Good).

RM1,2,4 – before harmonisation

	CY	FR	GR	IT	PT	SP
Max	1.011	1.393	1.144	1.226	1.443	1.386
MedGIG_H/G	0.903	0.918	0.986	0.851	0.997	0.908
MedGIG_G/M	0.798	0.807	0.866	0.752	0.747	0.677
MedGIG_M/P	0.693	0.703	0.746	0.603	0.498	0.446
MedGIG_P/B	0.588	0.592	0.632	0.455	0.249	0.225
H width to Max	0.11	0.48	0.16	0.38	0.45	0.48
G width	0.10	0.11	0.12	0.10	0.25	0.23
M width	0.10	0.10	0.12	0.15	0.25	0.23
H/G bias	-0.01	0.00	0.07	-0.06	0.08	0.00
G/M bias	0.02	0.03	0.09	-0.02	-0.03	-0.10
H/G bias_CW	-0.09	0.04	0.61	-0.17	0.34	-0.01
G/M bias_CW	0.22	0.31	0.76	-0.23	-0.11	-0.42

	Median MedGIG
H/G	0.9127
G/M	0.7749

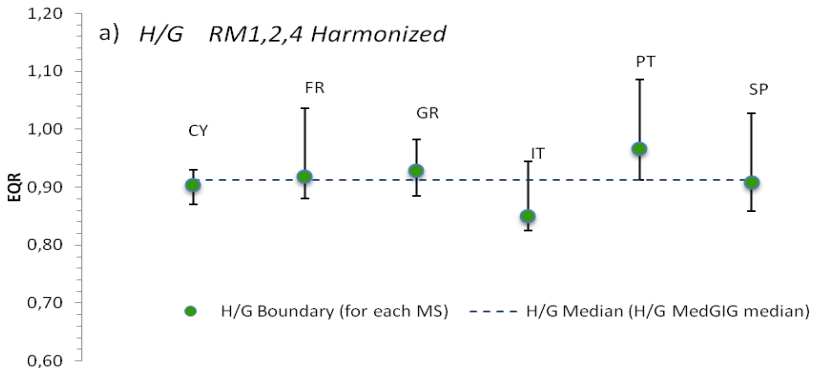


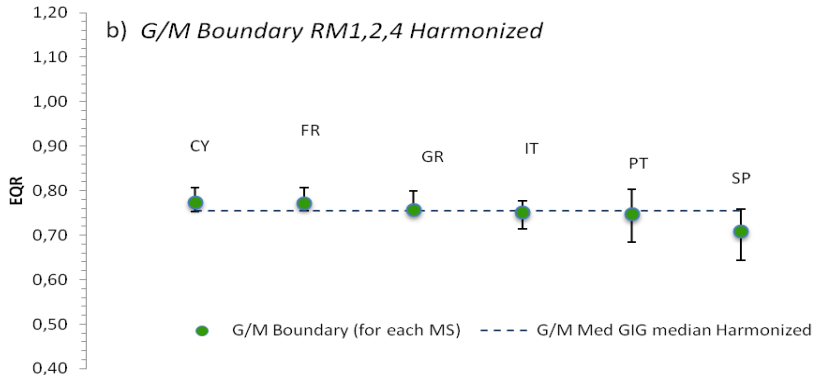


RM1,2,4 – after harmonisation

	CY	FR	GR	IT	PT	SP
Max	1.011	1.393	1.144	1.226	1.443	1.386
MedGIG_H/G	0.903	0.918	0.928	0.851	0.967	0.908
MedGIG_G/M	0.774	0.771	0.757	0.752	0.747	0.709
MedGIG_M/P	0.693	0.703	0.746	0.603	0.498	0.446
MedGIG_P/B	0.588	0.592	0.632	0.455	0.249	0.225
H width to Max	0.108	0.476	0.216	0.376	0.476	0.478
G width	0.129	0.147	0.171	0.099	0.220	0.199
M width	0.081	0.068	0.011	0.148	0.249	0.263
H/G bias	-0.010	0.005	0.015	-0.062	0.054	-0.005
G/M bias	0.020	0.017	0.003	-0.003	-0.007	-0.045
H/G bias_CW	-0.09	0.03	0.09	-0.17	0.25	-0.01
G/M bias_CW	0.24	0.25	0.25	-0.03	-0.03	-0.23

	Median MedGIG
H/G	0.9127
G/M	0.7543





Ecological characterization between G and M ecological status




Major changes between G and M associated with:

- ↓species richness (median in G sites =12; M sites=7),
- ↑ cover and frequency of pondweed taxa, such as *Potamogeton pectinatus* and *P. nodosus*, macroalgae (e.g. *Enteromorpha sp., Cladophora* sp.), and other hydrophyes (*Lemna gibba, Nuphar lutea*), and of some emergent species, such as *Schoenoplectus lacustris*.

Ecological characterization

• loss and/or ↓ cover of bryophytes, mainly *Rhynchostegium riparioides, Fontinalis antipyretica, Fissidens crassipes, Eurhynchium praelongum, Lunularia cruciata* and *Amblistegium riparium*, and of some amphibious and hygrophyte species (*Lotus pedunculatus, Carex elata, C. pendula*).

•Some infrequent species in the data base, bryophytes (*Bryum* sp.) , isoetids, *Juncus sp., Myosotis* sp. were only observed in sites classified in Good ecological status.

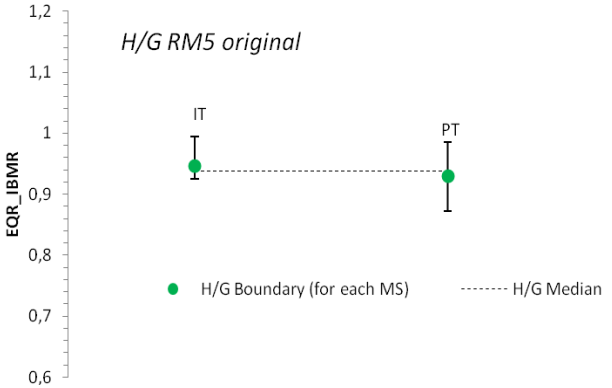
•Some alien invasive species raise their abundance due the raise of pressures, this is the case of *Azolla* sp.

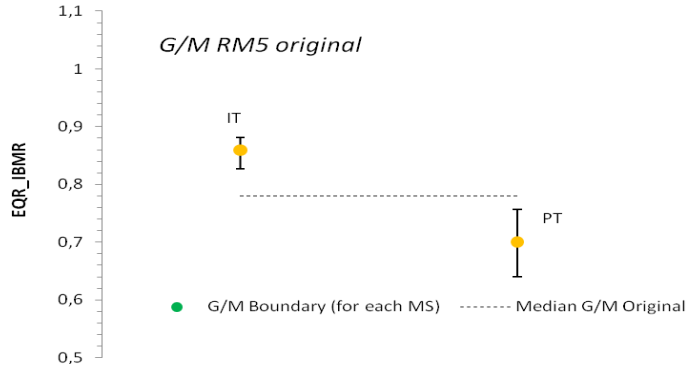
RM5 – Option 1 (IT and PT)

Boundaries	Original		Original MedGIG	
	IT	PT	IT	PT
Max	1.1240	1.1538	1.1405	1.1535
H/G	0.90	0.93	0.946	0.930
G/M	0.80	0.70	0.859	0.700
M/P	0.65	0.46	0.729	0.460
P/B	0.50	0.23	0.599	0.230

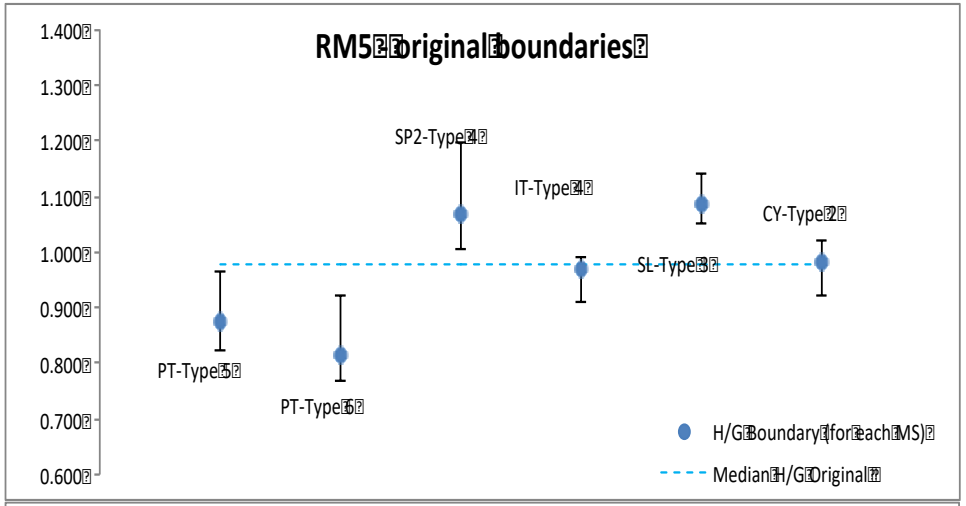
	Original		Harmonized	
	IT	PT	IT	PT
Max	1.1404	1.1535	1.1404	1.1535
MedGIG_H/G	0.946	0.930	0.946	0.930
MedGIG_G/M	0.859	0.700	0.726	0.728
MedGIG_M/P	0.729	0.460	0.729	0.460
MedGIG_P/B	0.599	0.230	0.599	0.230
Median H/G MedGIG	0.938		0.938	
Median G/M MedGIG	0.780		0.727	
H width to Max	0.194	0.224	0.194	0.224
G width	0.087	0.230	0.220	0.202
M width	0.130	0.240	-0.003	0.268
H/G bias	0.008	-0.008	0.008	-0.008
G/M bias	0.080	-0.080	-0.001	0.001
H/G bias_CW	0.092	-0.036	0.036	-0.036
G/M bias_CW	0.612	-0.346	-0.005	0.004

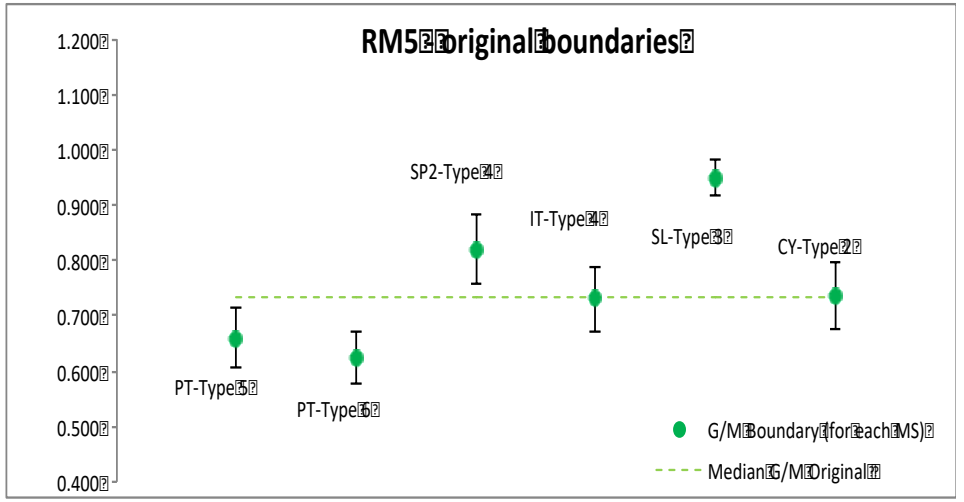
Regression analyses per MS used to convert the national boundaries into comparable boundaries.
IT: Y=0.8674x+0.1655;
PT: 0.9999+0.0002

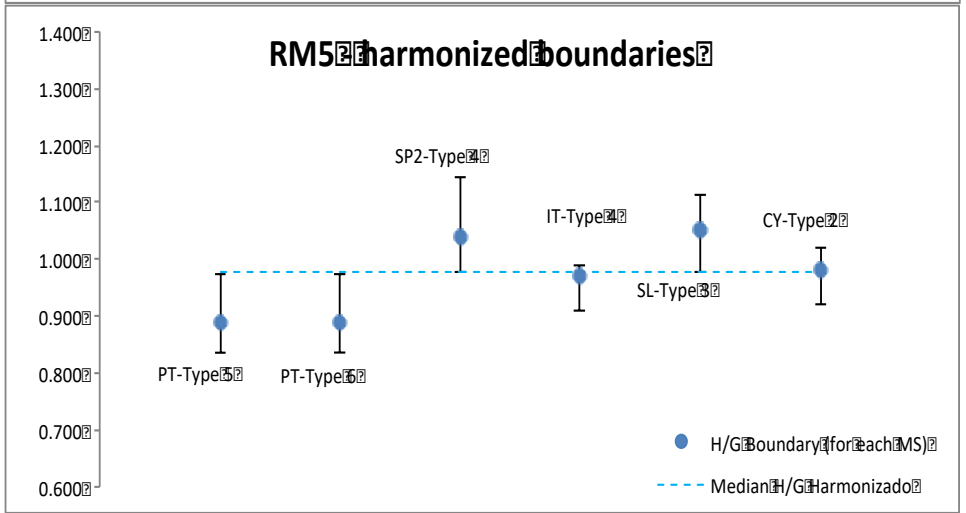


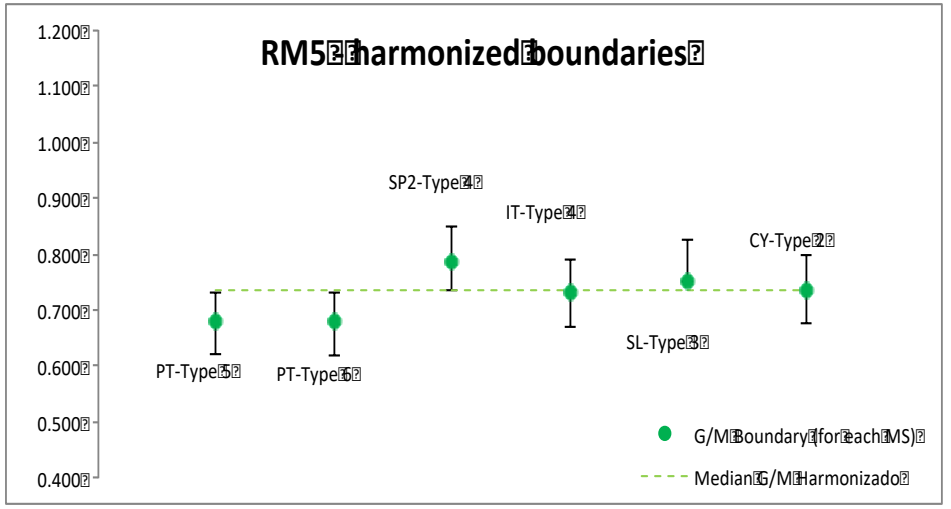


HARMONIZATION IN MED GID









HARMONIZATION IN MED GID

ORIGINAL - RM124

	PT-Type 1	PT-Type 2	PT-Type 3	PT-Type 4	SP-Type 1	SP-Type 2	SP-Type 3	FR-Type 1	FR-Type 2	FR-Type 3	IT-Type 1	IT-Type 2	IT-Type 3	SL-Type 1	SL-Type 2	CY - Type 3
High Max (maximum of national EQR)	1,188	1,188	1,188	1,188	1,166	1,166	1,166	1,124	1,124	1,124	1,262	1,262	1,262	1,514	1,514	1,339
H/G Boundary + 0.25H	1,042	0,993	0,993	1,042	0,885	0,886	0,884	0,939	0,939	0,939	0,921	0,921	0,921	1,169	1,169	0,998
H/G Boundary (for each MS)	0,993	0,928	0,928	0,993	0,791	0,792	0,790	0,877	0,877	0,877	0,808	0,808	0,808	1,055	1,055	0,884
H/G Boundary - 0.25H	0,928	0,865	0,865	0,928	0,742	0,742	0,740	0,838	0,838	0,838	0,759	0,759	0,759	1,017	1,017	0,811
H/G MedGIG Mean	0,896	0,896	0,896	0,896	0,896	0,896	0,896	0,896	0,896	0,896	0,896	0,896	0,896	0,896	0,896	0,896
H/G quarter (+)	0,049	0,065	0,065	0,049	0,094	0,093	0,094	0,062	0,062	0,062	0,114	0,114	0,114	0,115	0,115	0,114
H/G quarter (-)	0,066	0,063	0,063	0,066	0,050	0,050	0,049	0,039	0,039	0,039	0,048	0,048	0,048	0,038	0,038	0,074

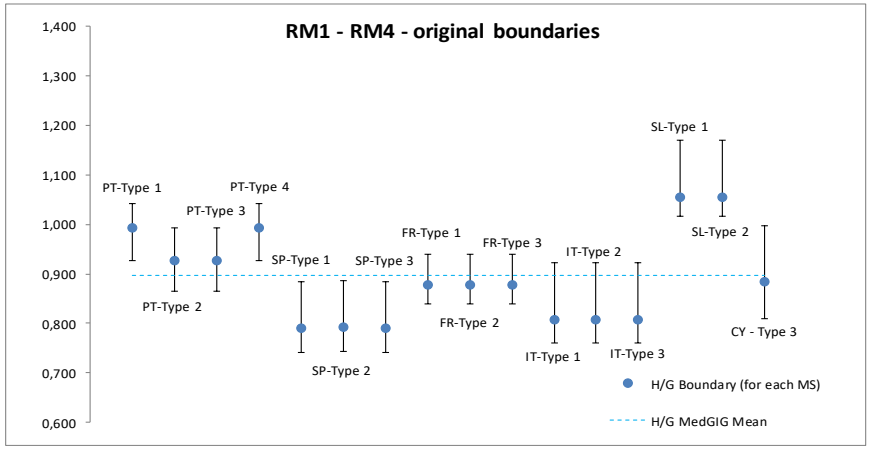
Mean H/G Original
0,896

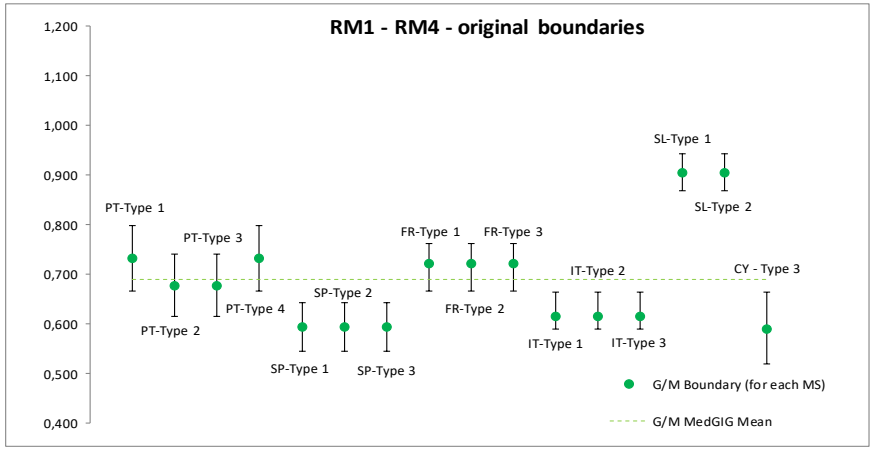
Good/moderate Max	0,993	0,928	0,928	0,993	0,791	0,792	0,790	0,877	0,877	0,877	0,808	0,808	0,808	1,055	1,055	0,884
G/M+ 0.25H	0,797	0,739	0,739	0,797	0,642	0,643	0,642	0,761	0,761	0,761	0,663	0,663	0,663	0,942	0,942	0,663
G/M Boundary (for each MS)	0,731	0,677	0,677	0,731	0,593	0,594	0,593	0,722	0,722	0,722	0,615	0,615	0,615	0,904	0,904	0,590
G/M Boundary - 0.25H	0,666	0,614	0,614	0,666	0,544	0,545	0,544	0,666	0,666	0,666	0,589	0,589	0,589	0,867	0,867	0,518
M/P Min	0,469	0,425	0,425	0,469	0,399	0,400	0,397	0,499	0,499	0,499	0,513	0,513	0,513	0,754	0,754	0,302
G/M MedGIG Mean	0,688	0,688	0,688	0,688	0,688	0,688	0,688	0,688	0,688	0,688	0,688	0,688	0,688	0,688	0,688	0,688
G/M quarter (+)	0,066	0,063	0,063	0,066	0,050	0,050	0,049	0,039	0,039	0,039	0,048	0,048	0,048	0,038	0,038	0,074
G/M quarter (-)	0,066	0,063	0,063	0,066	0,048	0,048	0,049	0,056	0,056	0,056	0,025	0,025	0,025	0,038	0,038	0,072

Mean G/M Original
0,688

H/G Statistic	0,372	0,127	0,127	0,372	-0,279	-0,278	-0,282	-0,076	-0,076	-0,076	-0,194	-0,194	-0,194	1,057	1,057	-0,026

G/M Statistic	0,165	-0,046	-0,046	0,165	-0,480	-0,476	-0,484	0,152	0,152	0,152	-0,379	-0,379	-0,379	1,441	1,441	-0,334





EXERCICIO DE INTERCALIBRAÇÃO

Grupo de Intercalibração Geográficos (GIG) que partilham tipos de massas de água comuns

- Costeiras: Tipos nacionais A5, A6 e A7 -> Tipo comunitário NEA 1/26
- Transição: Tipo nacional A1 -> Tipo comunitário NEA 11

O valor das fronteiras entre o Estado Excelente/Estado Bom e o Estado Bom/Estado Razoável é estabelecido por meio do IC, garantindo que as classes de qualidade são coerentes com as definições normativas da DQA

EXERCICIO DE INTERCALIBRAÇÃO

1ª fase do IC - Decisão **2008**/915/CE, de 30 de outubro -> **PGRH1**

2ª fase do IC – Decisão **2013**/480/UE e retificação de 8 de outubro -> **PGRH2**

Elementos de Qualidade Biológicos		Fases do Exercício de Intercalibração		
		1ªFase	2ªFase	3ªFase
Águas de Transição	Fitoplâncton			
	Macroalgas (oportunistas)			
	Sapais			
	Ervas marinhas			
	Macroinvertebrados bentónicos			
	Peixes			
Águas costeiras	Fitoplâncton			
	Macroalgas			
	Macroinvertebrados bentónicos			
	Ervas marinhas			
	Legenda	Não concluído	Incompleto	Concluído

3ª Decisão de Intercalibração

Decisão (UE) **2018**/229 da Comissão de 12 de Fevereiro de 2018 que estabelece, nos termos da DQA, os valores para a atribuição de classificações com base nos sistemas de monitorização dos Estados-Membros, no seguimento do Exercício de Intercalibração, e revoga a Decisão 2013/480/UE da Comissão -> **PGRH3**