Endbericht im Vorhaben

„Interkalibrierung – Teilprojekt: Vertretung in GIG und Makrophyten-Berechnungen“

im Auftrag der Länderarbeitsgemeinschaft Wasser (LAWA), Projekt-Nr. O 7.09 im Länderfinanzierungsprogramm "Wasser, Boden und Abfall".

Dr. Sebastian Birk

Hamm (Sieg), Februar 2010

Inhaltsverzeichnis

Erläuterung der Abkürzungen

BQE	Biologische Qualitätskomponente
CB_{riv}GIG Makrophyten	Arbeitsgruppe „Interkalibrierung Makrophyten in Fließgewässern im GIG Mitteleuropa/Baltikum“
ECOSTAT	Arbeitsgruppe „Ökologischer Zustand“ der Gemeinsamen Umsetzungsstrategie für die WRRL (CIS)
EQR	Ökologischer Qualitätsquotient (Ecological Quality Ratio)
GIG	Geographische Interkalibrierungs-Gruppe
IK	Interkalibrierung
mICM	Interkalibrierungsindex Makrophyten (macrophyte Intercalibration Common Metric)
R-C	Kürzel der Interkalibrierungstypen im GIG „Mitteleuropa/Baltikum“ Fließgewässer
WRRL	EG-Wasserrahmenrichtlinie

1 Einleitung

Die EG-Wasserrahmenrichtlinie 2000/60/EC fordert für die Oberflächengewässer der Mitgliedstaaten der Europäischen Union den guten ökologischen und chemischen Zustand. Im Prozess der Interkalibrierung werden die Ergebnisse der nationalen Verfahren zur Zustandsbewertung verglichen und harmonisiert. Der vorliegende Bericht fasst die im Projektjahr 2009 geleisteten Arbeiten zur Interkalibrierung der Bewertungsverfahren für Makrophyten in Fließgewässern zusammen. Viele der vorgestellten Inhalte basieren auf Vorarbeiten zu diesem Themengebiet, die in Birk et al. (2007a), Birk (2008) und Birk (2009) dargestellt sind.

Der Arbeitsauftrag für das Projektjahr 2009 umfasste die Vertretung Deutschlands in den Sitzungen der Fließgewässer GIG Mitteleuropa/Baltikum inklusive der Delegation und Überwachung der aus der GIG-Arbeit resultierenden nationalen Aufgaben, Vor- und Nachbereitung der jeweiligen Sitzungen sowie Rückkopplung mit nationalen Behördenvertretern. Einen weiteren Schwerpunkt bildete die Koordinierung der Interkalibrierung Makrophyten in Fließgewässern im GIG Mitteleuropa/Baltikum mit der Organisation der Arbeit sowie der Experten-Workshops. Die Ausführung von internationalen Berechnungen und Auswertungen, Rückkopplung mit den nationalen Methodenentwicklern sowie die Kommunikation und Treffen mit Experten anderer Mitgliedstaaten zur Koordinierung der Interkalibrierung waren weitere Aufgaben innerhalb dieses Vorhabens.

Die Verabschiedung der neuen Interkalibrierungsleitlinie (European Communities 2009) stellt die Akteure innerhalb des Interkalibrierungsprozesses vor konkrete Aufgaben der Umsetzung und Berichterstattung. Aufgrund ihrer großen Bedeutung für die zweite Interkalibrierungsphase sind die wesentlichen Inhalte der neuen Leitlinie am Anfang dieses Berichtes (Kapitel 2) zusammengefasst. Die innerhalb des Projektjahres durch die Gruppe CB_{riv}GIG Makrophyten erarbeiteten Ideen und Konzepte konnten in diese Leitlinie eingebracht werden. Maßgebend waren vor allem die Arbeiten zu den Analyseoptionen sowie zur Definition von einheitlichen Ankerpunkten für die Interkalibrierung. Kapitel 3 nimmt Bezug auf diese Arbeiten und verweist auf verschiedene Anhänge, die dem Leser dieses Berichts einen detaillierten Einblick in den Sachstand liefern. Ferner wurden im Projektjahr weitere Aktivitäten zur Umsetzung der Interkalibrierung durchgeführt. Kapitel 4 sowie die dort erwähnten Anhänge geben hierzu einen umfassenden Überblick.

2 Die neue Leitlinie zum Interkalibrierungsprozeß in der zweiten Phase 2008-2011

2.1 Einführung

Seit Dezember 2009 liegt die neue Leitlinie für den Interkalibrierungsprozess vor (European Communities 2009). Dieses Dokument bereitet den verbindlichen Rahmen für die Durchführung der Interkalibrierung in der zweiten Phase 2008 bis 2011. Im Vergleich zur ersten Leitlinie (European Communities 2006) sind die notwendigen Arbeitsschritte viel konkreter gefasst, um die einheitliche Umsetzung der Interkalibrierung zwischen den verschiedenen BQE und Gewässerkategorien zu gewährleisten. Dennoch fehlen der Leitlinie noch wichtige Anhänge, die voraussichtlich in der ECOSTAT-Sitzung im April 2010 verabschiedet werden: Annex III (Leitlinien zur Bestimmung von Ankerpunkten für die Interkalibrierung), Annex V (Definition von Vergleichbarkeitskriterien für die Interkalibrierung) und Annex VI (Inhalte der Berichterstattung zur Interkalibrierung).

Die wesentlichen Inhalte der neuen Interkalibrierungsleitlinie sind im Folgenden zusammengefasst.

2.2 Grundprinzipien der Interkalibrierung

Ziele der Interkalibrierung

- Die Interkalibrierung stellt sicher, dass die Einstufungen der ökologischen Qualität durch die Mitgliedstaaten in Übereinstimmung mit den normativen Begriffsbestimmungen des WRRL Annex V sind, sowie dass diese Einstufungen zwischen den Mitgliedstaaten vergleichbar sind.
- Interkalibriert werden die Klassengrenzen sehr gut - gut und gut - mäßig, so dass die Ergebnisse der nationalen Bewertungsverfahren einen vergleichbaren Grad an ökosystemarer Veränderung reflektieren.
- Das im Jahre 2005 aufgestellte Interkalibrierungsregister spielt innerhalb der zweiten Interkalibrierungsphase keine Rolle.
- Die zweite Interkalibrierungsphase schließt die Lücken der ersten Phase mit dem Ziel, die BQE für alle Gewässerkategorien vollständig zu interkalibrieren.
- Es besteht die Notwendigkeit einer Überprüfung der Ergebnisse der ersten Interkalibrierungsphase.

WRRL-konforme Bewertungsverfahren

- Die partielle Interkalibrierung von BQE (z.B. nur ausgewählte indikative Parameter, wie Biomasse des Phytoplanktons) ist nur dann zulässig, wenn die vollständige Interkalibrierung nicht realisierbar ist.
- Die BQE ‚Makrophyten & Phytobenthos' sowie ‚Großalgen & Angiospermen' sind jeweils als Einheit von der WRRL definiert. Die getrennte Interkalibrierung von Untereinheiten (z.B. nur Makrophyten) bedarf einer Rechtfertigung.
- Wenn ein nationales Bewertungsverfahren nicht interkalibrierbar ist, dann bemüht sich der betreffende Mitgliedsstaat um einen alternativen Interkalibrierungsansatz, welcher durch die GIG befürwortet werden muss.

Praktische Umsetzung

- Die Interkalibrierung wird innerhalb der GIG für Gemeinsame Interkalibrierungstypen („Common Intercalibration Types") durchgeführt.
- Die Interkalibrierungstypen sollten alle Hauptgewässertypen innerhalb einer GIG erfassen, und es muss klar sein, welche der nationalen Gewässertypen durch die Interkalibrierungstypen abgedeckt sind. Möglicherweise ist die vorhandende Definition der Interkalibrierungstypen zu überarbeiten (siehe auch Kapitel 4.1).
- Alle wichtigen Kombinationen von Gewässertypen, BQE und Gewässerbelastungen müssen von der Interkalibrierung berücksichtigt werden.
- Die Vergleichbarkeit der Referenzbedingungen muss gewährleistet sein. Wenn der naturnahe Referenzzustand für bestimmte Gewässertypen nicht mehr vorhanden ist oder nicht zuverlässig abgeleitet werden kann (z.B. für große Ströme), soll die Interkalibrierung mit Hilfe von alternativen Ankerpunkten („Alternative Benchmarks") durchgeführt werden, z.B. über den guten ökologischen Zustand für diesen Gewässertypen.
- In der zweiten Interkalibrierungsphase wird keine Interkalibrierung des guten ökologischen Potentials durchgeführt.
- Daten aus erheblich veränderten oder künstlichen Gewässern können für die Interkalibrierung herangezogen werden, z.B. wenn die BQE durch die hydromorphologische Veränderung nicht beeinträchtigt sind (Phytoplankton in Staugewässern), oder um die Datenlage für die Interkalibrierungsanalysen zu vergrößern.
- Die Interkalibrierung der nationalen Klassengrenzen erfolgt durch drei Optionen. Die Klassengrenzen selbst können auch erst im Interkalibrierungsprozeß festgelegt werden.

2.3 Durchführung und Zeitrahmen

- Die zweite Interkalibrierungsphase ist in fünf Arbeitsschritte unterteilt, die jeweils durch eine Berichterstattung von den Leitern der jeweiligen Arbeitsgruppen (z.B. Benthische Invertebraten in Seen im GIG Mitteleuropa/Baltikum) an ECOSTAT dokumentiert werden („Milestone Reporting“). Diese Arbeitsschritte sind im Folgenden kurz beschrieben. Zur Veranschaulichung ist das Flussdiagramm aus der Interkalibrierungsleitlinie in Abbildung 2.1 wiedergegeben.
- 1. Arbeitsschritt: Überprüfung der Vorbedingungen der Interkalibrierung[1].
    - „Sind die Bewertungsverfahren WRRL-konform?“, z.B.: Werden die numerischen Ergebnisse in EQR ausgedrückt und in fünf Qualitätsklassen dargestellt?; Sind alle indikativen Parameter der normativen Begriffsbestimmungen des WRRL Annex V für die Qualitätskomponente durch das Bewertungsverfahren abgedeckt?
    - „Ist die Interkalibrierung durchführbar?“, z.B.: Werden nur solche Bewertungsverfahren interkalibriert, die ähnliche Belastungen für ähnliche Gewässertypen durch ein ähnliches Bewertungskonzept einstufen?
    - Die erste Berichterstattung („Milestone 1“) über einen Zwischenstand dieser Überprüfungen erfolgte im Oktober 2009 (siehe Anhang 5 für die Makrophyten in Fließgewässern im GIG Mitteleuropa/Baltikum).
- 2. Arbeitsschritt: Datengrundlage und Vorbereitung der Interkalibrierung.
    - Zusammenstellung eines Datensatzes für die Interkalibrierung („Common Dataset“);
    - Entwurf eines Arbeitskonzepts;
    - Auswahl der Interkalibrierungsoption und Evaluierung von möglichen Allgemeinen Metriks („Common Metrics“).
    - Die zweite Berichterstattung („Milestone 2“) ist für März 2010 geplant.
- 3. Arbeitsschritt: Ankerpunkte und Klassengrenzvergleich.
    - Definition von Ankerpunkten für die Interkalibrierung (entweder durch naturnahe Referenzen oder alternative Ankerpunkte);
    - Vergleich der nationalen Klassengrenzen untereinander.
    - *Dieser Arbeitsschritt wird durch den Inhalt des fehlenden Annex III (Leitlinien zur Bestimmung von Ankerpunkten für die Interkalibrierung) und Annex V (Definition von Vergleichbarkeitskriterien für die Interkalibrierung) konkretisiert werden.*
    - Die dritte Berichterstattung („Milestone 3“) ist für September 2010 geplant.
- 4. Arbeitsschritt: Angleichung der nationalen Klassengrenzen.
    - Durchführung des Verfahrens zur Vereinheitlichung der nationalen Klassengrenzen.
    - *Dieser Arbeitsschritt wird durch den Inhalt des fehlenden Annex V (Definition von Vergleichbarkeitskriterien für die Interkalibrierung) konkretisiert werden.*
    - Die vierte Berichterstattung („Milestone 4“) ist für März 2011 geplant.
- 5. Arbeitsschritt: Zusammenfassung.
    - Überprüfung und Diskussion der geleisteten Arbeit;
    - Zusammenstellung des Endberichts.
    - Die fünfte Berichterstattung („Milestone 5“) ist für Juni 2011 geplant.

[1] Diese wird unter Verwendung der Daten aus der WISER-Fragebogenaktion durchgeführt Das Europäische Forschungsprojekt WISER (Water bodies in Europe: Integrative Systems to assess Ecological status and Recovery – http://www.wiser.eu) unterstützt die Interkalibrierung u.a. durch die Erstellung einer Datenbank mit Informationen über die im WRRL-Überwachung genutzten nationalen Bewertungsverfahren.

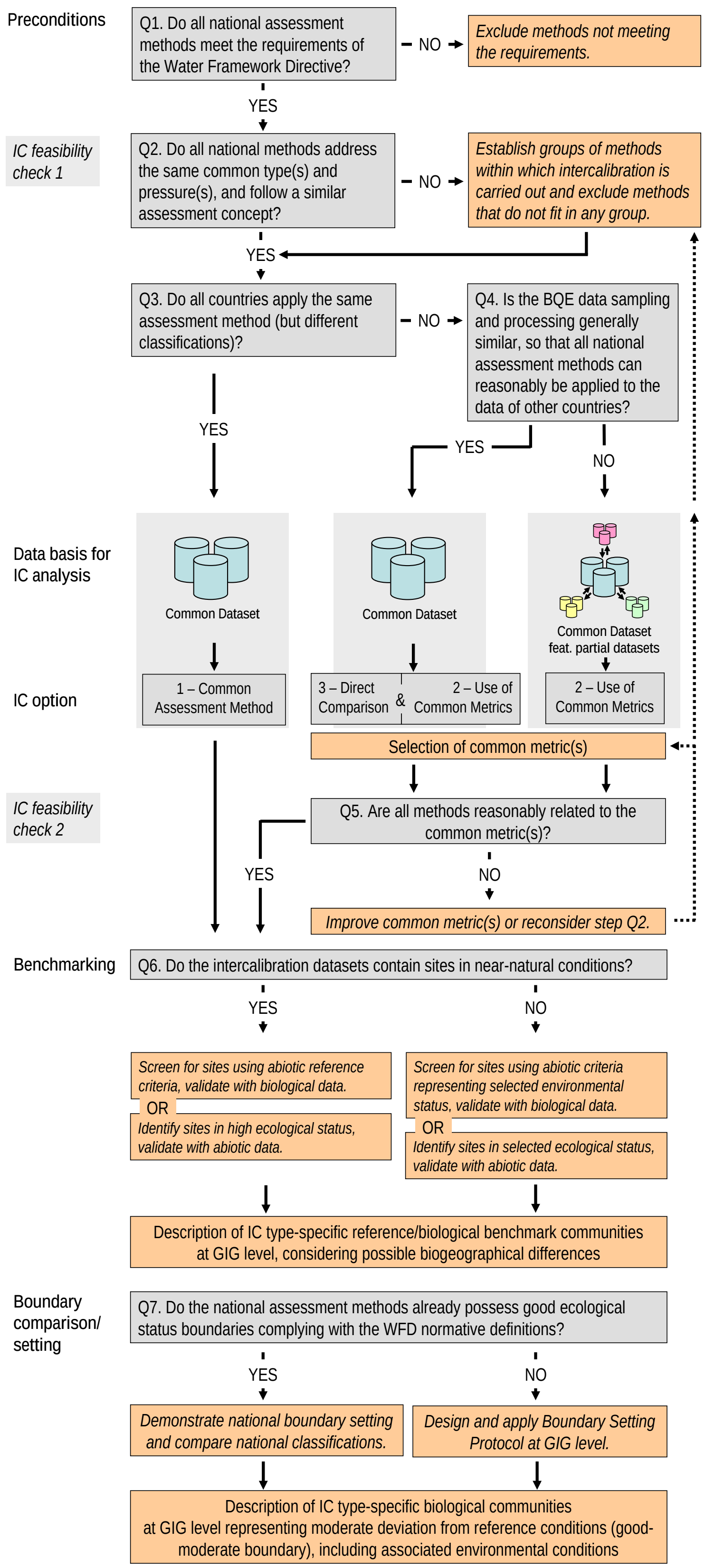

Abbildung 2.1: Flussdiagramm der Hauptschritte des Interkalibrierungsprozeß (aus European Communities 2009)

3 Aktivitäten zur Interkalibrierung Makrophyten in Fließgewässern der GIG Mitteleuropa/Baltikum

3.1 Entwicklung von analytischen Verfahren zum Vergleich der nationalen Klassengrenzen

Die Aufgaben der CB_{riv}GIG Makrophyten im Jahr 2009 waren geprägt durch konzeptionelle Arbeiten wie die Definition von einheitlichen Ankerpunkten (siehe Kapitel 3.2) und Analysen zum Vergleich der nationalen Klassengrenzen. Da die neue Interkalibrierungsleitlinie (European Communities 2009) erst im Oktober 2009 durch ECOSTAT verabschiedet wurde, bot sich in der ersten Hälfte des Projektjahres die Gelegenheit, die heute verbindlichen Vorgaben inhaltlich mit zu gestalten. Viele der innerhalb der CB_{riv}-GIG Makrophyten entwickelten Ideen und Konzepte fanden bei der Erstellung der Leitlinie Berücksichtigung. Vor diesem Hintergrund entstand auch die in Anhang 7 vorgestellte Arbeit, auf die an dieser Stelle explizit verwiesen ist.

3.2 Definition von Ankerpunkten für die Interkalibrierung

Beim Vergleich der nationalen Zustandsbewertungen spielt die Definition von einheitlichen Ankerpunkten eine wesentliche Rolle (Birk & Böhmer 2007). Die Verfahren zur Herleitung solcher einheitlichen Referenzen in der ersten Interkalibrierungsphase wurden kritisch hinterfragt (Hildrew et al. 2008) und werden derzeit überprüft (Pardo et al. 2010). Vor diesem Hintergrund beschloss die CB_{riv}GIG Makrophyten, der Erstellung von einheitlichen Ankerpunkten für die Interkalibrierung besondere Sorgfalt zu widmen.

In einer erneuten Datenanfrage zu abiotischen Parametern wie Landnutzung im Einzugsgebiet, Gewässerchemie und Bewertung hydromorphologischer Aspekte wurde im Projektjahr eine Referenzdatenbank mit über 180 Probestellen aus den Gewässertypen „Sandbäche des Tieflandes", „Silikatische Mittelgebirgsbäche" sowie „Flüsse des Tieflandes" aufgebaut („Benchmark Sites") (Abbildung 3.1). Die Vorauswahl der Stellen erfolgte durch die Einstufung der Makrophytengemeinschaft (sog. „Common High/Good Status Sites", d.h. Probestellen, welche mehrheitlich von den nationalen Bewertungsverfahren als sehr gut (Sandbäche des Tieflandes, Silikatische Mittelgebirgsbäche) bzw. gut (Flüsse des Tieflandes) bewertet wurden) (siehe auch Anhang 4).

Die nun vorliegenden abiotischen Daten ermöglichen die Analyse von biogeographischen und gewässertypologischen Einflussfaktoren neben einer Darstellung von Belastungsgradienten, trotz eines (sehr) guten ökologischen Zustands noch (gering) ausgeprägt sein können. Ziel dieser Arbeit ist die Definition von Ankerpunkten für die Interkalibrierung – eine zentrale Forderung der neuen Interkalibrierungsleitlinie („Milestone 3"-Berichterstattung, siehe auch Kapitel 2.3).

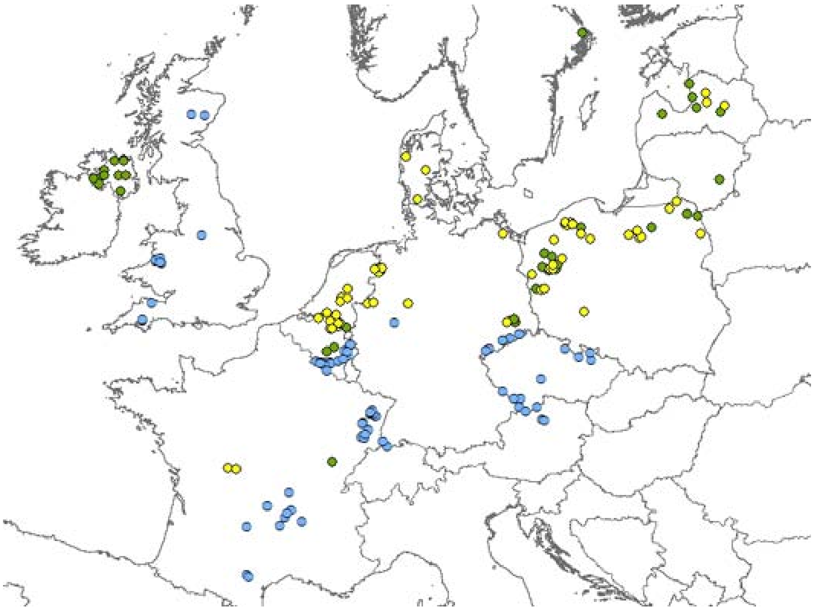

Abbildung 3.1: Lage der sog. "Benchmark Sites" für die einheitliche Definition von Ankerpunkten (gelb: Sandbäche des Tieflandes, blau: Silikatische Mittelgebirgsbäche, grün: Flüsse des Tieflandes)

4 Weitere Aktivitäten zur Umsetzung der Interkalibrierung

4.1 Typzuweisung Fließgewässer – Interkalibrierungsphase 1

Die neue Interkalibrierungsleitlinie (European Communities 2009) fordert, dass alle Hauptgewässertypen innerhalb einer GIG durch die Ausweisung von Interkalibrierungstypen erfasst werden. Ferner muss klar definiert sein, welche der nationalen Gewässertypen durch die Interkalibrierungstypen abgedeckt sind. Vor diesem Hintergrund wurden die Mitgliedstaaten von Seiten der Gemeinsamen Forschungsstelle (JRC) in Ispra (Italien) im April 2009 aufgefordert, die durch die Interkalibrierung in der ersten Phase bearbeiteten Gewässertypen zu benennen. Im Rahmen des hier dokumentierten Projektes wurde dieser Aufforderung nachgekommen. Anhang 6 beinhaltet die Aufstellung der nationalen Fließgewässertypen, denen der jeweilige Interkalibrierungstyp für das Makrozoobenthos und die Diatomeen zugewiesen ist.

4.2 Aufstellung aller im Projekt geleisteten Teilnahmen an nationalen und internationalen Aktivitäten zur Interkalibrierung

Zur Durchführung der Arbeitsaufgaben des Vorhabens bedurfte es der Teilnahme an verschiedenen Aktivitäten. Schwerpunkt bildete in diesem Projektjahr die Beteiligung an der Ausgestaltung der zweiten Interkalibrierungsphase. Der Projektnehmer konnte auf nationaler und internationaler Ebene an den lebendigen Diskussionen zu Inhalten und Organisation der fortgesetzten Interkalibrierung teilnehmen. Innerhalb der Aktivität des CB_{riv}GIG Makrophyten wurden die Grundlagen für die Auswertungen der Interkalibrierung im Rahmen eines mehrtägigen Arbeitstreffens gelegt. Die Ergebnisse sind in den Anhängen 7 und 8 festgehalten. Zur Arbeitsgruppe „IK-Referenzbedingungen" konnte der Auftragnehmer konzeptionelle Inhalte beitragen (Anhänge 3 und 4). Auf zwei Sitzungen der LAWA-Fließgewässer-Expertengruppe „Biologische Bewertung und Interkalibrierung" wurden die Ländervertreter über den internationalen Sach- und Diskussionsstand unterrichtet (Anhänge 1 und 2).

Tabelle 4.1: Aufstellung aller im Projekt geleisteten Teilnahmen an nationalen und internationalen Aktivitäten zur Interkalibrierung (I – international, N – national)

Nr.	Veranstaltung	Ausrichtung	Datum	Ort
1	GIG-übergreifendes, konzeptionelles Treffen	I	18.-19. Februar 2009	Lissabon (PT)
2	CB_{riv}GIG Makrophyten Experten-Workshop	I	28.-30. April 2009	Kopenhagen (DK)
3	LAWA Expertentreffen Fließgewässer	N	1. Juli 2009	Wiesbaden
4	Treffen der AG „IK-Referenzbedingungen"	I	14.-15. September 2009	Oviedo (ES)
5	Treffen der AG „ECOSTAT"	I	1.- 2. Oktober 2009	Brüssel (BE)
6	LAWA Expertentreffen Fließgewässer	N	24.-25. November 2009	Berlin

5 Literatur

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Anhang 1: Präsentation „Arbeiten zur Interkalibrierung in der zweiten Phase 2008-2011“ – 1. Juli 2009, Wiesbaden

Arbeiten zur Interkalibrierung in der zweiten Phase 2008 - 2011

Inhalt

- Der Interkalibrierungs-Prozess in der zweiten Phase
- Sachstand Interkalibrierung Makrophyten
- Überprüfung der nationalen Referenzausweisungen
- Interkalibrierung “Große Fließgewässer”
- Sachstand Interkalibrierung Makrozoobenthos Seen

Der Interkalibrierungs-Prozess in der zweiten Phase

Begutachtung der Verfahren und Ergebnisse der ersten Runde (ECOSTAT, externe Wissenschaftler)

- Angesichts der Herausforderungen: Lob für die geleistete Arbeit
- Kritik an einzelnen (Schlüssel-)Aspekten:
  - mangelnder ökologischer Bezug
  - Vernachlässigung von Unsicherheiten
  - intransparente Herleitung der nationalen Referenzbedingungen im IK-Prozess
  - Anwendung unterschiedlicher Vergleichbarkeitskriterien (v.a. zwischen IK-Option 2 und 3)

Der Interkalibrierungs-Prozess in der zweiten Phase

Reaktion von ECOSTAT/EU Kommission

- Überprüfung der Ausweisung von Referenzbedingungen
- Revision der Interkalibrierungs-Leitlinie
  - stärkerer Vorgabe-Charakter
  - einheitliche Vergleichbarkeits-Kriterien (Bei welcher Abweichung besteht Anpassungsbedarf der nationalen Klassengrenzen?)
  - erhöhte ökologische Transparenz (z.B. Beschreibung von internationalen Referenzgemeinschaften, Erstellen von Dosis-Wirkungs-Beziehungen)
  - Möglichkeit alternativer Bezugspunkte für die Interkalibrierung

Sachstand Interkalibrierung Makrophyten

- Integration des revidierten PHYLIB-Moduls Makrophyten
- Erstellung von „common metrics“ nach dem in 2008 entwickelten Verfahren
- Definition von internationalen Bezugspunkten für die Interkalibrierung anhand von Stellen im sehr guten/guten Zustand (validiert durch abiotische Daten zur Gewässerqualität) → Rücksprache zu individuellen Stellen erforderlich
- Erarbeitung von Analyse-Optionen für den Vergleich von Klassengrenzen (Mitgestaltung der Interkalibrierungs-Leitlinie)

→ Vorläufige Ergebnisse: Ende 2009 (nur Makrophyten)
Kombination von Makrophyten & Phytobenthos: 2010

Überprüfung der nationalen Referenzausweisungen

- Charakterisierung der in der ersten IK-Phase gemeldeten Referenzstellen für MZB und PB (Daten zur Biologie, Gewässerchemie, EZG-Nutzung, Hydromorphologie, Verortung)
- Erläuterung der Anwendung der Referenzkriterien

→ Zentrale Sammlung und Auswertung durch Expertengruppe „IK-Referenzbedingungen“ (Leitung: I. Pardo, Spanien)

Interkalibrierung „Große Fließgewässer“

Große Fließgewässer waren nicht Teil der ersten Interkalibrierungs-Phase.

Schwierigkeiten:
- Geringer Entwicklungsstand der Bewertungsverfahren in vielen Staaten
- Fehlen von naturnahen Referenzstellen

Start der IK-Aktivität im Herbst 2009: internationaler Workshop in Koblenz (Leitung: F. Schöll, BfG)

Interkalibrierung „Große Fließgewässer“

Generelle Vorgehensweise

- Bildung eines Netzwerkes von Experten für große Fließgewässer (alle BQE)
- Aufbau einer gemeinsamen Datenbank für die IK-Analysen
- Erstellen einer IK-Typologie und Ausweisung von „geringst gestörten Bedingungen“ (least disturbed conditions) als alternativer IK-Bezugspunkt

Sachstand Interkalibrierung MZB der Seen

- Datensammlung für Pilotanalysen bald abgeschlossen;
- Entsprechende internationale Datenbank programmiert
- Pilotanalysen im CB-GIG begonnen
- Zunächst nur Interkalibrierung von Eulitoral / allgemeine Degradation, im alpinen GIG bald auch Sublitoral / Eutrophierung
- Positionspapier zu „Alien Species“ in Vorbereitung - Abstimmung mit LAWA-Expertenkreisen vorgesehen

Anhang 2: Präsentation „Interkalibrierung Fließgewässer - Sachstand“ – 25. November 2009, Berlin

Interkalibrierung Fließgewässer
Sachstand

LAWA Expertensitzung – Berlin, 24+25 Nov 2009

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• Überprüfung der nationalen Referenzausweisungen
• Sachstand „Interkalibrierung Makrophyten“

Überprüfung der nationalen Referenzausweisungen

- Zentrale Forderung von ECOSTAT zur Überprüfung der Ergebnisse der ersten IK-Phase
- GIG-übergreifende Arbeitsgruppe „Referenzen“
  - ✓ Überprüfung der Referenz-Ausweisungen (Frühjahr 2010)
    → Anfrage: Umweltdaten der Referenzstellen
  - ✓ Überarbeitung der Referenz-Kriterien (2011)
    → Anfrage: Daten zur Analyse von Beziehungen zwischen anthropogener Belastung und biologischer Auswirkung
  - ✓ Erstellung eines Konzepts für alternative Ankerpunkte (2011)
    → in Zusammenarbeit mit Makrophyten-IK

Überblick Referenzstellen Interkalibrierung (erste Phase) *Makrozoobenthos*

IK-Typ	Bundesl.	Gewässer	Probestelle
Sandbach des Tieflandes (n = 6)	BR	Plane	Brandenburg a. d. Havel, bei Raben
		Verlorenwasserbach	Brandenburg a. d. Havel, Nähe Egelinde, nordwestl. Belzig
		Schwarzer Bach	Brandenburg a. d. Havel, westl. Ragösen, nördl. Belzig
		Nieplitz	Luckenwalde, südl Treuenbritzen, bei Frohnsdorf
	NW	Rotbach	Essen, bei Sträterei nahe Dinslaken
		Furlbach	Pegel Tütgenmühle
Silikatischer Bach des Mittelgebirges (n = 18)	BW	Brotenaubach	Baden-Baden, Lochquelle uh. Brotenau südwestl. Bad Wildbad, südöstl. Baden-Baden
		Mannenbächle	Baden-Baden/Pforzheim, Eyachmühle nordwestl. Bad Wildbad
		Kleine Wiese	Freiburg, bei Tegernau südwestl. Schönau
		Rüttebach	Freiburg, bei Todtmoos
		Wilde Gutach	Freiburg, bei Wehrleshof in Obertal, Nähe St. Märgen, Krs. Emmendingen
		Zastlerbach	Freiburg, beim Adamshof, Nähe Oberried, Lkr. Breisgau-Hochschwarzwald
		Wagensteigbach	Freiburg, Buchenbach beim Falkenhof, Nähe Kirchzarten, Lkr. Breisgau-Hochschwarzwald
		Ibenbach	Freiburg, Buchenbach beim Melcherhof, Lkr. Breisgau-Hochschwarzwald
		Kleine Wiese	Freiburg, Bürchau westl. Schönau
		Erlenbach	Freiburg, Lehenhof bei St. Märgen, Lkr. Breisgau-Hochschwarzwald
		Angenbach	Freiburg, Mündung westl. Rohmatt, südwestl. Todtnau
		Neumagen	Freiburg, Sorbaum bei Oberelend, östl. Staufen
		Fohrenbach	Freiburg/Konstanz, Fohrenbachmühle bei Nöggenschwiel, Nähe Waldshut
		Lohmühlenbach	Lahr, Mündung südöstl. Schömberg südl. Freudenstadt
		Kleine Enz	oh. Calmbach
	HE	Elbrighäuser Bach	Bad Wildungen, nördl. Dodenau Nähe Battenberg (Eder), südwestl. Bad Wildungen
	TH	Bere	Nordhausen, oh. Eisfelder Talmühle nordöstl. Ilfeld (Harz)
		Haselbach	Suhl, oh. Oberschönau, Thüringer Wald
Kleiner Fluss des Tieflandes (n = 2)	BR	Buckau	Brandenburg a.d. Havel, südöstl. Ziesar, Herzberg, bei Buckau
	SA	Pulsnitz	Dresden, bei Naundorf nördl. Dresden

Überblick Referenzstellen Interkalibrierung (erste Phase) *Diatomeen*

IK-Typ	Bundesl.	Gewässer	Probestelle
Silikatischer Bach des Mittelgebirges (n = 5)	NW	Fürwiggebach	Zulauf zur Fürwiggetalsperre
		Hoppecke	oh. Brilon-Wald bei Brilon
		Lörmecke	am Hohlen Stein bei Warstein
	BY	Schweinenaab	Wegbrücke oh. Herzogspitz
	TH	Zahme Gera	Arlesberg
Kleiner Fluss des Tieflandes (n = 1)	NI	Hunte	Schäferhof, oh Einlauf Dümmer See

Überprüfung der nationalen Referenzausweisungen
Resümee für Deutschland

gilt für viele Mitgliedstaaten

Keine Tiefland-Stelle entspricht den Kriterien:
- Siedlungen im EZG >0,8% (Miss-Interpretation: SI)
- Intensive Landwirtschaft im EZG >20%
- Gewässerchemie über Grenzwert
- Veränderte Hydromorphologie (v.a. Diatomeen-Stellen)

→ EU Kommission könnte IK-Ergebnisse der ersten Phase für Tiefland-Gewässer in Frage stellen (nicht vor 2011).

Mögliche Reaktion - International:
- Revision der IK-Referenzkriterien (z.B. „Entschärfung“ der Landnutzungs-Grenzwerte)
- Anwendung „alternativer IK-Ankerpunkte“

Mögliche Reaktion - National:
- Ausweisung neuer Referenzstellen

Überprüfung der nationalen Referenzausweisungen
Fragen an das Gremium

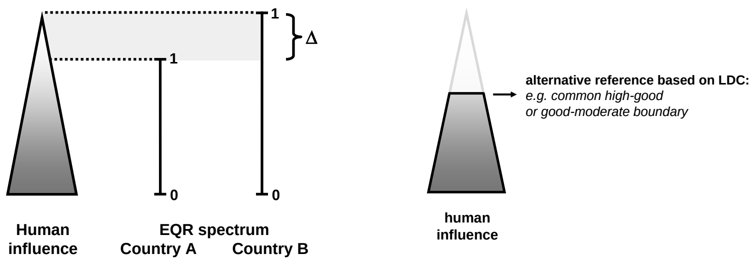
(1) Zustimmung zur Datenlieferung „Überprüfung der Referenzstellen“ (Diatomeen) → transparenter IK-Prozess

(2) Daten-Beitrag zur Überarbeitung der Referenzkriterien sowie Findung von „alternativen Ankerpunkten“ → günstige Möglichkeit: Arbeit wird von Wissenschaftlern der Universität Vigo (Spanien) geleistet

Vorschlag: Nutzung ausgewählter Daten aus dem UBA-Projekt

Interkalibrierung „Makrophyten in Fließgewässern"
Sachstand

Alternative Ankerpunkte:



- Abschluss der Datensammlung (171 Probestellen aus 14 Ländern)
- Analysen in den kommenden zwei Monaten

Interkalibrierung „Makrophyten in Fließgewässern"
Sachstand

Vorhaben 2010:

- Vergleich der nationalen Klassengrenzen für drei IK-Typen
- Verknüpfung mit den IK-Ergebnissen für Diatomeen (noch zu organisieren)

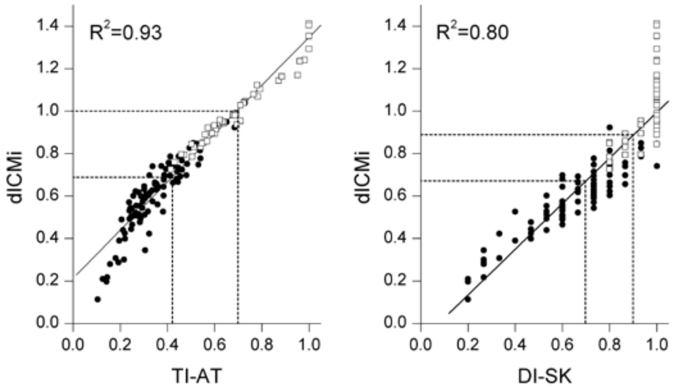
Anhang 3: Präsentation „Alternative benchmarking for intercalibration“ – 14. September 2009, Oviedo (Spanien)

Alternative benchmarking for intercalibration

Objective

To establish a trans-national reference point to compare national quality classifications for water body types that lack in (sufficient) reference sites.

Example



National EQRs including class boundaries vrs. common metric (standardised by benchmark value)
white squares = sampling sites delineated according to selected benchmarking approach

Birk & Hering (2009), Ecological Indicators

Approaches

Direct Benchmarking:
Definition of biological conditions ("benchmark communities") that represent common level of biological deviation from natural reference communities.

Indirect Benchmarking:
Identification and description of biological response to pre-defined pressure range.

Characterisation

<table>
<tr><th></th><th>Direct Benchmarking</th><th>Indirect Benchmarking</th></tr>
<tr><td rowspan="2">Advantages</td><td>Closely related to the ecological status classification according to WFD Annex V</td><td rowspan="2">Pressure as the "international currency" that allows for benchmarking despite of differences in national sampling protocols or biogeographical differences</td></tr>
<tr><td>Circumvents problem of unclear pressure-impact relationships</td></tr>
<tr><td rowspan="3">Disadvantages</td><td>Prone to biogeographical differences</td><td>Need of high quality pressure data</td></tr>
<tr><td rowspan="2">Problematic definition in case of different national sampling protocols</td><td>Requires strict type definitions to ensure comparable pressure-impact relations</td></tr>
<tr><td>Relies on clear-cut pressure-impact relations and identification of relevant parameters</td></tr>
<tr><td>Recommended IC Option</td><td>3</td><td>2+3</td></tr>
</table>

CBrivGIG macrophyte benchmarking approach

Direct Benchmarking

Problems of CB GIG reference criteria

1. Only few reference sites were nominated (esp. lowland streams)
   - Reference criteria too stringend (e.g. Baattrup-Pedersen et al. 2009)
   - National monitoring focusses on degraded sites
2. Design of national assessment methods for river macrophytes:
   - Reference definitions mostly based on historical data, modelling, expert judgement, NOT existing reference sites

   → Lack in national expertise and data
3. High variability of biological conditions among references sites for siliceous mountain brooks

   → selected reference parameters and thresholds seem inappropriate for macrophytes (e.g. nutrients in the sediment, alteration of land-water interface, flow modification, ...)

CBrivGIG macrophyte benchmarking approach

Problems of CB GIG reference criteria

4. Natural and anthropogenic effects are hard to disentangle for macrophytes.

   → no clear-cut pressure-impact relationship (limited scientific knowledge)

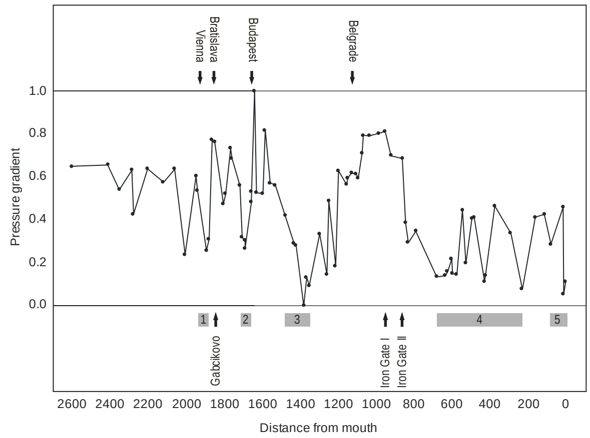
Which screening parameters need to be measured and how?

CBrivGIG macrophyte group resorts to direct benchmarking by defining benchmark communities showing less deviation from natural reference communities.

→ Synthesis of existing „common high status“ sites
(validated by expert judgement and supported by pressure data)

Indirect Benchmarking

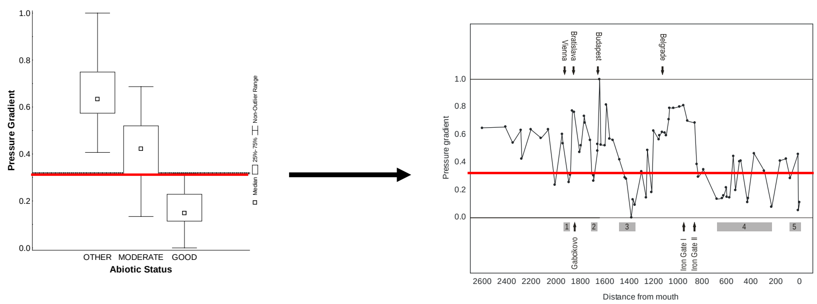
Defining biological benchmarks for the Danube River intercalibration exercise



Abiotic pressure profile of the Danube River derived from morphological, chemical and land use data via PCA

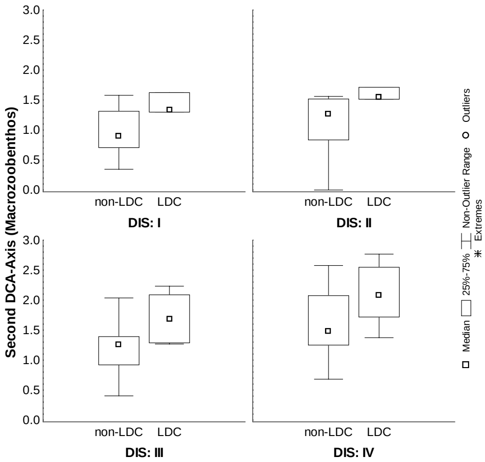
Birk & van Kouwen (2009), ICPDR report

Defining biological benchmarks for the Danube River intercalibration exercise



Using abiotic quality status to derive environmental threshold to delineate Least Disturbed Conditions (LDC)

Defining biological benchmarks for the Danube River intercalibration exercise



Response of the macrozoobenthos community at LDC and non-LDC sites for different Danube Intercalibration Stretches (DIS)

(Second DCA-axis explains 25% of variance and is correlated to gradient with C_{Sp}=0.7)

Anhang 4: Beitrag der CB_{riv}GIG Makrophyten zum Bericht der Arbeitsgruppe „IK-Referenzbedingungen“ (Pardo et al. 2010)

The CB GIG river macrophyte benchmarking approach

The initial approach to define benchmarks for the intercalibration of the national quality classifications using rivers macrophytes followed the procedure established by the diatom and invertebrate exercise in the first round of intercalibration: screening for near-natural reference sites based on common criteria (i.e. “CB GIG reference criteria”).

However, the approach was not successful for two reasons: Firstly, the number of reference sites nominated by the Member States was very small, especially for the sandy brooks (R-C1) and medium-sized streams in the lowlands (R-C4). Flanders and the Netherlands were not able to assign any reference sites for these types, while the number of sites identified by France, Wallonia, Germany and Poland did not allow for sound statistical treatment of the data. Here, the reference criteria seem too stringent to collate reasonable benchmark datasets from within the contemporary data yielded by the current national monitoring programmes (see also Baattrup-Pedersen et al. 2009). This is probably due to the generally distorted character of the lowland river systems in the CB GIG, but also to the national focus on impacted instead of natural sites in their monitoring programmes. It has to be mentioned that in the design of national macrophyte assessment methods defining reference conditions based on existing reference sites was uncommon, and countries relied instead on geographical analogues and historical data or modelling (e.g. Baattrup-Pedersen et al. 2008). National expertise and data availability may thus be generally scarce, probably forcing inconsistent and inexact screening procedures.

More reference sites passing the CB GIG criteria were nominated by the countries for the mountain brooks (R-C3). However, with only four to eight sites defined by Austria, Germany, the United Kingdom and Wallonia, the numbers per country was still small (Tab. 3). France defined 37 reference sites, allowing for preliminary analysis of the biological features: The French and Walloon sites showed high variability of the macrophyte communities, including sites classified in worse than moderate quality status according to the national assessment methods (Fig. 9). Since the macrophyte IC group shared a common notion of the common type environment and its biological setting, we precluded typological or biogeographical differences to explain these results. This highlights the second reason for the unsuccessful application of the CB GIG reference criteria: The selected parameters and thresholds seem inappropriate for the screening of macrophyte reference sites.

Country	AT	BE (WL)	DE	FR	UK
# surveys	6	8	4	37	6

Table 3: Number of macrophyte reference sites complying with the CB GIG criteria for the mountain brooks (R-C3)

Several pressure parameters relevant for the macrophyte communities were not included in the catalogue of reference criteria: Nutrient concentrations in the substrate, alteration of the land-water interface and extent of riparian tree cover, flow modification. Furthermore, macrophyte communities are dependent on natural factors showing high variability at small scales, e.g. light conditions and flow patterns. Macrophytes are long-term indicators and compositional changes are therefore more likely to reflect chronic change rather than short term fluctuations, or, possibly, ambient conditions. The response of the communities integrates various stresses among which the natural influences are either often hard to disentangle from the anthropogenic pressures or buffer the effects of anthropogenic pressure. Therefore, the pressure-impact relationship is not as clear as for other biological quality elements. Here, scientific knowledge is limited (e.g. Janauer 2001), and with regard to an improvement of the reference criteria catalogue the questions is: which screening parameters need to be measured and how? Against the background of an already problematic screening procedure revealed by the current revision of national reference delineations, we regard the efforts arising from a revised catalogue as being impracticable for this intercalibration phase.

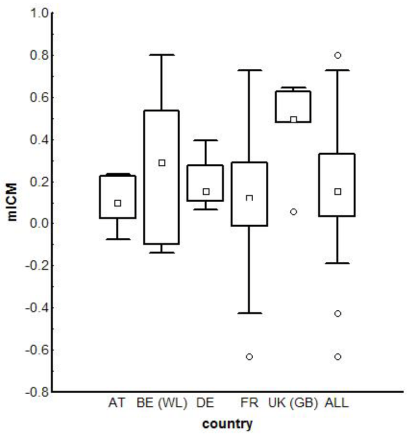


Figure 9. Range of macrophyte Intercalibration Common Metric (mICM) among national reference sites in R-C3

To find a common benchmark for intercalibrating the national quality classifications the macrophyte group is thus resorting to the description of biological benchmark communities. The approach is to define a common level of biological deviation from natural reference communities. Since Member

States are using comparable protocols for data acquisition and share a common notion of undisturbed macrophyte communities, these assemblages can generally be described on the international level for each common intercalibration type. Using data on national surveys stored in the intercalibration database a pool of sites in minimally impacted conditions is selected. This is done by extracting "Common High Status" sites (CHS), i.e. surveys that are assessed at least in good status by all countries, but in high status by the majority of countries. These CHS represent the full spectrum of commonly rated high quality macrophyte communities representative of a river type, and, by definition, represent minimal departure from the biological conditions that are found or expected in the absence of detectable pressures. Following Baattrup-Pedersen et al. (2008, 2009) the CHS approach thus establishes a GIG-wide guiding image for macrophyte reference communities that goes beyond mere expert judgement, building also on empirical data. Differences in common metric values or macrophyte assemblages between geographical regions point to biogeographical or typological trends within the common intercalibration type. Supporting environmental data for the CHS are currently being collected from the Member States. The requested information covers catchment land use data, the evaluation of general chemical, hydromorphological and hydrological pressure and water chemistry data. This benchmark dataset covers a broad geographical gradient from Northern Ireland to the Baltic countries (Fig 10) and comprises both reference and slight to moderately impaired sites. We intend to analyse the effects of biogeographical and typological differences on the macrophyte assemblages of these sites, as well as the macrophytic response to moderate levels of pressure. By quantifying the global stress exerted on the benchmark sites we will link this alternative reference approach to the overall reference concept followed in the intercalibration exercise.

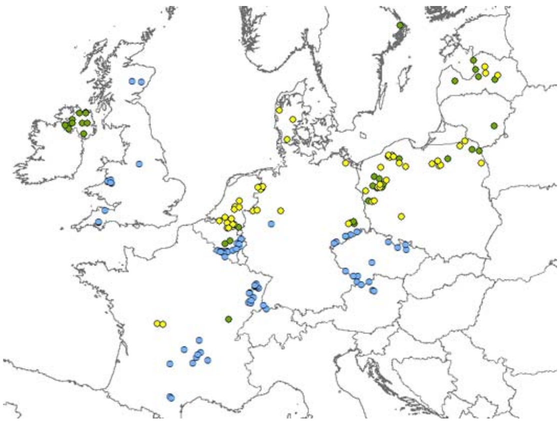


Figure 10: Location of benchmark sites used to establish an alternative reference for the intercalibration of river macrophyte assessments in the CB GIG (yellow dots=R-C1, blue dots=R-C3, green dots=R-C4)

Anhang 5: Kopie der Milestone 1 Berichterstattung des CB$_{riv}$GIG Makrophyten

EUROPEAN COMMISSION
DIRECTORATE GENERAL JRC
JOINT RESEARCH CENTRE
Institute of Environment and Sustainability

WFD Intercalibration Phase 2 : Milestone 1 report (for ECOSTAT meeting 1-2 October 2009)

The reporting for the second phase of the intercalibration exercise will be done according to the new guidance document that is in development. A first version of the guidance was distributed earlier. A new draft will be sent out to ECOSTAT members and GIG leads in the first week of September, for discussion at the ECOSTAT meeting of 1-2 October 2009.

The new guidance already foresees a 'Milestone 1' report for the autumn of 2009, with the following key elements:
– overview of the national assessment methods that will be intercalibrated
– check of their WFD compliance of the national methods
– 'feasibility check' for intercalibration (do methods address common types and pressures, and follow a similar assessment concept?)
– progress on compilation of IC dataset

The template below follows the requirement of the (draft) guidance. All GIGs are kindly requested to submit their progress reports for the relevant quality elements following this template as much as possible. At this stage it is acceptable to leave empty those sections that have not been addressed in your GIG.

Also, you are requested to update the relevant sections of the intercalibration work plan (distributed as a separate document).

Depending on how the work has been organized, we expect one response for each quality element for each of the GIGs. In case of horizontal activities (e.g. large rivers) or where the work is carried out cross-GIG (e.g. fish in rivers), one coordinated response is expected. Please contact the IC steering group if you need any further clarifications:
Sandra Poikane (Sandra.poikane@jrc.eu.europa.eu) - Lakes
Wendy Bonne (wendy.bonne@jrc.ec.europa.eu) - Coastal/Transitional
Wouter van de Bund (wouter.van-de-bund@jrc.ec.europa.eu) - Rivers.

Please send your responses before 15th September 2009 to eewai@jrc.ec.europa.eu

Water category/GIG/BQE/ horizontal activity:	**Rivers/CB/Macrophytes**
Information provided by:	Sebastian Birk

1: Organisation

1.1. Responsibilities and participation

Please indicate how the work is organised, indicating the lead country/person.

The work is organised by Germany (Sebastian Birk).
19 Member States' representatives are included in the information exchange;
14 Member States have provided data to the intercalibration database (AT, BE, CZ, DE, DK, EE, ES, FR, IT, LT, LU, LV, NL, PL);
8 Member States/regions hold biological assessment methods (AT, BE (FL), BE (WL), DE, FR, NL, PL, UK);
7 national methods are included in the intercalibration exercise (AT, BE (FL), BE (WL), DE, FR, PL, UK).

Are there any difficulties with the participation of specific Member States? If yes, please specify

Several Member States are not participating in the intercalibration exercise (see above), as these countries lack national assessment methods for river macrophytes.
The Netherlands hold an assessment methods that follows a different assessment concept, thus it currently cannot be intercalibrated.
Belgium holds two different national assessment methods (Flemish and Walloon method).

1.2. Work plan, Timetables and deadlines

Annex 1 to this questionnaire contains the GIG work plans as presented at ECOSTAT in April 2008 Please provide an updated version the general work plan for your GIG below

GIG CB rivers Last update: August 2009
Quality element Macrophytes
Overview of results achieved to date and issues to complete/improve:
Intercalibration analyses are currently performed based on national macrophyte survey data of three common intercalibration types, i.e. R-C1x2 (subtype of medium to high alkalinity), R-C3, R-C4x2 (subtype of medium to high alkalinity). The work comprises six national assessment methods including quality class boundaries. A common metric (mICM) was developed and is currently compared against the national assessment indices. In parallel, direct pair-wise comparison of normalized national EQRs is performed.
To establish benchmarks for intercalibration "common high status sites" (i.e. river sites that are assessed in high status by most of the countries, but at least in good status by the rest) are identified. For these sites environmental data are collected. In addition, mean nutrient values (i.e. average $N\text{-}NO_3$ and $P\text{-}PO_4$ concentrations at which certain taxa are occurring) are requested. With both information, the common benchmark will be established.

Scope of the continuation work:
Combination of Phytobenthos and Macrophytes: The group recommends to carry out this task by a specific sub-group (funding required). However, we shall wait for completion of national research on this topic (e.g. UK, FR). This activity shall start in 2010.
Intercalibration of R-C5: We will start with the collection of additional data and analysis in 2010. Sebastian can probably coordinate this task (depending on funding).
X-GIG Macrophyte activities: The group does not recommend a specific X-GIG macrophyte organisation, but information exchange and collaboration among GIGs is appreciated.

Estimated timetable for the completion of the work:
The group will draft a report by end of this year covering all necessary details required for the official intercalibration reporting (covering only macrophyte results). We will update this report until 2011 to include additional Member States that are currently not participating.

Comments:
none

2: Methods to be intercalibrated

2.1. Overview of Member States providing national assessment methods

Do you have an overview of the national classification methods that will be intercalibrated? If not: when will this information be available?

Yes, the overview is given in Birk et al. (2007)[1]. However, national updates need to be considered.

2.2. Checking of compliance of national assessment methods with the WFD requirements

*What are the arrangements in the GIG to verify the **compliance of national assessment methods** with the WFD requirements ? Has the GIG already started an evaluation of the compliance of national assessment methods with WFD requirements? Please give a short report on how this is done (or will be done)*

Design and concept of national assessment methods were extensively discussed and evaluated among experts at the intercalibration workshops. The WFD compliance criteria stated in the IC Guidance draft are met.

2.3: Progress on Feasibility checking: method acceptance criteria

The intercalibration process ideally covers all national assessment methods within a Geographical Intercalibration Group. However, the comparison of dissimilar methods ("apples and oranges") has to be avoided. Intercalibration exercise is focused on specific type / biological quality element / pressure combination. The intercalibration guidance foresees an "IC feasibility check" to narrow the actual intercalibration analysis to methods that address

[1] http://circa.europa.eu/Public/irc/jrc/jrc_eewai/library?l=/milestone_reports/milestone_reports_2007/rivers/cb_gig/june-07-v2_annexes/cbrivgig_june-07-v2pdf_1/_EN_1.0_&a=d

the same common type(s), the same anthropogenic pressure(s), and follow a similar assessment concept.

The task of the GIG is compilation of groups including similar assessment methods, and evaluation of "outlying" methods. A feasibility check includes coverage of **intercalibration types**, **pressures** and **method concept**. The aim of the check is to address if all national methods address the same common type(s) and pressure(s), and follow a similar assessment concept.

- *Has the GIG evaluated if intercalibration is feasible in terms of typology? Are the common type delineations suited for the specific BQE intercalibration exercise? Are all assessment methods appropriate for the intercalibration water body types ? Are any types going to be added?*

The group has evaluated the common IC type delineation and defined sub-types based on alkalinity ranges. Furthermore, the analyses of the biological data showed distinct biological sub-types shared by two or more countries. Benchmarks will be defined accordingly.

- *Has the GIG evaluated if intercalibration is feasible in terms of pressures? Do all national methods address the same pressure(s) ?*

The national assessment methods are primarily designed to assess eutrophication pressure. National studies show that the national indices are responsive to nutrient enrichment. However, general degradation and hydromorphological pressure are additionally addressed by some national methods. This is especially reflected by the conceptually different assessments done by Flanders (using macrophyte growth forms) and the Netherlands (using taxonomic richness).

- *Has the GIG evaluated if intercalibration is feasible in terms of assessment concept? Do all national methods follow a similar assessment concept? If the GIG previously encountered problems with regard to checking comparability of dissimilar methods, how are these resolved ?*

The Flemish and Dutch assessment methods are conceptually different. The former includes growth form evaluation into quality classification. The intercalibration exercise is focussing only on the Flemish metrics related to the common metric. The Dutch method is different in terms of data acquisition (spot checks covering the entire water body) and metric calculation (sum of scores, not weighted average). Currently, this method is not taking part in intercalibration.

2.4: Progress on Collection of IC dataset and Design the work for IC procedure

Please describe progress on data collection within the GIG

Most data of the relevant IC types have been collected and are stored in a central database. Currently, environmental data is collected for the common high status sites (see work plan).

2.4: Progress on Reference conditions/benchmarking

Which actions are ongoing/planned to compare reference conditions (including the results of the first phase) and boundary setting ?

We define "common high status sites" and validate these by using supportive environmental data and related nutrient information. Furthermore, the macrophyte communities at high status are examined to detect compositional differences. These differences allow to distinguish between national sub-types within a common IC type. The common metric will be used to show if these differences are numerically reflected.

2.5. Design the work for IC procedure

Please describe progress of choice of the appropriate intercalibration option.

Both Option 2 (commonmetrics) and Option 3 (direct comparison) are evaluated in parallel.

3. Further comments

none

Anhang 6: Zuweisung der nationalen Fließgewässertypen zu den Interkalibrierungstypen des Makrozoobenthos und der Diatomeen

No.	German stream type[2]	Corresponding diatom type[3]	Length [km][4]	Length [%][3]	Catchment size [km²]	Altitude [m]	Geology	Substrate	Common intercalibration type
1	Type 1: Alpine streams	D1.1, D1.2	1,796	1.6	10-10,000	>800	calcareous, flysch	boulders and cobble	R-A1: Small to medium, high altitude, calcareous Alpine streams *(only diatoms)*
2	Type 2: Streams in the alpine foothills	D2	7,347	6.4	10-1,000	200-800	mixed	cobble, gravel, sand, clay, silt	-
3	Type 3: Streams in the Pleistocene sediments of the alpine foothills	D3	2,270	2.0	10-1,000	200-800	calcareous	boulders, cobbles and gravel	R-A1: Small to medium, high altitude, calcareous Alpine streams *(only benthic invertebrates)*
4	Type 4: Large rivers in the alpine foothills	D4	652	0.6	1,000-10,000	200-800	calcareous	cobbles, boulder and gravel	-
5	Type 5: Small coarse substrate dominated siliceous highland rivers	D5	19,381	17.0	10-100	200-800	siliceous	cobbles and boulders	R-C3: Small mid-altitude siliceous streams
5.1	Type 5.1: Small fine substrate dominated siliceous highland rivers	D5	8,490	7.4	10-100	200-800	siliceous	sand and gravel	R-C3: Small mid-altitude siliceous streams
6	Type 6: Small fine substrate dominated calcareous highland rivers	D8.1	9,245	8.1	10-100	200-800	calcareous	loam, clay and sand	-
7	Type 7: Small coarse substrate dominated calcareous highland rivers	D9.1	5,647	4.9	10-100	200-800	calcareous	flat cobbles and boulders	-
9	Type 9: Mid-sized fine to coarse substrate dominated siliceous highland rivers	D7	5,536	4.8	100-1,000	200-800	siliceous	cobble, boulder and gravel	-
9.1	Type 9.1: Mid-sized fine to coarse substrate dominated calcareous highland rivers	D8.2, D9.2	2,955	2.6	100-1,000	200-800	calcareous	cobble, pebble and gravel	-
9.2	Type 9.2: Large highland rivers	D10.1	3,353	2.9	1,000-10,000	200-800	calcareous	boulders and cobble	-
10	Type 10: Very large gravel-dominated rivers	D10.2	1,613	1.4	>10,000	<200	calcareous	coarse gravel and cobble	-
11	Type 11: Small organic substrate-dominated rivers	D3, D5, D11.1	2,499	2.2	10-100	not specified	organic	organic substrates	-
12	Type 12: Mid-sized and large organic substrate-dominated rivers	D3, D11.2, D12.1, D12.2, D13.1	1,026	0.9	100-10,000	not specified	organic	organic substrates	-

[2] Pottgiesser, T. & M. Sommerhäuser, 2004. Profiles of German stream types. - http://www.wasserblick.net/servlet/is/24739/
[3] Birk, S., J. Böhmer, C. Meier, P. Rolauffs, J. Schaumburg & D. Hering, 2007. EG-Wasserrahmenrichtlinie - Harmonisierung der Berichterstattung zur ökologischen Einstufung nach EG-Wasserrahmenrichtlinie (Interkalibrierung biologischer Untersuchungsverfahren in Deutschland). University of Duisburg-Essen, Essen.
[4] Sommerhäuser, M. & T. Pottgiesser, 2005. Die Fließgewässertypen Deutschlands als Beitrag zur Umsetzung der EG-Wasserrahmenrichtlinie. In Feld, C.K., S. Rödiger, M. Sommerhäuser & G. Friedrich (eds.), Typologie, Bewertung, Management von Oberflächengewässern. Schweitzerbart'sche Verlagsbuchhandlung, Stuttgart: 13-27.

No.	German stream type	Corresponding diatom type	Length [km]	Length [%]	Catchment size [km2]	Altitude [m]	Geology	Substrate	Common intercalibration type
14	Type 14: Small sand-dominated lowland rivers	D11.1, D12.1	12,996	11.4	10-100	<200	mixed	sand and gravel	R-C1: Small lowland siliceous sandy streams
15	Type 15: Mid-sized and large sand and loam-dominated lowland rivers	D12.2, D13.1	5,307	4.6	100-10,000	<200	calcareous	sand and loam	R-C4: Medium lowland streams of mixed geology, R-C5: Large lowland stream of mixed geology
16	Type 16: Small gravel-dominated lowland rivers	D11.1, D12.1	4,861	4.3	10-100	<200	mixed	gravel, cobble and sand	-
17	Type 17: Mid-sized and large gravel-dominated lowland rivers	D12.2, D13.1	974	0.9	100-10,000	<200	mixed	gravel and sand	R-C4: Medium lowland streams of mixed geology[5], R-C5: Large lowland stream of mixed geology[4]
18	Type 18: Small loess and loam-dominated lowland rivers	no method available	3,075	2.7	10-100	<200	calcareous	silt and clay	-
19	Type 19: Small streams in riverine floodplains	D3, D8.1, D12.1	10,704	9.4	10-300	not specified	mixed	organic substrates, sand, loam	-
20	Type 20: Very large sand-dominated rivers	D13.2	1,210	1.1	>10,000	<200	calcareous	sand and gravel	-
21	Type 21: Lake outflows	no method available	1,010	0.9	10-1,000	not specified	mostly cal-careous	gravel and sand	-
22	Type 22: Marshland streams of the coastal plains	no method available	1,936	1.7	10->10,000	<200	calcareous	clay, silt and mud	-
23	Type 23: Backwater and brackish water influenced Baltic Sea tributaries	no method available	344	0.3	10-1,000	<200	calcareous	detritus and fine sedi-ments	-

[5] not intercalibrated due to lack of national reference sites

Anhang 7: Tischvorlage - CB_{riv}GIG Workshop Kopenhagen, 29. und 30. April 2009

Preparatory Document

6th Central-Baltic Rivers GIG Macrophyte Intercalibration Meeting, April 29-30th, 2009

Introduction

This document provides an overview of the current intercalibration approaches of national assessment methods using river macrophytes within the Central-Baltic (CB) GIG. The analyses carried out in this exercise were based on common datasets. These datasets included macrophyte survey data on taxonomic composition and abundance for three common intercalibration stream types covering various CB GIG countries.

The current work comprised the assessment and classification schemes of seven national methods (AT, DE, FL, FR, PL, UK, WL). Preparatory steps were the conversion of national abundance schemes into international values (see Birk et al., 2007b), and the standardization of datasets to gain comparable biological information concerning the floristic records. The main part of this document describes the procedure to intercalibrate reference values and the national class boundaries for the common type R-C3 (i.e. small mountain streams with coarse substrate and alkalinity <0.4 µeq/l). Here, we present the results of two intercalibration options (Option 2: comparison using common metrics; Option 3: direct comparison). Furthermore, we provide an update on the narrative descriptions for sites in high and bad status of the river type R-C3. An annex includes the indicator scores of the macrophyte Intercalibration Common Metric (mICM) of the types R-C3 and R-C4x2 (i.e. medium-sized lowland streams with sandy or gravely substrate and alkalinity >2 µeq/l).

We intend to present the results of the analyses for the common types R-C4x2 and R-C1x2 (i.e. sandy siliceous brooks of the lowland with alkalinity >1 µeq/l) at the meeting. This document is mainly to make you familiar with the intercalibration approaches.

Database

Macrophyte data used in the analyses were taken from the common intercalibration database mainly containing national monitoring data provided by various countries. Table I summarizes the number and origin of macrophyte surveys for R-C3 included in the analysis. The selected surveys meet all national assessment criteria, e.g. at least two submerged taxa[6], sum of cubed national abundance >16, ratio of scoring to non-scoring taxa >75% (Germany), and at least two scoring species and sum of cubed national abundance >15 (Austria).

Table I: Overview of survey data used in the analysis of R-C3

AT	BE (WL)	DE	FR	UK (GB)	Sum
23	41	49	58	29	200

National assessment methods

The national assessment methods of seven countries are included in the analyses (Table II). We considered the latest updates of these methods, especially the amendments undertaken by Austria, Germany and Great Britain in spring 2009. For France, Poland and Wallonia we used the reference and

[6] Exception: We accepted at least one submerged taxon for the sandy lowland brooks (R-C1x2) to account for the missing growth form data (emerged/submerged) and the generally more species-poor conditions of this type.

boundary values given in Birk et al. (2007b). For the common metric development only the sensitivity metrics of the Flemish method were regarded.

Table II: Overview of national assessment methods used in this study

Country	Method	Version	Including algae
AT	AIM	Spring 2009	no
DE	PHYLIB	Spring 2009	no
FL	MAFWAT	Update of indicator list: 2008 (focus on sensitivity metrics)	no
FR	IBMR	2003; Reference and boundaries: June 2007	yes
PL	MIR	Reference and boundaries: June 2007	yes
UK	LEAFPACS	Spring 2009	yes
WL	IBMR	2003; Reference and boundaries: June 2007	yes

Standardization of database

The national methods of France, Great Britain, Poland and Wallonia include algae taxa in bioassessment. Austria, Flanders and Germany do not consider these taxa in their macrophyte method. The taxonomic groups surveyed by all national methods are mosses and vascular plants. The application of indices requiring algae information to the common database, that includes surveys with and without algae records, may introduce bias caused by the different national survey protocols. Therefore, we excluded the records of algae taxa (Table III) from the surveys used in the analysis.

To determine the effect of this exclusion on the national assessment results of France, Great Britain, Poland and Wallonia, we identified the relationship of these national indices including and excluding algae taxa (Figure I). Then we converted the original national reference value into the corresponding reference value excluding algae taxa to calculate the national EQR (excl ALG) (Table IV).

Table III: List of algae taxa excluded from the analyses

Audouinella sp., Bangia sp. (B. atropurpurea), Batrachospermum sp., Binuclearia sp., Chaetophora sp., Cladophora glomerata, Cladophora sp., Diatoma sp., Draparnaldia sp., Enteromorpha sp., Hildenbrandia sp., Hydrodictyon sp., Hydrurus sp. (H. foetidus), Lemanea sp. (L. gr. Fluviatilis), Leptomitus sp. (L. lacteus), Lyngbya sp., Melosira sp., Microspora sp., Monostroma sp., Mougeotia sp., Nostoc commune, Nostoc parmelioides, Nostoc sp., Nostoc verrucosum, Oedogonium sp., Oscillatoria sp., Phormidium sp., Rhizoclonium sp., Schizomeris sp., Sirogonium sp., Spirogyra sp., Sphaerotilus sp. (S. natans), Stigeoclonium sp., Stigeoclonium tenue, Tetraspora sp., Thorea sp. (T. hispida = T. ramossissima), Tribonema sp., Ulothrix sp., Vaucheria sp., Zygnema sp.

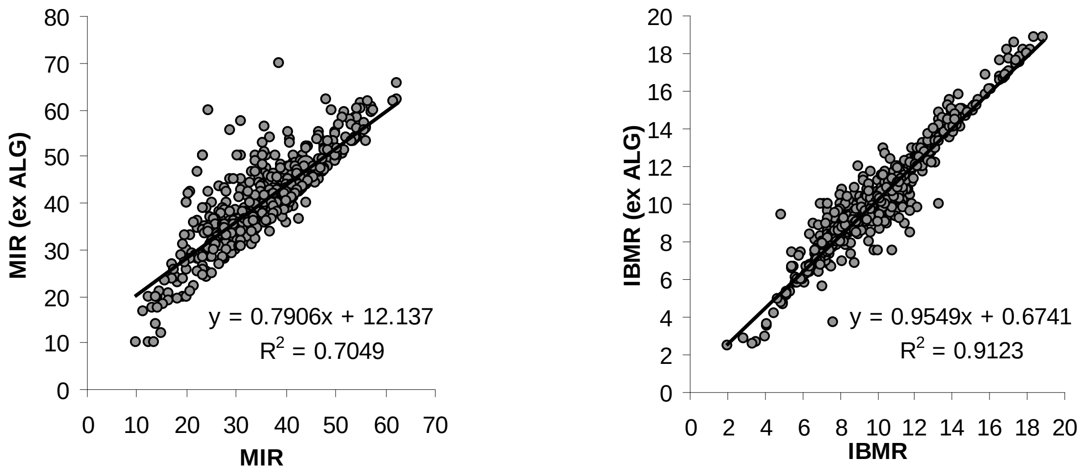


Figure I: Regression of the Polish and French national index results calculated with algae taxa included and excluded

Table IV: Original and converted national reference values excluding algae taxa (n.a.=not available)

		UK				FR	WL	PL
		RMNI	**RMHI**	**N-TAXA**	**N-FG**	**IBMR**	**IBMR**	**MIR**
R-C1x2	original	-	-	-	-	-	-	48.4
	converted	-	-	-	-	-	-	50.4
R-C3	original	n.a.	n.a.	n.a.	n.a.	14.7	15.0	-
	converted	n.a.	n.a.	n.a.	n.a.	14.7	15.0	-
R-C4x2	original	n.a.	n.a.	n.a.	n.a.	11.8	-	48.4
	converted	n.a.	n.a.	n.a.	n.a.	11.9	-	50.4
Data basis		high status surveys of UK				>500 surveys from UK, WL, FR, PL, IT, LU and STAR		

Intercalibration analysis (R-C3)

National boundary comparison using common metric mICM

The relationship between R-C3 mICM values and national EQRs is shown in Figure II. Generally there is a strong correlation between national EQRs and the common metric with R^2-values ranging from 0.67 to 0.86. This suggests that there is relatively little variation between countries in their approach to assessment of R-C3 rivers and consequently the common metric performs well in integrating all approaches. The elongated tail of low national EQR values over a range where the mICM varies little creates a curvilinear relationship in all cases which is best defined by a quadratic function. This probably partly reflects the low number of poor or bad status sites on R-C3 rivers in both national and common datasets. In terms of its use to predict mICM values at national EQRs of 1, 0.8 and 0.6 the use of polynomial function is of little consequence since the relationships in all cases are linear over the EQR range 0.5 to 1.0. The values derived from these regressions are summarised in Table V.

Table V: Summary of regressions between mICM and national EQRs

	DE	FR	WL	UK	AT	average	lower	upper
Ref mICM	0.45	0.32	0.35	0.58	0.64	0.47	0.32	0.61
HG mICM	0.06	0.01	0.01	0.14	0.11	0.06	-0.08	0.21
GM mICM	-0.21	-0.21	-0.25	-0.16	-0.23	-0.21	-0.36	-0.07
R^2	67	75	76	83	86	77		
SE_pred	0.17	0.15	0.15	0.12	0.13	0.14		

Figure III compares the mICM values of different countries at national class boundaries. The harmonisation band in each case is defined by the average prediction error in the regressions in Figure II, which is equivalent to 0.14 mICM units (Table V). This represents 9% of the length of the mICM gradient (-0.65 to + 0.85). In the reference condition band, FR falls just below the band, but apart from this all countries fall inside the band. The reference condition IBMR value (14.7) used to derive the national EQR values for R-C3 rivers appears to be a little too low. Based on a regression between IBMR (excl ALG) and the mICM value an IBMR value of ~16 would be needed to match the mid point of the reference band (Figure IV). Figure III illustrates that two countries, AT and UK clearly have a more precautionary view of reference condition rivers in this type. It is rather unclear whether this is typological or reflects differences in the application of screening criteria. UK lies in a different ecoregion and given the Atlantic nature of its R-C3 rivers might be expected to have a stricter mICM value at reference condition than more continental countries. A related issue might be the inclusion of sites in R-C3 by the UK that might have been considered within Alpine GIG by those continental members of CB GIG. R-C3 seems to be a relatively well defined common type and it is rather surprising that differences between countries in derived mICM reference values are as large as those observed. In other cases DE occupies an average position in all bands, FR becomes progressively more precautionary at lower classes, while AT becomes more relaxed.

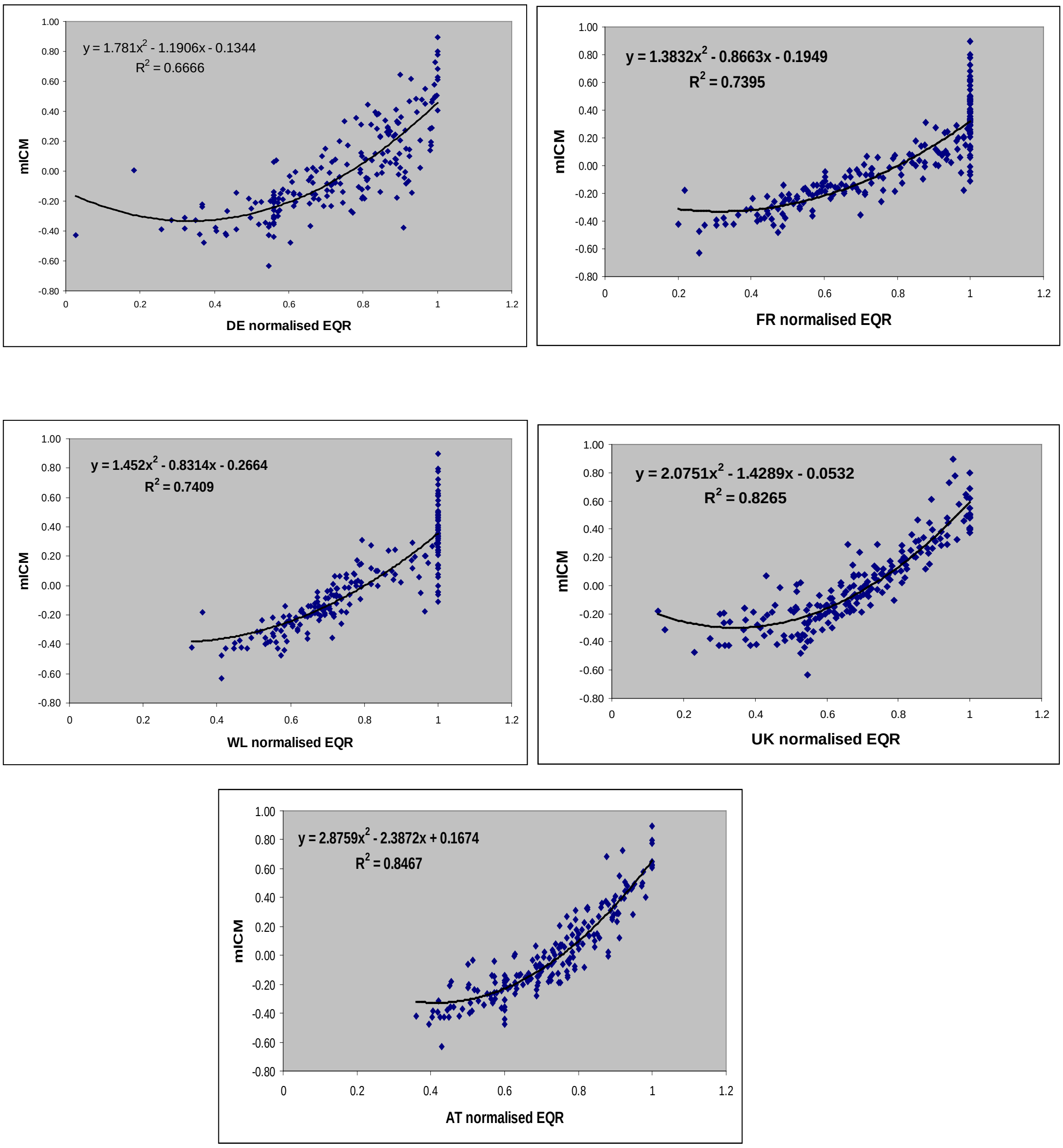


Figure II: Regressions between national EQRs and mICM.

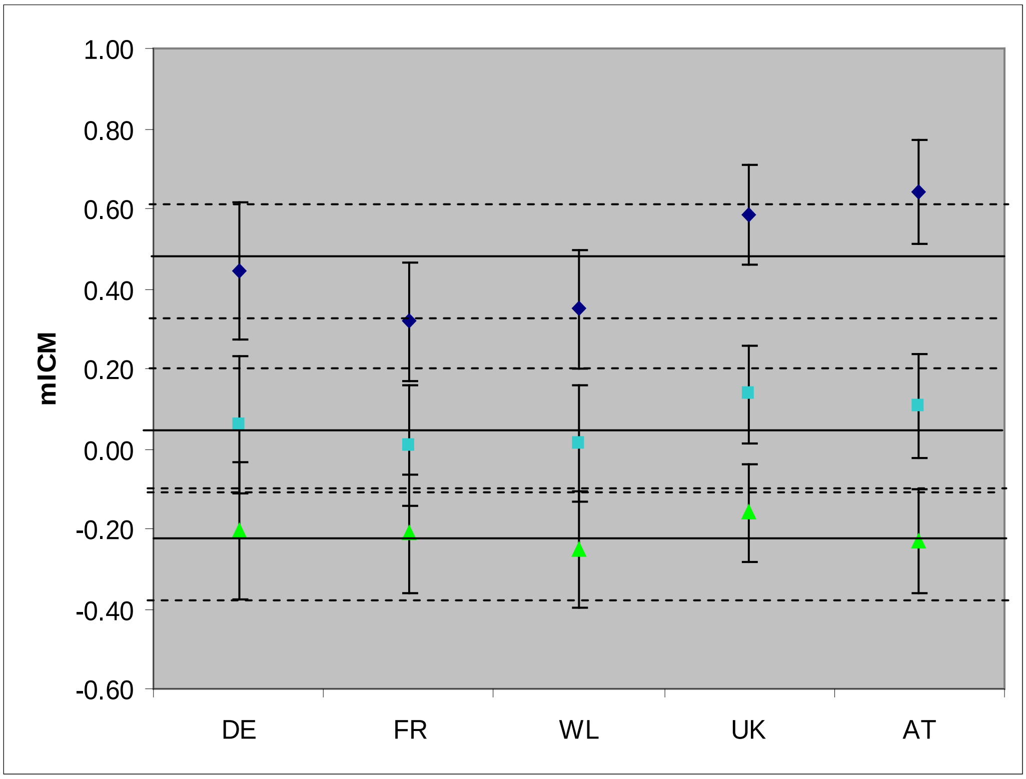


Figure III: Comparisons of reference, HG and GM boundary values between countries where the R-C3 mICM forms the basis for comparison. Solid lines represent global mean. Harmonised band widths defined by average prediction error of national EQR versus mICM of 0.14 mICM units.

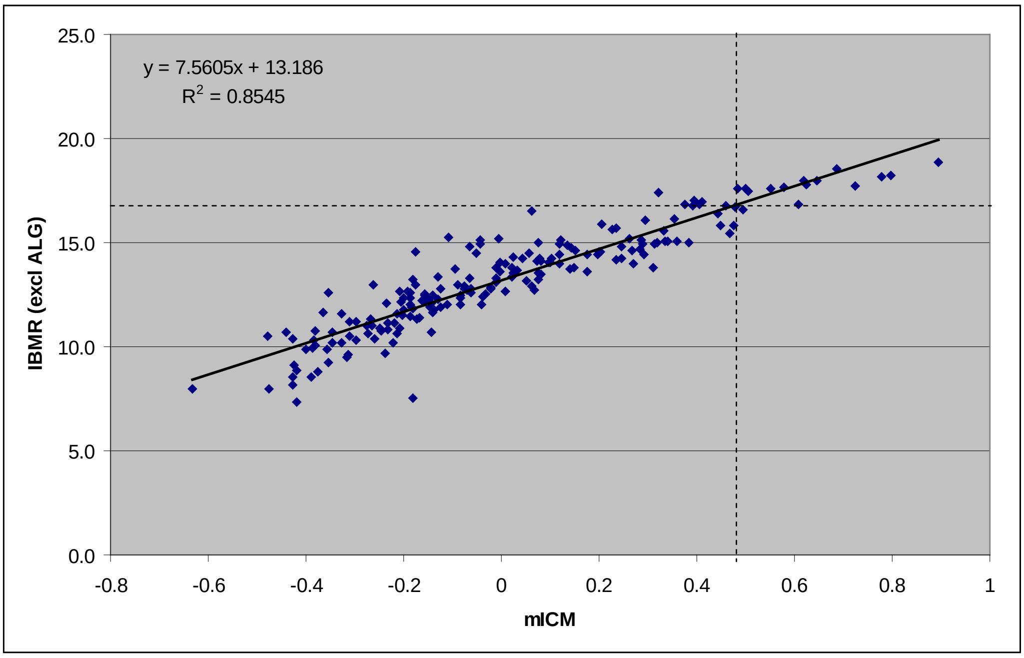


Figure IV: Regression between French IBMR (excl ALG) values, and the R-C3 mICM. The dashed line equates to a value of 0.47 which represents the mid point of the reference band.

Further analysis of these results can be achieved by interpreting the data relative to the mICM value equivalent to a national EQR of 1, or by interpreting values relative to the mid point of the harmonisation band (see Table VI). When the derived common index value for a national EQR equal to 1 is used as the basis for comparison (i.e. dark blue symbols in Figure III above) only the rather relaxed position of AT at the GM boundary (0.32 mICM_EQR) stands out. This reflects the relatively precautionary position of AT at reference. In contrast, when the global average reference value is used as the basis for comparison (i.e. mid point of harmonisation band in Figure III above), WL has the most relaxed view at the GM boundary, while UK has a precautionary view at both HG and GM boundaries. However, in all these cases, all countries lie inside the harmonisation bands.

Table VI: Comparison of class boundaries for R-C3 rivers after standardisation as mICM_EQR calculated relative to derived national reference value (upper panel) or relative to global average reference value. Note: Harmonisation band width defined by average standard error of prediction in national regressions vrs. mICM (i.e. 0.14) rescaled to an EQR equivalent of 0.09 to reflect length of mICM gradient.

	DE	FR	WL	UK	AT	average	lower	upper
	as mICM at national EQR =1							
HG	0.65	0.68	0.67	0.64	0.58	0.64	0.55	0.73
GM	0.41	0.45	0.40	0.40	0.32	0.39	0.30	0.48
	as global average of reference mICM							
HG	0.63	0.59	0.59	0.70	0.68	0.64	0.55	0.73
GM	0.40	0.39	0.36	0.44	0.37	0.39	0.30	0.48

Common high status sites in R-C3 rivers

To generate a set of common high status sites that could be used as a baseline for comparison and to provide a narrative of high status biology we extracted 69 sites that were classified as High status by the majority of countries and above the middle of Good status by all countries. A slightly broader definition was required to reduce the influence of the most precautionary countries. Common high status sites based on this definition occurred in all countries participating in the intercalibration of R-C3 rivers (AT = 5 sites; DE= 8 sites; FR = 29 sites; UK = 14 sites and WL = 13 sites). The frequency distribution of mICM values of common high status sites is shown in Figure V.

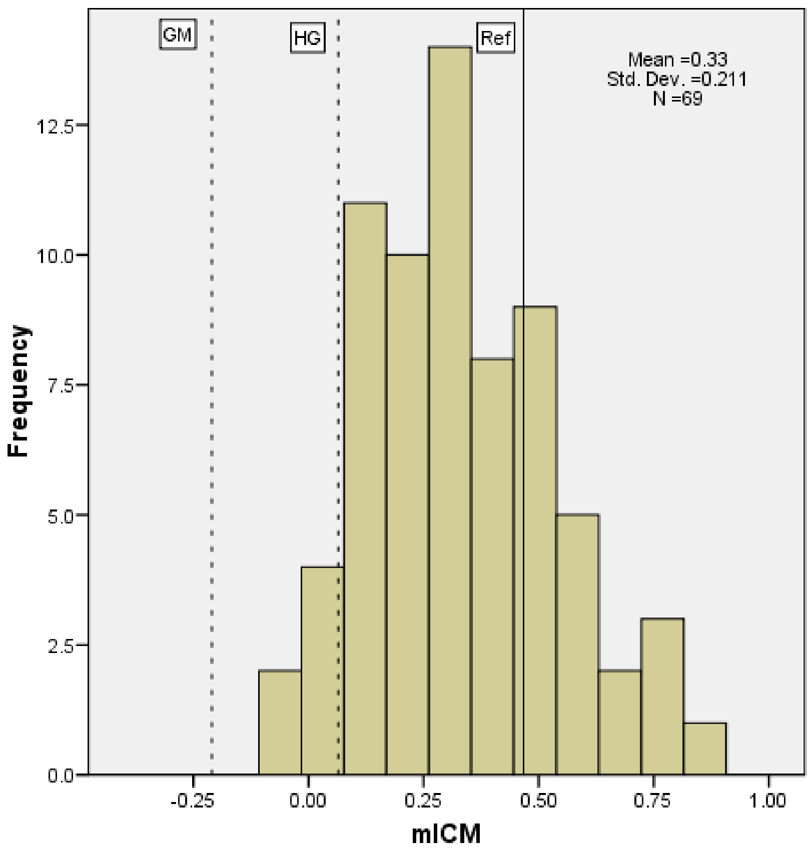


Figure V: Distribution of mICM values in 69 common high status sites (i.e. sites classed as High status by the majority of countries and above middle of Good status by all countries). Solid vertical line indicates average position of reference mICM value (EQR=1) from regressions of national EQR vrs. mICM. The position of the HG and GM values based on the average positions derived from national regressions (see Table V) are shown as dashed lines.

To examine the distribution of mICM values in EQR terms an mICM EQR was calculated based on (Obs mICM-min mICM)/(ref mICM – min mICM). Since the common high status (CHS) sites cover high status and the upper end of good status the median of this population of sites is not an appropriate reference value, rather some upper percentile of this population must be used. The average reference mICM value derived from the national EQR versus mICM regressions was 0.47, compared to the median mICM value of the 69 CHS sites of 0.33. The value of 0.47, which represents the 75th percentile of the distribution, was therefore employed as a global reference value. The minimum mICM value used was -0.65 since this represented the lowest value recorded of all the 200 sites that were assessed by all countries. Thus, if an mICM value of 0.3 is recorded this is equivalent to an mICM EQR of (0.3 - -0.65)/(0.47 - -0.65) = 0.85. The distribution of mICM EQR values for the 69 common high status sites is shown in Figure VI.

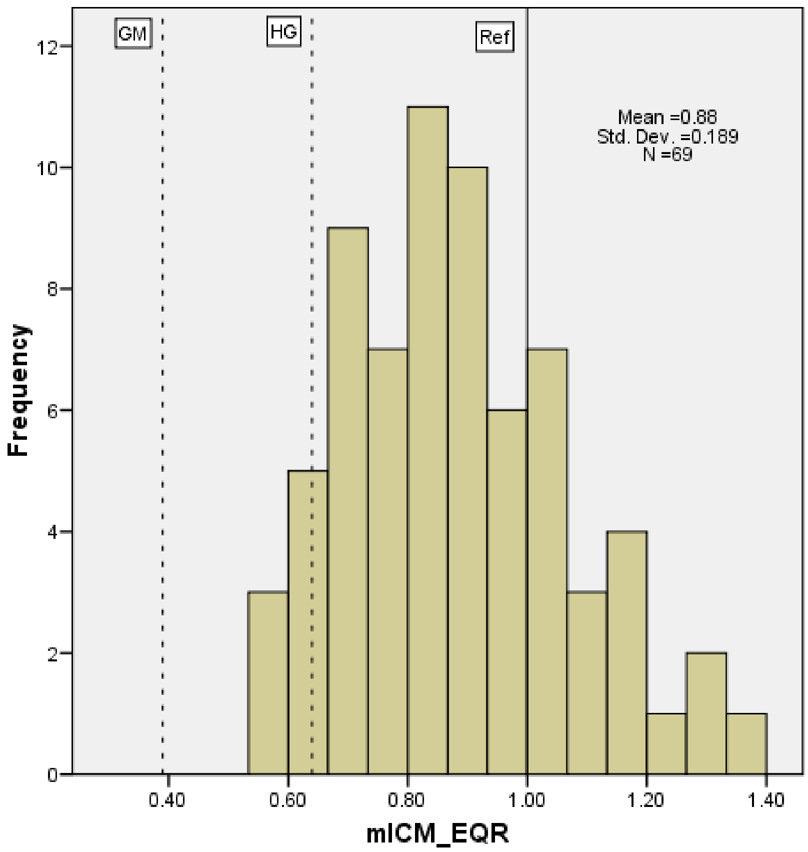


Figure VI: Distribution of mICM values of 69 R-C3 common high status sites, using an mICM value of 0.47 as the reference.

The composition of the 69 CHS sites is summarised in Table VII. A narrative description of reference condition in this type is also presented. Different countries should review this to assess whether it accords with their national view of this type.

Table VII: Macrophyte composition of 69 common high status sites in R-C3
Notes: Taxa are ranked by descending constancy (i.e. frequency of occurrence in 69 sites). Median cover is represented as the median cover score on international scale calculated across sites in which that taxa occurred. Taxa occurring in <5% of sites are excluded.

Taxon	GF	mICM	N	Constancy	Median cov
Scapania undulata	BRh	1.00	54	78.3	2
Chiloscyphus polyanthos	BRh	0.50	45	65.2	2
Rhynchostegium riparioides	BRm	-0.12	39	56.5	3
Fontinalis squamosa	BRm	0.55	33	47.8	3
Brachythecium rivulare	BRm	0.45	33	47.8	3
Racomitrium aciculare	BRm	0.78	32	46.4	2
Fontinalis antipyretica	BRm	-0.60	23	33.3	2
Pellia epiphylla	BRh	0.58	19	27.5	1
Phalaris arundinacea	PHe	-0.45	19	27.5	2
Hygrohypnum ochraceum	BRm	0.39	17	24.6	3
Amblystegium fluviatile	BRm	-0.23	15	21.7	2
Brachythecium plumosum	BRm	0.52	14	20.3	2
Fissidens crassipes	BRm	-0.01	13	18.8	1
Callitriche hamulata	PHy	-0.06	13	18.8	2
Hyocomium armoricum	BRm	0.54	12	17.4	2
Thamnobryum alopecurum	BRm	0.27	12	17.4	2
Glyceria fluitans	PHe	-0.15	10	14.5	2
Ranunculus flammula	PHy	0.36	8	11.6	1
Marchantia polymorpha	BRh	0.04	7	10.1	2
Marsupella emarginata	BRh	0.39	6	8.7	2
Hygrohypnum luridum	BRm	0.28	6	8.7	3
Caltha palustris	PHe	0.12	6	8.7	1
Fissidens rufulus	BRm	0.22	5	7.2	3
Oenanthe crocata	PHe	0.10	5	7.2	1
Agrostis stolonifera	PHe	-0.43	5	7.2	2
Fissidens pusillus	BRm	0.15	4	5.8	1
Plagiomnium undulatum	BRm	0.14	4	5.8	1
Riccardia chamaedryfolia	BRh	0.11	4	5.8	1
Conocephalum conicum	BRh	0.00	4	5.8	2
Cardamine amara	PHg	-0.15	4	5.8	2
Amblystegium riparium	BRm	-0.72	4	5.8	2

Direct comparison of national quality classes (IC Option 3)

Normalisation of national EQR values

The direct comparison of EQR values between countries depends on an initial normalisation of all EQR values to a common class boundary system of 5 x 0.2 EQR units. When national EQRs are already expressed on this scale no transformation is required. The normalisation requires a piece-wise linear transformation so that national classes are stretched or compressed to conform to unit intervals of 0.2. This changes the relative width of national classes but not the position of the class boundaries. Thus, if the class boundaries for HG and GM for a country are at 0.9 and 0.65, the High Class is stretched so that 0.1 units on the national scale covers 0.2 units on the harmonised scale, whereas the Good class is compressed so that 0.25 units on the national scale covers 0.2 units on the harmonised scale.

Approaches for comparing national EQR values under Option 3

Regression based approach: this method essentially uses the average of normalised EQR values as a means for deriving an index for directly comparing different countries. The average of the normalised EQRs is therefore analogous to a common metric. The important difference in this approach is that the index to compare country 1 with 2, 3 and 4 is based on the average of the normalised EQRs for countries 2, 3 and 4 only, not country 1 as well. This basis for comparison is necessary to ensure that the 'common metric' is statistically independent of the EQR of that particular country. The same principle is followed when comparing country 2 with country 1, 3 and 4 etc. Using linear regression this method then establishes the point on a common index based on the dependent countries that is equivalent to each class boundary for the independent country. Results can be evaluated in the same way as Option 2. The harmonisation band can be considered as being defined as the mean prediction error of national EQR versus average normalised EQR. This takes account of the uncertainty in comparability of results and is preferable to an arbitrary criterion such as 0.05 EQR units (i.e. one quarter of a class).

1. *Direct pair-wise comparison of EQR values over full quality gradient:* this approach relies on comparing the EQR value for each site for each country with the EQR values awarded to those sites by all other countries. Results can be expressed as absolute or actual EQR differences, and these differences can subsequently be converted to an equivalent class difference on the normalised EQR scale (e.g. an absolute EQR difference of 0.1 is equivalent to a mean class difference of 0.5 when each class is 0.2 units in width). Therefore for country 1, the mean absolute EQR difference is the mean of each pairwise comparison in EQR value between country 1 and countries 2, 3 and 4, across all the sites that were commonly assessed. This method can be considered a refinement of the Option 3 approach used originally in CB GIG lake macrophyte intercalibration, where comparisons between countries were based on class, rather than EQR.

2. *Class-wise comparison of national EQR values using ANOVA*: This approach was proposed by Willby & Birk as a possible solution to some of the weaknesses in previous Option 3 comparisons used in previous intercalibration exercises. The comparison depends on defining the class of all sites, as proposed by each country, followed by extraction of the EQR values for these sites as voted by all other countries. Therefore, for country 1, at Good status, the population of EQR values is defined by the EQR values given to these same sites by countries 2, 3 and 4. For country 2, at Good status, the population of EQR values is defined by the EQR values given to those sites by countries 1, 3 and 4. A direct comparison of the population of EQR values between countries at a given class can then be undertaken using ANOVA. Multiple comparison tests can used to identify countries that show the greatest difference. The method can be simplified to use the average normalised EQR across the dependent countries (as defined in method 1 above) as the basis for comparison (rather than every individual EQR), or the method could also be used to directly compare values of an mICM.

Approach 1

Figure VII illustrates the relationship between each national EQR and the average of the normalised EQRs of the other countries. These regressions are used as the basis for deriving the index value equivalent to national EQRs of 1, 0.8 and 0.6. The low scatter in these regressions confirms the similarity in approach to assessment of R-C3 rivers.

Application of this approach indicates that all countries fall inside the harmonisation band for each tier of comparison (reference, HG and GM). Consequently the results indicate slightly better harmonisation than is apparent from Option 2, although several countries only just manage to fall within the harmonisation bands (Figure VIII). Results can be explored in the same way as Option 2. Thus from Figure VIII one can see that DE has an average position and retains this relative position across the three bands, FR has a relaxed position in terms of EQR=1, but becomes progressively more precautionary, WL and AT become progressively more relaxed, while UK remains precautionary.

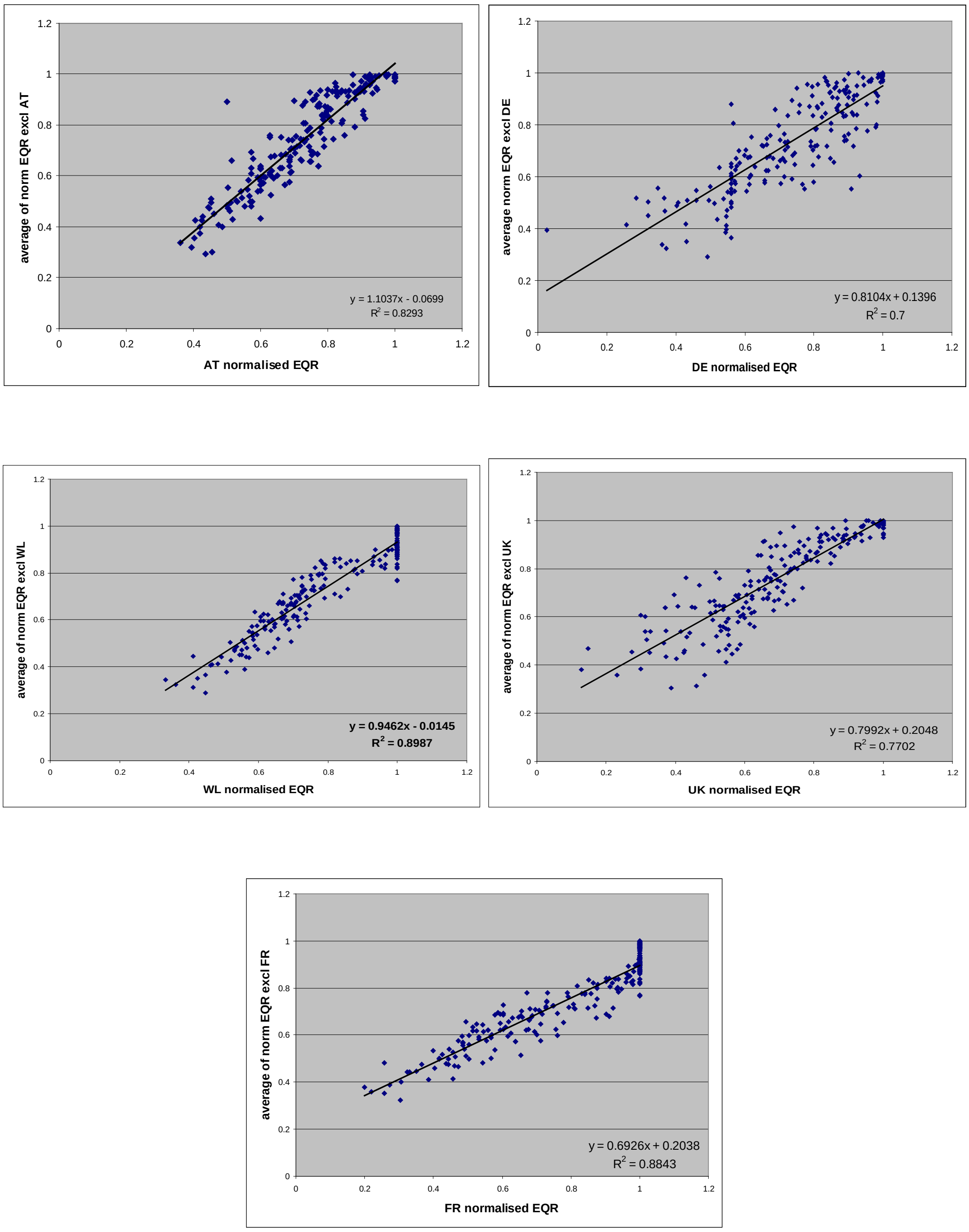


Figure VII: Regressions between national normalised EQR and the average normalised EQR of the remaining four countries

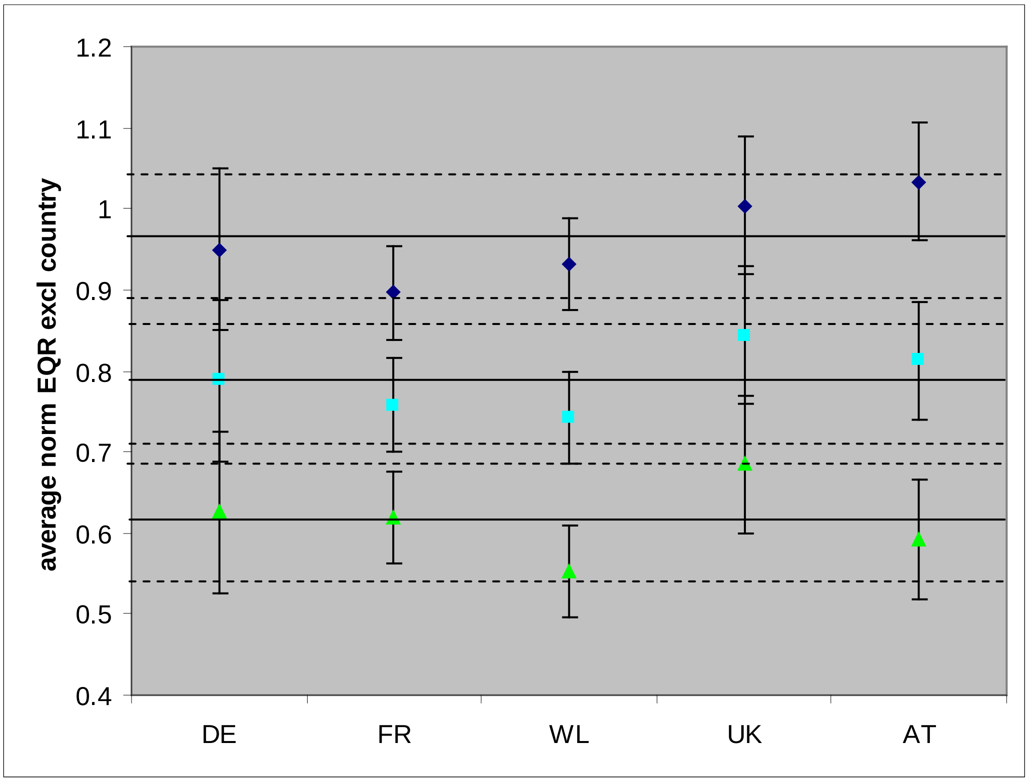


Figure VIII: Comparisons of reference, HG and GM boundary values between countries where the average of the normalised EQR of the dependent countries forms the basis for comparison. Solid lines represent global mean. Harmonised band widths defined by average prediction error of national versus average normalised EQR values.

Further analysis of these results can be achieved by interpreting the data relative to the value equivalent to a national EQR of 1, or by interpreting values relative to the mid point of the harmonisation band (see Table VIII). When the derived index value for a national EQR equal to 1 is used as the basis for comparison (i.e. dark blue symbols in Figure VIII above) only the rather relaxed position of AT at the GM boundary stands out. This reflects the relatively precautionary position of AT at reference. In contrast, when the global average reference value is used as the basis for comparison (i.e. mid point of harmonisation band in Figure VIII above), WL has a relaxed view at the GM boundary, while UK has a precautionary view at both HG and GM boundaries.

Table VIII: Comparison of class boundaries for R-C3 rivers after standardisation relative to derived national reference value (upper panel) or relative to global average reference value.
Note: Highlighted cells indicate countries at edges of harmonisation bands.

	DE	FR	WL	UK	AT	mean	lower	upper
relative to value at national EQR of 1								
HG	0.83	0.86	0.83	0.83	0.79	0.82	0.75	0.90
GM	0.66	0.71	0.65	0.65	0.57	0.65	0.57	0.72

relative to value at global average of reference harmonisation band								
HG	0.82	0.79	0.77	0.88	0.84	0.82	0.74	0.89
GM	0.65	0.64	0.57	0.71	0.61	0.64	0.56	0.71

The advantages of this method are its ease of calculation and the fact that it reflects all aspects of national methods, not just those that are accommodated within an mICM (Option 2). The disadvantages are its low ecological immediacy and the fact that any revisions to national class boundaries by one country require modification of all regressions involving comparisons provided by that country. This method also cannot be considered to provide pair-wise comparisons in the strict sense because averaging EQRs across dependent countries will promote central tendency and will tend to reduce the influence of outliers. Hence the scaling of values on the average normalised EQR scale represents an attenuated version of the full EQR gradient and a difference of 0.2 units on this scale cannot be thought of as being equivalent to one class.

Approach 2

A pair-wise comparison of EQR values for all sites between each country and every other country in turn (200 sites x 4 other countries = 800 comparisons per country) indicates that the classifications for R-C3 rivers would pass the IC Guideline criteria of an absolute average class difference of 0.5 (i.e. 0.1 EQR units when all EQRs are normalised to a common class boundary interval; see Table IX). A similar comparison based on actual differences in EQR values (i.e. taking direction of difference into account) indicates that UK is the most precautionary country, awarding EQR values that are on average, one third of a class lower than other countries, while WL is the most lenient country, awarding EQR values that are on average, almost one third of a class higher than other countries.

Table IX: Result of pairwise comparisons of EQR values for 200 R-C3 sites across 5 countries.
Note: abs mean EQR diff = mean absolute difference in EQR between that country and the other 4 countries across 200 sites. Abs mean class diff = the class difference that is equivalent to the absolute EQR difference. Mean EQR diff = the actual difference in EQR between that country and the EQRs of the other 4 countries across 200 sites.

	abs mean EQR diff.	**abs mean class diff.**	**mean EQR diff.**	**mean class diff.**
DE	0.10	0.49	0.00	-0.01
FR	0.09	0.45	0.03	0.14
WL	0.08	0.41	0.06	0.28
UK	0.10	0.51	-0.07	-0.35
AT	0.08	0.41	-0.01	-0.07

This method is simple to apply and can quickly generate a useful impression of the position of each country and overall comparability of the results. It can be considered a refinement of the Option 3 approach used originally in CB GIG lake macrophyte intercalibration, where comparisons between countries were based on class, rather than EQR. The disadvantages are that (i) the acceptance criteria seem rather arbitrary, (ii) the importance that should be given to actual differences in EQR relative to absolute differences is unclear, and (iii) the comparison make use of the full EQR gradient (i.e. from High to Bad), even though the explicit focus of intercalibration should be on High and Good classes and their lower boundaries.

Approach 3

Application of this method to the 200 commonly assessed R-C3 sites indicates that there is a significant difference ($p<0.01$) between countries in EQR values awarded by other countries to both High or Good status sites (Figure IX). The same results are obtained if one uses instead the mICM as the basis for comparison. Multiple comparison tests (Tukeys HSD) indicate that there are two homogenous subsets at High status (AT and UK, or DE, FR and WL). At Good status UK is separated significantly from the other four countries.

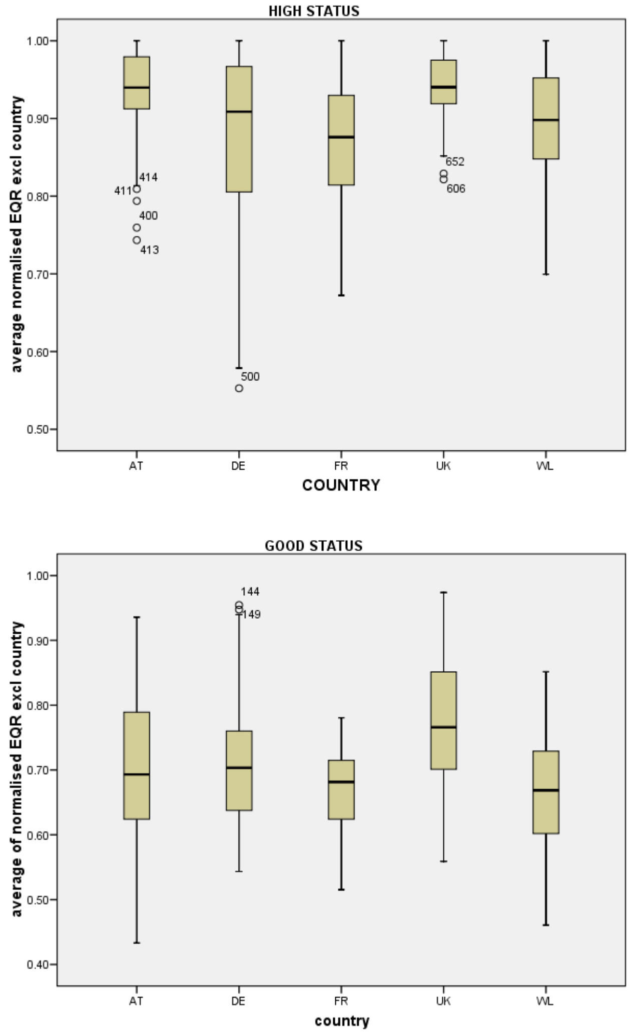


Figure IX: Comparison of average normalised EQR between countries based on sites in high or good status according to national classification

If the analysis is repeated using the mICM as the basis for comparison the same results are again obtained. Consequently it seems that this method offers a very strict test for comparison of national classifications, and provides results that are not fully consistent with Option 2, or with other Option 3 approaches. There are two obvious difficulties with this method that indicate a need for further refinement (i) any initial differences in reference condition biology (which are legitimate if they can be justified on typological or biogeographical grounds) will be propagated further and simply reflected in comparisons of High and Good status sites. Thus, if one takes the sites awarded an EQR>0.9 (upper High status) by each independent country and compares the EQRs or mICM values for these sites between countries, it is apparent that AT and UK have a relatively precautionary view of reference condition in R-C3 rivers (Figure X). At least in the case of UK, this initial difference is reflected in all subsequent comparisons. (ii) this method takes no account of the within-class variability in EQR of the independent country and is therefore not assessing pairwise differences between countries for a given site, in the way that is achieved under Option 3 approaches 1 and 2 described above. (iii) given issues (i) and (ii) it is difficult to define suitable acceptance criteria for this method of comparison.

One possible value of the best homogenous subsets analysis is to provide a better basis for standardisation of results using other approaches. Thus in Option 2 or Option 3, approach 1, one possibility would be to standardise HG and GM boundary metric values relative to the mean of the members of that subset rather than relative to a global mean or relative to the derived metric value at a national EQR of 1. See Table X.

Table X: Homogenous subsets for mICM and average of normalised EQR for countries intercalibrating R-C3 rivers

Average of normalised EQR			
		Subset	
	N	1	2
FR	80	0.889279	
DE	42	0.90641	
WL	66	0.911033	
AT	30		0.963042
UK	29		0.966891
mean		0.902241	0.964966
Sig.		0.621608	0.999139

mICM			
		Subset	
	N	1	2
FR	80	0.287375	
WL	66	0.325909	
DE	42	0.345238	
AT	30		0.491333
UK	29		0.505517
mean		0.319507	0.498425
Sig.		0.775234	0.998573

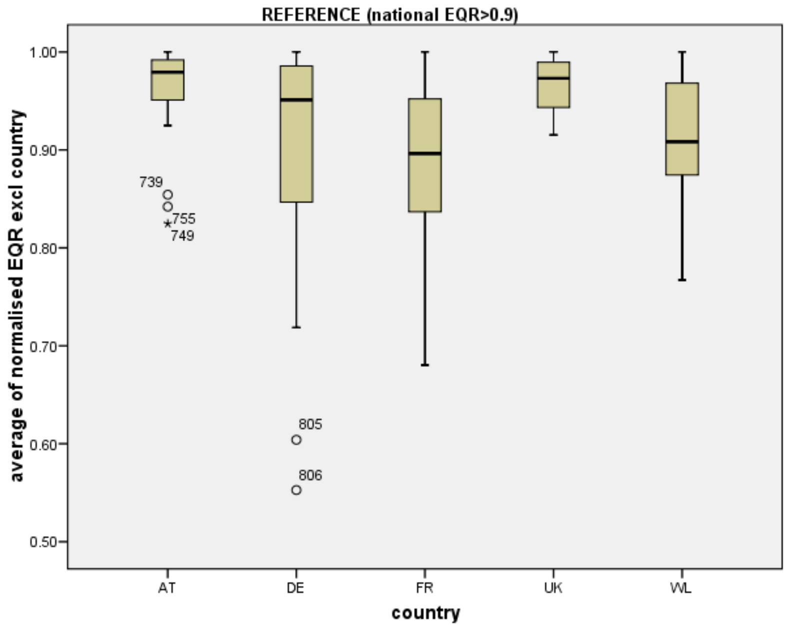


Figure X: Comparison of average normalised EQR between countries based on sites assigned by each country to upper part of High status. UK and AT form a more precautionary homogenous subset.

Anhang 8: Ergebnisprotokoll - CB_{riv}GIG Workshop Kopenhagen, 29. und 30. April 2009

Summary of Decisions and Actions

6th Central-Baltic Rivers GIG Macrophyte Intercalibration Meeting, April 29-30th, 2009

Interim intercalibration results

We decided to produce interim intercalibration results for the assessment methods of Poland, Flanders, Wallonia, France, Great Britain, Germany and Austria using the mICM approach for the river types R-C1.x.2, R-C3 and R-C4.x.2. Nigel and Sebastian will draft a report by end of this year covering all necessary details required for the official intercalibration result reporting (see revised Intercalibration Guidance). We will update this report until 2011 to include additional Member States that are currently not participating.

The reference setting will be based on common high or good status sites, backed by abiotic data to verify their high or good quality, respectively. Both high-good and good-moderate harmonisation band will be described in terms of type-specific macrophyte community compositions and related nutrient status using the mean ortho-phosphate and nitrate values provided per species (see Action 1).

Actions:

1. To collate mean ortho-phosphate and nitrate values per macrophyte species based on analysis of national databases.
2. To provide abiotic data (e.g. catchment land use, hydromorphological quality class, physico-chemical parameters) for sites in common high status and common good status.

Sebastian will circulate a template that specifies the required data deliveries. National experts will have to complete these templates by **June 27th, 2009**.

Additional decisions:

- *Reference conditions*: The group will give recommendations for the X-GIG group based on analysis of common high and good status sites and their respective abiotic data.
- *Combination of Phytobenthos and Macrophytes*: The group recommends to carry out this task by a specific sub-group (funding required). However, we shall wait for completion of national research on this topic (e.g. UK, FR). This activity shall start in 2010.
- *Intercalibration of R-C5*: We will start with the collection of additional data and analysis in 2010. Sebastian can probably coordinate this task (depending on funding).
- *IC of large rivers*: There was no clear vision how to carry out this task. There is a need to discuss this further in 2010.
- *X-GIG Macrophyte activities*: The group does not recommend a specific X-GIG macrophyte organisation, but information exchange and collaboration among GIGs is appreciated. National delegates from Norway, Finland (N-GIG), Slovak Republic (EC GIG) and Portugal (MED GIG) attended the meeting. They confirmed the valuable character of their participation.