

[print](#) [1] | [pdf](#) [2]

## [Welcome editorial by the REFORM Coordinator](#) [3]

Dear reader,

This is the last newsletter of the REFORM project. Over the last 4 years we have informed you through 8 newsletters approximately every half year. The results from the REFORM project will remain online available at least until the end of 2018. In order to continue receiving regular news on key scientific findings, projects and events related to river restoration, we would like to encourage you to consider a subscription for the following news services: the [Freshwater Blog](#) [4] and the [newsletter](#) [5] of the [European Centre for River Restoration](#) [6].

In our last newsletter we inform you on our final results and the outcome of the final events.

In our 5th newsletter (September 2014), we informed you on our first scientific publications. Now at the end of the project there are already over 50 scientific publications and in the near future there are more to come. I am very proud with this impressive list already published during the course of the project.

In the last months, REFORM organized a workshop to address the linkage between e-flows and sediment dynamics (Rome, September 2015). The motivation originated from the feedback given by stakeholders during our mid-term stakeholder workshop (Brussels, February 2012). We hope to draw attention to the fact that rivers need more than just water. The outcome of the workshop is captured in a separate policy discussion paper. The opportunity having several experts together was further exploited by organising a back-to-back national stakeholder event for the Italian water sector.

ECOSTAT, one of the working groups for the WFD Common Implementation Strategy (CIS) used the momentum that the final results of REFORM were available to organize a workshop on hydromorphology (Oslo, October 2015). Besides presentations from Member States and other key scientists, REFORM presented key results regarding hydromorphological assessment and the (im)possibilities of biological quality elements to detect the impact of HyMo changes.

A separate item in this last newsletter introduces our proposal for thorough hydromorphological assessment paying attention to both spatial and temporal aspects, because the larger spatial dimension and the history of changes direct and restrict the options for improvement. Most rivers cannot be reversed to what they once were. Restoring in that sense can be a misleading word.

The results of REFORM are rather bulky. The full set of deliverables contains thousands of pages. Therefore we summarised the main findings in our wiki following the logical sequence of river basin management planning: How does my river work? What's wrong? and How to improve? The relevant REFORM Deliverable 6.3 is the guidebook to the contents of the wiki.

Besides, factsheets have been drawn up by regional experts for 11 different types of rivers covering prevailing pressures, on-going and promising restoration measures and monitoring requirements. Even apparently similar river types require a tailor-made restoration strategy acknowledging the governing hydrological and morphological conditions and the interaction with vegetation. The factsheets are thus meant to support decision making, and should not be used as cookbooks.

The final deliverable of our project will be our 3<sup>rd</sup> and final policy brief. It will be available early January 2016. I do hope you enjoyed reading our newsletters over the years and that our results help and stimulate you to find a better balance between using and conserving streams, rivers, floodplains and other connected wetlands. For me it has been a great privilege to coordinate this interesting and challenging project and to work intensively with so many nice and highly qualified colleagues. I am convinced that the results of REFORM will be of great help to address the complicated topic of

heavily modified water bodies and to identify and implement more effective restoration projects.

On behalf of the complete REFORM team,

Tom Buijse

REFORM Coordinator





**For further information:**

Tom Buijse, Deltares

[Guidance and decision support for cost-effective river](#)

[restoration](#) [7]

Much of the knowledge developed in REFORM has found its way to over 50 peer-reviewed papers in scientific journals. But how can we make this knowledge available for practitioners? That was the challenge for REFORM Work Package 6 “Applications and tools”. The work package team developed a web-based information system, or wiki, along with a separate document for guidance. This document, [deliverable D6.3 of the project](#) [8], provides guidelines and decision support for cost-effective river restoration and its benefits. It summarizes the contents of the wiki and serves as a portal to the system.

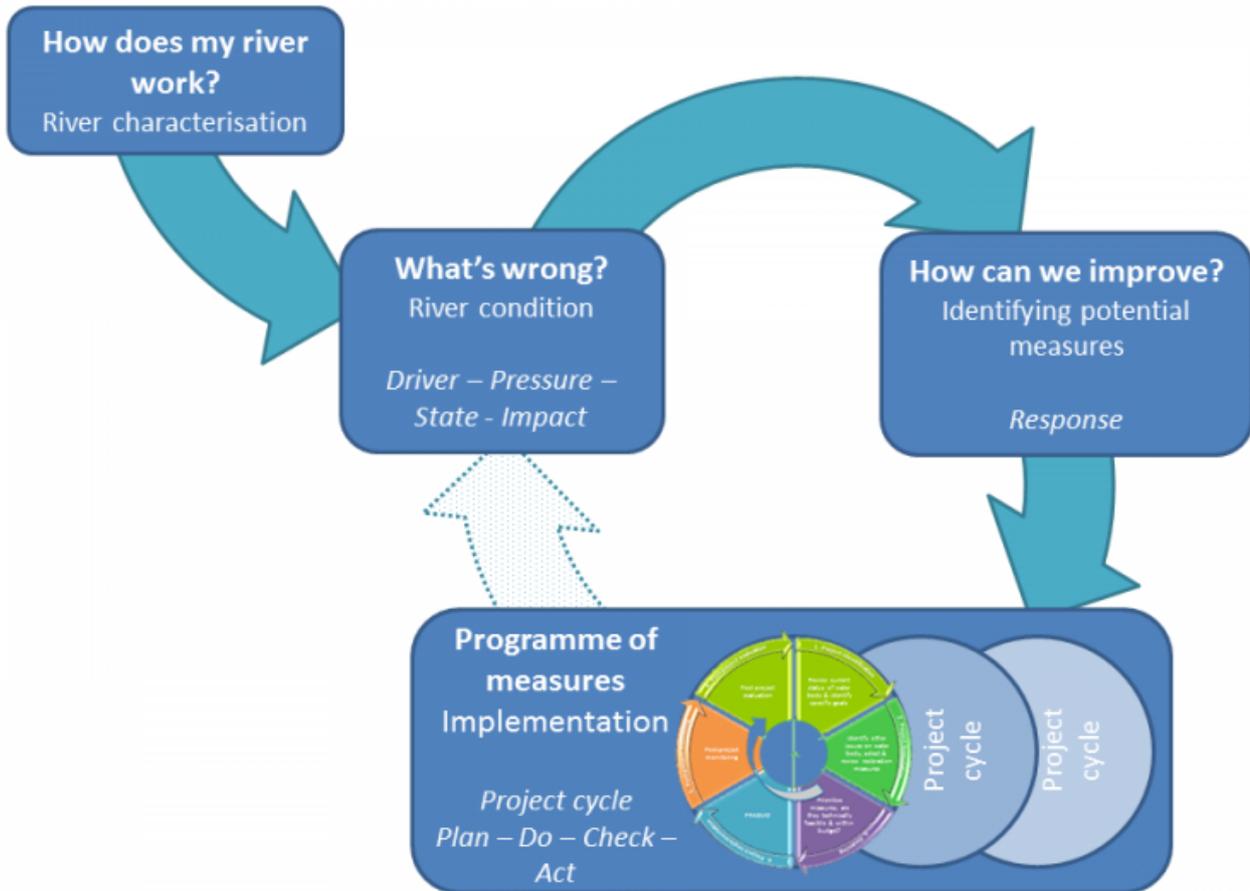


Figure 1: “What’s in this wiki?” (source: REFORM Wiki [web page](#) [9])

**Structure along the planning process for river restoration**

The REFORM guidance and decision support document and the wiki have been structured along the planning process for river restoration. This process is cyclic, but requires understanding of the river first. The guidance thus starts with the question: [How does my river work?](#) [10] A key step for this is hydromorphological characterization, looking at rivers from a perspective that discloses the relevant processes and forms. Hydromorphology is a matter of water and sediment, but also of riparian and aquatic vegetation interacting with water and sediment. This makes both geomorphological and ecological processes relevant. REFORM developed a multiscale hierarchical framework for this hydromorphological river characterization.

The next question is: [What’s wrong?](#) [11] Here REFORM developed a coherent set of methods and tools for practical assessment and monitoring of hydromorphological conditions, building on [understanding the river in the multiscale hierarchical framework](#) (see article on methods and tools in REFORM has received funding from the European Union’s Seventh Programme for Research, Technological Development and Demonstration under Grant Agreement no. 282656. Page 4 of 20

this REFORM newsletter). The assessment comprises four stages: (1) delineation and characterization of the river system; (2) assessment of past temporal changes and current river conditions; (3) assessment of future trends; and (4) identification of management actions.



Figure 2: “What’s wrong?” (photo: Erik Mosselman)

This leads to the final question in the planning cycle: [How can we improve?](#) [12] According to the conclusions of REFORM scientists, there is no single “best measure” for river restoration, but the measure of river widening generally has a high effect. Restoring specific habitats appears more important than merely increasing habitat diversity. It is also worth noting that small restoration projects do work, although we recommend larger projects with a long-term plan.

## Wiki

The web-based information system remains our main vehicle for making knowledge available to practitioners and scientists alike. Key information is placed at the highest level. Clickable hyperlinks give access to deeper levels of more detailed information, including [REFORM deliverables](#) [13], [scientific publications](#) [14], and information on existing tools that are relevant for river restoration.

## For further information:

Erik Mosselman, Deltares

## [New methods and tools to assess the hydromorphology of rivers \[15\]](#)

A new report produced by the REFORM project ([Methods, models and tools to assess the hydromorphology of rivers](#) [16]) provides a framework of procedures and tools through which practitioners can:

- assess river hydromorphological conditions,
- set monitoring activities, and
- support the selection of appropriate and sustainable restoration actions.

The assessment framework presented in this report is a more prescriptive version of the open-ended multiscale hierarchical framework for hydromorphological assessment produced in the earlier stage of REFORM (see [relevant article](#) [17] in Newsletter No.2). It provides a more formal set of methods and tools with which to practically assess and monitor hydromorphological conditions.

The overall framework comprises the following **four stages**:

1. **Catchment-wide delineation and spatial characterization** of the river system in its current conditions. This is done according to the multiscale spatial framework (see [relevant article](#) [17] in Newsletter No.2).
2. Assessment of **temporal changes and current conditions**. This phase involves reconstructing the history and evolutionary trajectories of morphological changes and assessing river conditions in its present state.
3. Assessment of **scenario-based future trends**. This phase is aimed to identify possible scenarios of hydromorphological modification.
4. Identification of **management actions**. This last phase is aimed to identify possible hydromorphological restoration or management actions.

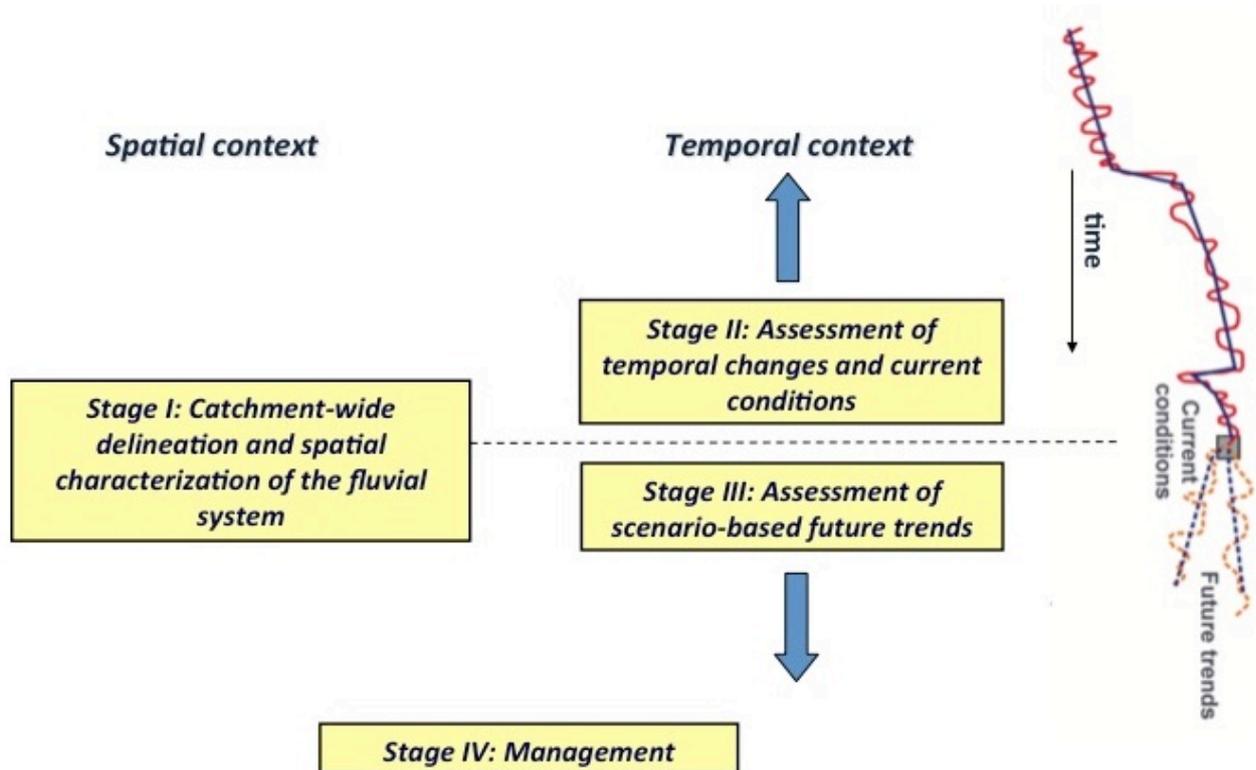


Figure 1: Structure of the overall hydromorphological framework. On the right side, the graph emphasizes that the present state of the river system represents a spot within a long trajectory of evolution that needs to be known to understand current conditions and possible future trends. (source: Rinaldi et al., 2015a)

In addition, [our report](#) [16] suggests suitable **methods** for the evaluation of the different components of an overall ‘river condition assessment’. The recommendations are based on the integration of three **new tools**, originally developed in Italy and then expanded to other European countries:

- the [Morphological Quality Index](#) [18] (MQI),
- the [Morphological Quality Index for monitoring](#) [18] (MQIm), and
- the [Geomorphic Units survey and classification System](#) [19] (GUS).

The **Morphological Quality Index (MQI)** is strongly based on the consideration of physical processes such as continuity in sediment and wood flux, bank erosion, lateral mobility, and channel adjustments. The spatial scale of application of the MQI is the reach (i.e., a relatively homogeneous portion of the river with a length in the order of some km), which is recognized as the most appropriate and meaningful scale for assessing hydromorphology. The temporal component is explicitly accounted for by considering that a historical analysis of channel adjustments provides insight into the causes and time of alterations and into future geomorphic changes.

The MQI assessment includes a set of 28 indicators assessing longitudinal and lateral continuity, channel pattern, cross-section configuration, bed structure and substrate, and vegetation in the riparian corridor. These characteristics are evaluated by an integration of remote sensing - GIS analysis and field survey. Based on the MQI value (ranging from 0 to 1), five classes are defined to classify morphological quality conditions (from very poor to very good), allowing to investigate the whole gradient of hydromorphological conditions.

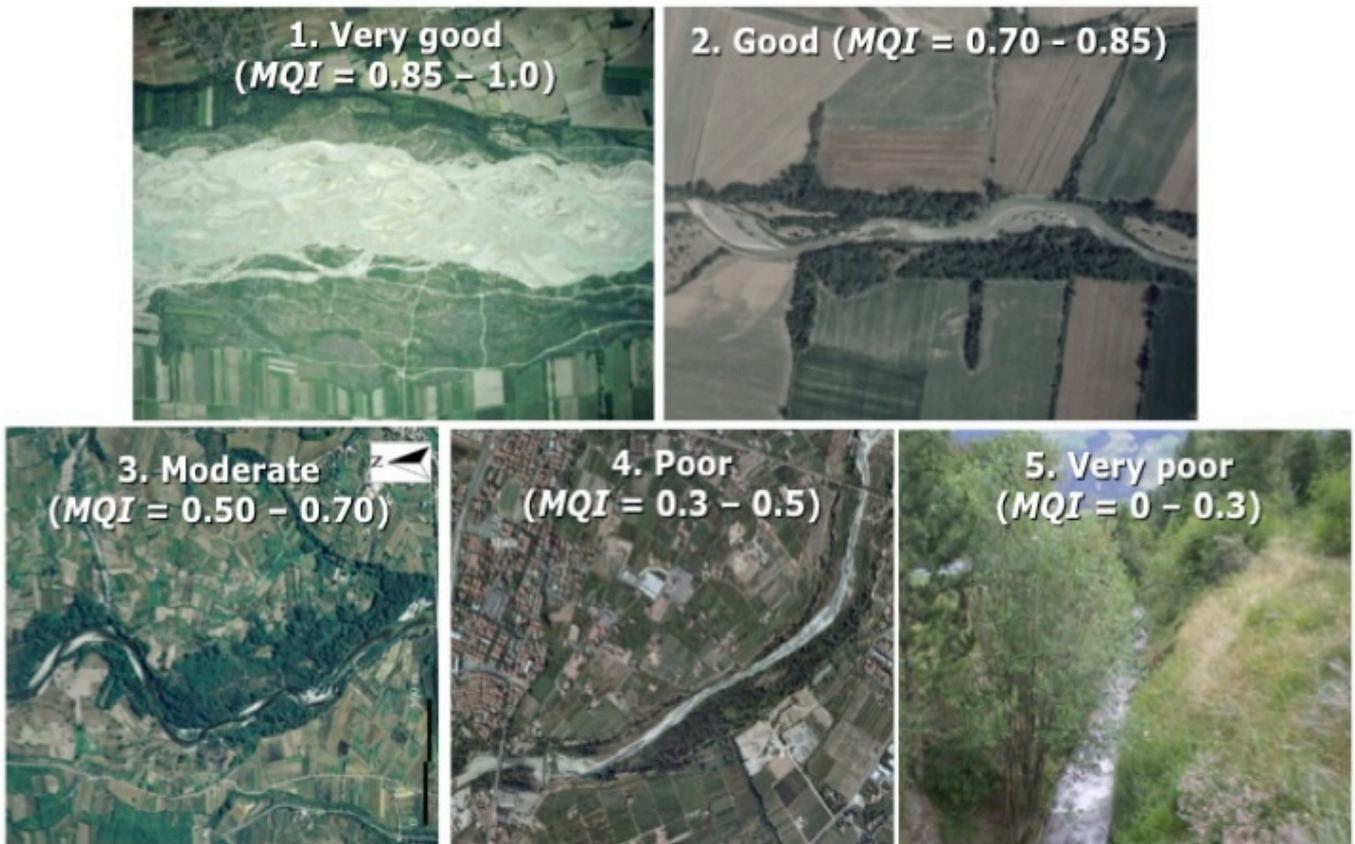


Figure 2: Examples of the five MQI classes. (source: Rinaldi et al., 2015b)

Related to the MQI, a specific tool named **Morphological Quality Index for monitoring (MQIm)** is specifically designed to evaluate the tendency to an enhancement or deterioration of the morphological quality.

Finally, a new specific system for the survey and classification of **geomorphic units (GUS)** in streams and rivers has been developed. The system is suitable for incorporation into the MQI and is also aimed at allowing the establishment of links between hydromorphological conditions at reach scale, characteristic geomorphic units, and related biological conditions.

### Key recommendations

- We recommend using two linked process-based approaches to achieve a comprehensive and synergic hydromorphological assessment: (i) the REFORM multiscale hierarchical framework to develop an understanding of river reach hydromorphology; (ii) a more prescriptive approach based on the integration of more specific assessment tools, as outlined in the present newsletter article.
- The multiscale hierarchical framework can be used to underpin the delineation of WFD water body boundaries by a further division in 'reaches' using additional geomorphological criteria such as the classification of river typologies.
- The Morphological Quality Index (MQI) is the recommended method by REFORM for the assessment of river conditions, i.e. for analyzing and interpreting critical problems and causes of alteration. The method should be implemented for the entire gradient of morphological conditions (not only for high status water bodies) for supporting the interpretation of BQEs, and should be supported by a characterization of the assemblage of geomorphic units (GUS) determining the morphology at reach scale.

## Further links

D6.2 Final report on methods, models, tools to assess the hydromorphology of rivers

- Part 1 [Main report with overall framework for hydromorphological assessment](#) [16]
- Part 2 [Thematic annexes on protocols for monitoring indicators and models](#) [20]
- Part 3 [Guidebook for the application of the Morphological Quality Index \(MQI\)](#) [18]
- Part 4 [Geomorphic Units survey and classification System \(GUS\)](#) [19]
- Part 5 [Applications to several case studies](#) [21]

## References

M. Rinaldi, A.M. Gurnell, B. Belletti, M.I. Berga Cano, S. Bizzi, M. Bussetini, M. Gonzalez del Tanago, R. Grabowski, H. Habersack, M. Klösch, F. Magdaleno Mas, E. Mosselman, M. Toro Velasco, P. Vezza (2015a) Final report on methods, models, tools to assess the hydromorphology of rivers, Deliverable 6.2, Part 1, of REFORM (REstoring rivers FOR effective catchment Management), a Collaborative project (large-scale integrating project) funded by the European Commission within the 7<sup>th</sup> Framework Programme under Grant Agreement 282656.

Rinaldi M., Belletti B., Bussetini M., Comiti F., Golfieri B., Lastoria B., Nardi L., Surian N. (2015b) - *New tools for an integrated hydromorphological assessment of European streams*. D7.5 Conference Proceedings 'Novel Approaches to Assess and Rehabilitate Modified Rivers', 30 June - 2 July 2015, Wageningen (the Netherlands), 400-406.

## For further information:

Massimo Rinaldi, Università di Firenze

## [Factsheets on restoration for 11 river types](#) [22]

The REFORM project produced factsheets for different types of rivers in various ecoregions across Europe which provide a synthesis of restoration experiences per river type, describe best and efficient restoration practices and include promising restoration techniques and variables suited for monitoring restoration.

The description of the factsheets is preceded by a literature meta-data analysis. Of the 22 REFORM river types, 12 types occurred in the database together with four combinations of 2-3 river types. In total, 11 pressure categories and 23 pressures were classified. Channelization was the most common pressure category in all river types. This is not surprising as the focus of the review was on hydromorphology. The second most common pressure category was habitat degradation followed closely by barriers/connectivity, bank degradation and flow alteration.

In-channel habitat conditions are mostly improved by restoration with a broad spectrum over actual measures. Next, floodplain and river planform appeared as mostly restored. Within the floodplain, the attention went to reconnecting and creating existing backwaters, oxbow-lakes and wetlands. The river planform measures dealt with re-meandering, widening and re-braiding. The riparian zone,

mainly the development of natural vegetation on buffer strips, was also often implemented. Hydrological measures were much less often executed.



*Figure 1: Small, single-thread, lowland river in the Netherlands (photo: Piet Verdonschot)*

The literature meta-data analysis was followed by the factsheets for 11 river types (Table 1). Each factsheet gives information on: River type name, Pressure categories/pressures, Measure categories/measures, and Monitoring scheme (Table 2). The factsheets are meant to give insight into the diversity and similarities of restoration techniques for different types of rivers in terms of present practice and promising, but to date little used, approaches.

The river typology adopted for the factsheets differs from the river reach typology developed in REFORM and refers to the (sub)catchment setting of a river in terms of altitude, size and geology and as such links to the European broad river types (ETC/ICM, 2015). The setting of these types does not change in time. In contrast, the REFORM river reach typology is designed for assessing the hydromorphological functioning of individual river reaches. REFORM river reach types may change in time because they represent the response of the river reaches to processes of flow, sediment and vegetation. Furthermore, river (sub-)catchments of a single type according to the types presented in these factsheets may and often will contain different REFORM reach types. Thus when identifying the most appropriate restoration techniques it is even for apparently similar river types (i.e. covered by the same factsheet) not a ‘one size fits all’ approach, but a tailor-made approach acknowledging the governing hydrological and morphological conditions and the interaction with vegetation. The factsheets drawn up by regional experts are thus meant to support decision making, and should not be used as cookbooks.

Table 1 River types (source: REFORM deliverable 4.5 ‘Factsheets for restoration projects’)

1	Small, single-thread, lowland rivers
2	Large, single-thread, lowland rivers

3	Small, anastomosing, lowland rivers
4	Large, anastomosing, lowland rivers
5	Small, single- and multi-thread, mid altitude rivers
6	Mid-sized, single- and multi-thread, mid altitude rivers
7	Small, sinuous-straight highland rivers with bedrock-coarse mixed sediments
8	Mid-sized, sinuous-straight highland rivers with bedrock-coarse mixed sediments
9	Small, cascade, step-pool/plain bed, riffle-pool highland rivers with (very) coarse sediments
10	Mid-sized, cascade, step-pool/plain bed, riffle-pool, highland rivers with (very) coarse sediments
11	Glacial rivers (all Europe)

Table 2 Contents of a factsheet (source: REFORM deliverable 4.5 'Factsheets for restoration projects')

River type	Valley- and planform, Hydrology, Morphology, Chemistry, Riparian zone
Pressures	Major pressures, Problems and constraints for river restoration
Measures	Common restoration practice, Problems and constraints with common restoration practice, Promising and new measures
Monitoring scheme	

For further reading: REFORM deliverable 4.5 '[Factsheets for restoration projects](#) [23]'

#### Reference

ETC/ICM, 2015. European Freshwater Ecosystem Assessment: Cross-walk between the Water Framework Directive and Habitats Directive types, status and pressures, ETC/ICM Technical Report 2/2015, Magdeburg: European Topic Centre on inland, coastal and marine waters, 95 pp. plus Annexes

### For further information:

Piet Verdonschot, Alterra Wageningen UR

## [REFORM scientific publications - II \[24\]](#)

In September 2014, I informed you in our [5<sup>th</sup> newsletter](#) [25] for the first time about peer-reviewed scientific publications that have been published within the framework of REFORM. At that time – one year ago – we had 13 publications. Now at the end of the project there are already more than 50. Personally I am very pleased and also proud that so many high quality papers have been published during the course of the REFORM project.

Besides individual publications, several special issues have been prepared or are under preparation:

- In the journal *Aquatic Sciences: research across boundaries*, 10 papers are published in a special issue: “**A multi-scale framework for supporting river assessment and management**”, which has been coordinated by the guest-editors Angela Gurnell and Massimo Rinaldi (Gurnell et al., 2015).
- In the journal *River Research and Applications*, 6 papers are published in a special issue: “**Hydrogeomorphology - ecology interactions in river systems**”. This has been coordinated by the guest-editors Angela Gurnell and Bob Grabowski (Grabowski & Gurnell, 2015).
- In the journal *Hydrobiologia*, a special issue regarding the “**Effects of large- and small-scale river restoration on hydromorphology and ecology**” is under preparation and should be available soon. It will contain 9 papers on restoration effects on hydromorphology, fish, benthic invertebrates, aquatic macrophytes, floodplain vegetation, riparian ground beetles, foodwebs, ecosystem services and a synthesis. The integrating paper of this study has already been published (Hering et al., 2015).

The complete overview of all published scientific papers is given at the REFORM website (Results -> [Scientific Publications](#) [26]). For each publication the full reference, abstract and DOI (Digital Object Identifier) is given. The DOI links to the journal. Due to copy right restrictions we are not allowed to upload full papers. If you are interested in the full paper then you can first check whether it is open access. If not, then you are kindly invited to contact the corresponding author requesting a copy. We will keep on updating the list in the future even though the REFORM project has now formally ended.

### References

Grabowski, R.C. & A.M. Gurnell, 2015. Hydrogeomorphology–ecology interactions in river systems. *River Research and Applications*, announced link, but not yet online: <http://dx.doi.org/10.1002/rra.2974> [27]

Gurnell, A. M., M. Rinaldi, B. Belletti, S. Bizzi, B. Blamauer, G. Braca, A. D. Buijse, M. Bussettini, B. Camenen, F. Comiti, L. Demarchi, D. García de Jalón, M. González del Tánago, R. C. Grabowski, D. M. Gunn, H. Habersack, D. Hendriks, A. J. Henshaw, M. Klösch, B. Lastoria, A. Latapie, P. Marcinkowski, V. Martínez-Fernández, E. Mosselman, J. O. Mountford, L. Nardi, T. Okruszko, M. T. O’Hare, M. Palma, C. Percopo, N. Surian, W. van de Bund, C. Weissteiner, L. Ziliani (2015) A multi-scale hierarchical framework for developing understanding of river behaviour to support river management. *Aquatic Sciences: research across boundaries* – published online 22 September 2015. <http://dx.doi.org/10.1007/s00027-015-0424-5> [28]

Hering, D., J. Aroviita, A. Baattrup-Pedersen, K. Brabec, T. Buijse, F. Ecke, N. Friberg, M. Gielczewski, K. Januschke, J. Köhler, B. Kupilas, A.W. Lorenz, S. Muhar, A. Paillex, M. Poppe, T. Schmidt, S.

Schmutz, J. Vermaat, P.F.M. Verdonschot, R.C.M. Verdonschot, C. Wolter & J. Kail (2015) Contrasting the roles of section length and instream habitat enhancement for river restoration success: a field study of 20 European restoration projects. *Journal of Applied Ecology* published online 18 September 2015 <http://dx.doi.org/10.1111/1365-2664.12531> [29]

## For further information:

Tom Buijse, Deltares

## [Linking E-Flows to Sediment Dynamics: REFORM Stakeholder Workshop in Rome, September 2015](#) [30]

River infrastructure that changes the flow regime can have severe effects on hydromorphology and ecosystems. Specifying environmental flows (e-flows) to address these impacts is a key strategy for maintaining functional river processes and ecosystems and to reach the environmental objectives of the European Water Framework Directive 2000/60/EC (WFD).

The [Common Implementation Strategy \(CIS\) guidance on ecological flows](#) [31] identifies a series of overall key indications to tackle some critical aspects linked to the management and restoration of water bodies affected by hydrological pressures. Among these, the guidance suggests to **consider sediment dynamics and river morphology together with hydrology and hydraulics in order to determine e-flows**.

The links of sediment dynamics to e-flows were discussed by a panel of international experts from relevant agencies and academia during the REFORM workshop organized by ISPRA (the Italian Institute for Environmental Protection and Research) in Rome on 9-10 September 2015. The aim of the workshop was to agree on a common approach to specify efficient e-flow based measures that consider river sediment dynamics and morphological evolution, in order to supplement the CIS guidance on e-flows. The discussion could draw on the newly developed [REFORM multi-scalar and process-oriented framework](#) [32] since it is ideally suited for tackling hydrology-sediment relationships.

### Workshop structure and content

During the first day the invited speakers gave an overview of the relevant EU activities (REFORM, WFD CIS working group on e-flows) and highlighted the critical aspects related to e-flow specification (role of sediment dynamics, biological response to hydrological and morphological pressures). The latest results from scientific activities and from experimental implementations of e-flows were also presented. In particular, Dr. Nikolai Friberg (NIVA, NO) illustrated the variable and weak response of metrics on biological quality elements to flow alteration, and the possible alternative indicators and methods. Prof. Gordon Grant (Oregon State University, US) evidenced how water flows and sediment flows are interdependent, and how actions on one aspect will inevitably affect the other. Moreover, Prof. Grant underlined how a multiscale process based approach, like the framework developed in REFORM, is needed to understand river processes.



*Figure 1: REFORM Stakeholder Workshop on Linking E-flows to Sediment Dynamics, Rome (photo: Attilio Castellucci, ISPRA).*

The case of the Mediterranean context was presented by Prof. Diego García de Jalón (UPM, ES), given that in the Mediterranean context the combination of pressures and water availability issues makes vegetation play a critical role, with permanent encroachment affecting channel morphology and dynamics.

Innovative approaches to e-flow modeling at the mesohabitat scale, consistent with geomorphic taxonomy as developed in REFORM, were presented by Dr. Paolo Vezza (Politecnico di Torino, IT), and an overview of implementation of e-flows in Spain was given by Dr. Fernando Magdaleno Mas (CEDEX, ES).

During the afternoon, the discussion was guided by a series of questions related to the necessities of knowledge, tools and instruments in the field of ecological and geomorphological assessment in order to support the evaluation and implementation of e-flows. The outcomes of the discussion were finalized in the successive morning session and they will be the topics of an ad-hoc comprehensive policy discussion paper, which is currently under preparation.

Some main points can be summarized as follows:

- Water and sediment flows sustain aquatic life and ecosystem services. They are intrinsically interconnected and have to be considered and managed together in order to set and maintain/achieve effective environmental objectives. Together with water, **sediments have to be considered into the analytical and decision-making framework when specifying e-flows.**
- In absence of quantitative evidence on the linkages between ecology and hydrology and also given the shortness of time series of ecological data, rehabilitation of hydromorphological processes cannot but be beneficial for ecology, assumed that no alteration of biotic

interactions has irreversibly taken place. Therefore, one approach to estimating e-flows is to **identify those flows required to maintain certain geomorphic processes and forms that directly contribute to aquatic habitat and ecosystem functioning.**

- The choice of the best option to be considered in combination with changes in the hydrologic regime (i.e., sediment transport vs. morphological reconstruction) depends on the specific context, for example the reach sensitivity and morphological potential. Therefore, **selecting the appropriate measures requires setting the river reach within a wider spatial-temporal framework**, such as that developed in REFORM.
- Hydromorphological alteration is directly detected by process-based hydromorphological methods. The limitations of the sensitivity of current biological methods to hydromorphological alteration can be overcome by integrating them with hydromorphological assessment.
- Besides the current biological methods, supplementary and more sensitive alternative biological methods/indicators are required, among which are: biological traits (habitat template theory), ecosystem functioning (as secondary production), stressor-specific deviation, riparian organism, riparian zones, and alternative sampling strategies.

### **Italian stakeholder workshop to present key REFORM findings**

A national stakeholder workshop followed the thematic workshop on sediment dynamics and e-flows in the afternoon of 10 September to disseminate the main outcomes of REFORM. The national workshop was oriented to discuss and clarify the aspects related to the sensitivity of current metrics to hydromorphological pressures, how REFORM can help overcome the current shortcomings of current biological methods and which is the way forward. Presentations were given by Dr. Tom Buijse (REFORM project leader, DELTARES, NL), Prof. Massimo Rinaldi (REFORM, University of Florence, IT), Dr. Nikolai Friberg (REFORM, NIVA, NO) and Martina Bussettini, (REFORM, ISPRA, IT) and a public discussion followed.

Many Italian public and private stakeholders, including river basin water managers, attended the workshop (also via web) and gave their positive feedback.



Figure 2: Italian stakeholder workshop to present REFORM findings, Rome (photo: Attilio Castellucci, ISPRA).

## References

Keynotes of the convenors of the E-flows and Sediments Workshop can be found in this [link](#) [33]. Keynotes of the convenors of the Italian Stakeholder Workshop can be found in this [link](#) [34].

## Further links

[http://www.isprambiente.gov.it/en/events/4th-reform-national-stakeholder-workshop?set\\_language=en](http://www.isprambiente.gov.it/en/events/4th-reform-national-stakeholder-workshop?set_language=en) [35]

## For further information:

Martina Bussettini, ISPRA

Stefano Mariani, ISPRA

## [ECOSTAT Workshop on Hydromorphology and WFD classification, Oslo, October 2015](#) [36]

On 12 and 13 October 2015, around 70 participants attended the ECOSTAT workshop on “Hydromorphology and WFD classification” that was hosted by the Norwegian Environment Agency in Oslo, Norway. The workshop was organized jointly by ECOSTAT and REFORM representatives and held back-to-back with the 30th ECOSTAT meeting that took place on 14-15 October in the same location.

The outcome of the REFORM project was one of the main motivations for the working group ECOSTAT of the WFD Common Implementation Strategy to organise this workshop.

The aims were to:

- Address new scientific insights and recommendations (mainly from REFORM)
- Present best practices from selected Member States
- Discuss key issues, especially on the:
  - Suitability of existing biological methods to detect hydromorphological alteration
  - Use of hydromorphological assessment methods in WFD classification
  - Bottlenecks for research and practitioners in practical implementation
  - Need for further work on hydromorphology in the coming mandate of the WFD Common Implementation Strategy

The workshop was run in a pleasant working atmosphere alternating plenary sessions with work in breakout groups. It promoted lively discussions amongst others on which biological quality elements

(BQEs) are best suited to assess hydromorphology and what is essential for a good hydromorphological assessment.



*Figure 1: ECOSTAT Workshop on Hydromorphology and WFD classification at the Norwegian Environment Agency (photo: Jo Halvard Halleraker)*

Four presentations were given by REFORM partners on the full overview of the project, the potential and limitations of BQE methods and indicators for hydromorphological pressures, new tools for an integrated hydromorphological assessment of European streams and remote sensing information in hydromorphological assessment.

Further presentations were given by DG Environment, JRC, the European Committee for Standardisation (CEN) as well as Member States (Germany, the Netherlands, Italy, Norway, Sweden and France). All workshop presentations are available on CIRCABC ([link](#) [37]).



Figure 2: Presentation of Johan Kling, Swedish Agency for Marine and Water Management and Member of the REFORM Advisory Board (photo: Jo Halvard Halleraker)

The following are some highlights of the key workshop conclusions:

- Fish, macrophytes, macroinvertebrates and (more rarely) diatoms are the biological quality elements most used to detect effects of hydromorphological pressures.
- Many of the **intercalibrated WFD methods** are generic multi-metric indices responding weakly to specific hydromorphological pressures because they were not originally designed to be sensitive to such pressures. This can be improved by using **more targeted indicators or an adjusted monitoring strategy**. There are already good examples of Member States using such targeted indicators in their biological assessment systems.
- River **typologies** should reflect natural variability in hydromorphological characteristics and processes. This is crucial because differences in natural hydromorphology result in different reference conditions for the BQEs.
- BQE assessments need to be supplemented with information from the supporting elements in order to identify inconsistencies between hydromorphological and biological assessment, to diagnose problems and to identify effective restoration measures. A clear understanding of **what is meant by “supportive element”**, how it should be used, how it is reported is needed.
- Until recently, there were few **shared and standardized multiscale hydromorphological assessment methods**. This has prevented a proper analysis of the linkages with BQEs so far. Recent scientific work (including the REFORM project) has resulted in new and better approaches and tools, which could now be used and further standardized.
- **Data from remote sensing** are increasingly available from many sources, including EU space programs. This data has a great potential to be used in hydromorphological assessments at different scales, in combination with field data and other existing relevant information. This is likely to result in a more robust and cost-effective implementation of the WFD. The main challenge is not data availability and acquisition, but to solve issues with data

processing and interpretation.

It was acknowledged that the majority of the work on hydromorphology is taking place in the Member States. The advantage of a European project such REFORM was that international cooperation was made possible and an interdisciplinary team of scientists could pull different sources of information together in order to advance knowledge on certain aspects. Further sharing of knowledge and cooperation on working areas related to hydromorphology is crucial for the future development of comparable methods and indicators across Europe.

The summary of the workshop conclusions is also available on CIRCABC ([link](#) [37]).

ECOSTAT and the work programme of the WFD Common Implementation Strategy will follow up in 2016-2017 with the outcomes of this workshop.

## For further information:

Eleftheria Kampa, Ecologic Institute

- [Home](#)
- [Imprint](#)

**Source URL:** <https://reformrivers.eu/newsletters/362/complete>

### Links

- [1] <https://reformrivers.eu/print/printpdf/newsletters/362/complete>
- [2] <https://reformrivers.eu/printpdf/printpdf/newsletters/362/complete>
- [3] <https://reformrivers.eu/news/372>
- [4] <http://freshwaterblog.net/>
- [5] <http://www.ecrr.org/JoinECRR/tabid/3645/Default.aspx>
- [6] <http://www.ecrr.org/>
- [7] <https://reformrivers.eu/news/365>
- [8] <http://reformrivers.eu/results/applications-and-tools>
- [9] [http://wiki.reformrivers.eu/index.php/What%27s\\_in\\_this\\_wiki%3F](http://wiki.reformrivers.eu/index.php/What%27s_in_this_wiki%3F)
- [10] [http://wiki.reformrivers.eu/index.php/How\\_does\\_my\\_river\\_work%3F](http://wiki.reformrivers.eu/index.php/How_does_my_river_work%3F)
- [11] [http://wiki.reformrivers.eu/index.php/River\\_condition](http://wiki.reformrivers.eu/index.php/River_condition)
- [12] [http://wiki.reformrivers.eu/index.php/How\\_can\\_we\\_improve%3F](http://wiki.reformrivers.eu/index.php/How_can_we_improve%3F)
- [13] <http://reformrivers.eu/results/deliverables>
- [14] <http://reformrivers.eu/results/scientific-publications>
- [15] <https://reformrivers.eu/news/361>
- [16] <http://www.reformrivers.eu/methods-models-tools-assess-hydromorphology-rivers-part-1-main-report>
- [17] <http://www.reformrivers.eu/news/167>
- [18] <http://www.reformrivers.eu/guidebook-evaluation-stream-morphological-conditions-morphologic-al-quality-index-mqi>
- [19] <http://www.reformrivers.eu/geomorphic-units-survey-and-classification-system-gus>
- [20] <http://www.reformrivers.eu/methods-models-tools-assess-hydromorphology-rivers-part-2-thematic-annexes>

- [21] <http://www.reformrivers.eu/methods-models-tools-assess-hydromorphology-rivers-part-5-applications>
- [22] <https://reformrivers.eu/news/373>
- [23] <http://www.reformrivers.eu/fact-sheets-restoration-projects>
- [24] <https://reformrivers.eu/news/363>
- [25] <http://reformrivers.eu/newsletters/238>
- [26] <http://www.reformrivers.eu/results/scientific-publications>
- [27] <http://dx.doi.org/10.1002/rra.2974>
- [28] <http://dx.doi.org/10.1007/s00027-015-0424-5>
- [29] <http://dx.doi.org/10.1111/1365-2664.12531>
- [30] <https://reformrivers.eu/news/364>
- [31] [https://circabc.europa.eu/sd/a/4063d635-957b-4b6f-bfd4-b51b0acb2570/Guidance%20No%2031%20-%20Ecological%20flows%20\(final%20version\).pdf](https://circabc.europa.eu/sd/a/4063d635-957b-4b6f-bfd4-b51b0acb2570/Guidance%20No%2031%20-%20Ecological%20flows%20(final%20version).pdf)
- [32] [http://wiki.reformrivers.eu/index.php/Introduction\\_to\\_characterisation:\\_Multi-scale\\_Hierarchical\\_Framework](http://wiki.reformrivers.eu/index.php/Introduction_to_characterisation:_Multi-scale_Hierarchical_Framework)
- [33] <http://reformrivers.eu/events/371>
- [34] <http://reformrivers.eu/events/370>
- [35] [http://www.isprambiente.gov.it/en/events/4th-reform-national-stakeholder-workshop?set\\_language=en](http://www.isprambiente.gov.it/en/events/4th-reform-national-stakeholder-workshop?set_language=en)
- [36] <https://reformrivers.eu/news/360>
- [37] <https://circabc.europa.eu/w/browse/8ad88423-5a71-4ee6-9f1a-1f1ea9131568>