

WISER

WISER is developing methods for assessing and restoring aquatic ecosystems

Nine years after enactment of the European Water Framework Directive (WFD) many Member States still lack assessment systems for specific water categories (e.g., lakes, coastal waters) and/or organism groups (e.g., fish, marine plants). This often hampers the implementation of WFD-compliant monitoring schemes for the ecological status and, thus, affects the comparison of national monitoring systems within the pan-European intercalibration exercise.

WISER will support the implementation of the Water Framework Directive by developing assessment schemes and by modelling the effects of restoration and climate change on assessment results. In the field of ecological assessment the project will:

- ➔ test and complement existing assessment schemes,
- ➔ develop novel assessment schemes for integrated assessment of the ecological status of European surface waters where necessary,
- ➔ estimate costs and efficacy of assessment schemes and particular methods to identify most efficient low-cost approaches,
- ➔ support the intercalibration of assessment schemes for all water categories and organism groups, and
- ➔ estimate the uncertainty of assessment schemes to quantify the classification strength.

WISER will generate new data during extensive field campaigns, but will largely rely on data from previous international and national research and monitoring initiatives. A focus will be on lake and marine ecosystems.

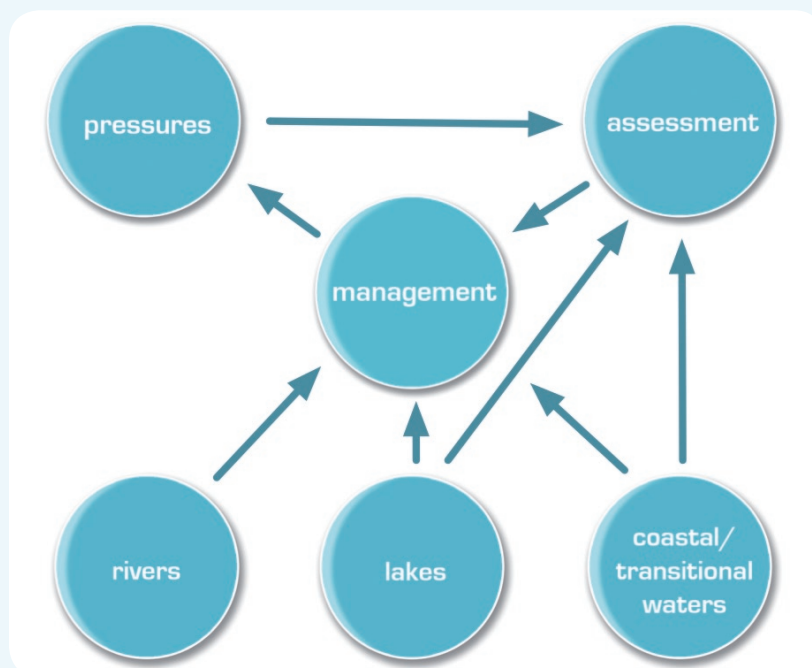
Besides integrated assessment, WISER will address biological recovery processes after release from various anthropogenic pressures. Therefore, large-scale data will help to identify linkages between pressure variables and ecosystem responses. A variety of modelling techniques will be applied to more than 20 selected case study river basins all over Europe to evaluate the efficacy of restoration.

WISER explicitly aims at providing guidance for the next steps of the implementation of the European Water Framework Directive.

This will be facilitated by the cooperation of project partners and end users (coordinators of Geographical Intercalibration Groups, River Basin Managers, and Environmental Ministries and Agencies).

In particular, the project will:

- ➔ quantify the effects of environmental pressures on organism groups in all water categories,
- ➔ derive conceptual linkages between restoration and recovery,
- ➔ develop and quantify models to predict the recovery of organism groups to multiple measures of pressure reduction, and
- ➔ estimate the effect of climate change on both degradation and recovery.



The data sources



WISER data sources are being bundled and will be provided according to a common data structure. This includes i) the compilation of more than 90 existing databases in a meta database, ii) the provision of common database templates for all analytical workpackages, iii) a review of existing assessment schemes for all water categories and organism groups in Europe, and iv) the provision of guidelines for data generation and indicator

development.

For lakes and marine ecosystems, a field campaign will generate high-quality data for all organism groups according to harmonised field and laboratory protocols in line with existing CEN standards. Samples will be taken in 2009 and early 2010 from 28 lakes and 7 transitional and coastal waters.

Lake assessment and intercalibration



WISER will develop and validate indicators and assessment metrics for all WFD relevant organism groups in lakes (phytoplankton, macrophytes, benthic invertebrates, fish). The major stressors considered are hydromorphological alterations and eutrophication. The work on hydromorphological pressures in lakes will focus on structural changes in the littoral zone and on water level fluctuations. Regarding eutrophication the indicators already developed will be validated, with particular focus on the deduction of boundaries of ecological quality classes.

The work on assessment metrics will focus on such showing significant pressure-response relationships, low uncertainty, high cost-efficiency, and robustness across climatic regions. Different approaches will be tested for each organism group to obtain an integrated (holistic) assessment, for instance, by combining single metrics into a multimetric index.

The following achievements will be made available:

- ➊ overview of suitable and cost-efficient indicators for operational and investigative monitoring of eutrophication and

hydromorphological degradation,

- ➋ recommendations on low-cost monitoring methods,
- ➌ recommendations on combination rules for metrics of each organism group to obtain integrative assessment schemes, and
- ➍ quantification of the main sources of uncertainty for recommended metrics and

software tools for assessing the overall uncertainty and risk of misclassification.

integrated assessment systems

impact of climate change

restoration

provides

estimates

guides

Transitional & coastal water assessment and intercalibration



Full assessment systems will also be developed and refined for the relevant organism groups in transitional and coastal waters (phytoplankton, macroalgae/angiosperms, benthic invertebrates, fish). This requires the validation of existing indicators and in some cases the development of new indicators.

Marine pressures include hydromorphological degradation (mainly in transitional waters), eutrophication and toxic stress (e.g., metals and organic compounds).

The following achievements will be

provided for transitional and coastal waters:

- ➊ compilation of metrics to assess the impact of different pressures on marine ecosystems,
- ➋ recommendations on combination rules for single metrics into holistic assessment schemes for each organism group,
- ➌ evaluation of low-cost monitoring methods for each organism group,
- ➍ recommendations on the reduction of misclassification risks in marine ecosystems,
- ➎ quantification of the main sources of uncertainty for recommended metrics, and
- ➏ software tools for assessing the overall uncertainty and the risk of misclassification.

The two main future drivers of changes in European water bodies will be recovery (following pressure reduction and restoration measures) and climate change. The latter is expected to result in additional threats on ecosystem integrity both directly (through changing temperature and precipitation regimes) and indirectly (through interaction with other pressures, for instance, land use changes).

WISER will examine and predict recovery processes of organism groups in aquatic ecosystems following hydromorphological restoration and oligotrophication. Analyses will also consider possible effects of climate change on recovery trajectories affecting the good/moderate class boundary, for instance, by shifting baselines.

Ecosystem response to decreasing

Impacts of pressure reduction and climate change on the ecological status of different water categories

pressure levels will be modelled for different pressure reduction schemes, catchment management options and climate change scenarios. Thus, WISER will help to understand and quantify:

- the required pressure reduction for ecosystems to achieve good ecological status, and its efficiency,
- the uncertainty of ecological effects of pressure reduction, and
- implications of climate and land use changes on ecological thresholds that are used to define the boundaries between good and moderate ecological status.



uncertainty

intercalibration

To design and implement cost-effective management programmes a better knowledge of the response signatures of different organism groups is required, as well as an understanding of the uncertainties associated with the use of different organism groups.

WISER will particularly address

the question how different organism groups and water categories respond to degradation and to rehabilitation.

The design of robust monitoring programmes using multiple organism groups will be supported by:

- guidance on and evaluation of uncertainty associated with sampling, sample processing, and the use of multiple organism groups in field campaigns,
- guidance on the combination of multiple organism groups into complete water body assessment schemes with focus on testing the one-out-all-out concept stipulated in the WFD,
- comparison of response signatures of different organism groups in different water categories and habitats (e.g., riffles/pools in rivers, littoral/profundal in lakes) to degradation and recovery, and
- comparison of pressure-impact-response-recovery chains for rivers, lakes and marine ecosystems.

Optimisation and integration of results



standardisation

estimates

supports

supports

identifies

low-cost monitoring methods

WISER will promote dissemination and communication of project results by establishing 'end user teams'. European and national experts (River Basin Managers, Geographical Intercalibration Group coordinators, Environmental Ministries and Water Agencies) will be directly involved in the discussion of draft achievements and in the revision of guidelines.

The end user teams will help to ensure two-way interactions: from end users to WISER to obtain useful, practical and

applicable results, and from WISER to end users to define the requirements for ecologically meaningful and robust assessment and restoration of European waters.

WISER will frequently provide and exchange results with European Geographical Intercalibration Groups and the CIS ECOSTAT Group. An Advisory Board consisting of 13 European experts on River Basin Management will help to ensure the usability of WISER's achievements.

Dissemination and end user involvement



Who we are — the project partners

The WISER consortium combines European expertise in biological assessment, intercalibration, uncertainty estimation, modelling and restoration of freshwater and marine ecosystems.

Partner name	Country	Website
University of Duisburg-Essen (UDE)	Germany	www.uni-due.de/hydrobiology
Norwegian Institute for Water Research (NIVA)	Norway	www.niva.no
Natural Environment Research Council, Centre for Ecology & Hydrology (NERC)	UK	www.nerc.ac.uk
AZTI-Tecnalia Foundation (TECNALIA AZTI)	Spain	www.azti.es
University of Hull, Institute of Estuarine & Coastal Studies (UHULL)	UK	www.hull.ac.uk
Aarhus University - National Environmental Research Institute (AU)	Denmark	www.dmu.dk
French Research Institute for Agricultural and Environmental Engineering (CEMAGREF)	France	www.cemagref.fr
Swedish University of Agricultural Sciences (SLU)	Sweden	www.slu.se
European Commission Joint Research Centre (EC-JRC)	EU	www.jrc.ec.europa.eu
Institute of Environmental Protection (IEP)	Poland	www.ios.edu.pl
Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB-FVB)	Germany	www.igb-berlin.de
Finnish Environment Institute (SYKE)	Finland	www.environment.fi/syke
Spanish National Research Council (CSIC)	Spain	www.csic.es
ALTErra Green World Research (ALTErra)	Netherlands	www.alterra.nl
University of Natural Resources and Applied Life Sciences Vienna (BOKU)	Austria	www.boku.ac.at
Estonian University of Life Sciences (EMU)	Estonia	www.emu.ee
University College London (UCL)	UK	www.ucl.ac.uk
Institute for Ecosystem Studies (CNR-ISE)	Italy	www.cnr.it
Deltares (DELFT)	Netherlands	www.deltares.nl
University of Coimbra, Institute of Marine Research (IMAR)	Portugal	www.imar.pt
Institute of Oceanology, Bulgarian Academy of Sciences (IO-BAS)	Bulgaria	www.io-bas.bg
Trinity College Dublin (TCD)	Ireland	www.tcd.ie
University of Salento (USALENTO)	Italy	www.unile.it
University of Bournemouth (BournemouthU)	UK	www.bournemouth.ac.uk
La Sapienza University of Rome (UNIROMA1)	Italy	www.uniroma1.it



How to obtain more information?

- ➔ WISER – water bodies in Europe: integrative systems to assess ecological status and recovery
- ➔ funded under the 7th EU Framework Programme, Theme 6 (Environment including Climate Change), Contract No.: 226273
- ➔ www.wiser.eu
- ➔ coordinator: University of Duisburg-Essen

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