

MARS
PROJECT

Managing Aquatic
ecosystems and
water Resources
under multiple Stress



Managing multiple stress for multiple benefits in aquatic ecosystems

**Final conference of the
EU research project MARS**

January 16-17 2018, Brussels/Belgium

Scientific conference

www.mars-project.eu

The MARS conference

Over the last four years, the EU research project MARS investigated into multi-stress effects on European surface waters, supporting their management under the Water Framework Directive. MARS eventually comes to an end in January 2018.

At this final two-days conference the MARS key results and recommendations are presented:

- The ‘Scientific Event’ (Tuesday, January 16) summarises and reviews the main project outcomes within the context of aquatic multi-stressor research.
- The ‘Management & Policy Event’ (Wednesday, January 17) introduces into MARS products (guidance, tools) and discusses effective river basin management and policy under multi-stress conditions.

The conference addresses applied scientists, water managers and administrators, as well as policy-makers and executives.

The scientific conference is open to the public on January 16 +17 (Tuesday+Wednesday).

The MARS internal meeting for project partners only is on January 15 + 18 (Monday+Thursday).

Venue

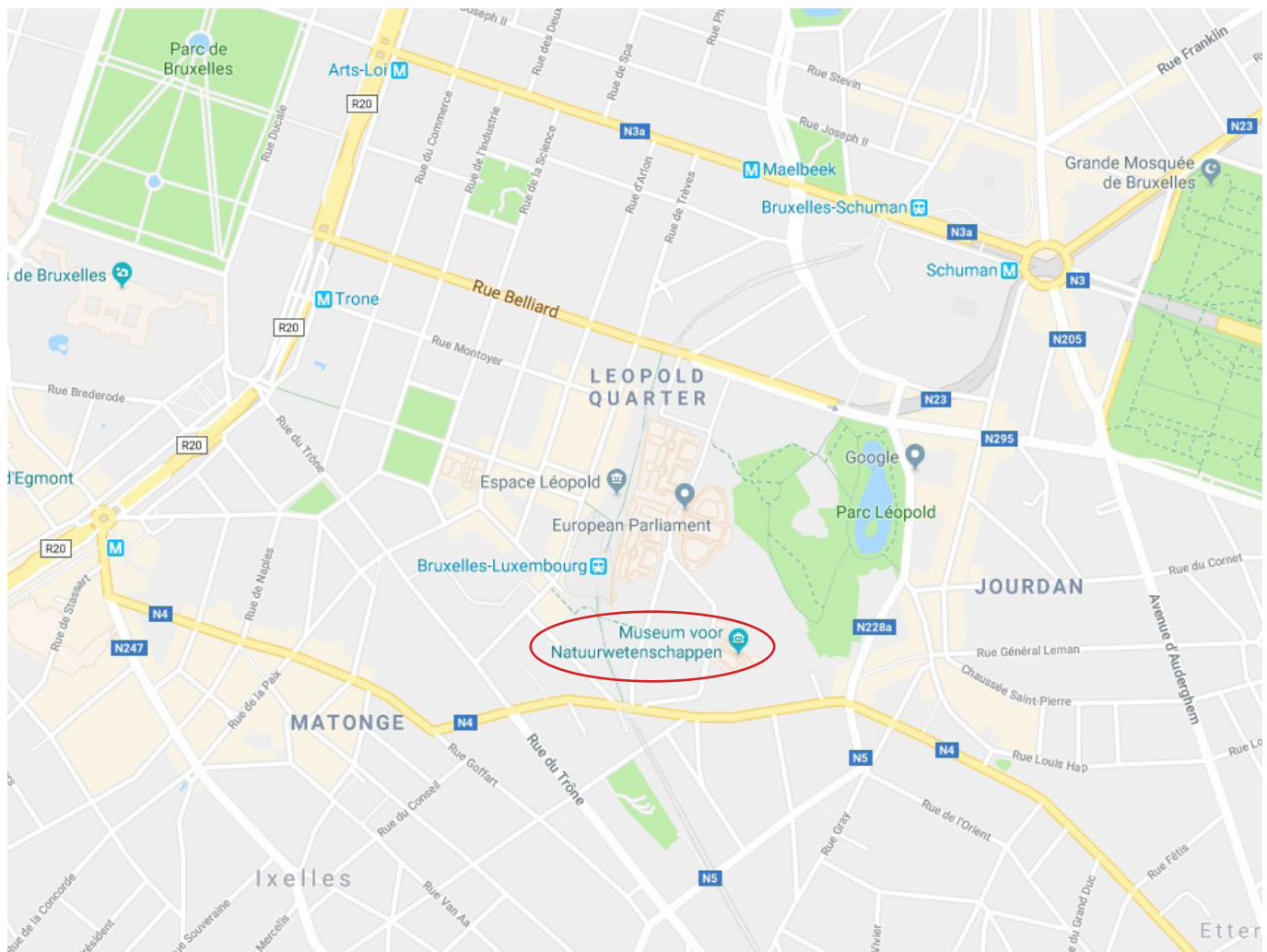
Museum of Natural Sciences

Vautierstreet, 29

1000 Brussels, Belgium

Find more information on the website of the museum:

www.naturalsciences.be/en/museum/practical-information



Note: There is no public parking space next to the venue, so please use public transport to get to the museum.

Accommodation

We kindly ask you to organise accommodation yourself.

Schedule

Tuesday, January 16

Scientific event

Forenoon session: Summary of MARS results

Chair: *Anne Lyche Solheim* (NIVA, NO)

- 09:00 – 09:30 **Introductory keynote: Complex to understand, but simple to manage:
The role of multiple stressors for assessing and restoring Europe's waters**
Daniel Hering (UDE, DE)
- 09:30 – 10:20 **Multiple stressors at the European scale:
Discovering patterns across the continent**
– incl. short presentations on selected key outcomes
Ana Cristina Cardoso (JRC, EC) & *Yiannis Panagopoulos* (NTUA, GR) and collaborators
- 10:20 – 10:50 Coffee break
- 10:50 – 11:40 **Multiple stressors at water body scale:
The MARS experimental studies** – incl. short presentations on selected key outcomes
Erik Jeppesen (AU, DK) & *Stefan Schmutz* (BOKU, AT) and collaborators
- 11:40 – 12:30 **Multiple stressors at the river basin scale:
The 16 case-study catchments** – incl. short presentations on selected key outcomes
Teresa Ferreira (ULisboa, PT) and collaborators
- 12:30 – 14:00 Lunch break

Afternoon session: Synthesis and outlook

Chair: *Ana Cristina Cardoso* (JRC, EC)

- 14:00 – 14:20 **Synthesis: Stressors, scenarios and water management**
Laurence Carvalho (CEH, UK)
- 14:20 – 14:40 **Scenarios and models: The science behind the MARS tools**
Markus Venohr (IGB, DE) & *Christian Feld* (UDE, DE)
- 14:40 – 15:00 **What did we learn from MARS? Key findings of the project**
Sebastian Birk (UDE, DE)
- 15:00 – 15:20 **MARS and multiple stressors: what next for freshwater research and management?**
Steve Ormerod (CU, UK)
- 15:20 – 15:40 **Multiple stressors: the need for generality in a context-dependent world**
Ian Donohue (TCD, IE)
- 15:40 – 16:20 Coffee break

16:20 – 17:30 **World-Café – Applied aquatic multi-stressor research:**
What can we recommend to river basin management?
All conference participants

19:00 – 22:00 Joint dinner on the museum's balcony (incl. poster session at 20:30)

Wednesday, January 17

Management & policy event

Forenoon session: The operational level –
MARS outcomes relevant for river basin management

Chair: *Sebastian Birk* (UDE, DE)

09:00 – 09:30 **Introductory keynote: The results of MARS and its implications for the water management and research agendas**
Daniel Hering (UDE, DE)

09:30 – 10:00 **The suite of MARS tools in support of river basin management**
Markus Venohr (IGB, DE) & *Tom Buijse* (DELTAWARES, NL)

10:00 – 10:30 **The missing link: Merging evidence with Bayesian networks**
Christian Feld (UDE, DE) & *Gerben van Geest* (DELTAWARES, NL)

10:30 – 11:00 Coffee break

11:00 – 11:30 **The MARS Guidance: How to deal with multi-stressors in river basin management?**
Anne Lyche Solheim (NIVA, NO) & *Rafaela Schinegger* (BOKU, AT)

11:30 – 12:00 **Integrating ecosystem services into river basin management**
Bruna Grizzetti (JRC, IT)

12:00 – 12:30 **Key-recommendations for river basin management under water scarcity and toxic stressors** (contributions of the projects GLOBAQUA and SOLUTIONS)
Damia Barcelo (ICRA, ES) & *Werner Brack* (UFZ, DE)

12:30 – 14:00 Lunch break

Afternoon session: The policy level – implementing the WFD

Chair: *Lidija Globevnik* (UL, SI)

14:00 – 14:20 **Reflections on the 2nd river basin management cycle**
Lourdes Alvarellos (EC)

14:20 – 14:40 **Options for improved WFD implementation using instruments of the current and future CAP**
Gerard Shortle (EC)

- 14:40 – 15:00 **Understanding multiple pressures and effects on environmental status to support management under the Marine Strategy Framework Directive**
Angel Borja (AZTI, ES)
- 15:00 – 15:20 **How to improve River Basin Management using integration of various policies?**
Kirsty Blackstock (JHI, UK)
- 15:20 – 15:50 Coffee break
- 15:50 – 16:10 **Towards an integrative water resource management in a bio-economy context**
Per Stålnacke (NIBIO, NO)
- 16:10 – 16:30 **The Future of Water Management in Europe: Outcomes of the MARS e-Conference reviewing WFD implementation**
Laurence Carvalho (CEH, UK)
- 16:30 – 17:30 **Panel discussion: Managing multiple stress for multiple benefits in aquatic ecosystems**
All speakers of the afternoon session, Moderator: *Stefan Schmutz* (BOKU, AT)
- 17:30 – 17:45 **Closing remarks**
Daniel Hering (UDE, DE)

The MARS project

Aims

MARS stand for “Managing Aquatic ecosystems and water resources under multiple stress “. The research project supports European policies, such as the Water Framework Directive, and the Blueprint to Safeguard Europe’s Water Resources.

Our target groups include ‘water managers’, which assess and restore water bodies under multi-stress conditions, and ‘policy makers’, which draft and implement policies related to water.

Our main objectives:

- to understand the effects of multiple stressors on surface waters and groundwaters, their biota, and the services they provide to humans.
- to understand how ecological status and ecosystem services are related – if at all.
- to advise river basin management how to restore multiply stressed rivers and lakes.
- to advise the revision of the Water Framework Directive on new indicators for ecological status and ecosystem services.
- to develop methods and software for the Programmes of Measures.

The MARS team

For four years, 24 European research institutions and organisations representing 17 countries addressed the assessment and management of waters bodies in Europe. The MARS consortium has combined European expertise in biological assessment, intercalibration, uncertainty estimation, modelling and restoration of fresh-water ecosystems.

University of Duisburg-Essen (**UDE**) - project coordinator, *Germany*, Aarhus University (**AU**), *Denmark*, AZTI-Tecnalia (**AZTI**), *Spain*, University of Natural Resources and Life Sciences (**BOKU**), *Austria*, Czech Hydrometeorological Institute (**CHMI**), *Czech Republic*, Cardiff University (**CU**), *United Kingdom*, Danube Delta National Institute for Research and Development (**DDNI**), *Romania*, Stichting DELTARES (**DELTARES**), *Netherlands*, Estonian University of Life Sciences (**EMU**), *Estonia*, Leibniz-Institute of Freshwater Ecology and Inland Fisheries (**FVB-IGB**), *Germany*, National Research Institute of science & Technology for Environment & Agriculture (**IRSTEA**), *France*, European Commission Joint Research Centre (**JRC**), *EU*, Middle East Technical University (**METU**), *Turkey*, Natural Environment Research Council (**NERC**), *United Kingdom*, Norwegian Institute for Water Research (**NIVA**), *Norway*, National Technical University of Athens (**NTUA**), *Greece*, Finnish Environment Institute (**SYKE**), *Finland*, University of Ljubljana (**UL**), *Slovenia*, Technical University of Lisbon (**UTL**), *Portugal*, Portuguese Environment Agency (**APA**), *Portugal*, Federal Ministry of Agriculture, Forestry, Environment & Water Management (**BMLFUW**), *Austria*, Environment Agency of England and Wales (**EA**), *United Kingdom*, International Commission for the Protection of the Danube River (**ICPDR**), National Administration Romanian Waters (**NARW**), *Romania*

The MARS results

Scientific publications

The research of MARS already led to the publication of >150 papers (see www.mars-project.eu). A selection is presented below.

An excellent overview of MARS and high-ranking papers

Hering, D., Carvalho, L., Argillier, C., Beklioglu, M., Borja, A., Cardoso, A. C., Duel, H., Ferreira, T., Globevnik, L., Hanganu, J., Hellsten, S., Jeppesen, E., Kodeš, V., Lyche Solheim, A., Nöges, T., Ormerod, S., Panagopoulos, Y., Schmutz, S. Venohr, M., Birk, S. (2015) Managing aquatic ecosystems and water resources under multiple stress - an introduction to the MARS project. *Science of the Total Environment* 503-504, 10-21, <http://dx.doi.org/10.1016/j.scitotenv.2014.06.106>

Davidson, T.A., Audet, J., Svenning, J.C., Lauridsen, T.L., Søndergaard, M., Landkildehus, F., Larsen, S.E., Jeppesen, E. (2015) Eutrophication effects on greenhouse gas fluxes from shallow-lake mesocosms override those of climate warming. *Global Change Biology* 21, 4449-4463, <https://doi.org/10.1111/gcb.13062>

Ren, L., He, D., Chen, Z., Jeppesen, E., Lauridsen, T. L., Søndergaard, M., Liu, Z., Wu, Q. L. (2017) Warming and nutrient enrichment in combination increase stochasticity and beta diversity of bacterioplankton assemblages across freshwater mesocosms. *The ISME Journal* 11(3), 613-625, <http://dx.doi.org/10.1038/ismej.2016.159>

Spears, B. M., Futter, M. N., Jeppesen, E., Huser, B. J., Ives, S., Davidson, T. A., Adrian, R., Angeler, D. G., Burthe, S. J., Carvalho, L., Daunt, F., Gsell, A. S., Hessen, D. O., Janssen, A. B. G., Mackay, E. B., May, L., Moorhouse, H., Olsen, S., Søndergaard, M., Woods, H., Thackeray, S. J. (2017) Ecological resilience in lakes and the conjunction fallacy. *Nature Ecology & Evolution* 1, 1616-1624, <https://doi.org/10.1038/s41559-017-0333-1>

Verberk, W.C.E.P., Durance, I., Vaughan, I.P., Ormerod, S.J. (2016) Field and laboratory studies reveal interacting effects of stream oxygenation and warming on aquatic ectotherms. *Global Change Biology* 22, 1769-1778, <https://doi.org/10.1111/gcb.13240>

Weyhenmeyer, G. A., Kosten, S., Wallin, M. B., Tranvik, L. J., Jeppesen, E., & Roland, F. (2015) Significant fraction of CO₂ emissions from boreal lakes derived from hydrologic inorganic carbon inputs. *Nature Geoscience* 8, 933-936, <http://dx.doi.org/10.1038/ngeo2582>

Representative papers for the different workpackages

Audet, J., Neif, E. M., Cao, Y., Hoffmann, C. C., Lauridsen, T. L., Larsen, S. E., Søndergaard, M., Jeppesen, E., Davidson, T. A. (2017) Heat-wave effects on greenhouse gas emissions from shallow lake mesocosms. *Freshwater Biology* 62, 1130-1142, <http://dx.doi.org/10.1111/fwb.12930>

Branco, P., Santos, J. M., Amaral, S., Romao, F., Pinheiro, A. N., Ferreira, M. T. (2016) Potamodromous fish movements under multiple stressors: Connectivity reduction and oxygen depletion. *Science of the Total Environment* 572, 520-525, <http://dx.doi.org/10.1016/j.scitotenv.2016.08.070>

Feld, C.K., Segurado, P., Gutiérrez-Cánovas, C. (2016) Analysing the impact of multiple stressors in aquatic biomonitoring data: A “cookbook” with applications in R. *Science of the Total Environment* 573, 1320-1339, <https://doi.org/10.1016/j.scitotenv.2016.06.243>

Grizzetti, B., Pistocchi, A., Liqueste, C., Udias, A., Bouraoui, F., Van De Bund, W., 2017. Human pressures and ecological status of European rivers. *Scientific Reports* 7, 1-11, <https://doi.org/10.1038/s41598-017-00324-3>

Nôges, P., Argillier, C., Borja, Á., Garmendia, J.M., Hanganu, J., Kodeš, V., Pletterbauer, F., Sagouis, A., Birk, S. (2016) Quantified biotic and abiotic responses to multiple stress in freshwater, marine and ground waters. *Science of the Total Environment* 540, 43-52, <https://doi.org/10.1016/j.scitotenv.2015.06.045>

Tools

MARS provides tools for river basin management under conditions of multiple stress. Knowing that no single tool can cover the diverse conditions across Europe, we synthesize current knowledge and designed practical tools for different purposes.

- A freshwater information system.
- Tools for analysis and diagnosis of the effects of multi-stressor conditions.
- Tools to predict the effects of climate change, land-use change and restoration (debut at the conference).

All tools and further information are available on the Freshwater Information Platform (FIP): **www.freshwaterplatform.eu**



Participants

For privacy reasons the list is only available to the participants as a print version at the conference or digital on demand via info@mars-project.eu.