The RIBES project

and the

Marie Skłodowska-Curie Doctoral Networks

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The RIBES project

RIver flow regulation, fish BEhaviour and Status

FRAMEWORK

RIBES - RIver flow regulation, fish BEhaviour and Status

- ✓ **FRESHWATER ECOSYSTEMS: hotspot of biodiversity – 0,01% of water on Earth but.. host 9,5% described animal species, one third of invertebrates, and about 55% of all fish species**

- ✓ **INCREASING PRESSURES: river fragmentation, flow modifications (water withdrawals) and habitat degradation, further amplified by hydrological regime and water temperature alterations induced by climate change**

FRAMEWORK

Article

More than one million barriers fragment Europe's rivers

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Check for updates

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Rivers support some of Earth's richest biodiversity[1] and provide essential ecosystem services to society[2], but they are often fragmented by barriers to free flow[3]. In Europe, attempts to quantify river connectivity have been hampered by the absence of a harmonized barrier database. Here we show that there are at least 1.2 million instream barriers in 36 European countries (with a mean density of 0.74 barriers per kilometre), 68 per cent of which are structures less than two metres in height that are often overlooked. Standardized walkover surveys along 2,715 kilometres of stream length for 147 rivers indicate that existing records underestimate barrier numbers by about 61 per cent. The highest barrier densities occur in the heavily modified rivers of central Europe and the lowest barrier densities occur in the most remote, sparsely populated alpine areas. Across Europe, the main predictors of barrier density are agricultural pressure, density of river-road crossings, extent of surface water and elevation. Relatively unfragmented rivers are still found in the Balkans, the Baltic states and parts of Scandinavia and southern Europe, but these require urgent protection from proposed dam developments. Our findings could inform the implementation of the EU Biodiversity Strategy, which aims to reconnect 25,000 kilometres of Europe's rivers by 2030, but achieving this will require a paradigm shift in river restoration that recognizes the widespread impacts caused by small barriers.

Belletti, B., Garcia de Leaniz, C., Jones, J. *et al.* More than one million barriers fragment Europe's rivers. *Nature* **588**, 436–441 (2020).

ARTICLE

Corrected: Author Correction

https://doi.org/10.1038/s41586-019-1111-9

Mapping the world's free-flowing rivers

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Free-flowing rivers (FFRs) support diverse, complex and dynamic ecosystems globally, providing important societal and economic services. Infrastructure development threatens the ecosystem processes, biodiversity and services that these rivers support. Here we assess the connectivity status of 12 million kilometres of rivers globally and identify those that remain free-flowing in their entire length. Only 37 per cent of rivers longer than 1,000 kilometres remain free-flowing over their entire length and 23 per cent flow uninterrupted to the ocean. Very long FFRs are largely restricted to remote regions of the Arctic and of the Amazon and Congo basins. In densely populated areas only few very long rivers remain free-flowing, such as the Irrawaddy and Salween. Dams and reservoirs and their up- and downstream propagation of fragmentation and flow regulation are the leading contributors to the loss of river connectivity. By applying a new method to quantify riverine connectivity and map FFRs, we provide a foundation for concerted global and national strategies to maintain or restore them.

Grill, G., Lehner, B., Thieme, M. *et al.* Mapping the world's free-flowing rivers. *Nature* **569**, 215–221 (2019)

INTRO

RIBES - RIver flow regulation, fish BEhaviour and Status

Conflicting EU strategies

- ✓ **EU BIODIVERSITY STRATEGY 2030: ambitious targets – "*at least 25,000 km of rivers to be restored into free-flowing rivers by 2030 through the removal of primarily obsolete barriers and the restoration of floodplains and wetlands*"**
- ✓ **Directive (EU) 2018/2001 on Renewable Energy Sources (RES): target share of energy production raised to 40% by 2030 (strategic to consolidate hydropower sector exploit residual potential)**
- ✓ **EU Floods Directive: river works for flood protection (+ construction of water storage reservoirs - cc)**

Need for innovative technical solutions to allow the achievement of contrasting objectives

INTRO

RIBES = INNOVATIVE EUROPEAN TRAINING NETWORK
H2020-MSCA-ITN (ETN) - Marie Skłodowska-Curie Actions

«TRAIN 15 EARLY STAGE RESEARCHERS in the interdisciplinary field of ECOHYDRAULICS to find innovative solutions for freshwater fish protection and river continuity restoration in anthropogenically altered rivers»

FIELDS OF SCIENCE: engineering and technology/civil engineering/water engineering
PERIOD: 48 months - Jan 2020-Dec 2023
EU contribution: € 4.048.220,16

NETWORK

NETWORK

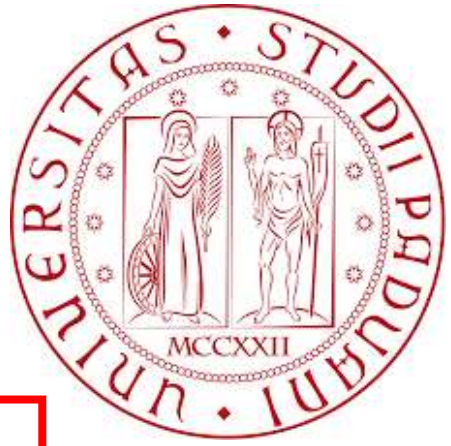
6 COUNTRIES:
Italy, Sweden, Germany, UK, Belgium, Estonia

11 BENEFICIARIES + 6 PARTNER ORGANISATIONS (Universities, Companies, Public Bodies)

https://cordis.europa.eu/project/id/860800

RIBES

BENEFICIARIES



PARTNER ORGANISATIONS

Environment Agency

iren

RESEARCH INSTITUTE NATURE AND FOREST

ACQUE RISORGIVE CONSORZIO DI BONIFICA

Freie Universität Berlin

IGM - INGENIEURBÜRO DR GERALD MÜLLER

Several different key stakeholders represented – ESRs employability

ESRs (Early Stage Researchers)

ESR01 - Philip Ericsson

ESR02 - James Campbell

ESR03 - Henry Hansen

ESR04 - Sophia Schumann

ESR05 - Miriam Castagna

ESR06 - Alfredo Schiavon

ESR07 - Marcelo Ruiz

ESR08 - Usama Ashraf

ESR09 - Rachel Mawer

ESR10 - Florian Eggers

ESR11 - Ali Hassan Khan

ESR12 - Luocheng Wu

ESR13 - Jelger Elings

ESR14 - Gloria Mozzi

ESR15 - Velizara Stoilova

WPs

4 INTER-RELATED WORK PACKAGES:

- ✓ **WP1 - FISH STRESS AND BEHAVIOUR**
- ✓ **WP2 - FISH HYDRODYNAMICS**
- ✓ **WP3 - TOOLS AND TECHNOLOGIES**
- ✓ **WP4 - FISH MANAGEMENT SOLUTIONS**

WPs

WP1 - FISH STRESS AND BEHAVIOUR

WP1 deals with biological **stress indicators** and behavioural **response of fish to external disturbances**. The objectives are the assessment of the **effects of sound, light, water depletion and passage through structures on fish**.

P. Ericsson, P. Kemp, P. White: *Consider the bigger picture: The effect of multimodal sensory integration on behavioural deterrent performance*

J. Campbell, S. Shry, O. Calles, F. Hölker: *Application of animal movement models with acoustic telemetry positioning*

H. Hansen, J. Erickson: *Practitioner friendly introduction to bayesian flood frequency analyses*

S. Schumann, E. Negrato, A. Marion, G. Santovito, D. Bertotto: *Stress evaluation using physiological biomarkers on fish tested in the hydraulic facility*

WP2 - FISH HYDRODYNAMICS

WP2 investigates the **links between flow and turbulence dynamics and fish propulsion, energy consumption and migration habits**, identifying similarity concepts for scale modelling of **fluid-fish interactions**

M. Castagna, S. Cameron, B. Scott, S. Martin, A. Zampiron, V. Nikora: *Hydrodynamics of fish-shaped rigid bodies: velocity-drag coupling*

A. Schiavon, C. Comoglio, A. Candiotto, M. Spairani, F. Hölker, J. Watz, D. Nyqvist: *River runs dry: Movement pattern of Telestes muticellus (Cypriniformes: Leuciscidae) in an intermittent river stretch*

M. X. Ruiz Coello, R. Sandoval, A. Bottacin Busolin, A. Marion, M. J. Guerra, L. Rios, P. Ortega: *Numerical approaches to evaluate the hydraulics of Vertical Slot Fishways: A comparative study of 2D and 3D simulations*

M. U. Ashraf, C. Comoglio, D. Nyqvist, G. Mozzi, P. Domenici, A. Marion, C. Manes: *Fish swimming performance: effect of flume length and different fatigue definitions*

WP3 - TOOLS AND TECHNOLOGIES

WP3 deals with **innovation in instrumental detection of fish paths**.

The objectives are developing and **improving fish tracking techniques**, including **sensors** and telemetry **modelling of trajectories and routes**

R. Mawer, S. Bruneel, I. Pauwels, M. Schneider, J. Elings, I. Kopecki, J. Coeck, P. Goethals: *Identifying hydraulic preferences of riverine fish, using fine-scale fish tracks and hydraulic data*

F. Eggers*: An overview of methods for the assessment of fish passes*

A. H. Khan, G. Toming, S. Hoerner, J. A. Tuhtan: *Comparison of near-body flow fields of a gudgeon and NACA0013 profile*

L. Wu, P. White, P. Kemp: *Measurements of the resonance properties of dummy fish swim bladders*

WP4 - FISH MANAGEMENT SOLUTIONS

WP4 focuses on **innovative engineering and management solutions** to allow safe fish passage through anthropically altered rivers. The objectives are developing spatio-temporally **dynamic predictive model to support river managers**, **design criteria for novel guidance facilities** for downstream migrating species and improved technical solutions for **minimising fish stress during passage** across hydropower dams

J. Elings, R. Mawer, S. Bruneel, I. Pauwels, I. Kopecki, M. Schneider, J. Coeck, P. Goethals: *Applying Hidden Markov modelling to fine-scale fish telemetry*

G. Mozzi, C. Manes, D. Nyqvist, P. Domenici, C. Comoglio: *Aggregation in riverine fish: a review from a fish passage perspective*

V. Stoilova: *Behavioural guidance systems for downstream migrating fish: a mini-review*

RIBES WEBSITE

www.msca-ribes.eu

SOCIAL MEDIA PLATFORMS

Facebook

https://www.facebook.com/MSCA.RIBES

Twitter

https://twitter.com/MSCA_RIBES

ResearchGate

https://www.researchgate.net/project/RIBES-River-flow-regulation-fish-BEhaviour-and-Status

LinkedIn

https://www.linkedin.com/company/ribes

RIBES

Marie Skłodowska-Curie Doctoral Networks

Marie Skłodowska-Curie ACTIONS

Who do the MSCA support?

Researchers	Actions available
Researchers without a PhD degree	Doctoral Networks Staff Exchanges COFUND-DP
Researchers with a PhD degree	Postdoctoral Fellowships Staff Exchanges COFUND-PP
Other staff (Research managers, technicians, etc.)	Staff Exchanges

Doctoral Networks
Doctoral programmes in and outside academia incl. joint & industrial doctorates

Postdoctoral Fellowships
Support to excellent postdoctoral researchers

Staff Exchanges
Support for research and innovation staff exchanges

COFUND
Co-funding doctoral and postdoctoral programmes

MSCA and Citizens
Public outreach events (Night)

MSCA Doctoral Networks

MSCA DOCTORAL NETWORK OBJECTIVES

MSCA
Marie Skłodowska-Curie Actions
Developing talents, advancing research

- ✓ **to implement doctoral programmes** by **partnerships of organisations from different sectors** (academic and non-academic organisations) across Europe and beyond
- ✓ **to train highly skilled doctoral candidates**, stimulate their creativity, enhance their **innovation** capacities and boost their **employability in the long-term**

MSCA Doctoral Networks

MSCA DOCTORAL NETWORK MUST:

- ✓ **respond to WELL-IDENTIFIED NEED(S)**
- ✓ **in various R&I areas (BOTTOM-UP)**
- ✓ **EXPOSE the researchers to the ACADEMIC AND NON-ACADEMIC SECTORS**
- ✓ **offer TRAINING IN RESEARCH**
- ✓ **and TRANSFERRABLE SKILLS and COMPETENCES relevant for INNOVATION and LONG-TERM EMPLOYABILITY**

MSCA Doctoral Networks

MSCA DOCTORAL NETWORK RULES:

- ✓ **CONSORTIA: min. 3 independent organisations**, each established in a different EU Member State (at least 1) or Associated Country
- ✓ **FELLOWSHIPS: max 15 - max 40% total budget to same country/beneficiary**
- ✓ **CANDIDATES:** any nationality, to be enrolled in a Doctoral programme, **mobility rule** (must not have resided/worked/studied in the country of the recruiting organisation for more than 12 months in the 36 months immediately before their recruitment date)

MSCA Doctoral Networks

Researcher unit cost	Institutional unit cost	
"top-up allowance"	Research, training and networking	Management and indirect costs
3400€ (living allowance)* 600 € (mobility allowance) 660 € (family allowance)**	1600 €	1200 €

* adjusted through the application of a country correction coefficient
**if applicable, as well as long term leave allowance or special needs allowance

Joint Doctorates (DN-JD)
creation of joint Doctoral programmes, leading to the delivery of joint, double or multiple Doctoral degrees

Industrial Doctorates (DN-ID)
mandatory involvement of the non-academic sector in the doctoral training (50%-50%)

MSCA Doctoral Networks

NEXT CALLS:

2023: 30 May – 28 Nov 2023 – 434,8M€

2024: 29 May – 27 Nov 2024 – 451,15M€

https://marie-sklodowska-curie-actions.ec.europa.eu/actions/doctoral-networks

THANKS FOR YOUR ATTENTION