

# **QUESTIONNAIRE (final version, last update 28/June/2023)**

## **PERCEPTION OF STAKEHOLDERS ON RIVER RESTORATION INITIATIVES**

You are being invited to participate in the questionnaire "*Perception of Stakeholders on River Restoration Initiatives*". This questionnaire was adapted from the original version produced by Bernhardt et al. (2007) (<https://doi.org/10.1111/j.1526-100X.2007.00244.x>). The survey among different stakeholders on river restoration initiatives is part of the transnational RESTOLINK project (*Quantifying restoration success across biomes by linking biodiversity, multifunctionality and hydromorphological heterogeneity*). This project is conducted by researchers from the Helmholtz Centre for Environmental Research (UFZ - Germany), University of São Paulo (USP - Brazil), University of Koblenz-Landau (UKL – Germany), University of Barcelona (UB – Spain), and Umeå University (UmU – Sweden). The primary goal of this project is to develop a novel mechanistic framework for quantifying restoration success that interlinks hydromorphological heterogeneity at relevant spatial scales with multi-group biodiversity and essential ecosystem functions. This new framework will advise managers on selecting the most effective restoration measures on ecologically relevant scales. Your participation is very important because it will help us better understand the main characteristics, potential challenges, and stakeholders' perception on previous river restoration initiatives in each country.

### **Why are you being invited to participate?**

We invited you because you are a relevant stakeholder involved with river restoration efforts, and we believe you have the knowledge to help us with this assessment.

### **What is the questionnaire like and how long will it take to complete it?**

This questionnaire is divided into five sections, each with questions allowing you to select one or more answers about the restoration projects' design, implementation, coordination, monitoring, and evaluation. We will conduct a phone interview with you and we estimate it will take approximately 30 minutes to respond to all questions. We are sharing the questions with you before the interview so you can see all the content in advance.

**Are you required to participate?**

Your participation in this study is entirely voluntary. There are no foreseeable risks associated with this project. However, if you are uncomfortable answering a question, you may leave the survey at any time without giving us a reason.

**What will happen to the results of this questionnaire?**

We will not request any personal information from you, only the name of the company and the position you hold. Such personal information will be kept strictly confidential. The collected data will be reported only in a grouped form and for solely scientific purposes. Personal or confidential information shared here will not be included in final reports or manuscripts.

We adhere to all of the ethics, privacy, and data management guidelines recommended by each partner country's research agencies. If you want to learn more about them, you can do so at any time during this survey.

If you have any further questions about the research or the methodology used, please contact Dr. Mario Brauns in Germany ([mario.brauns@ufz.de](mailto:mario.brauns@ufz.de)), Dr. Davi Cunha in Brazil ([davig@sc.usp.br](mailto:davig@sc.usp.br)), Dr. Ryan Sponseller in Sweden ([ryan.sponseller@umu.se](mailto:ryan.sponseller@umu.se)), or Dr. Daniel Von Schiller in Spain ([d.vonschiller@ub.edu](mailto:d.vonschiller@ub.edu)).

Thank you so much for your time and support.

By agreeing to participate, you declare that you have read and agree with the information above and that you voluntarily accept to participate in the research and answer the questionnaire.

## QUESTIONNAIRE

### PART I – GENERAL INFORMATION/CHARACTERIZATION

### PART II – PROJECT DESIGN, IMPLEMENTATION AND COORDINATION

### PART III – MONITORING

### PART IV – EVALUATION

### PART V – SUCCESS INDICATORS

Questions were extracted (with some adaptations and additions) from the NRRSS (National River Restoration Science Synthesis, United States) interview form (Bernhardt et al. 2007 *Res. Ecol.* 15:482-493).

### PART I – GENERAL INFORMATION/CHARACTERIZATION

1) Which institution are you from?

- research institute
- public authority (which level? Federal, state, city...) [TEXT] \_\_\_\_\_
- NGO
- consultancy office
- university
- other [TEXT] \_\_\_\_\_

2) For how many years have you been involved with restoration projects throughout your career?

\_\_\_\_\_ years (number)

3) Please provide an estimation of the number of restoration projects/initiatives you were involved with throughout your career.

\_\_\_\_\_ projects (number)

For ALL the next questions, please consider your experience in the last **TEN YEARS**. If you have been involved with restoration for <10 years, please consider the whole period. Please pay attention to the **MAXIMUM NUMBER** of selected responses allowed for each question.

4) What were the main measures of river/stream restoration projects you were involved with? See text in bold with further details/definitions for each category. **Please tick UP TO FIVE boxes (most relevant goals).**

o Aesthetics/Recreation/Education

*Activities that increase community value: use, appearance, access, safety, knowledge, and environmental education*

o Bank Stabilization

*Practices designed to reduce/eliminate erosion/incision or slumping of bank material into the river channel. This category DOES NOT include stormwater management, see next intent category*

o Channel Reconfiguration

*Restoration of the layout of the river channel, modification of channel plan form or longitudinal profile and/or daylighting (converting culverts and pipes to open channels). Includes stream meander restoration and in-channel structures that alter the thalweg of the stream*

o Dam Removal/Retrofit

*Removal of dams and weirs or modifications/retrofits to existing dams to reduce negative ecological impacts. Excludes dam modifications that are simply for improving Fish Passage (see next category)*

o Fish Passage

*Removal of barriers to upstream/downstream migration of fishes. Includes the physical removal of barriers and also construction of alternative pathways. Includes migration barriers placed at strategic locations along streams to prevent undesirable species from accessing upstream areas*

o Floodplain Reconnection

*Practices that increase the flood Frequency of floodplain areas and/or promote flux of organisms and material between riverine and floodplain areas*

o Flow Modification

*Practices that alter the timing and delivery of water quantity (DOES NOT include stormwater management). Typically, but not necessarily associated with releases from impoundments and constructed flow regulators*

o In-stream Habitat Improvement

*Modifying structural complexity to increase habitat availability and diversity for target organisms and provision of breeding habitat and refugia from disturbance and predation. (In some cases, habitat improvement may be an action with the intent of In-stream Species Management; in Other cases, Habitat Improvement may be the intent and might be accomplished through Channel Reconfiguration; be very careful to separate action from intent when deciding whether to select this category*

o In-stream Species Management

*Practices that directly alter aquatic native species distribution and abundance through the addition (stocking) or translocation of animal and plant species and/or removal of exotics. Excludes physical manipulations of habitat/breeding territory (see In-stream Habitat Improvement)*

o Land Acquisition

*Practices that obtain lease/title/easements for streamside land for the explicit purpose of preservation or removal of impacting agents and/or to facilitate future restoration projects. Note: Simple Purchase and preservation to prevent potential future land conversion are insufficient. Projects should demonstrate intended or actual cessation of detrimental activities in acquired land or active restoration components*

o Management of waterborne diseases

*Actions that prevent waterborne diseases through drinking water and contact with contaminated water, such as riparian reforestation to prevent diffuse contamination, habitat modification to prevent intermediate host proliferation, and water quality improvement focusing on waterborne diseases*

o Riparian Management and restoration

*Revegetation of riparian zone and/or removal of exotic species (e.g., weeds, cattle). Excludes localized planting Only to stabilize back areas (see Bank Stabilization)*

o Stormwater Management

**Special case of flow modification that includes the construction and management of structures (ponds, wetlands, and flow regulators) in urban areas to modify the release of storm run-off into waterways from watersheds with elevated imperviousness into waterways. These practices/structures generally aim to reduce peak flow magnitudes and extend flow duration. Stormwater management here refers to water quantity not quality. Urban sediment, litter, and temperature control should be categorized as Water Quality Management**

o Water Quality Management

*Practices that protect existing water quality or change the chemical composition and/or suspended particulate load. Remediation of acid mine drainage falls into this category as does Combined Sewer Overflow separation. Excludes urban runoff quantity management (see Stormwater Management)*

o Climate change mitigation

*Measures taken specifically to increase the resilience of watercourses to climate change impacts (as drought or floods).*

4.1) Why were these measures (pointed in the last question) the main ones? **Please tick UP**

**TO TWO boxes.**

o greatest factor influencing river degradation

o legal requirements

o focus for which funding was available

o public demand and/or safety

o problem that could be most easily addressed

o other? [TEXT] \_\_\_\_\_



5) What role did you play in restoration projects? **Please tick UP TO TWO boxes.**

- manager/coordinator
- consultant
- designer
- implementer
- evaluator
- funder
- other? [TEXT] \_\_\_\_\_

6) Who designed the projects? **Please tick UP TO THREE boxes.**

- Private contractor
- City/county agency
- Local or regional authority (e.g., Conservation District, Water Management Authority)
- State agency
- Federal agency
- Volunteers
- Non-governmental/Not for profit organization
- University
- other? [TEXT] \_\_\_\_\_

7) Who implemented the projects? **Please tick UP TO THREE boxes.**

- Private contractor
- City/county agency
- Local or regional authority (e.g., Conservation District, Water Management Authority)
- State agency
- Federal agency
- Volunteers
- Non-governmental/Not for profit organization
- other? [TEXT] \_\_\_\_\_

8) Restoration measures can only be successful if the the stressors are tackled. Were the restoration measures based on a proper diagnosis of the the stressors?

- Yes, all major stressors were known based on a standardized procedure

- o We believe that the major stressors were known (expert knowledge, but no standardized assessment procedure)
- o No, we are unsure if we really tackle all stressors by our restoration measures
- o Other answers? [TEXT]

8.1) If yes, please give diagnosis procedures [TEXT]\_\_\_\_\_

## **PART II – PROJECT DESIGN, IMPLEMENTATION AND COORDINATION**

1) What factors led to the prioritization of these sites over other possible restoration sites? **Please tick UP TO THREE boxes.**

- o funds available
- o public interest
- o scientific interest
- o ecological concerns
- o infrastructure concerns
- o legal requirements
- o in watershed plan
- o recreation
- o land availability
- o other [TEXT] \_\_\_\_\_

1.1) Which of these factors was the most important? \_\_\_\_\_

2) What was the most important expected benefit after the project implementation? **Please tick ONLY TWO boxes.**

- o Hydromorphology recovery
- o Biodiversity improvement
- o Ecosystem functioning improvement
- o Flood control
- o Landscape improvement
- o Ecosystem services improvement
- o Other (e.g., aesthetics, social/emotional acceptance or recovery of a forgotten/lost space)  
[TEXT] \_\_\_\_\_



3) What guideline was used in creating and evaluating the design plan that was selected? **Please tick UP TO TWO boxes.**

- Manual/Book/Report/Government agency guidelines. Which ones specifically? \_\_\_\_\_
- Peer-reviewed journal
- Models or project site analysis
- Individuals (If so, what area(s) of expertise?)
  - Hydrology
  - Biology
  - Ecology
  - Geomorphology
  - Engineering
  - Other: [TEXT]
- Past and local experience from the interviewee
- Other

### **PART III – MONITORING**

1) Did your organization or some other entity collect specific monitoring data to these projects in order to evaluate further the restoration initiative? [Yes/No] \_\_\_\_\_

1.1) If no, what constraints prevented you from collecting data in order to evaluate the restoration projects? **Please tick UP TO TWO boxes.**

- Lack of funding
- Personal (lack of people power or staff time and/or not hired to do data collection
- Equipment (lack of materials needed for data collection and/or lack of technology or expertise for data analysis)
- No suitable method available
- Not part of my organizational mission
- Lacking knowledge how to design appropriate monitoring
- Other [TEXT] \_\_\_\_\_

1.2) In any case, what would you have monitored if there had been no restrictions? **Please tick UP TO THREE boxes.**

- physical variables
- hydromorphological variables
- chemical variables
- biological variables (including biodiversity indicators)
- photo monitoring (including satellite/drone imagery)
- ecosystem functioning (e.g., organic matter decomposition, nutrient uptake)
- ecosystem services
- no interest
- other [TEXT]\_\_\_\_\_

1.3) If yes, what enabled your team to monitor these projects? **Please tick UP TO THREE boxes.**

- Pursuit of other additional sources of funding
- Funding mandate
- Local volunteer interest
- Interested expert
- Academic researcher involvement
- Ongoing regional effort (e.g., watershed management plans)
- Legal requirement
- Personal commitment
- Existing monitoring method
- Monitoring already installed
- Other [TEXT]\_\_\_\_\_

#### **PART IV – EVALUATION**

1) Were success criteria explicitly stated in the projects' design plan? [Yes/No] \_\_\_\_\_

1.1) If yes, what were they? \_\_\_\_\_[TEXT]

1.2) What generally made these projects successful? **Please tick UP TO TWO boxes.**

- Overall positive effects on riverine ecosystem services
- Overall positive effects on fish, wildlife, plants

- o Positive effects on human community
- o Increased understanding of river systems
- o Other criteria [TEXT]\_\_\_\_\_
- o The project was not successful

2) What generally prevented these projects from being successful? **Please tick UP TO THREE boxes.**

- o biological invasions
- o structural failure
- o public disapproval
- o human disturbance or incivility of human actions (e.g., vandalism)
- o natural disturbance (e.g., floods, extreme weather events)
- o inadequate design
- o insufficient funding
- o no increase in measures of success
- o wasn't implemented correctly
- o inappropriate reference
- o other [TEXT]\_\_\_\_\_

3) If you had the opportunity, what changes, if any, would you make to any aspects of these projects? Please provide further details. **Please tick UP TO THREE boxes.**

- o Partners/team/personnel (technical expertise, input from scientists)
- o Project management process (as opposed to the particular players in the previous bullet)
- o Funding and associated requirements
- o Design process
- o Implementation process
- o Monitoring
- o Evaluation
- o Public involvement
- o Other? [TEXT]\_\_\_\_\_

## **PART V – SUCCESS INDICATORS**

1) Which indicators of restoration success do you commonly use for your projects? **Please tick UP TO THREE boxes.**

- o Biodiversity indicators (incl. species diversity indices, community composition)
- o Multimetric indices (e.g. EU Water Framework Directive)
- o Trait information (e.g. functional feeding groups)
- o Indicators of ecosystem functioning (e.g., aquatic metabolism, nutrient uptake, leaf litter decomposition, stable isotopes, food web metrics)
- o Hydromorphological and habitat indexes
- o Water quality indexes
- o No indicators are used
- o Other [TEXT]\_\_\_\_\_

2) Do you think that a restoration project can be successful but the indicators failed to assess this?

- o Yes
- o No

2.1) If yes, for which indicators would this be most likely the case? [TEXT]\_\_\_\_\_

3) Ecosystem restoration often takes time, but it is useful to document success already by early indicators, e.g. of communication of measures to be adjusted. Do you have the proper tools to evaluate early success?

- o Yes
- o No
- o Partially

3.1) If not, would you like to see such early success indicators?

- o Yes
- o No

Comments? Please provide early success Indicators if available  
[TEXT]\_\_\_\_\_

4) Ecosystem services are indicated by both ecological structures (e.g., community composition etc.) and functions (e.g., metabolism, food web processes). Do you feel that both aspects are properly tackled by your evaluation tools?"

- o Yes
- o No

Comments? [TEXT]\_\_\_\_\_

5) If not, what impedes the application of indicators of ecosystem functioning in your restoration projects? **Please tick ONLY ONE box.**

- Don't know exactly what this is
- No suitable method available
- Too complicated/laborious
- Cannot be connected to existing/previous assessments
- I do not believe that functional indicators work
- Indicators of ecosystem functioning have been applied in the projects I have been involved with. Please name them [TEXT]\_\_\_\_\_

## **PART VI – CLIMATE CHANGE**

1) How many restoration projects have you accompanied/implemented that were primarily concerned with reducing the negative impacts of climate change?  
[NUMBER]\_\_\_\_\_

2) Which direct effects of climate change have been addressed with the restoration measure(s)?

- Flood
- Drought incl. drying
- Temperature increase
- Other: [TEXT]\_\_\_\_\_
- I have not yet accompanied/implemented any climate change relevant projects.

3) Do current hydromorphological reference conditions sufficiently take into account the effects of climate change on the success of restoration?

- Yes
- No

3.1) If not, how could hydromorphological reference conditions be adapted to adequately take climate change into account? [TEXT]\_\_\_\_\_

4) Do current biological reference conditions sufficiently take into account the effects of climate change on the success of restoration?

- Yes

No

4.1) If not, how could biological reference conditions be adapted to adequately take climate change into account? [TEXT]\_\_\_\_\_

5) Do you feel methodically capable of accompanying/implementing climate change-specific restoration projects?

Yes

No

5.1) If not, what would be needed to accompany/implement climate change-specific restoration projects?

Specific handouts (manuals, guidelines)

Closer cooperation with scientific institutions

Overview of the state of knowledge

Models of how measure will develop under different climate scenarios

Other assessment methods

Others