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RESTORING WETLANDS
FOR A SUSTAINABLE FUTURE

IGB
Leibniz Institute of Freshwater Ecology and Inland Fisheries

Reviving River Heritage through Education, Storytelling and Community Engagement along the Danube

Toward the Extended Museum of the Acheron River, Greece – Valorising water heritage, engaging communities and developing innovative practices for extended water museums.

Webinar, 10 June 2026

Gabriela Costea[1] , Tim Grandjean[2] , Mihai-Cristian Adamescu[3]

[1]Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB, Berlin)
[2]Archipelagos Institouto Thalassias Prostasias
[3]Research Center in Systems Ecology and Sustainability (RCSES), University of Bucharest

WATER MUSEUMS GLOBAL NETWORK

unesco Intergovernmental Hydrological Programme

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Management challenges in the Danube River basin

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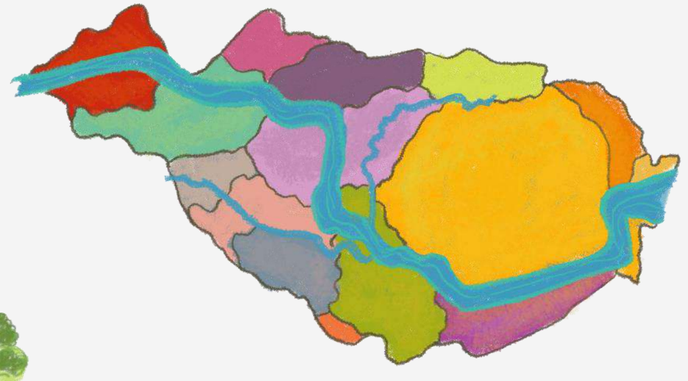
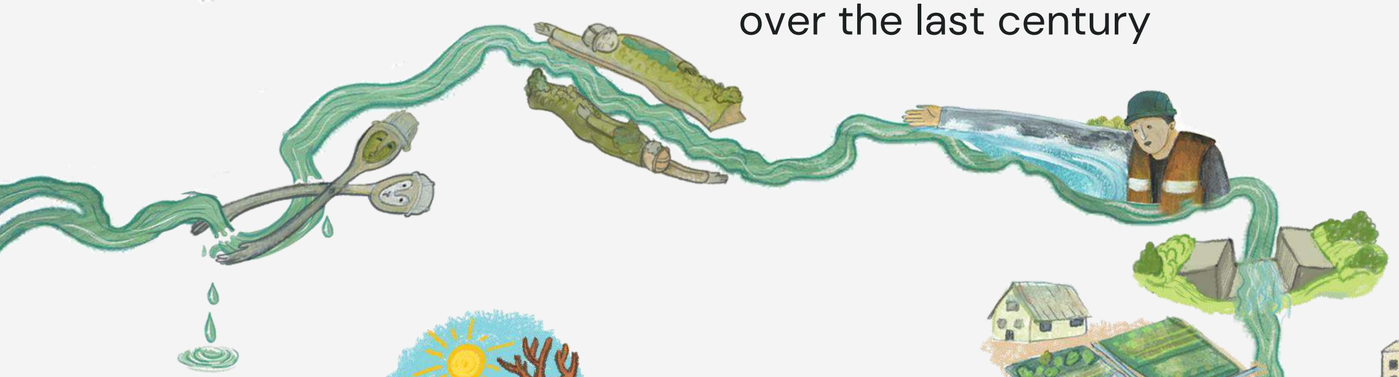
INTERNATIONAL COMMUNICATION



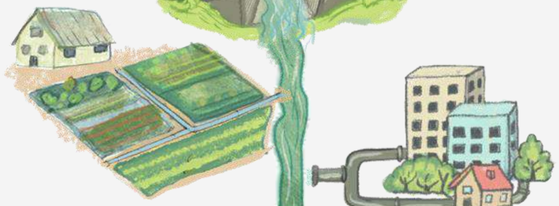
80% reduction in floodplain areas over the last century



DROUGHTS

FLOODS

CLIMATE CHANGE



deficits in water quality, the pollution challenges from agricultural runoff and industrial waste

fragmented river connectivity, many large dams

Knowledge–action gap:

Paradox:

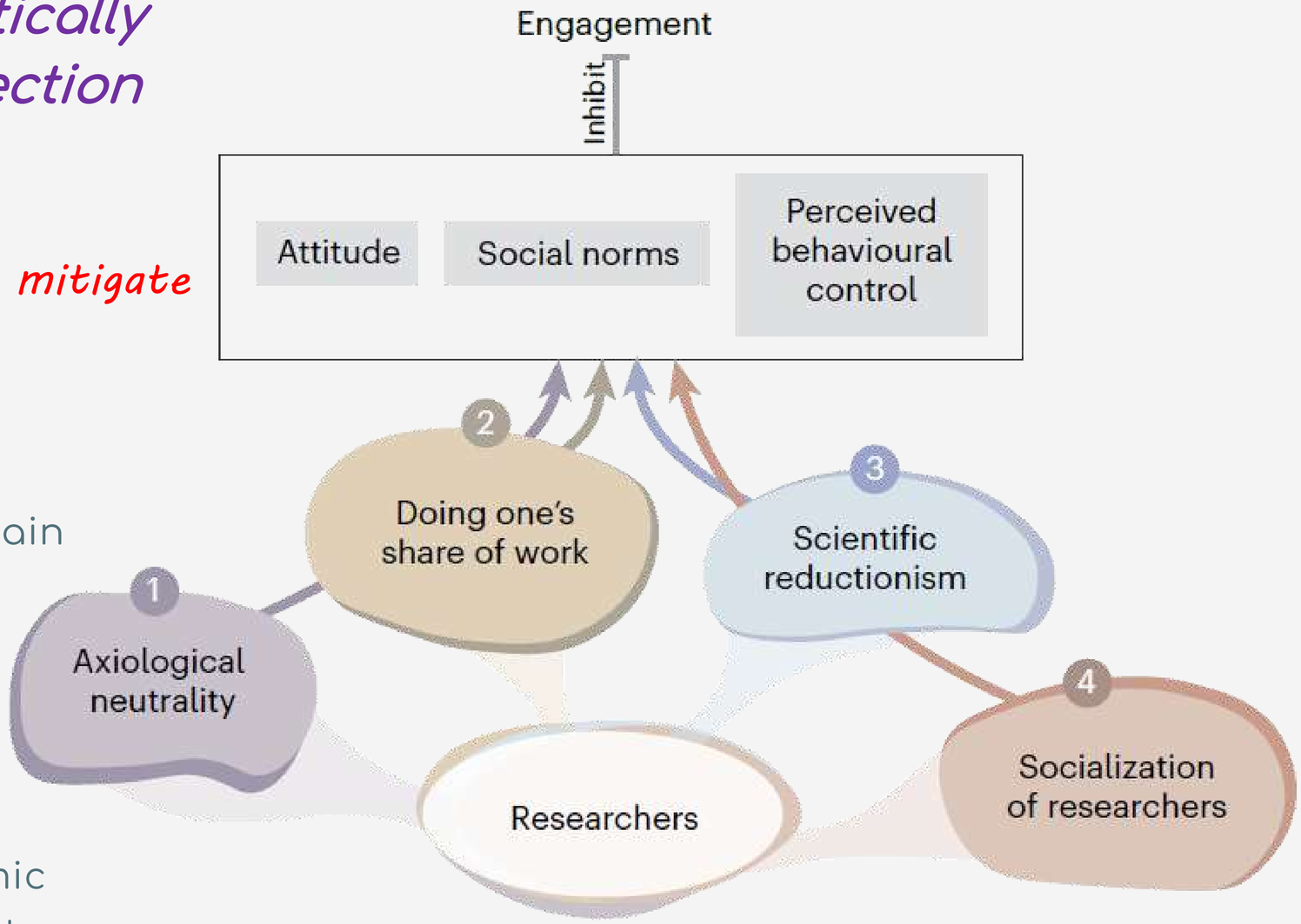
More knowledge does not automatically lead to better environmental protection

(Dupont et al., 2025)

→ *There is a gap between knowledge on environmental problems, and actions to mitigate them· Why?*

Obstacles preventing scientists from taking action:

- **Axiological neutrality** –science should remain value-free, discouraging advocacy.
- **Doing one's share of work** –producing knowledge is the primary contribution
- **Scientific reductionism** –specialized fields research
- **Socialization of researchers** – The academic system fosters individualism and conformity



Four special challenges may impede engagement (Dupont et all, 2025)

Dupont, L., Jacob, S. & Philippe, H. Scientist engagement and the knowledge–action gap. Nat Ecol Evol 9, 23–33 (2025).

Knowledge–action gap:

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How can scientists help to bridge the knowledge-action gap?

→Needed: A shift from a knowledge-centric approach to one focused on action and systemic change
(Dupont et al., 2025)

- Widespread scientist engagement with the public can create a **tipping point**, establishing public outreach as a valued norm in scientific culture
- Educational programs that **actively involve communities** and **promote hands-on participation** can train scientists to bridge the knowledge-action gap
- Environmental education going beyond facts and figures, but involving **more engaging approaches, as social, psychological, and political perspectives**, may encourage real-world engagement rather than just scientific understanding.

Dupont, L., Jacob, S. & Philippe, H. Scientist engagement and the knowledge–action gap. Nat Ecol Evol 9, 23–33 (2025).

Environmental Education - the need to reimagine, recreate, and restore

Reimagine, Recreate, Restore the EE
The theme of World Environment Day 2021

Social Responsibility

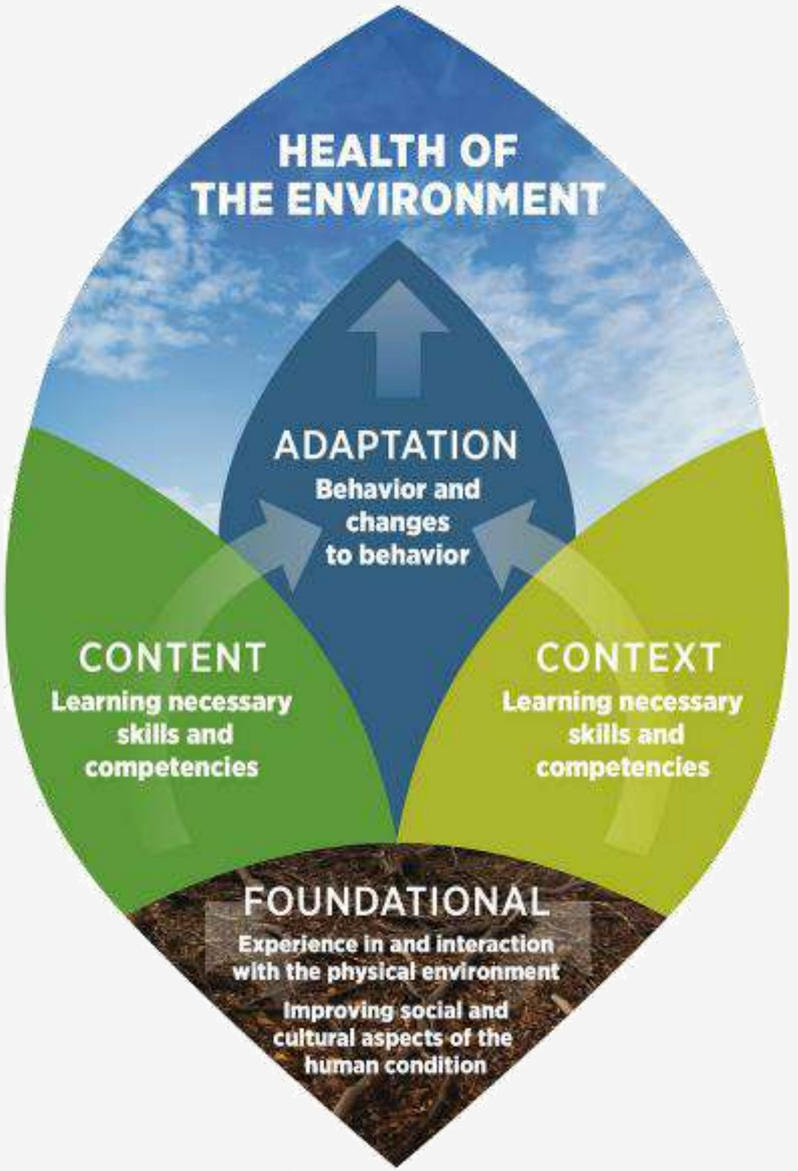
The environmental crisis cannot be addressed by science alone.

It requires **collaboration between science, arts, social sciences, and society.**

Need for Action

Education must promote **transformative, interdisciplinary learning** methods, enabling people to actively contribute to solving environmental problems.

Reid et.al., 2020



EE as a cornerstone of social change in solving environmental problems and ensuring the health of the environment. (Source: Clark et al. 2020, 381)

Emotions as catalysts for transformation

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EU Mission Restore our Ocean and Waters by 2030 Implementation Plan

EU COM aims to re-establish emotional linkages of citizens to freshwater ecosystems

*„ The Mission will seek to create **a stronger emotional connection between society and aquatic ecosystems**, which constitutes a barrier to catalysing the scale of change required as well as welcome or elicit interest in taking action.“*

*„ **To change hearts as well as minds** on this issue, communication actions will seek to inspire awe and wonder, and connect with the things people deeply value.” (p. 54)*

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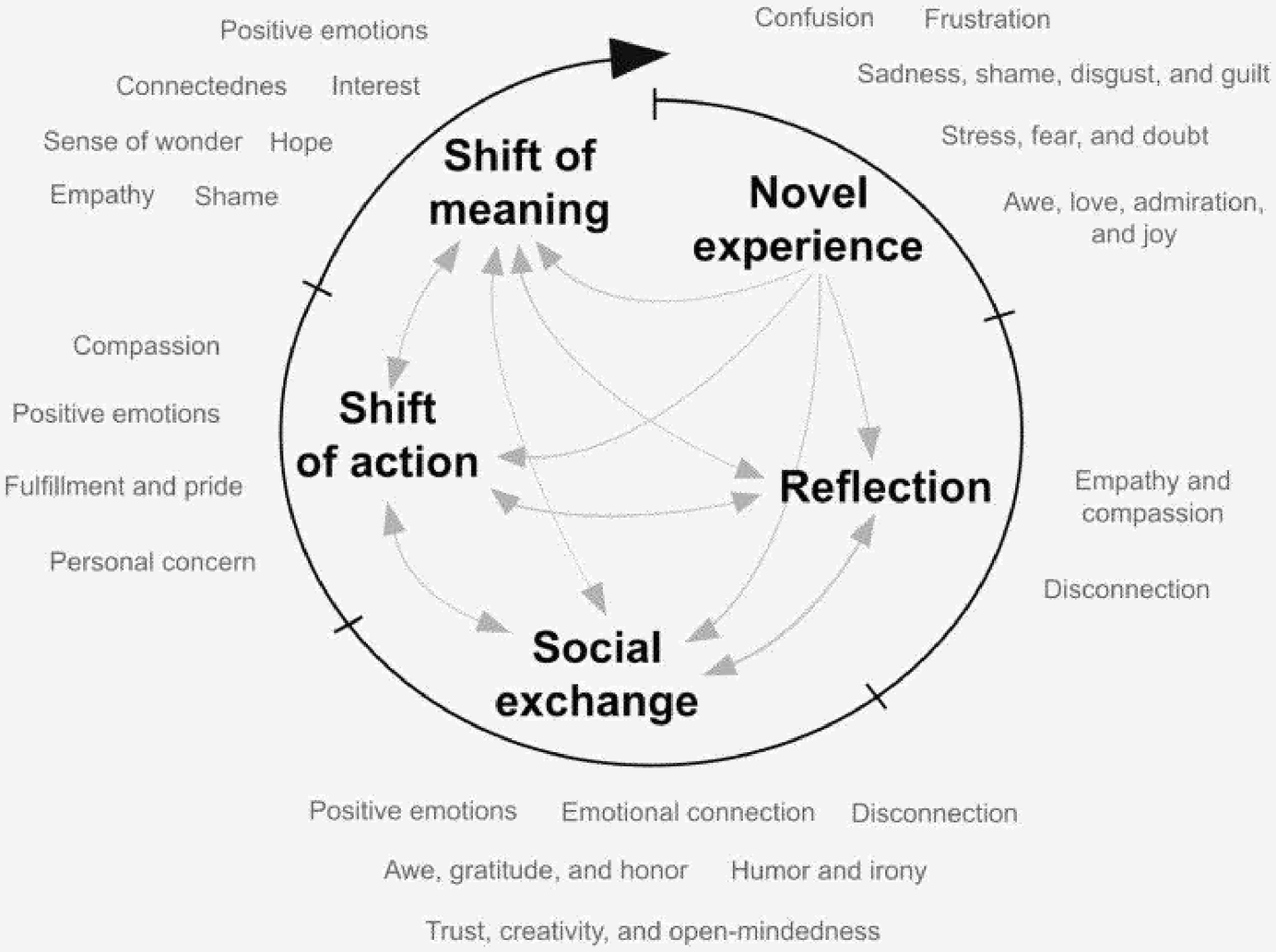
Emotions as catalysts for transformation

Kals, Schumacher, & Montada, 1999 - newly conceptualized construct: emotional affinity towards nature play an important role in the prediction of environmentally significant behavior (environmental psychology questionnaire study, N = 281)

Emotions drive pro-nature behavior
More concrete, frequent meaningful experiences in nature strengthen emotional affinity

Transformative learning is crucial for fostering sustainable behaviors and mindsets



Overview of specific emotions relevant to the 5 phases of transformative learning.
Black words inside the circle = phases of transformative learning,
Gray words = descriptions of emotions from the 20 in-depth reviewed article
(Grund, Singer-Brodowski & Büssing, 2024)

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Emotions as catalysts for transformation

Emotional engagement directly addresses several key barriers identified in the knowledge-action gap (Grund, Singer-Brodowski & Büssing, 2024):

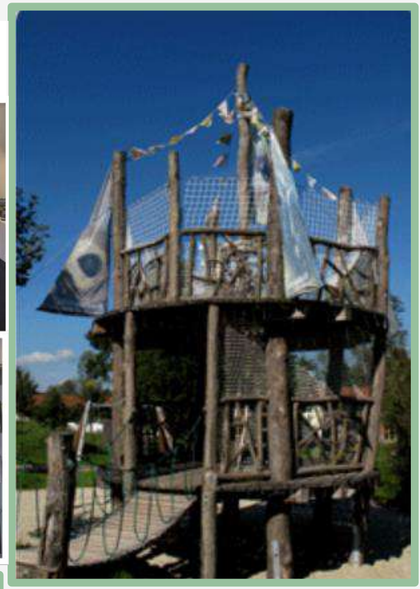
Abstract knowledge can feel distant and impersonal → **emotional connections create immediacy and relevance**

Information alone may overwhelm or paralyze → **emotional investment generates motivation and resilience**

Knowledge alone is often not enough to change perspectives → **emotional experiences can trigger profound perspective transformation**

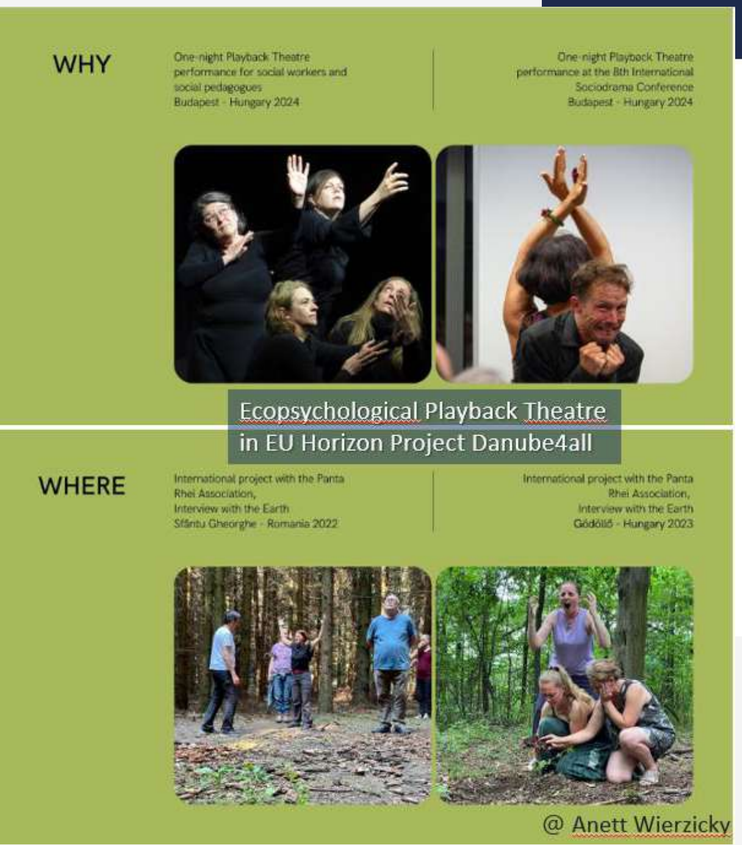
Stories of hope - Educational approaches that can bridge the gap

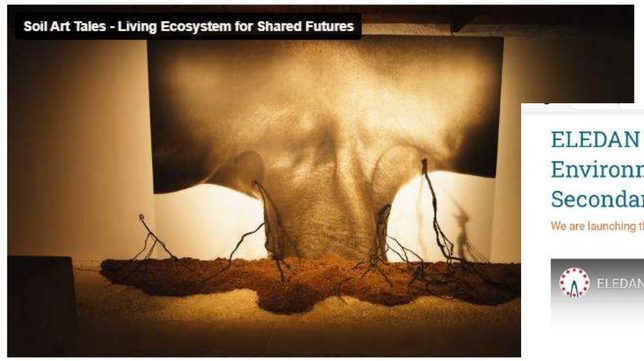
EE is taught in schools, communities, visitor centers, parks, zoos, museums, and Horizon Europe Projects

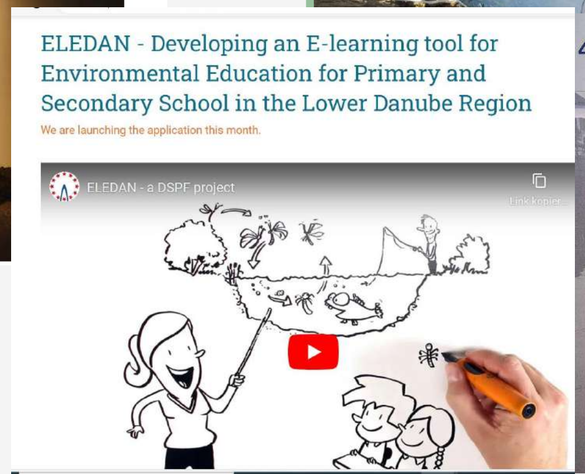


Information panel in a play tower Isarmündung Information Centre – Dr. Georg Karl Haus, Germany

@ www.watermuseums.net







@ museumfrankfurt.senckenberg.de

Museums now are focusing on the mission of connecting with their local communities

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New trends in popup experiences to create new opportunities to create a museum that is more distributed throughout its community

@ “Thermal Alchemy” by Sara Bonaventura
in the WAMU-NET
“Water Dream Memory” Exhibition

@ www.heritagemuseumsandgardens.org

Stiftung Herzogtum Lauenburg
@Sebastian Knorr / HA

@ www.exploratorium.edu

Example from the EU Restore4Life project

EU MISSION: RESTORE OUR OCEAN AND WATERS HORIZON Projects

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SCAN ME!

RESTORE4LIFE SHOWCASES THE REMARKABLE SOCIO-ECONOMIC BENEFITS DERIVED FROM A COMPREHENSIVE AND INTERDISCIPLINARY APPROACH TO RESTORING FRESHWATER AND COASTAL WETLANDS IN THE DANUBE BASIN.

PROJECT GOALS

- Develop a Wetland Restoration Decision Support System
- Support local revenue and business activities in restored ecosystems
- Empower stakeholders and the community
- Support the implementation of holistic wetland restoration solutions

Restore4life is part of the EU Mission: Restore our Ocean and Waters which aims to protect and restore the health of our ocean and waters through research and innovation, citizen engagement and blue investments.

The project engages in 4 demonstration sites and 6 monitoring sites all across the Danube basin to make evident that increased delivery of key ecosystem services, as water and pollutant retention, carbon sequestration and tourism opportunities as well as improved resilience of water-dependent habitats will produce multiple socio-economic synergies that also provide opportunities for sustainable businesses and investments.

4	6	31	48
IMPLEMENTATION SITES	MONITORING SITES	PARTNERS	MONTHS

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restore4life.eu

Restoration of wetland complexes as life supporting systems in the Danube Basin

Develop an **online Restore4Life Wetland Restoration Decision Support System** that will allow large-scale wetland restoration activities in the Danube basin and Europe through co-creation with multiple actors.

Develop a Restore4Life Wetland Restoration Decision Support System

Empower the community

Support local revenue & business activities in restored ecosystems

Support the implementation of holistic wetland restoration solutions

Participatory environmental learning

(citizen science + environmental education)

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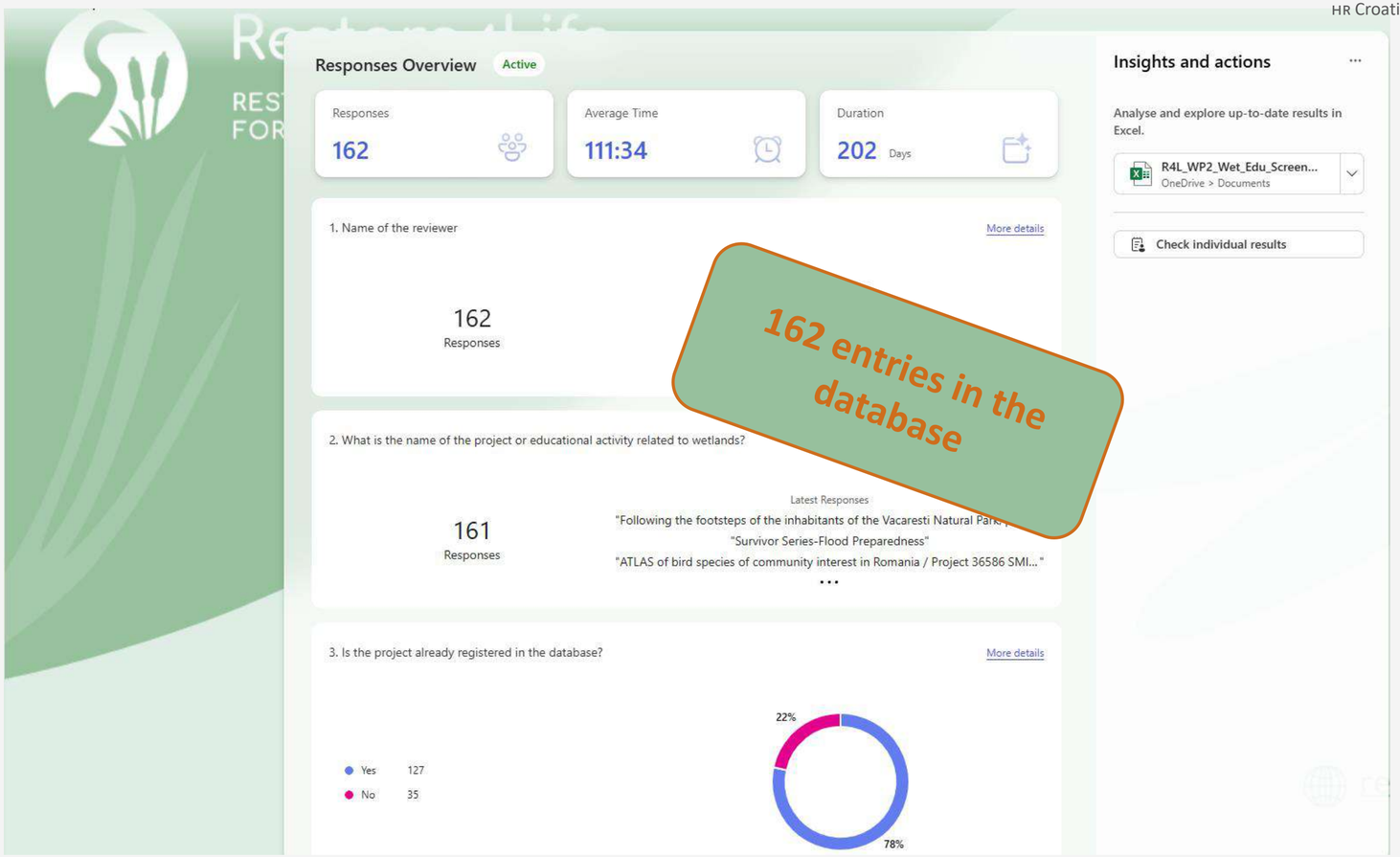
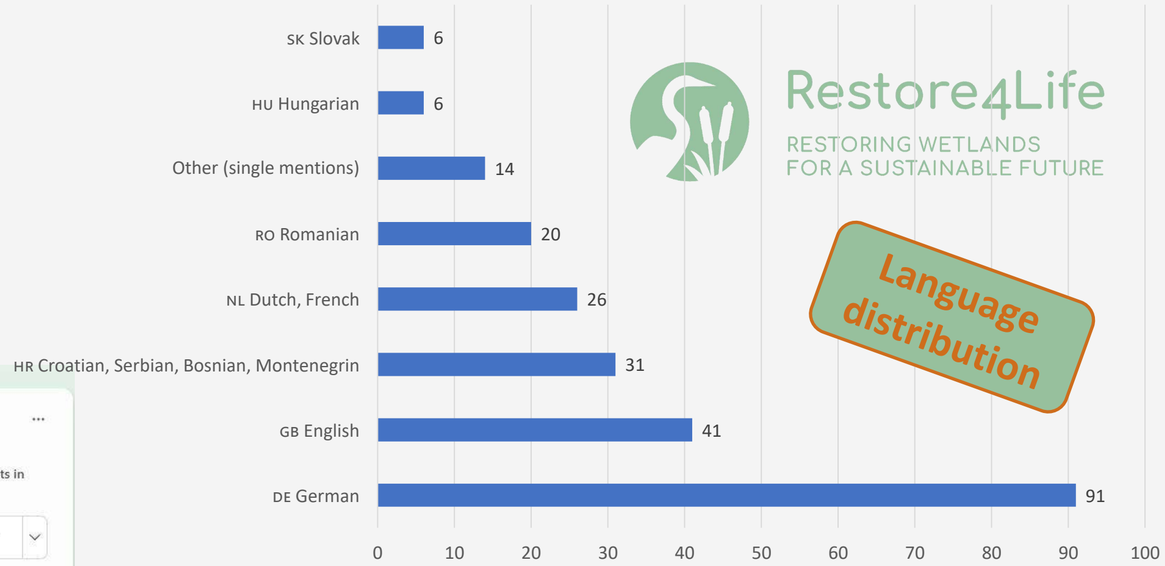
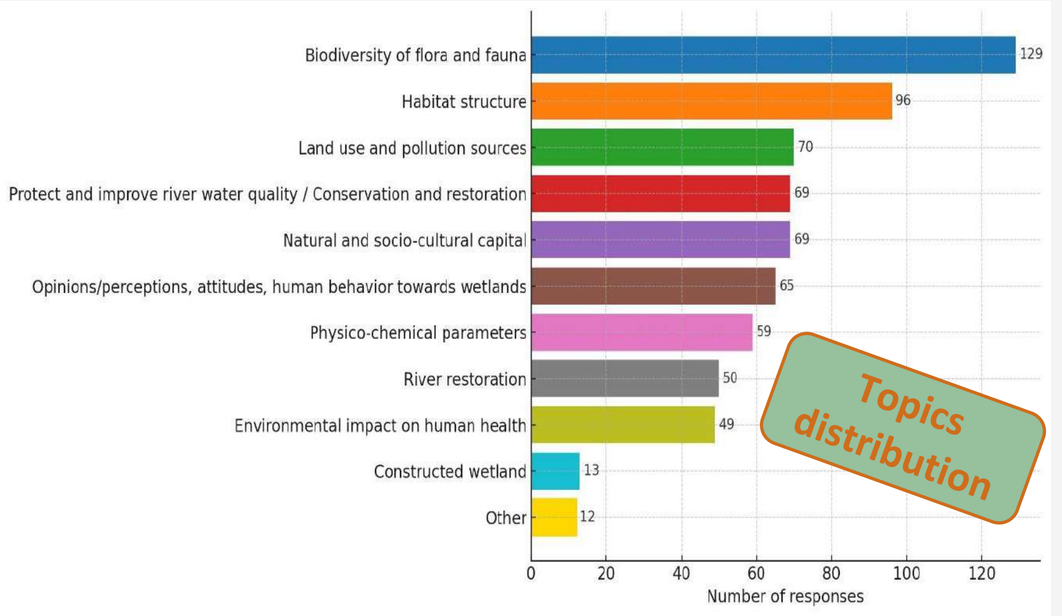
(AIMC, 2025)

DATABASE OF EXISTING EDUCATIONAL RESOURCES





Languages of educational projects and activities on wetlands and rivers identified through the Restore4Life questionnaire



Environmental themes addressed in collected educational projects — comparison of structural, functional, and socio-ecological topics

Living Floodplains:
A joint toolbox for education and citizen science on floodplain functions and Nature based Solutions

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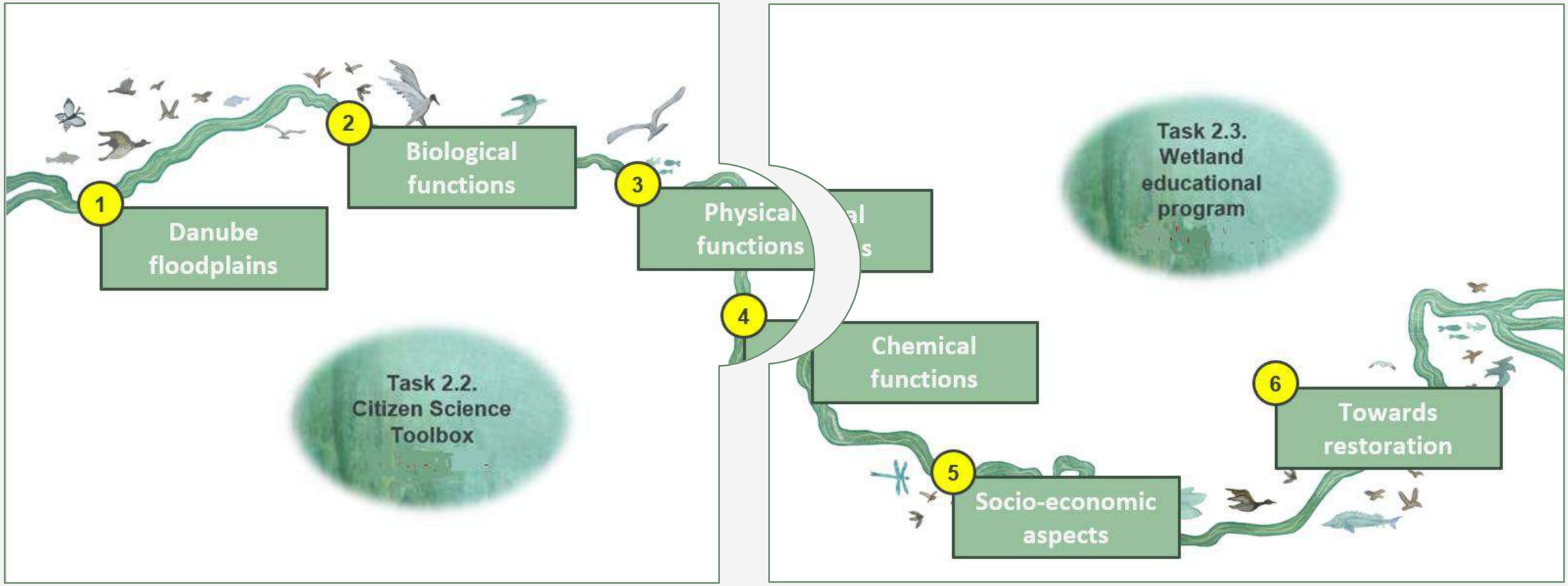

Pedagogical foundation:
5 E Instructional model approach:

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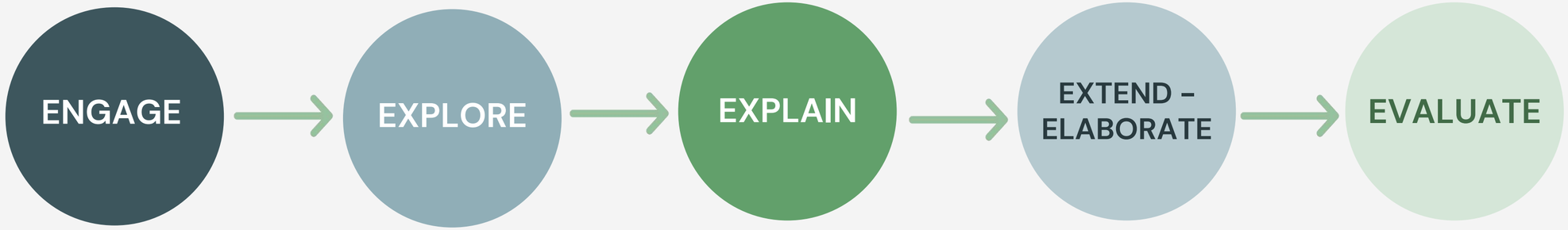

	Sparking curiosity	Hands-on learning	Making sense of experiences	Expanding understanding	Assessing learning
LEARNING EXPERIENCE DESIGN	a provocative question, an intriguing scenario, an outdoor experience or a hands-on experience	activities or experiments	teachers provide explanations	apply their newfound knowledge to different contexts deepening their understanding and refining their skills.	involves both teachers and students assessing understanding and skills.
TEACHER SUPPORT	Essential and guiding questions for each step	Student learning obiective	Materials	Vocabulary	Suggested assessment tasks
STUDENT MATERIALS	Student worksheet				
	https://teachers.institute/learning-teaching/constructivist-lesson-planning-5-e-model/				

R4L Teaching Protocol following the „*5 E*“ Learning experience Framework

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EXPLORING THE

TEACH

GRADE LEVEL: Secondary - High Scho

DURATION & LESSON STRUCTURE

IN

A habitat is the living environment
invertebrates, fish, and other wildlife — in

It is shaped by both abiotic (non-living) a
sand, nutrients, and sunlight, while biotic
plants, dead wood, and detritus, as well a

The typical habitats provided by rivers ar
hence often changing across time and sp
diverse organisms living there cannot sur
clarity, vegetation, or stream bed form —

Understanding how physical characterist
biological features (e.g., invertebrate or p
human impacts, and also supports identi

In this lesson, students will assess the eco
physical and biological parameters, deve
human impacts on aquatic habitats throu

LEARNING OBJECTIVES:

Students will be able to:

1. Identify and describe key abiotic an
2. Assess the physical characteristics
3. Evaluate how human activities affec
4. Interpret field data to conclude abo
5. Propose restoration measures for in

TEACHING FR
THE 5E INST

1. ENGAGE - Spa

AIM: To raise students' curiosity about s
human activities can alter them.

ACTIVITY 1 – VISUAL DISCOVERY: "HEALTH

PURPOSE OF THE ACTIVITY: To sti
natur
recog
huma

INSTRUCTIONS FOR STUDENTS:

GUIDING QUESTIONS

- What differences can you obse
- Which one do you think suppo
- What signs show human altera

TEACHER SUPPORT

- Use the *R*
habitat of
- Highlight
flow and s
- Use a mix

ACTIVITY 2 – LOCAL CONNECTIONS: "OUR

PURPOSE OF THE ACTIVITY: To co
local
activi
strea

INSTRUCTIONS FOR STUDENTS:

GUIDING QUESTIONS

- Have you noticed some featur
- Are there signs of pollution, w
- Why do you think stream healt

KEYWORDS: sinuosity, meanders, lat
deposition, riparian veg

- How do human activities affect s

Guide students to explore connections:

- Flow affects substrate distribu
- Bank vegetation influences sto
- Shading impacts water temper
- Sinuosity affects flow patterns
- How vegetation affects habita
- How flow affects: substrate cor
diversity

MEASUREMENT TOOLS AND TECHNIQU

- PHYSICAL MEASUREMENTS:
  - Depth stick/meter for
  - Flow meter/floating ob
  - GPS/maps for location
- DOCUMENTATION TOOLS:
  - Field notebooks
  - Habitat Worksheet
  - Cameras
- ASSESSMENT METHODS:
  - Visual surveys
  - Transect measurement
  - Photo documentation

TEACHER SUPPORT

- Brief student
- Demonstrate
Stream Habi
- Assign roles:
- Ensure each
downstream)

STUDENT ACTIVITIES

- Evaluate over a distance of 100 me
area the extent to which the analy
- Collect data on worksheet

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EXPLORING THE HABIT

WORKSHEE

To assess habitat quality, specific parameters are evaluat
downstream of the sampling site. For each parameter, ass
below. This will help you evaluate how natural and dynami

1. Analyzed para
HUMAN ALTERATION OF THE SINUO

How much has the river/stream
been altered by humans?

HABITAT QUALIT

1 → VERY GOOD
Natural floodplain, unaltered.

2 → GOOD
Partial presence
straightening or alter
works such as dredg
agriculture, concre
embankments, brid
construction activit

SCORE:

4. Analyzed parameter: THE DEPTH OF THE PROFILE

How much of the profile is artificially deep in relation to the area is the river bed?

HABITAT QUALITY

Transverse profile: very **natural, very wide**, with high dynamics.

Transverse profile: **moderately modified**. Dike present on one banks.

Highly modified cross profile and deepened. Dikes present on both banks; regularization and channel regularization.

Transverse profile
1 → VERY GOOD

Transverse profile
2 → GOOD

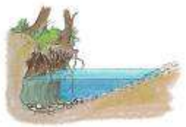
Transverse profile
3 → POOR

SCORE:

5. Analyzed parameter: THE STRUCTURE OF THE RIVER BANK

How is the structure of the bank?

HABITAT QUALITY



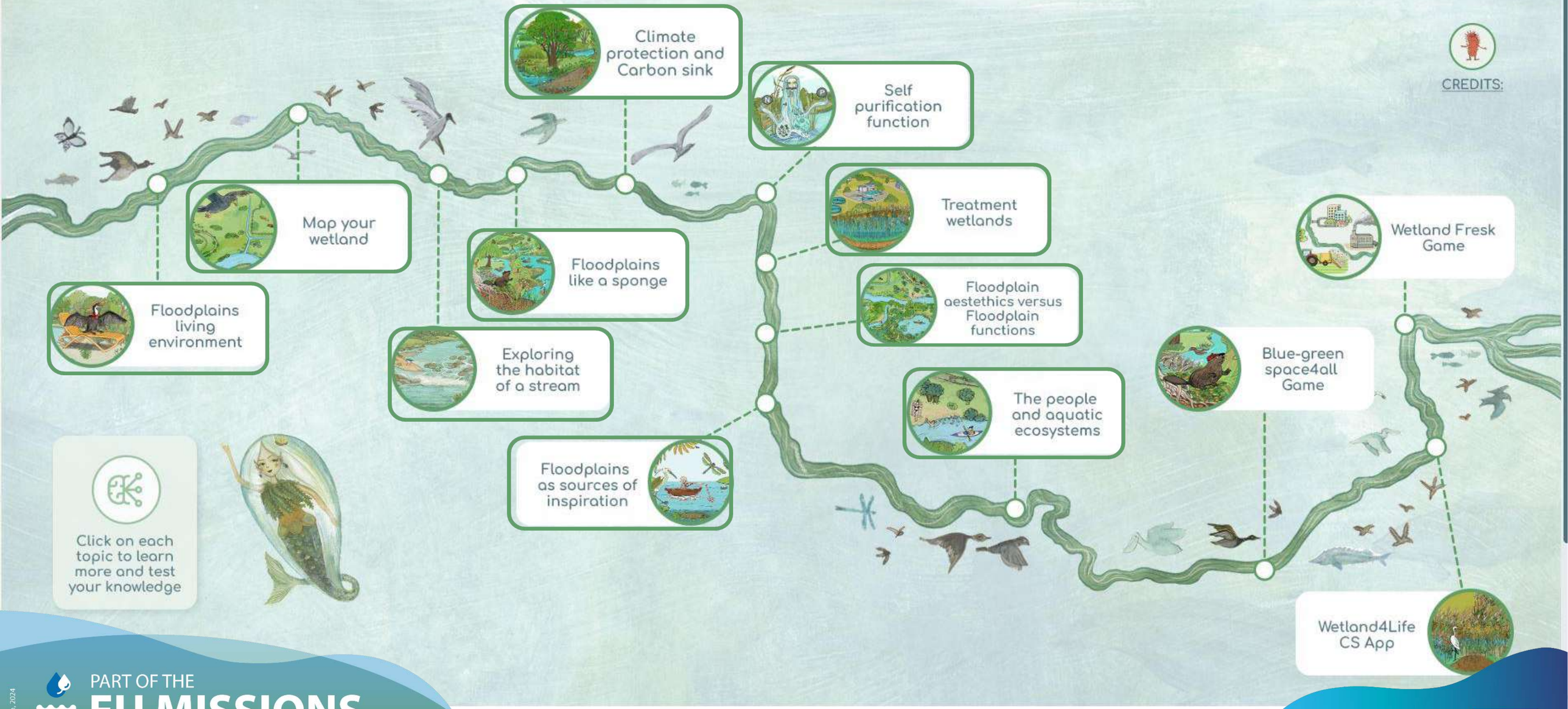
1 → VERY GOOD
Meandering river - Intact free-flowing rivers exhibit a dynamic steady state of their river bed: Bank erosion in one place is balanced by sediment deposition elsewhere. Vegetation on river banks prevents massive erosion, provides shade for some stream sections. Erodes, overhanging banks are often used by fish for shelter.

2 → GOOD
Moderately meandering watercourse with only local bank stabilization made up from natural materials, as stones and wood

3 → POOR
Straight watercourse with fully and uniformly stabilized banks

SCORE:

LIVING FLOODPLAINS: LEARN, EXPLORE, RESTORE4LIFE TOOLBOX



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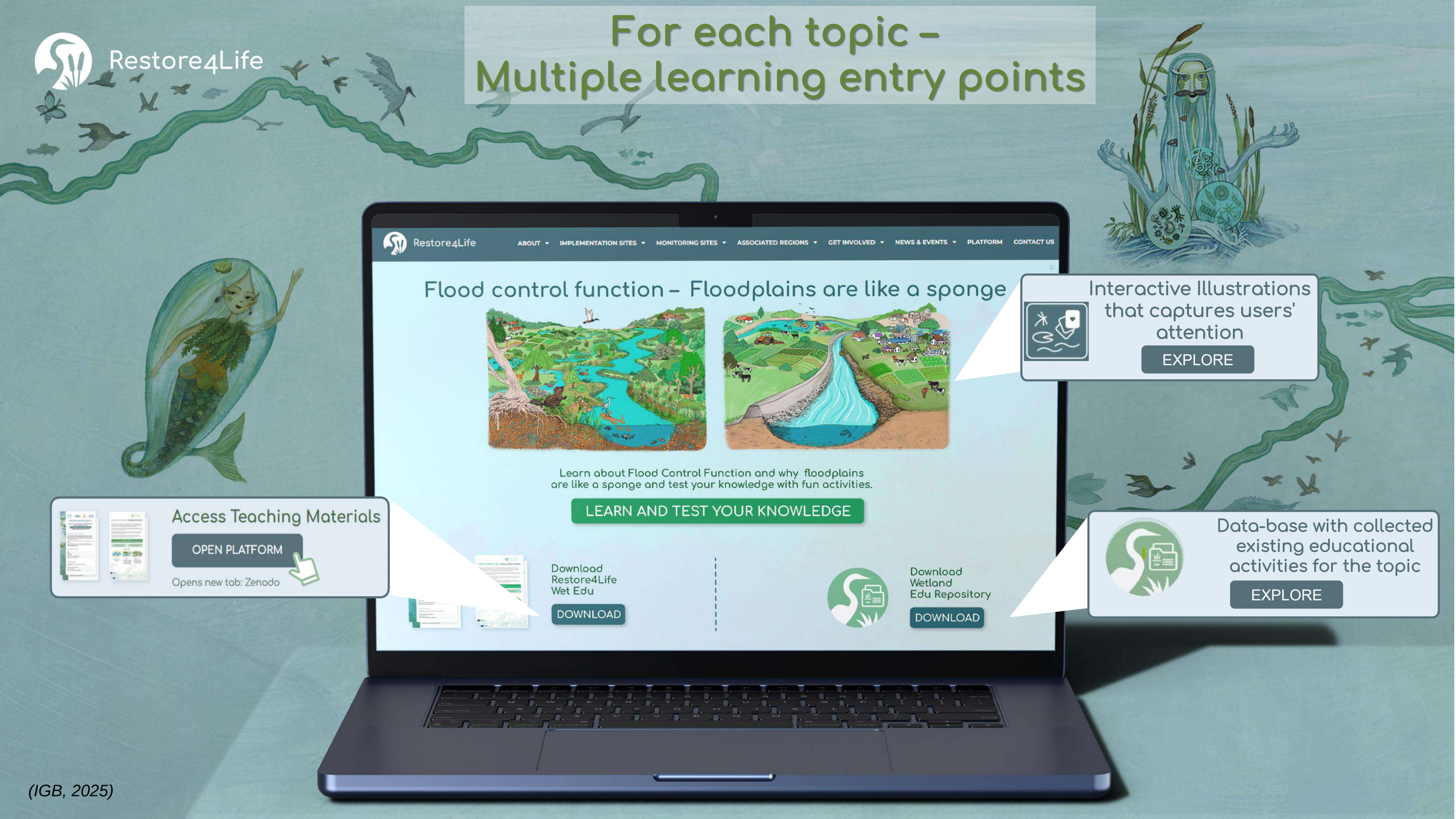
For each topic – Multiple learning entry points



(IGB, 2025)

Example of Interactive Illustrations from R4L Toolbox

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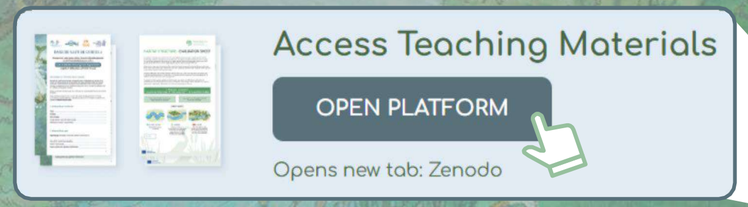

Example of 5E Teaching Materials from R4L Toolbox

Open acces & Reusability

TEACHING MATERIALS - 5E INSTRUCTIONAL MODEL (ENGAGE –EXPLORE –EXPLAIN –ELABORATE –EVALUATE)

1. FLOODPLAIN LIVING ENVIRONMENT –INTRO (WWF & FVB-IGB) (Gheorghiu, C., Costea, G., 2025)	http://doi.org/10.5281/zenodo.17494367
2. MAP YOUR WETLAND (UNSA) (Drešković, N., Radulovic, S., Djug, S., 2025)	https://doi.org/10.5281/zenodo.17476800
3. EXPLORING THE HABITAT OF A STREAM (FVB-IGB) (Costea, G., Pusch, M., 2025)	https://doi.org/10.5281/zenodo.17484378
4. FLOODPLAINS LIKE A SPONGE (UNIOS) (Mikuska, A., & Čerba, D. , 2025)	https://doi.org/10.5281/zenodo.17472524
5. CLIMATE PROTECTION AND CARBON SINK (BOKU) (Weigelhofer, G., Feldbacher, E., & Rosenberger, C. 2025)	Carbon sequestration in floodplain forests https://doi.org/10.5281/zenodo.17463283 Carbon sequestration and storage in soils https://doi.org/10.5281/zenodo.17453839
6. SELF-PURIFICATION FUNCTION (UNSFA & FVB-IGB) (Grabić, J., Srđević, Z., & Costea, G., 2025)	https://doi.org/10.5281/zenodo.17474269
7. TREATMENT WETLANDS (UNSFA & BOKU) (Ilić Paunić, M., Srđević, Z., Grabic, J., Langergraber, G., & Schobert, J., 2025)	https://doi.org/10.5281/zenodo.17478432
8. FLOODPLAIN AESTHETICS VS. FUNCTIONS (BOKU) (Feldbacher, E., Rosenberger, C., & Weigelhofer, G., 2025)	https://doi.org/10.5281/zenodo.17453699
9. FLOODPLAINS AS SOURCES OF INSPIRATION (ILESAS) (Miklósová, V., 2025)	https://doi.org/10.5281/zenodo.17478184
10. PEOPLE AND AQUATIC ECOSYSTEMS (FVB-IGB & UB) (Costea, G., Dinu, V., Adamenscu, M.C., Pusch, M., 2025)	https://doi.org/10.5281/zenodo.17477839

ZENODO LINKS

Implementation & Uptake

From development to practice:
Capacity building and outreach

The first Capacity building workshop in Romania with teachers, museum & Natural Parcs administrations educators, NGO representatives, cultural associations (March 2026)

Living Floodplains Toolbox

Train-the-Trainer Model

Capacity building workshops

Community of Practice

Continuous Improvement

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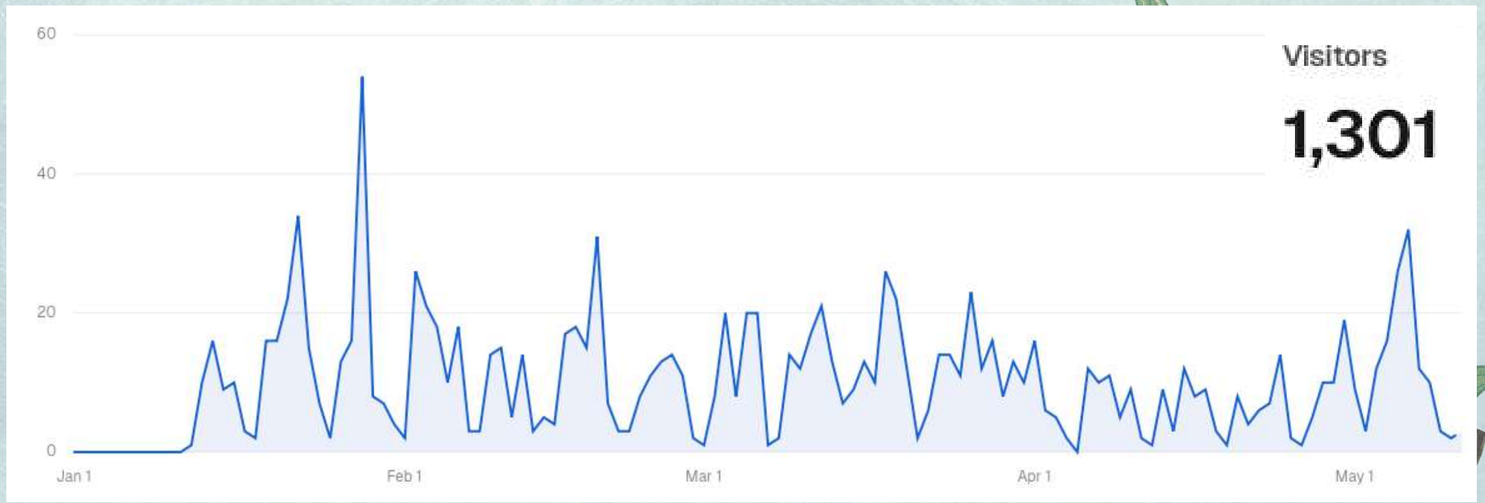
Impact & Reach

- Steady number of visitors since launce.
- Expected increase in the coming months with the implementation ahead, including school curricula.
- Users are from expected countries (Danube area) and beyond.



Romania	17%	224
Austria	13%	164
Germany	12%	156
Bulgaria	8%	102
United States of America	7%	93
Portugal	6%	72
Netherlands	5%	70
Serbia	5%	69
Greece	3%	38
Ireland	3%	38

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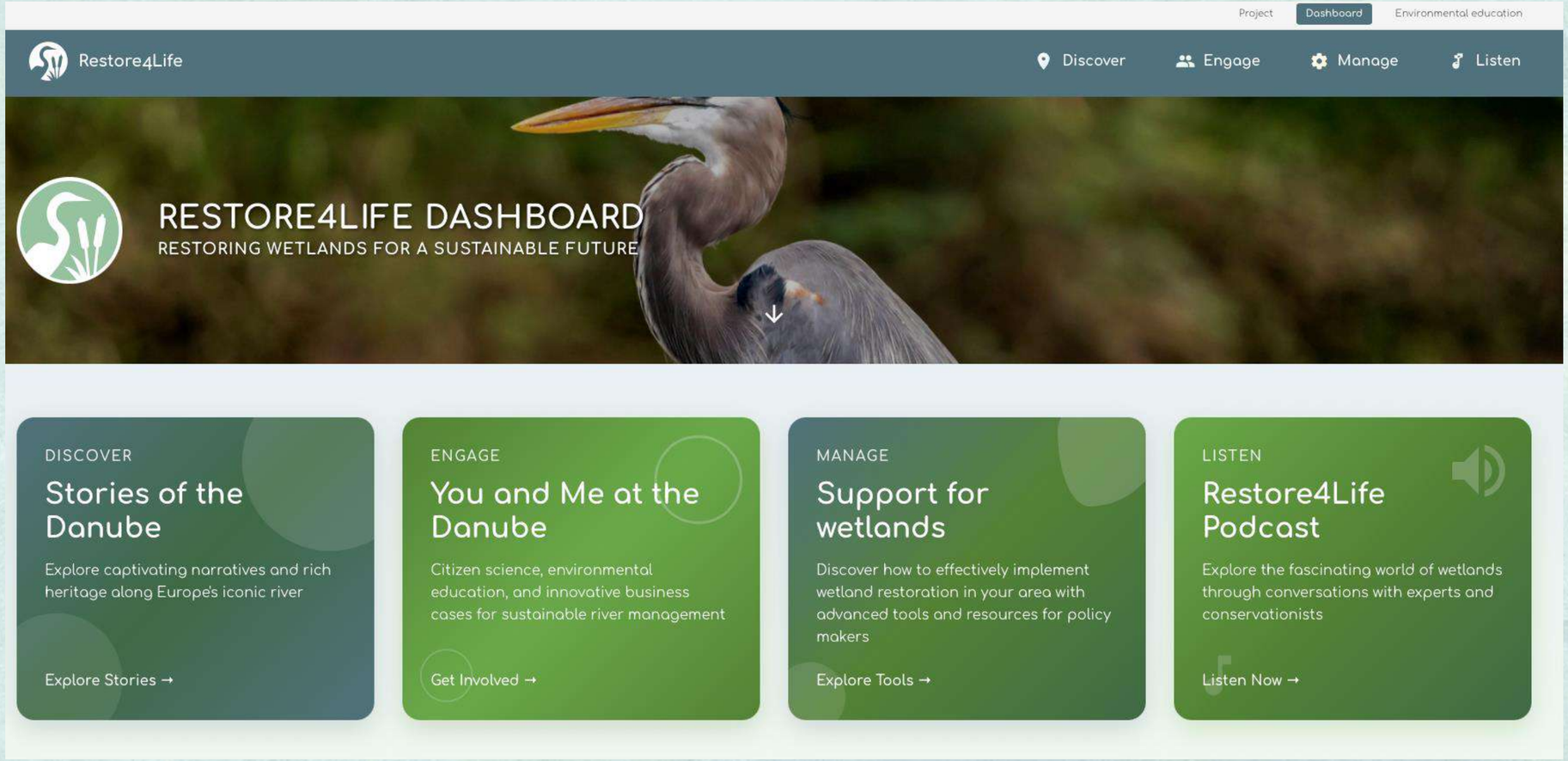
Integration into the Restore4Life Restoration Platform

Upcoming dashboard for stakeholders of wetlands, with stories, management support toolkits, educational content, everything to get a bottom-up and top-down restoration cycle going!



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Thank you for your interest!

Contact data:
Gabriela Costea: gabriela.costea@igb-berlin.de
Tim Grandjean: t.grandjean@archipelago.gr

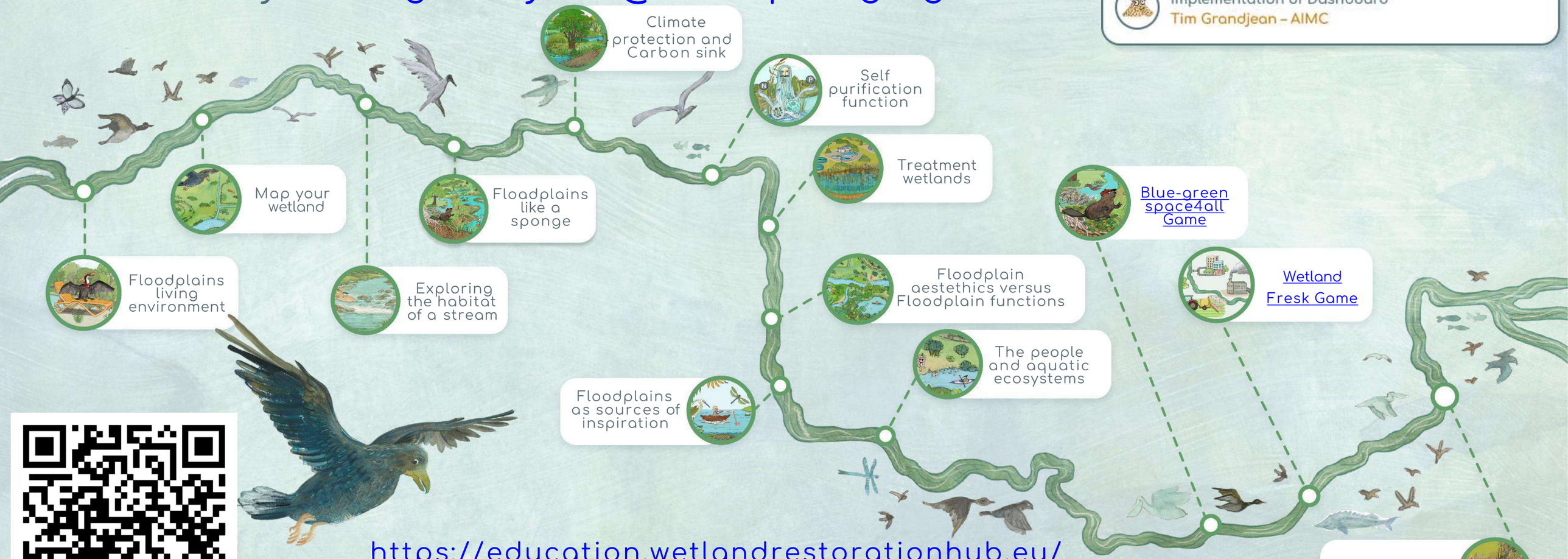
CREDITS:

Concept and text for interactive illustrations
Gabriela Costea – IGB

Illustrations
Anca Smărăndache

Graphic and UI/UX Design
Marina Gabriela Soare – Daydream Creative Studio

Implementation of Dashboard
Tim Grandjean – AIMC



https://education.wetlandrestorationhub.eu/

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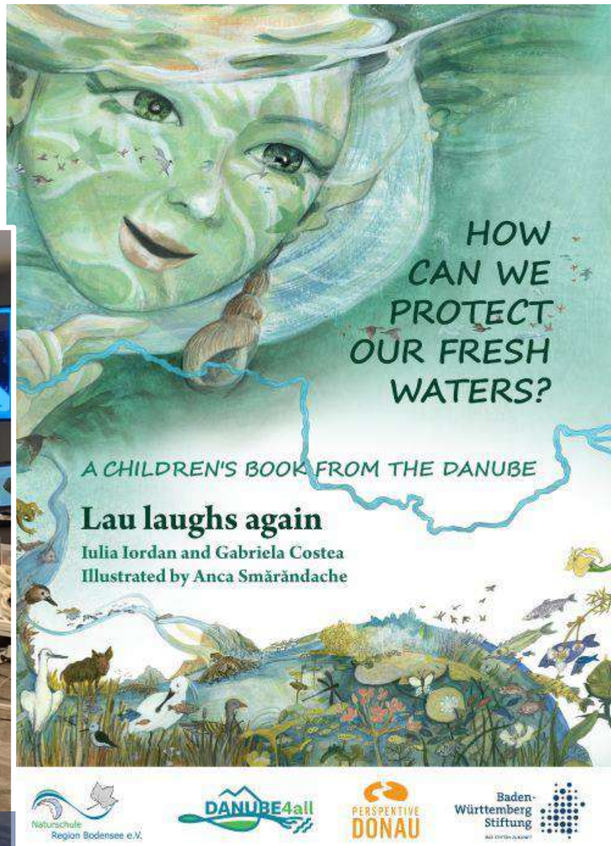
Storybook for children and families: ‘Lau laughs again - A story from the Danube’

Book available in Romanian, German and English


German version presentation in Danube Floodplain National Parc Austria, Oct. 24


English version presentation in EU Mission Ocean Forum, Brussels Mar. 25



- The river mermaid has an **adventurous journey** from the springs to the mouth of the Danube
- On her way she learns about the **diversity of life and functions of the Danube**, as well as its **threats and possible solutions**
- The river mermaid Lau **connects different cultures, countries and projects**.
- The children book written in a **fairytale-like tone** motivates the reader to observe and take action.


English version presentation in IAD Conference Sofia Apr. 25