SWIM

Sustainable Water and Integrated Management of Fish Migration and their Habitats in the Danube River Basin and NW Black Sea

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RESTORE OUR OCEAN & WATERS

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General information on the project

Call:	**HORIZON-MISS-2024-OCEAN-01-Actions for the implementation of the Mission Restore our ocean and waters by 2030**
Topic:	**HORIZON-MISS-2024-OCEAN-01-02**
Type of Action:	**HORIZON-IA (HORIZON Innovation Actions)**
Duration:	**48 months**
Project Coordinator:	**UZ-FSB**
Number of full beneficiaries:	**27**
Number of associated partners:	**15**
Number of countries involved:	**16**
Budget:	**8,2 MEUR**

Why this project?

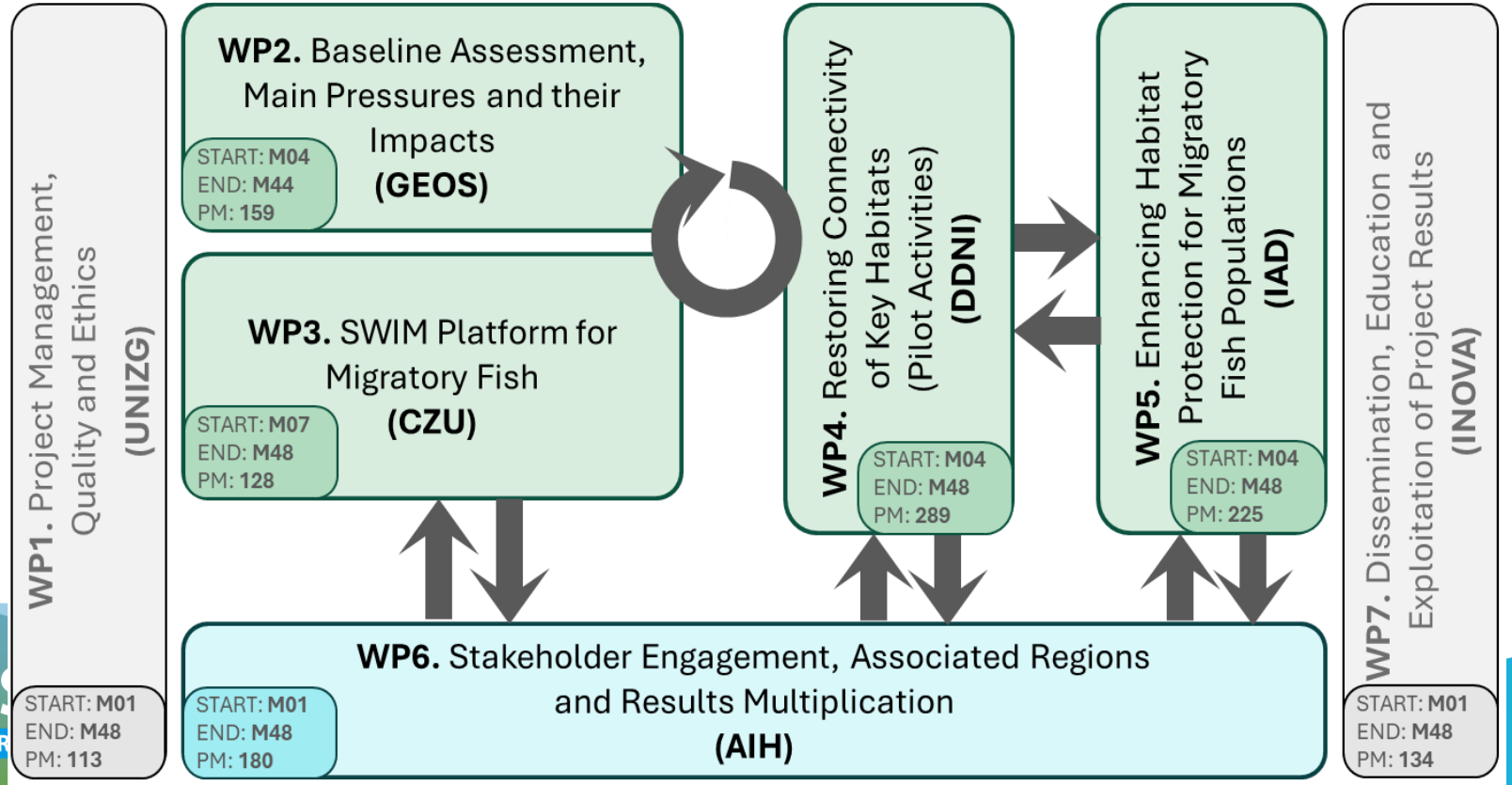
The reason relies in several important challenges related to migratory fish habitats and species:

- **Loss/deterioration** of **migratory fish** species habitats
- **Lack** of demonstrated **digital solutions** for migratory fish habitats improvement and their integration into the Digital Ocean and knowledge system
- **Lack** of **communities' involvement** and clearly defined **socio-economic benefits** for local and regional stakeholders
- Unequal opportunities for organizations to participate in **restoration actions at national level**
- **Insufficient implementation** of the **EU** and **regional policies** addressing migratory fish species and habitats, especially at the local level
- **Limited adoption** and scalability of **NBS** oriented approaches in migratory fish habitats restoration
- Insufficient response to **climate change** as a cause of migratory fish habitats deterioration

What is the project objective and the project structure?

SWIM's Approach to Tackling Key Challenges:

- Support restoration and protection of migratory fish habitats
- Apply innovative, eco-friendly solutions
- Focus on key sub-basins (Thaya, Drava, Sava, Lower Danube, Danube Delta, NW Black Sea coast)
- Promote sub-regional cooperation and coordination
- Engage local communities and stakeholders in a basin-wide effort



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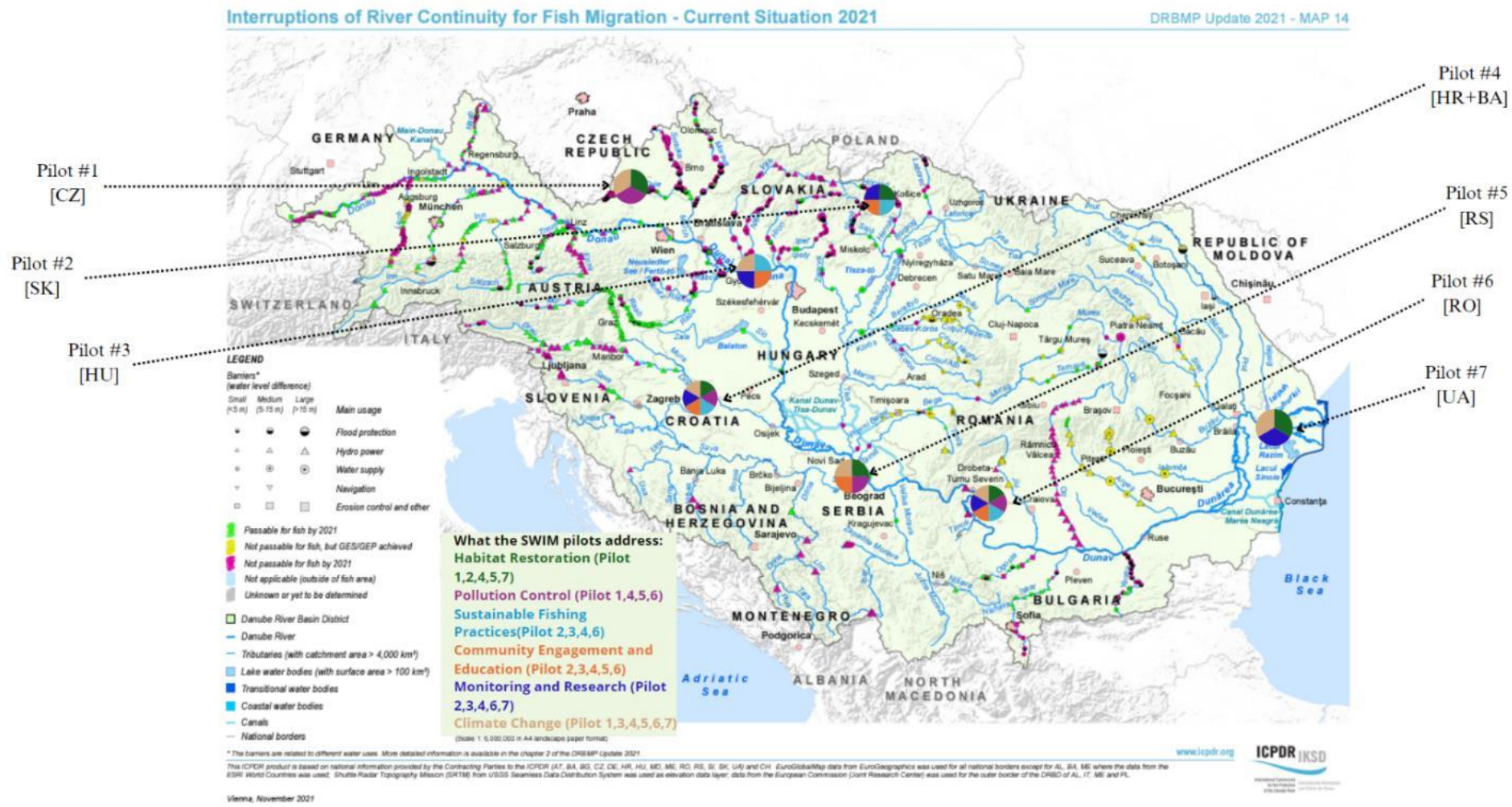
Geographical view of the project



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Pilot sites: #1 Czech Republic

- **Location:** Dyje/Thaya river basin: N 48°71’62’’ E 16°94’65’’
- **Challenge:** Fish migration disrupted by rising water temperatures, altered seasonal patterns, pollution (e.g. pharmaceuticals), and river fragmentation
- **SWIM Action**: Develop a hydrological model integrating climate change impacts, water temperature, and pharmaceutical concentrations to guide adaptive management
- **Innovation**: Creation of a Water Temperature Calculator – a map-based tool using real-time data and modelling to support decision-making
- **Ecological Impact**: Supports restoration efforts for vulnerable species like Sterlet sturgeon (Acipenser ruthenus), and enhances resilience of floodplain ecosystems

Pilot sites: #2 Slovakia

- **Location**: Hornád River near Košice, Slovakia (N48.657196, E21.322780 – N48.861633, E21.223226)
- **Challenge**: Outdated and non-functional fish passages hinder fish migration and river continuity
- **SWIM Action**: Design and implement nature-based fishways to restore 25 km of migratory routes and raise public awareness
- **Ecological Impact**: Improved conditions for key species (e.g. Chondrostoma nasus, Hucho hucho), supporting biodiversity and river health
- **Policy Alignment**: Supports the Water Framework Directive, Danube RBMP, and Biodiversity 2030 Strategy

Pilot sites: #3 Hungary

- **Location:** Upper Hungarian Danube, Szigetköz floodplain (N47°44'10.72", E17°46'23.05") – a historic sturgeon spawning ground
- **Challenge:** River engineering (e.g. Gabčikovo barrage) caused habitat fragmentation and disrupted fish migration, impacting species like sterlet
- **SWIM Action:** Use telemetry and hydraulic modelling to track fish migration, evaluate fish passes, and map critical habitats for conservation
- **Ecological Impact:** Aims to restore the Danube ecological corridor, support sterlet recovery, and enhance ecosystem services and climate resilience

Pilot sites: #4 Croatia + Bosna and Herzegovina

Reference site 4.1 – Noskovačka Bara (N45°48.600', E17°53.568')

- **Location:** Situated in the Middle Drava region, within Natura 2000 and Mura-Drava-Danube Biosphere Reserve
- **Main Goal:** Reconnect Noskovačka Bara to the Drava River by restoring water flow and improving fish spawning habitats
- **Nature-Based Solutions:** Side channel restoration, vegetative filtration, and bioremediation using riparian vegetation
- **Innovation:** Development of a **hydrodynamic fish habitat model** to guide optimal restoration strategies
- **Impact:** Enhanced conditions for migratory fish (e.g. sabre carp, huchen, eel), promotion of eco-tourism

Pilot sites: #4 Croatia + Bosna and Herzegovina

Reference site 4.2 – Ex-situ Conservation Facility (Jagodno, Sava River, Virovitica)

- **Location:** Includes sites in Jagodno, Mičevec (Sava River), and Virovitica fishponds for fish cultivation and acclimatization
- **Main Goal:** Produce juvenile migratory fish species (*Acipenser ruthenus*, etc.) for **supportive stocking**
- **Innovation:** Upgrade lab facilities for improved water quality analysis and fish disease prevention
- **Nature-Based Approach:** Connect ex-situ efforts with restored natural habitats to improve survival upon release
- **Impact:** Strengthens native populations, supports habitat connectivity, and preserves genetic diversity of migratory fish

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Pilot sites: #4 Croatia + Bosna and Herzegovina

Reference site 4.3 – Vukovar-Srijem County (N45°11′13.2″, E18°49′44.4″)

- **Location:** Eastern Croatia, a region with strong potential for **replication of SWIM innovations**
- **Main Goal:** Assess local migratory fish habitats and identify synergies with previous projects (DaWetRest, EcoDalli, RETFOR)
- **Deliverable:** Development of the **“Blue Document”** – a roadmap for habitat restoration and fish conservation
- **Stakeholder Involvement:** Collaboration with county representatives, NGOs, fisheries, and conservation authorities
- **Impact:** Enables **scalable and transferable restoration strategies**, boosting regional fish conservation efforts

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Pilot sites: #4 Croatia + Bosna and Herzegovina

Reference site 4.4. Starača & Tišina Swamps (N45°02'31", E18°30'41")

- **Location & Context:** Newly declared **protected landscapes** in Bosnian Posavina, vital migratory fish habitats near the Sava River
- **Main Challenges:** Wetland degradation due to drainage, agriculture, and climate extremes leading to critical water level loss
- **Restore hydrological connectivity** with Sava River to stabilize water levelsConduct **supportive stocking** of migratory fish in a 6 km riverbed area
- **Nature-Based Solutions:** Riparian buffer enhancement and **seasonal water regime restoration** to ensure habitat stability and climate resilience

Pilot sites: #5 Serbia

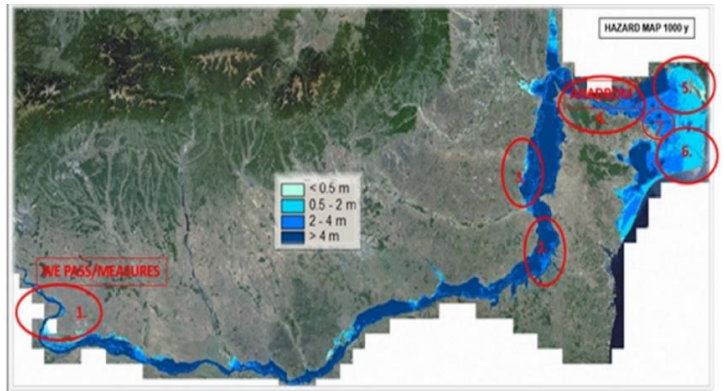
South Bačka District, Serbia

- **Location & Context:** Along the Danube River in Serbia; affected by **pollution, climate change, and habitat degradation** impacting migratory fish
- **Key Challenges:** Pressure from **untreated wastewater**, industrial/agricultural pollution, and changing hydrology threatening fish habitats
- **SWIM Actions:**
  - **Adapt Water Quality Index (WQI)** using AI and machine learning for fish-specific habitat monitoring
  - **Develop Habitat Suitability Index (HSI)** and GIS tools for mapping critical fish habitats
  - **Promote constructed wetlands** as nature-based wastewater treatment solutions
- **Innovation:** Integration of **hydrological and water quality modelling**, stochastic analysis, and **real-time remote sensing** for habitat assessment
- **Impact:** Enhanced monitoring and **targeted restoration of fish habitats**, improved water management, and stronger resilience for **migratory fish species**

Pilot sites: #6 Romania

RS6.1 – Fish Monitoring at Iron Gates II Dam (N44°18'59.55", E22°34'47.80")

- **Challenge:** The Iron Gates II dam disrupts **longitudinal river connectivity**, impeding migratory fish movements (e.g., sturgeons)
- **SWIM Action:** Long-term **fish monitoring** to identify key habitats and inform the **design and location of a fish passage**
- **Innovation:** Builds on past projects (MEASURES, WePass); integrates findings into **technical solutions for fish pass** development
- **Nature-Based Solutions:** Enhance habitat conditions and connectivity by designing **naturalistic fish passages** and supporting biodiversity
- **Expected Impact:** Restores upstream access for migratory fish, improves habitat quality, and supports **cross-border conservation efforts**



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Pilot sites: #6 Romania

RS6.2 – Monitoring Fish Migration & Defining Protected Habitats (Multiple Sites along the Danube & Black Sea)

- **Challenge:** Lack of detailed data on **key habitats** of migratory species (e.g., sturgeon, Pontic shad) limits protection and management
- **SWIM Action:** Use telemetry and habitat assessments to **map critical spawning, feeding, and resting areas** in river and coastal zones
- **Innovation:** Supports **adaptive management**, increases protection status, and aligns with **ongoing projects** (e.g., ANADROM)
- **Nature-Based Solutions:** Includes restoration of **riparian buffers, wetlands**, and creation of **natural fish passages**
- **Expected Impact:** Better protection of essential habitats, improved migratory fish populations, and establishment of **strictly protected areas**

Pilot sites: #6 Romania

RS6.3 – Ex-Situ Conservation & Aquaculture in Caraorman (N45°5'26.34", E29°24'13.91")

- **Challenge:** Sturgeons face severe population decline due to **habitat loss, IUU fishing**, and poor reproduction in the wild
- **SWIM Action:** Develop a **dual-purpose sturgeon complex** for ex-situ conservation and sustainable aquaculture
- **Innovation:** Apply **advanced genetics, cryopreservation, disease control**, and breeding techniques to produce native fingerlings
- **Nature-Based Solutions:** Vegetation filtration, **riparian shading** (willows), and habitat design for optimal fish health and water quality
- **Expected Impact:** Strengthens wild populations via **supportive stocking**, **market supply**, and creates local **economic benefits**

Fig.1.12: Synergies between DAWETREST pilot and SWIM

Pilot sites: #7 Ukraine

RS7.1 – Monitoring Fish Migration & Proposing Protected Habitats (Kylia Delta, N45°13’58”, E28°44’34”)

- **Challenge:** Human activities in the Kylia Delta threaten vital habitats for migratory species like **sturgeon, shad, black sea salmon**, and **river eel**
- **SWIM Action:** Develop **telemetry tracking systems** to identify key freshwater and marine habitats for migratory fish
- **Main Goal:** Propose **strictly protected zones** (including marine "no-take zones") to ensure safe migration and reproduction
- **Nature-Based Solutions:** Wetland filtration systems and **side-channel connectivity restoration** to improve water quality and ecosystem resilience
- **Expected Impact:** Enhanced protection of spawning and feeding areas will support **population recovery** and biodiversity conservation

Pilot sites: #7 Ukraine

RS7.2 – Monitoring Habitat Quality for Migratory Fish (Kylia Delta)

- **Challenge:** Climate change, reduced monitoring, and **increased water temperature** pose risks to shallow delta ecosystems vital for migratory fish
- **SWIM Action:** Implement a **monitoring system** for water quality and ecological status in habitats identified in RS7.1
- **Main Goal:** Assess and mitigate impacts from pollution, reduced flow, and warming through **targeted restoration strategies**
- **Nature-Based Solutions:** Reconnect side-channels, apply **vegetative and soil filtration**, and enhance **riparian shading** to cool habitats and retain nutrients
- **Expected Impact:** Improved **habitat quality and resilience**, contributing to the recovery and long-term viability of migratory fish populations

Thank you for your attention!

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