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Report on innovative practices for WRM in EU – WP1.5

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Innovative practices for WRM in EU

- Three-day workshop at EU partner HEI (BOKU) in May 2019
- Report on innovative practices for WRM in EU
  - Austria
  - Bulgaria
  - Croatia
  - Greece
  - Norway
  - Portugal

- New EU water management experiences
- Issues and deficits of WB partner countries

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Austria

Management of (small) wastewater treatment plants in Austria

- Population: about 8.4 million; area: about 84 000 km².
- About 1'800 WWTPs with a capacity larger than 50 PE serve about 95 % of the population.
- The remaining 5 % of the population live in single houses and small settlements (< 50 PE) that require on-site and decentralized wastewater treatment technologies. The estimated number of small treatment plants needed is 30 000 to 40 000.

- ➢ Legal requirements
- ➢ Permission to operate a small WWTP

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Austria

Management of (small) wastewater treatment plants in Austria

Permission to operate a small WWTP

… is given on a case-by-case evaluation

… is granted for a period of 15 years

… requires a self-monitoring (weekly routine checks, monthly sampling and analysis)

… requires an external monitoring (every two years)

… AND owners have to take part in the training course for operators

- Austrian Water and Waste Association (ÖWAV) in cooperation with BOKU

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Austria

Sediment management of surface water bodies

Deposition, treatment and disturbed dynamics of sediments in rivers

→ One of the main economic, technical and ecological challenges

Region	Storage capacity for hydropower use: 80% of the reservoir is filled up with sediment
Africa	2100
Asia	2035
Australia & Oceania	2070
Central America	2060
Europe	2080
Middle East	2060
North America	2060
South America	2080

ICOLD, Basson (2009)

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Austria

Sediment management of surface water bodies

(i) Lack of basic information / technologies for reservoir management

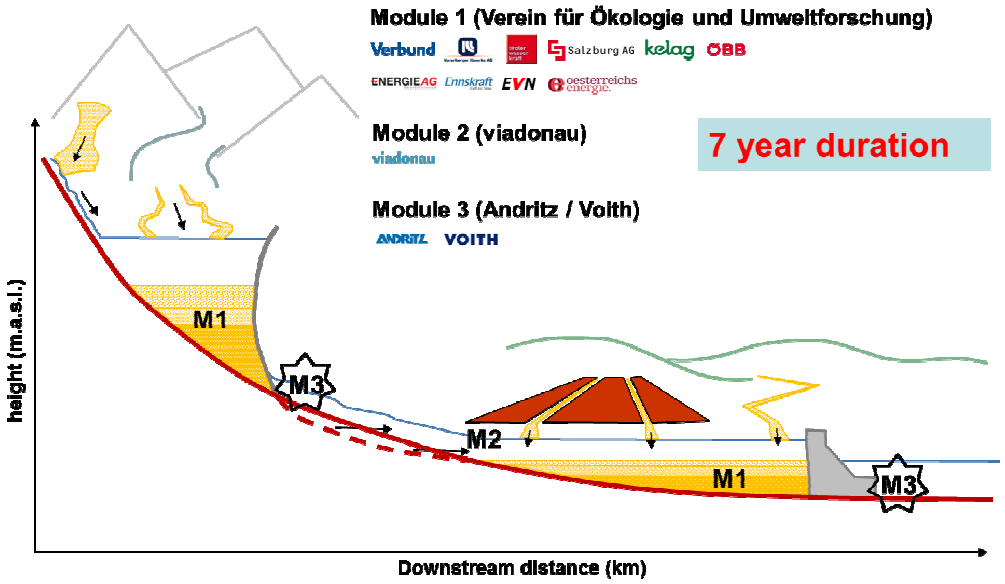
(ii) Lack of process understanding

(iii) Missing adjustment of sediment management opportunities in reservoirs

(iv) Insufficient infos of the interaction sediment dynamics / aquatic ecology

(v) No concepts concerning the (re-)use of deposited sediments

CD-Laboratory
„Sediment research and management“



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Bulgaria

"Innovation is a word, which has often been mentioned recently!"
(Petar Filkov, 2019)

- Update of crop water requirements taking into account climate changes
- Optimization tool for river basin management directorates
- From recycling to circular economy
- Use of solar pumps for irrigation

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Bulgaria

Update of crop water requirements taking into account climate change

- Scientific research → Cooperation between University and National Institute of Hydrology and Meteorology
- Update of crop water requirements for 7 specific agroclimatic zones in Bulgaria
- Consideration of changing trends of air temperature and precipitation
- Increase of irrigation requirements on average of 15% in 5 of 7 zones

→ *Ordinance for water consumption rates*

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Bulgaria

From recycling to circular economy

- Based on UN Sustainable Development Framework and EU´s Circular Economy Action Plan

  → Project *"Clean technologies for sustainable environment – waters, waste, energy for circular economy"*

- 3 pathways:

  (i) to improve treatment to increase the quality of the primary and the excess sludge, so that they can be re-used

  (ii) to develop a completely new treatment technology, not producing sludge

  (iii) to reduce pollutants at the source, which will enable the production of "cleaner" wastewater not requiring deeper treatment

- Focusing on (ii): Algy-based wastewater treatment technology; Starting with laboratory model and upscale it to real WWTP

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Croatia

- Projects in Water Resources Management – the influence of the EU
  - Water supply, sewage utility and irrigation development
  - Flood protection development and other projects

- Public-private partnership and collaboration with HEIs
  - Collaboration with stakeholders within projects
  - Collaboration with firms that develop specialized software
  - Other forms of collaboration with stakeholders

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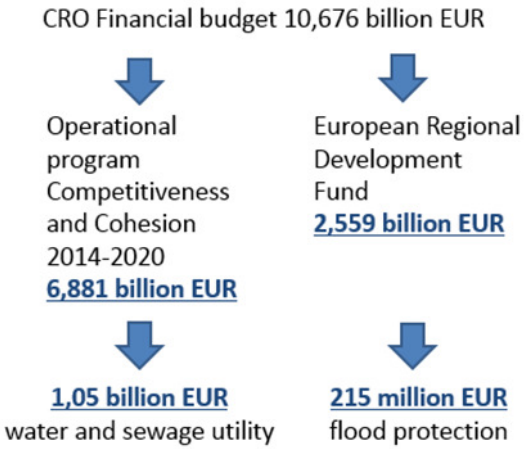
Croatia

Projects in Water Resources Management – the influence of the EU



Development of a strategical frame for using EU Funds

-) Partnership Agreements
-) Operational Programs
-) Common National rules and legislations
-) Laws
-) Regulation governing the competence of individual bodies for each EU Fund instrument

(2014 – 2020)

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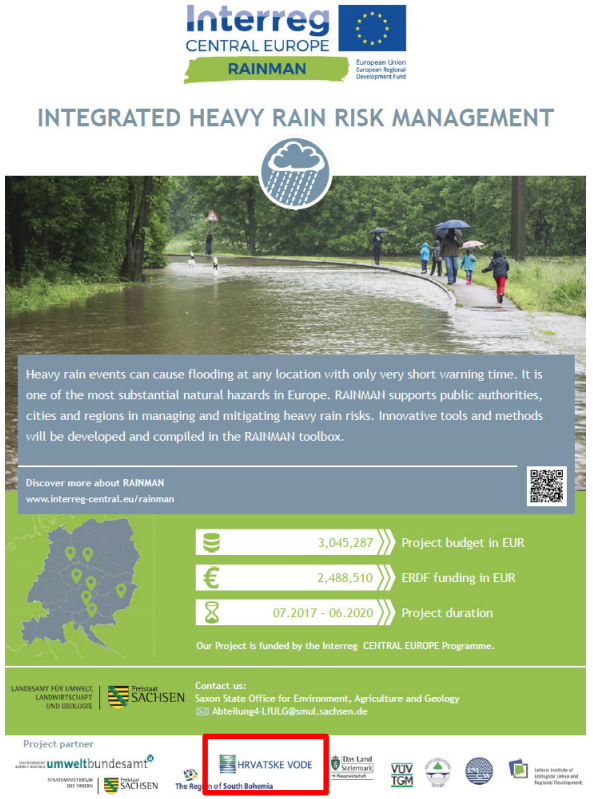
Croatia

Public-private partnership and collaboration with HEIs

PARTNERS

Area Council for Eastern Integrated Water Service of Trieste (CATO)	Italy
VERITAS Joint Stock Company Multiutility Water Service of Venice	Italy
Optimal Territorial Area Authority n.3 Marche Centro – Macerata	Italy
Italian National Council Water Research Institute (CNR-IRSA)	Italy
Water Utility of Nova Gorica	Slovenia
University of Ljubljana	Slovenia
Region of Istria	Croatia
Water Utility of Istria	Croatia
Faculty of Civil Engineering University of Rijeka	Croatia
Croatian Geological Survey	Croatia
The Jaroslav Černi Institute for the Development of Water Resources	Serbia
Water Supply and Sewarage Association of Albania	Albania
Hydro-Engineering Institute of Sarajevo Faculty of Civil Engineering	Bosnia and Herzegovina
P.C. Utility Neum	Bosnia and Herzegovina
Public Utility „Vodovod i kanalizacija" Nikšić	Montenegro
Region of Ionian Islands	Greece
University of Thessaly	Greece



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Greece

- Telemetric monitoring of water resources
  - Greek National monitoring programme
  - Telemetry monitoring systems
  - International case studies

- The energy-water-food-environment nexus concept
  - Introduction
  - EU and the nexus concept
  - Application of the Nexus approach in Greece

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Greece

The energy-water-food-environment nexus concept

nexus THE NEXUS DIALOGUE PROGRAMME

- Developed by Commission's Directorate-General for International Cooperation and Development (DG DEVCO)

- Nexus in a Nutshell
  → The Nexus approach highlights the interdependencies between achieving water, energy and food security for human well-being

- Recommendations and action plans for future investments

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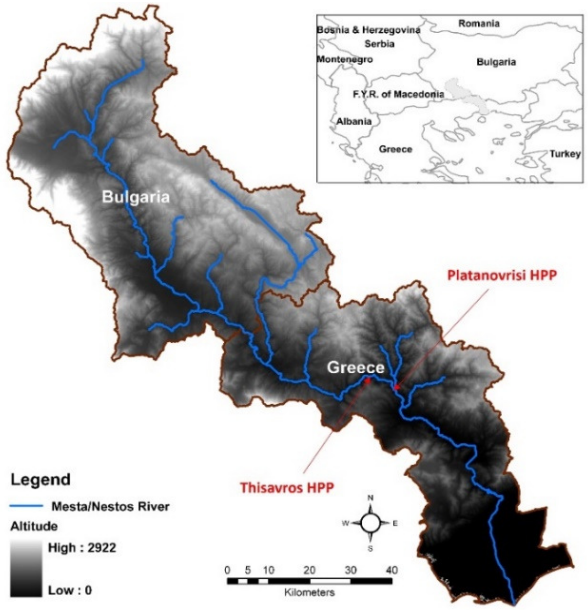
Greece

The energy-water-food-environment nexus concept

nexus THE NEXUS DIALOGUE PROGRAMME

- Transboundary case study in Greece and Bulgaria
- Analyse impacts of climate change on multipurpose hydropower projects
  → hydropower generation
  → agricultural economy
- Results
  → 34% Decrease of discharge
  → 50-62% Reduce of generated power
  → Extended water stress in agriculture
- Integrated management of the nexus has not reached sufficient standard



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Norway

- DNA for biomonitoring of water quality
- Satellite data for monitoring of coastal waters and lakes
- Non-target screening

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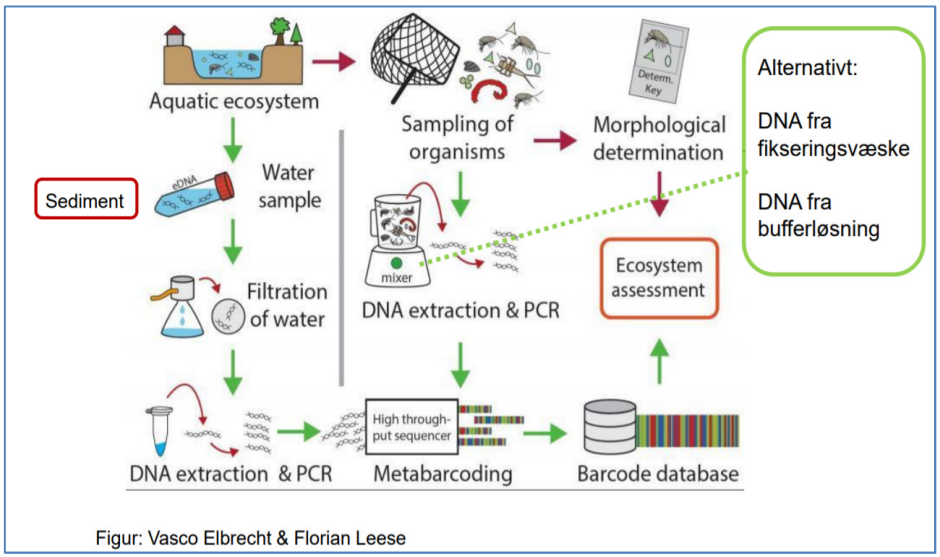
Norway

DNA for biomonitoring of water quality

- Traditionally
  Individuals from a specific waterbody are identified and compared to a list established earlier for reference-conditions → Calculation of degree of deviation → High expertise, high price, time consuming, etc.

- SCANDNAnet
  -) Genetically identification
  -) Very large data set
  -) Cost-effective



Figur: Vasco Elbrecht & Florian Leese

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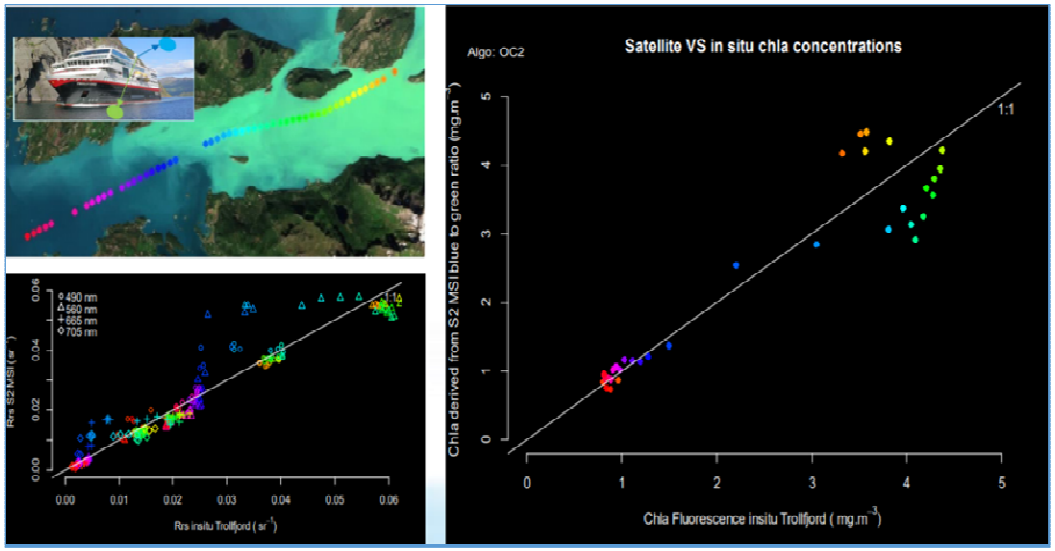
Norway

Satellite data for monitoring of coastal waters and lakes

- Combination of satellite data and monitoring sensors
  e.g. Analyse of chlorophyll-a on the ferry between Oslo and Kiel (“Ferrybox”) vs. satellite/modelling activities



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Portugal

- Large scale hydrological modelling
- Assessing water scarcity: the droughts
- Water resources management and climate change adaption in transboundary basins
- Trend analysis of increasing pollution in the groundwater bodies and the reverse of the trend
- Assessing groundwater bodies chemical status
- Identifying Groundwater dependent ecosystems

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Portugal

Trend analysis of increasing pollution in the groundwater bodies and the reverse of the trend

- Aim

  Analyse trends in hydrological time series and relate those trends with climate change issues
- Methods
  - Mann-Kendall test coupled with the Theil-Sen Slope
  - LOWESS (Locally Weighted Scatterplot Smoothing) operator
  - Singular Spectrum Analysis
- Investigation of the following aspects
  - Trends in time series (downward or upward trends and their range)
  - Trend reversal
  - Applicability of the methodology
  - Correction of seasonality

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Portugal

Identifying Groundwater dependent ecosystems

- Aim

  The Water Framework Directive (WFD) establishes the obligation to identify and characterize all the bodies of groundwater associated with surface or terrestrial ecosystems that depend directly on them.

- Methods
  - new methodology for the identification and characterization of groundwater dependent terrestrial ecosystems
  - Based on hydrological, hydrogeological and ecological criteria
  - Determination of the magnitude of dependence of specific fauna and habitats as well as stygofauna

	Tema	Sub-tema	PESOS
1	Topografia	Pendiente	0.06
2	Climatologia	Balance de água (P-ETR) o Reserva de agua en elo suelo	0.12
3	Higrogeologia	Medio hidrogeológico	0.09
4		Tipo de acuífero	0.12
5		Profundidad del nivel freático	0.15
6		Áreas de descarga /Manantiales perennes	0.15
7	Hidrografia	Lineas de água	0.09
8		Lagunas / Lagos / Humedales	0.12
9	Suelos	Tipo del suelo	0.09

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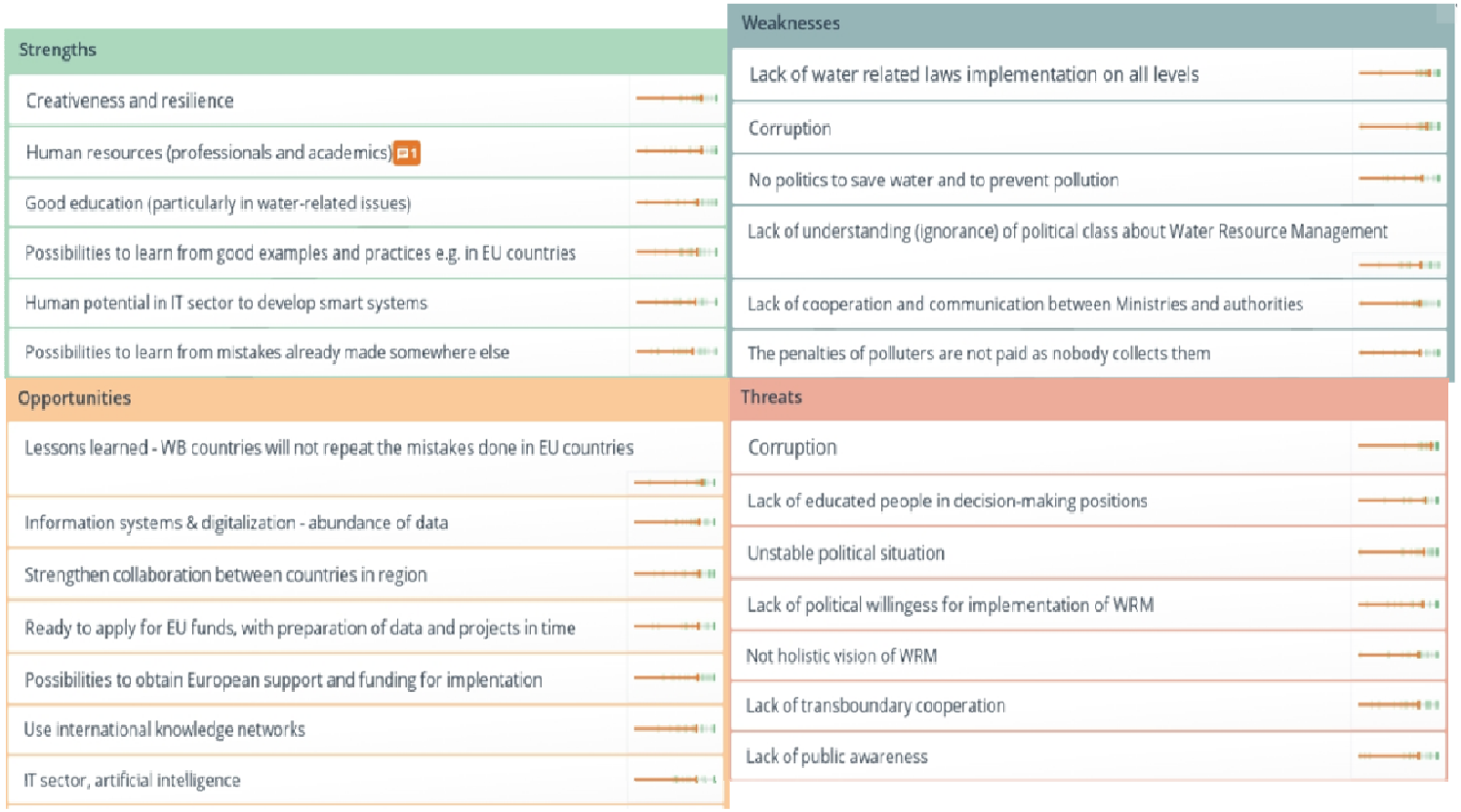
Issues and deficits of WB partner countries

- In-situ online voting of all project partners



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