ANALYSIS NODE

from spring to sea

DANUBIUS-RI, the International Centre for Advanced Studies on River-Sea Systems, is a pan-European distributed Research Infrastructure (RI), which is enabling integrated studies of rivers and their catchments, transitional waters such as estuaries, deltas and lagoons, and their adjacent coastal seas.

DANUBIUS-RI regards River-Sea Systems as socio-ecological systems, where natural processes and human activities are intertwined. That is why DANUBIUS-RI has chosen an integrated, interdisciplinary and participatory approach in order to enhance the process and system understanding and to enable a sustainable management of River-Sea Systems.

For detailed information please visit www.danubius-ri.eu

What is a NODE?

In DANUBIUS-RI Nodes are **competence centers** that ensure the **accessibility to modern facilities and research equipment**, coordinated **methods and tools**, as well as interdisciplinary **expertise** for observation, analysis, modelling and socio-economic studies in River-Sea Systems.

Analysis Node

The Analysis Node is responsible for coordinating, bundling, and harmonizing the analysis-based activities within DANUBIUS-RI. Therefore, the Analysis Node will focus on the accessibility of data, scientific **expertise**, technical know-how for instrumentation and quality assurance in **sampling, field measurements**, and **laboratory analyses** to different user groups. The Analysis Node is developing **methods** and **concepts** regarding sampling and measurement strategies that are supposed to include a holistic analysis of surface water descriptors and for statistical data analysis.

Additionally, the Analysis Node will manage an effective data transfer to the Data Center. Further, it will coordinate the network of the laboratories settled at the Supersites, which are supposed to collect data and manage the analysis-programs within a Supersite region and harmonizes the deployed methods and approaches as far as possible and practical.
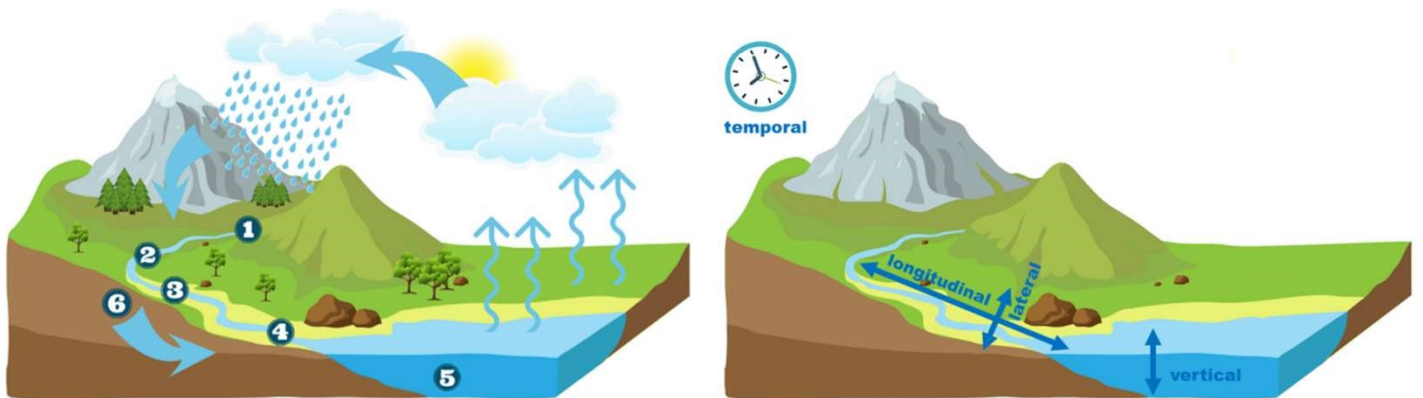
Therefore, the Analysis Node closely interacts with the three other Nodes integrated into the DANUBIUS- RI Project. The collected data and generated information serve the **Observation Node** as reference information, the **Impact Node** as a source of information and the **Modelling Node** as a data basis for the calibration and validation of numerical models.

Simultaneously the Analysis Node receives access to observations, samples and measurements from the Observation Node, insight into the current need of Information from the Impact Node and requirements for the temporal and spatial resolution of measured values from the modelling Node. In close cooperation with the Observation Node, the responsibilities regarding the Interface of In-situ and laboratory analytics will be defined in detail. Methodological support for the calibration and validation of remote sensing data will be guaranteed.

In particular, the Analysis Node should also investigate the interactions between the "disciplinary" data and information and integrate the partial information generated at the supersites to form a holistic picture of waterbody condition and load configuration.

Challenges

- **Obtain a maximum of information with limited resources:**
  develop fit-for-purpose measurement concepts for River-Sea Systems, which efficiently and economically provide high resolution data in time and space by combining long-term monitoring, event-based measurements and laboratory experiments;

- **Provide an interdisciplinary overview of the state of surface waters**;

- **Identify critical states and analyze trends** regarding gradients of pollutants and pollutant clusters;

- **Generate data for scenario-based modelling** regarding the development of pollutant inputs and water quality, as well as for assessing the efficiency of measures using compound flux modelling (in cooperation with the Modelling Node);

- **Untangle long-term trends and event-based effects** in surface waters by conducting event-based measurements as well as long-term monitoring campaigns;

- **Identity and quantify emerging pollutants**;

- **Quantify degradation rates of pollutants** by developing boat-based online sensoring methods which enable continuous measurements along rivers (lagrangian approach);

- **Identify the sources of particle-associated pollutants** by innovative fingerprinting methods.

Research Priorities

- **Develop innovative sampling, analysis and measurement methods and concepts** for River-Sea Systems;

- Integrate all relevant disciplines for a **system-oriented assessment of the state of River-Sea Systems**, such as hydrology, geomorphology, chemistry, ecology, biology, ecotoxicology and hygiene;

- **Assess the value of information obtained from given data** sets as a function of their temporal resolution;

- **Assess the value of information of high frequency measurements** from online measurements of indicator substances;

- Develop a sampling strategy by combining stationary sampling with **lagrangian sampling** in order to enhance information density;

- **Develop a coordinated sampling strategy** and customized sampling protocols for all involved disciplines.

Services

Step by step, the Analysis Node will complement already existing facilities and activities, as well as data and information systems in order to be able to fully implement the planned functions and services. In general, services can be offered in the entire range of topics of the surface water relevant core disciplines. The following categories of services can be accessed:

- **Provide access to field and laboratory equipment as well as research platforms:**
  analysis of trace elements, boat-based lagrangrian measurements, ecotoxicological effect-directed analysis, continuous long-term measurements in urban streams, facilities and equipment within the urban observatory Dresden and the test site upper Elbe;
- **Provide expertise regarding sampling, measurements and analysis of samples from River-Sea Systems:**
  catalogue of methods and recommendations for sampling strategies and concepts;
- **Integrate and provide access to data**, which is already existing regarding e.g. water quality, micropollutants, pathogens and heavy metals, as well as integrate the upcoming data from the DANUBIUS-RI community;
- **Provide expert support regarding sampling and analysis** for ship campaigns, as well as for modelling (e.g. hydrology, compound transport, water quality), collaborate in measurement programs and sampling campaigns;
- **Provide training regarding sampling and analysis of samples from River-Sea Systems:**
  organize workshops and conferences, develop training concepts and possibilities of training for guest researchers, e.g. through joint projects and theses.

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