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TM3. Environmental Management, Impact and Risk Assessment

TM3- 3.3

ENVIRONMENTAL IMPACT AND RISK ASSESSMENT

Assoc. Professor, dr. habil. eng. Brindusa Sluser

Professor, dr. eng. Carmen Teodosiu

Gheorghe Asachi Technical University of Iasi, Romania - TUIASI

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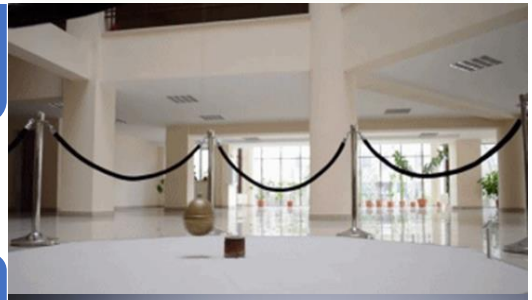
STRUCTURE

Sustainable development and environmnetal impact assessment

Environmental Agreement; Environmental Permit

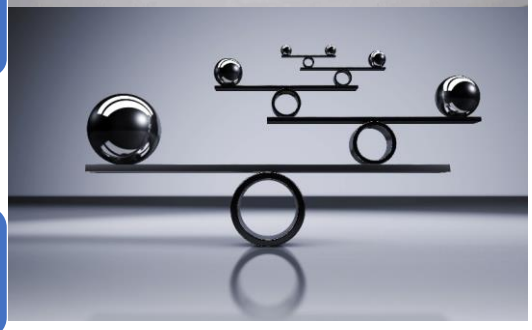
Pollution sources, emissions and associated effects / impacts

- Emissions/pollutants/sources
- Impacts and Pollution types



Environmental Risk Assessment

- Environmental Risk
- Tools for risk assessment and management

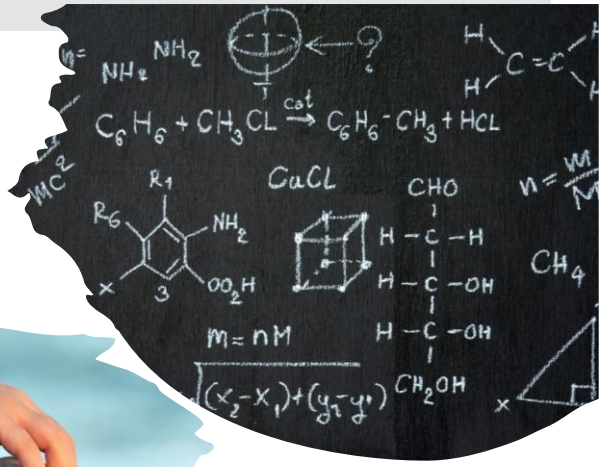


Case studies / environmental assessment in practice

Sustainable development concept

- … „***the development that meets the current needs, but not compromises the possibility of next generations to meet their own needs***.” (LPM 137/1995,2000)
- ***Sustainable development*** suppose that society satisfies consumer demand for its members by increasing the production potential, but also through the creation of fair conditions of access to natural resources for all members of society.
- ***Sustainable development*** is an economic growth without depletion of resources, considering the limit of sustainability and regeneration of ecosystems.

Minimum requirements for achieving sustainable development:



- Resizing the economical growth;
- Eradication of poverty;
- Control of demographic growth;
- Preserve and enhance the natural resources;
- Risk control (ecological, environmental, human health, technological);
- Involvement/participation of government in the decision-making process in the environmental protection field.

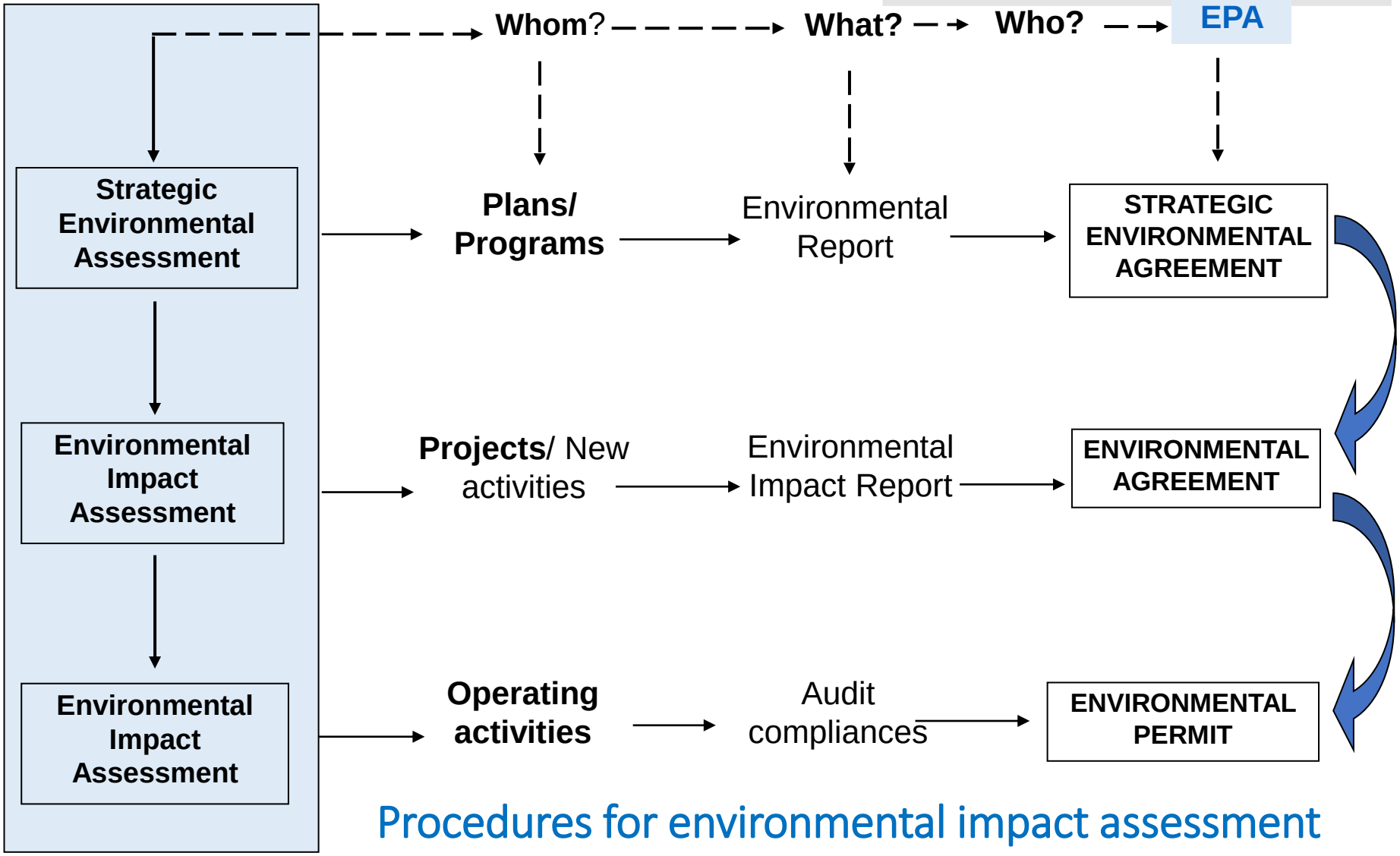
The play of environmental impact assessment

- In Europe the **first actions** related to environmental impact assessment promotion took place in **1975**, when the European Committee lunched the Decision regarding the need of environmental impact assessment and the Action Plan (elaborated in 1977). In 1980, the Official journal published the first draft of the European Committee Decision regarding the environmental impact assessment. Thus, that involved the implementation of this decision in all countries, EU members.

- The **EC Directive 85/337/EEC** has been approved by EU Ministers on 27th of June, 1985, and it was scheduled for implementation on 3rd of July, 1985. This Directive 85/337/EEC regarding environmental impact assessment for public or private projects was amended by Directive 97/11/EC from 3.03.1997, due to the feedback from practical activities of environmental impact assessment and the experience from different countries on directive implementation (feedback process).

Environmental assessment

- **Environmental Agreement** –EPA's decision that allows the project owner to implement the purposed activities within the project. It is a technical-administrative document that establishes the ways of project implementation, considering the environmental protection.
- **Audit compliance** – documents used to obtain the environmental permit, and which are prepared by accredited environmental experts.
- **Integrated Environmental Agreement** –EPA decision that allows the project owner to implement the purposed activities within the project, activities underlined in IPPC Directive. It is a technical-administrative document that establishes the ways of project implementation, considering the IPPC directive regarding integrated pollution prevention and control requirements. It can be given for one or more installations/processes/activities developed on the same site.



Procedures for environmental impact assessment

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Organizations and personnel involved in EIA

Project owner

- Managers
- Responsible of administrative departments
- Technical personnel

Competent Authorities

- Decision factors,
- Responsible of specific department
- Technical personnel
- Others

Consultants

- Consultancy companies
- Environmental experts
- Managers
- Universities, other research institutes

Public

NGO, citizens, EIA centers, mass media, other agencies

Types of impacts considered by environmental impact assessment

*"Human environment" is generally defined "**to include natural and phisical environment and the relation between human beings – environment**, which means, that economical or social effects don't replace the environmental impact assessment.*

*If there is made an environmental impact statement and there are evaluated econmical and social effects, next to those natural or phisical effects, then environmental impact statement will estimate all these effects (**magnitudes**) **on human environment**".*

EIA - evaluates direct, indirect, cumulative and synergic impacts on biophisical and socio-economic environment

- **The impact on biophisical environment** refers to the impacts on: human health conditions, air, soil, water quality, flora and fauna prezervation and its habitat, cultural patrimonium, heritages etc.

- **The impact on socio-economical environment** includes the impacts on following components: human population, style of life, jobs, etc. There are also taken into account the **consequences** of relations between the components mentioned above, i.e. ecosystems, interactions, etc. The evaluated effects are those related to pollution and excesiv use of natural resources.

Types of impacts analysed by EIA

"environmental impact" – is the negative influence on physical environment and EIA is required.

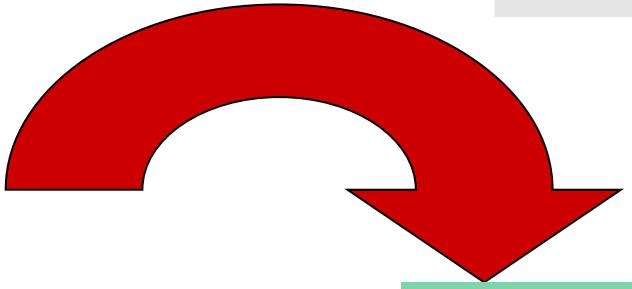
- Direct impact
- Indirect impact
- Cumulative impact
- Synergic impact

(for each proposed alternative)

on bio-physical and socio-economical environment.

Types …

- **Direct impacts/effects** are those induced by activities/actions that take place in the same time and place.
- **Indirect impacts/effects** are defined as being induced by activities/actions that appear later on in time and different places, and are likely predictable.
- **Cumulative impact/effect** is the impact resulted from a sum of various impacts from other activities added to those from past or current impacts/effects.



Receptors …

a. Environmental receptors (water, air, soil);

b. Ecosystems receptors (human beings, flora, fauna);

c. Exterior environment (structures, buildings, etc.).

Environmental Indicators

- **Minimum accepted environmental objectives** refer **to the set of environmental targets** established by EPA, based on conclusions from audit compliance. This set of environmental objectives describes the **qualitative and quantitative environmental targets** and **maximum period** of time allowed to fulfill the environmental requirements, according to the current regulations.
- **Alert level** represents the pollutants concentrations in air, water, soil from emissions or discharges, and it has the play to announce the environmental authorities to be aware about a **likely negative impact** on environment and it starts an additional monitoring and / or minimizing the quantities of pollutants discharged into environment.
- **Intervention level (maximum allowed concentration)** represents the level of pollutants concentrations in air, water, soil or emissions / discharges at which the environmental authorities will have to take all measures for pollution control and remediation due to the **significant negative impact**.
- **Likely significant pollution** is the case when the concentrations of pollutants are higher than alert level, but lower than maximum admissible level. **Significant pollution** is the case when the concentrations of pollutants are at or higher than maximum admissible level, concordant with environmental regulations.

Plan of measures *proposed by the owner of implemented activity and contains steps that need to be followed in a very specific period of time established by EPA within Environmental Permit, with the purpose to fulfill the environmental requirements.*

The compliance program has **2 sections** that refer to:

1. measures needed to reduce the current and predicted effects induced on the environment by certain activities;
2. measures needed to remediate the past effects induced on the environment by certain activities.

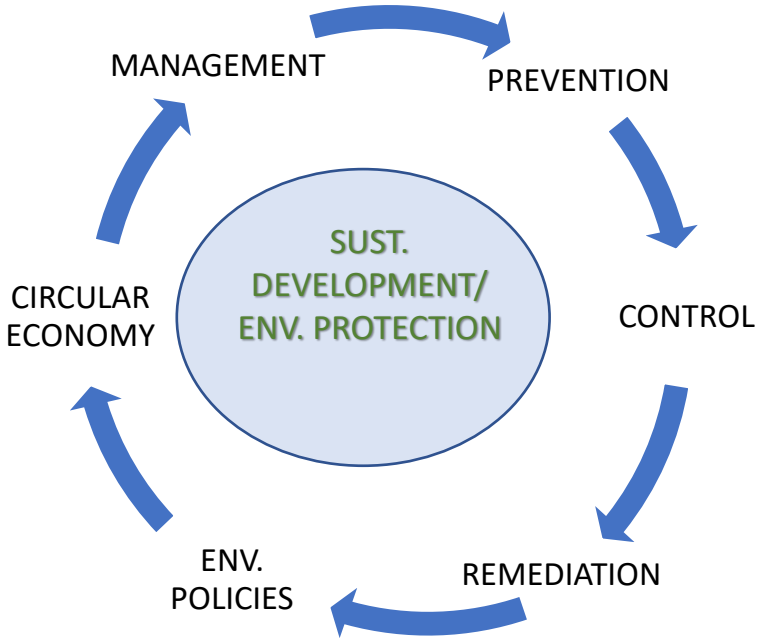
The compliance program is required for any activity in operation or post operation and has done injuries to the environment. The evaluation of injuries is done by audit compliances considering the environmental state of the art and necessary measures and action to reduce and remediate the negative effects. The compliance program established the measures needed to fulfill the environmental requirements, the steps, deadlines, costs, and the responsible persons for each action.

To elaborate the compliance program, the followings need to be considered:

- The conclusions of Environmental Reports and audit compliances;
- The environmental tasks established by Environmental Protection Agency taking into account the necessary measures and actions for environmental protection, and not only.
- The environmental information from the activity/project owner regarding the emissions and discharges of pollutants into environment;
- Other studies, environmental offers, documents etc.,
- Recommendations, comments from NGO etc.

Environmental risk assessment

- Examines the probability and the severity of the main components of an environmental impact.
- The necessity of additional information regarding the risks related to the identified pollution or to the pollutant activities developed on a site may determine the environmental competent authority to request a risk assessment with the aim of evaluating the probability of harm and finding the possible prejudiced entities.
- Not every site affected by a certain pollutant will exhibit the same risk or will need the same measures of remediation.



Risk assessment involves:

1. the **estimation** - the identification of:
   - the hazards,
   - the magnitude of the effects and
   - the probability of occurrence.

2. the **quantification** of:
   - the danger importance and
   - consequences for humans and/or environment.

The quantitative risk assessment encloses five stages:

- description of the aim;
- identification of the hazard;
- identification of the consequences;
- estimation of the magnitude of the consequences;
- estimation of the probabilities of the consequences.

According with Romanian Order no. 184/1997 …

… the risk is the probability that a negative effect will occur in a specified period of time:

Risk = Danger x Exposure

The risk assessment implies the identification of the hazard and of consequences that may appear as a result of occurrence of the events considered as risk sources. In function of the importance of the consequences one may decide if there is necessary or not to take remediation measures.

Concordant with the Romanian Order no. 184/1997…

… the risk quantification is based on a simple system of classification, where the probability and severity of an event are descendent distributed, being assigned with an arbitrary score:

Simplified model

Probability	***Severity***
3 = high	3 = major
2 = medium	2 = medium
1 = low	1 = insignificant

$$R = P \times S$$

The risk may be calculated by multiplying the two factors (probability, severity) in order to obtain a comparative number, for example 3 (high probability) x 2 (medium severity) = 6 (high risk).

This allows the comparison of different risks. The greater the results, the bigger the priority should be given to risk control – risk management.

When a big number of important pollutants are considered for assessment, an increased attention should be paid to a clearer manner of presentation (e.g. matrix).

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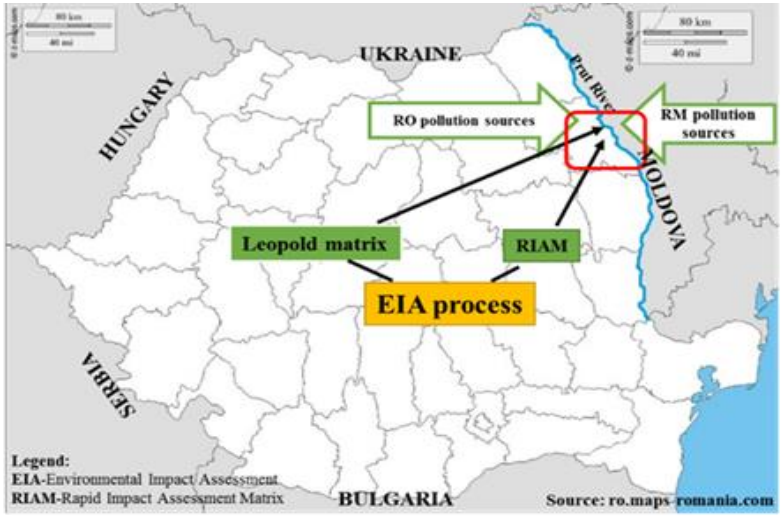
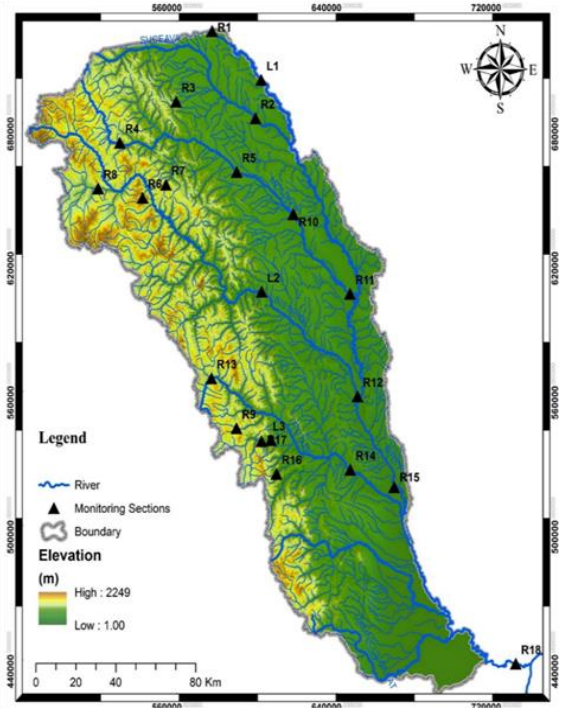
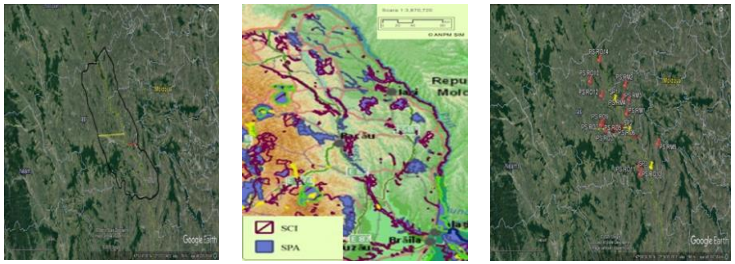
Applications – case studies







(a) (b) (c)

Environmental monitoring and impact assessment of Prut river cross-border pollution, Neamtu R., **Sluser** B., Plavan O, Teodosiu C., **Environmental Monitoring and Assessment Journal**, (2021), DOI: 10.1007/s10661-021-09110-1

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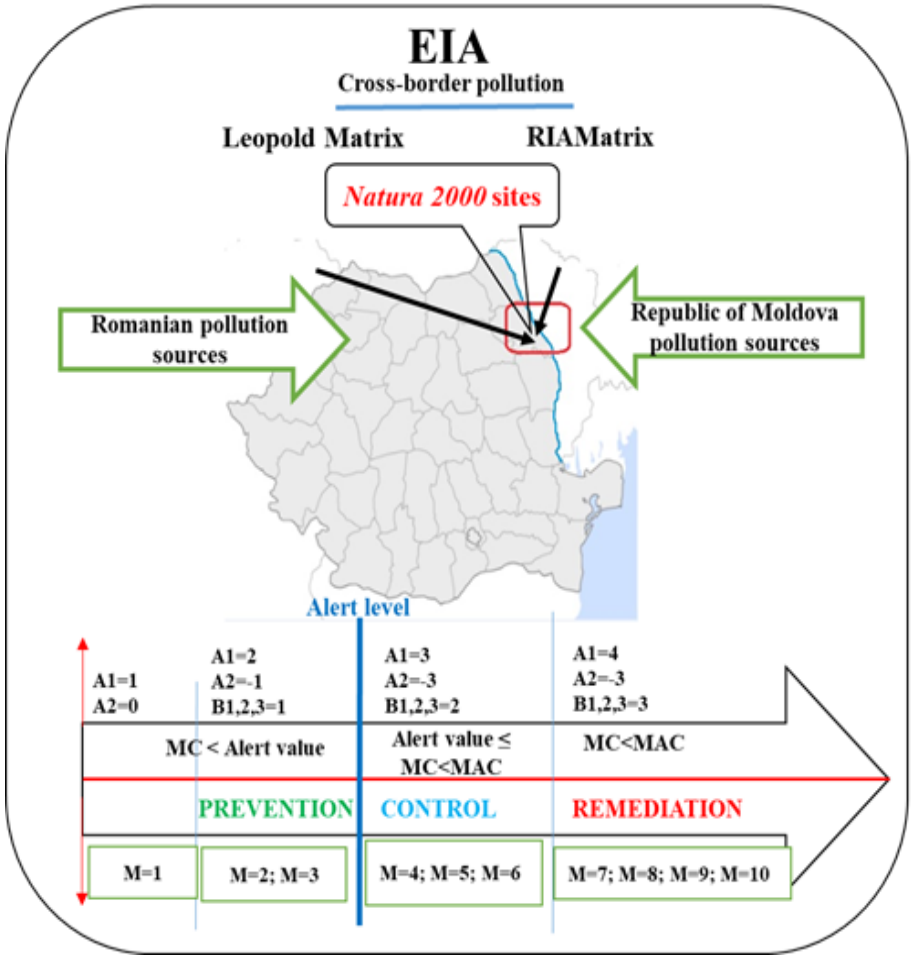
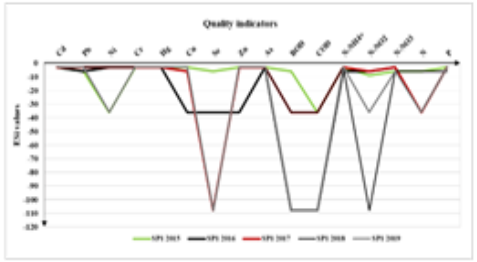
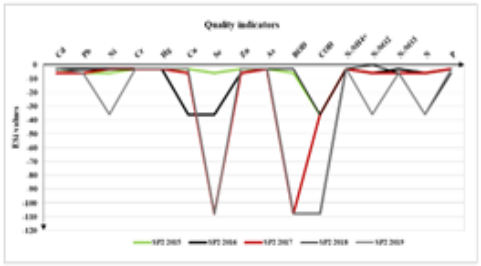
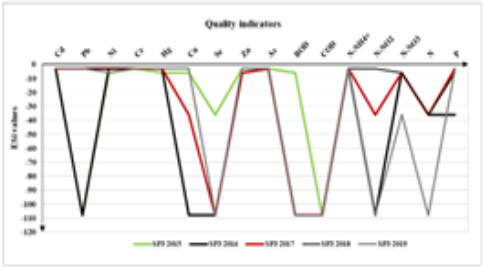
Aim: to assess the environmental impacts of the anthropic cross border activities, based on the Prut river water pollution and 16 quality indicators









- Overall image of water pollution in the cross-border area
- Water pollution levels highly increased on both sides of the river
- EIA by both methods revealed high scores in case of organic pollution
- The high scores of environmental impacts underlined the need for common policies and monitoring procedures.

Priority Pollutants Monitoring and Water Quality Assessment in the Siret River Basin, Romania. Zait, R.; **Sluser**, B.; Fighir, D.; Plavan, O.; Teodosiu, C., **Water**, 2022, 14, 129. https://doi.org/10.3390/w14010129

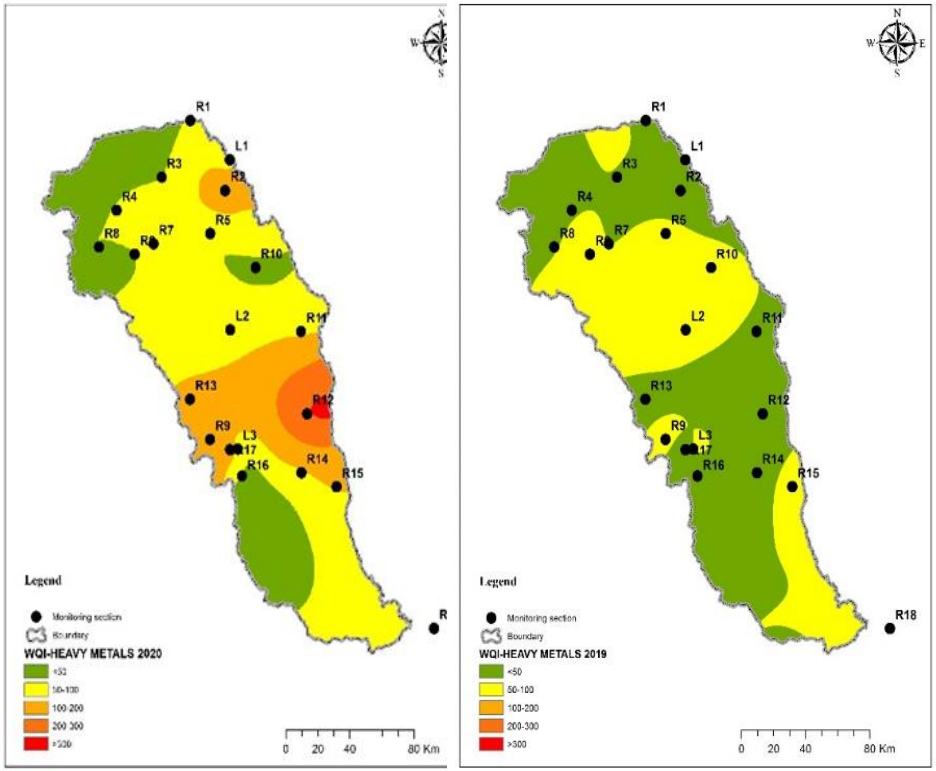
The **monitoring of the priority organic and inorganic pollutants** from the Siret River basin, Romania, in view of the implementation of the WFD requirements, and

The **evaluation of the water quality of the Siret River basin**, based on the measured concentration of the organic and inorganic priority pollutants using the WQI method, with the purpose to establish the water quality status that will contribute to the Second river basin management plan evaluation.

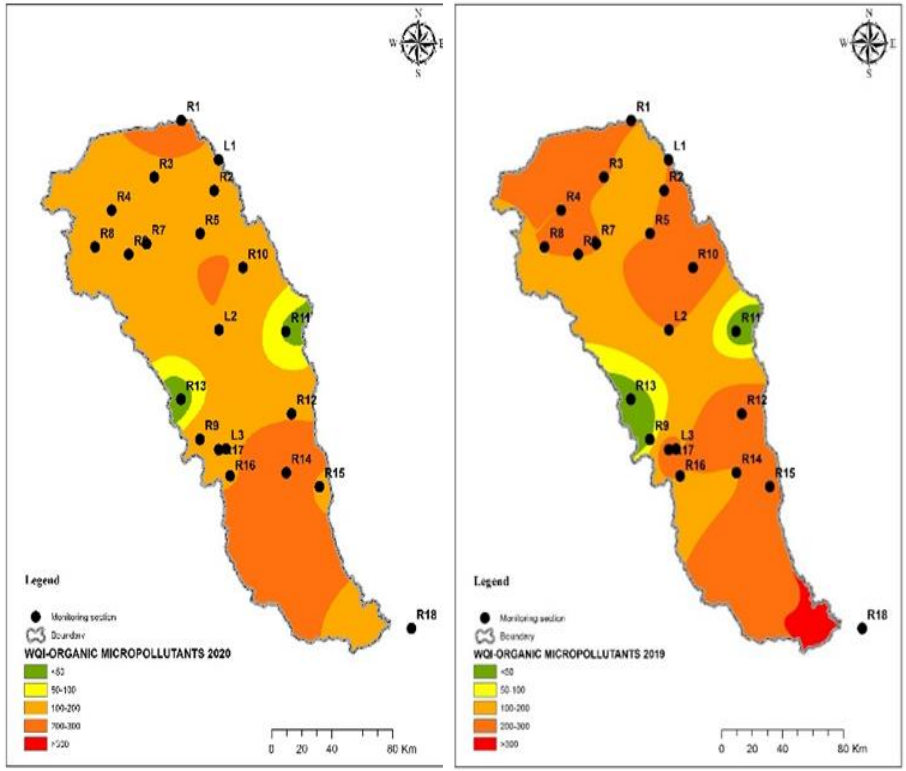
The survey was conducted during the period 2015-2020, considering 21 sampling points: 18 river sections and 3 lake sections.

An important role of this study is that the Siret river basin includes Sites of Community Importance, Natura 2000 sites.

Water quality influenced by inorganic and organic pollutants, 2019-2020



Inorganic pollution in 2019 and 2020



Organic pollution in 2019 and 2020

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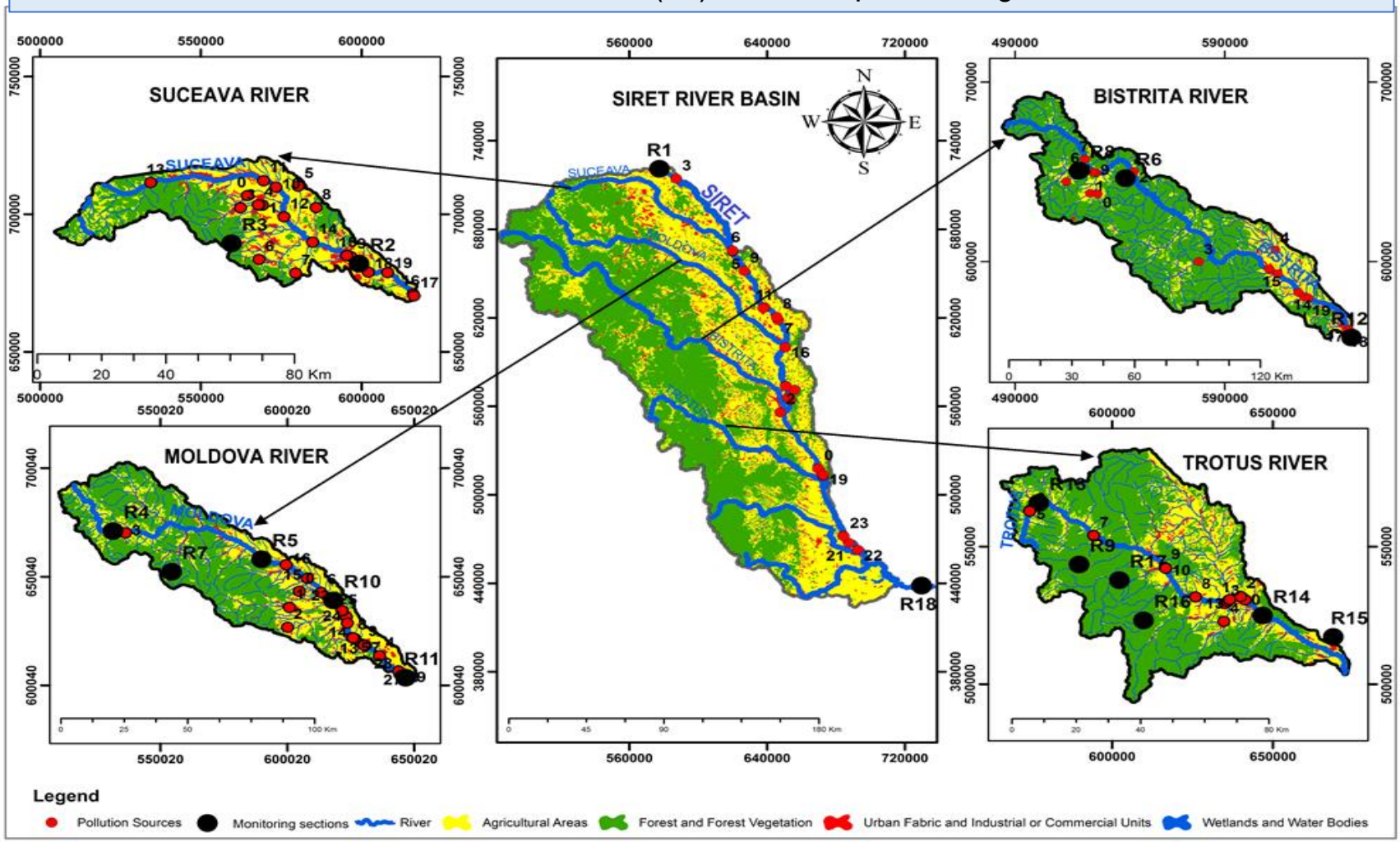
Priority pollutants effects on aquatic ecosystems evaluated through ecotoxicity, impact, and risk assessments, R.Zait, D.Fighir, B.**Sluser**, O.Plavan, C.Teodosiu, **Water** 2022, 14(20), 3237; https://doi.org/10.3390/w14203237.



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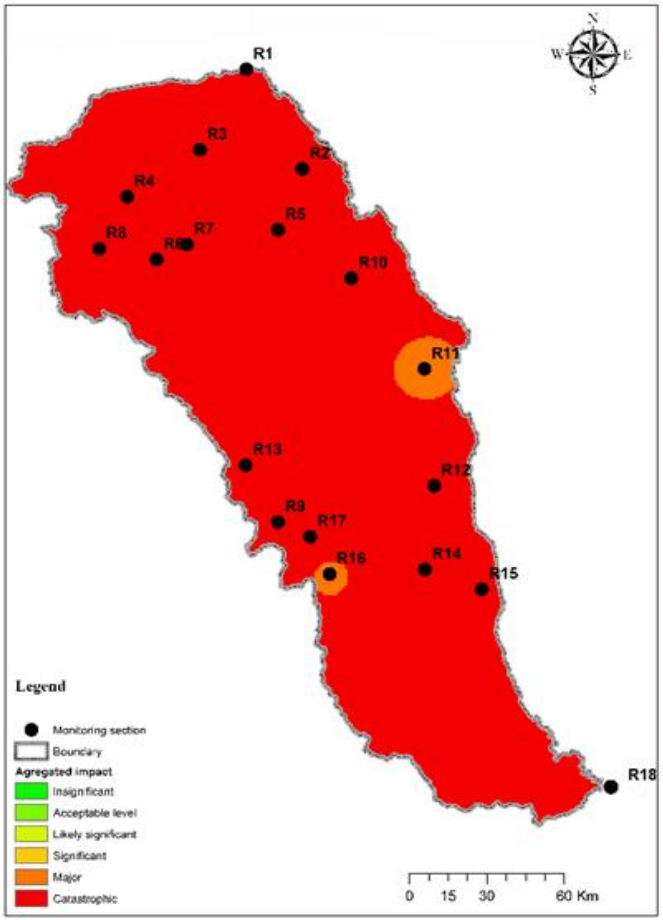
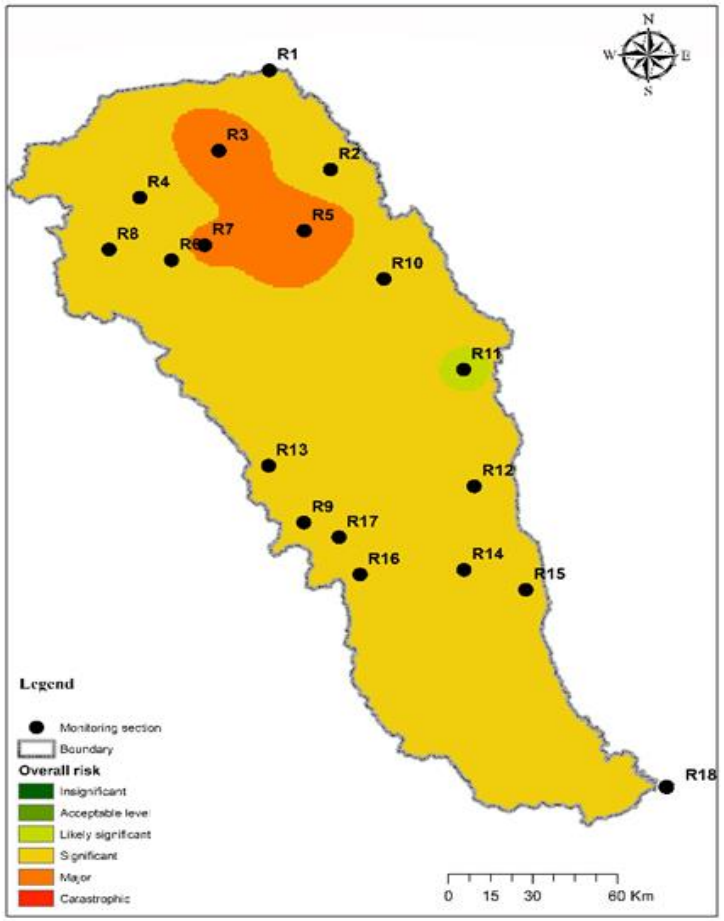
The aims: to assess the ecological and health hazards, and integrated impact and risk assessment, based on the ecotoxicity and exposure factors of each priority pollutant in the aquatic ecosystem.





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Discussions case studies / EIRA in practice

Transilvania University of Brașov

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