

# THE DEFINITION OF ENVIRONMENTAL MONITORING. PART II

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**Abstract:** *This study is continuing the legislative approach of the environmental monitoring definition. One of the research results was the identification of clear classification criteria. A second result of this study consists in proposing a definition that would exclude the possibility of confusion between environmental monitoring and the other three instruments analysed (environmental assessment, environmental inspection, and environmental analysis).*

**Key words:** *environmental classification, environmental monitoring, environmental definition.*

## 1. Introduction

The first part of this study aimed to present the gaps in the definition of environmental monitoring, both from a legislative perspective and from the perspective of its delimitation from environmental assessment, analysis or inspection [11].

The scientific specialized literature also pays attention to the environmental monitoring [8], bringing to the attention of researcher's different classifications and/ or definitions of the environmental monitoring.

A variety of definitions can be observed, sometimes resulting from the context of the topic addressed and studied, sometimes from the highlighting of specific elements considered by the author to be necessary in building the definition.

In this sense, regarding the understanding of the notion of environmental monitoring, we agree with the opinion that "what exactly does the term "monitoring" mean within an environmental perspective? Is it synonymous to measuring or observing? A sound definition of monitoring is essential at this point" [2].

## 2. Methodology

In order to identify clear criteria for the classifications of environmental monitoring, the tool of the analysis of the identified legal definitions was used and an analysis of the classification criteria and classifications of environmental monitoring found in the

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specialized scientific literature was carried out.

In addition to the terminological and legal delimitation of environmental monitoring as an environmental protection tool [11], it was necessary to follow two more research lines:

- to present a classification of environmental monitoring, based on those criteria that have been deduced, at least, from the elements of confusion of the terms studied;
- to propose a definition that has a high degree of scientific accuracy and that covers the complex aspects of environmental monitoring.

### 3. Environmental Monitoring Clasifications and Definitions

#### 3.1. Environmental Monitoring Clasifications

From the doctrine and the studied legislation a classification of the monitoring can be achieved by identifying and applying different criteria. Classifications of monitoring are found in the doctrine, but we do not always find an explanation of the criterion used, but only the explanation of the type of monitoring, which often led to confusion about the specific criterion [12].

We present a classification of environmental monitoring according to the most common criteria encountered. We mention that this classification is not exhaustive.

A first classification of the monitoring activity can be done according to its purpose:

- a) *prevention monitoring*, through which the qualitative characteristics of the environmental elements are monitored in order to know the quality of the environment,
- b) *compliance monitoring*, which monitors the qualitative characteristics of the environmental elements in order to verify the functioning of an installation or an activity in the parameters required by the permitting act and the legislation in force,
- c) *post-impact monitoring*, which *monitors* the qualitative characteristics of the environmental elements after determining the existence of an impact on the environment in order to determine the negative effects and the measures to be taken,
- d) *post-intervention monitoring*/ post repairs monitoring the *qualitative* characteristics of the environmental elements, after establishing the impact and taking measures to repair the environmental damage for the purpose of checking the effects of the intervention / repair.

A second classification will take as a criteria the endpoint of the monitoring:

- a) *passive monitoring*, which only measure the qualitative characteristics of the environmental elements and lead to the production of statistics at the most,
- b) *active monitoring*, which aims is taking the necessary measures following the results of the monitoring.

A tertiary classification can be made according to the environmental aspects considered in the monitoring procedure:

- a) *general monitoring*, through which all environmental aspects are monitored,
- b) *specific monitoring*, through which only certain environmental aspects are monitored.

A discussion can be made starting from the explanation encountered regarding the

classification of monitoring in "simple monitorings". Although the author shows that this type of monitoring "records the value of a single variable at a given moment over time", we appreciate, based on the previously stated criterion, that this is a specific monitoring.

Depending on the spatial coverage criterion, monitoring may be: local, regional, national and global.

Depending on who performs the monitoring, it can be said that it is classified in self-monitoring/ auto-monitoring and external monitoring.

Taking into account the way this monitoring is done, it can be direct or indirect. Monitoring is direct when estimation is obtained by direct measurements. Monitoring is indirect when the estimate is obtained through a suitable combination of measurements of surrogate parameters.

A subclassification according to the monitored environmental factor results in: air (atmosphere) monitoring, water monitoring, soil monitoring, etc.

The usefulness of these classifications can be highlighted by the following examples:

1. Monitoring the state of ocean waters is a global, direct, specific monitoring of a single environmental factor, prevention and can be passive or active and is always external, because we are not in a situation of activity.

2. Monitoring the state of sea waters after a naval incident can be regional, direct, external, specific monitoring of a single environmental factor, post impact and can only be active.

3. Monitoring wastewater following an industrial activity can be:

- specific, active monitoring of an environmental factor, internal/self-monitoring, direct, local.

- active, general monitoring of water pollutants, internal/self-monitoring, direct, local.

As already mentioned, there may be other classification criteria that can be taken into account, but the few presented here are enough to demonstrate that environmental monitoring is an area still insufficiently explored in doctrine and insufficiently or inadequately regulated.

### **3.2. Environmental Monitoring Definition**

A review of the literature on the definition of environmental monitoring highlights a non-uniform approach. A variety of definitions from simple to complex have been identified, of which we present some of the most representative definitions:

*a) simple definitions of the phrase "environmental monitoring"*

- in the simplest way, monitoring means measuring with one defined purpose one or more parameters in their spatio-temporal dynamics [9];

- measuring environmental characteristics over an extended period of time and space to determine their state and trends [3];

- systemic observations of the dynamics of a system made to extract statistical conclusions aimed at reducing uncertainty about how the system works [3];

- as the systematic sampling of air, water, soil, and biota in order to observe and study the environment, as well as to derive knowledge from this process [13];

*b) definitions with a complex approach to the expression "environmental monitoring"*

- in a broader sense, it is the surveillance of the time and space evolution of a system by measuring, estimating and eventually reporting the cases of exceeding the limit values for some indicators or defining parameters. The purpose of the monitoring is to diagnose the present state and to develop prognoses for the evolution of the analyzed system [4];

- in the context of the analysis of natural ecosystems, monitoring means the recording of environmental conditions and involves actions aimed at alerting the authorities responsible for their management in response to the reported changes [3];

- environmental monitoring is the observation and study of the environment. In scientific terms, we wish to collect data from which we can derive knowledge. At the heart of environmental monitoring are the definition of observation, sample, and measurement, and their relationship to scale [1];

- starting from the specific elements of the monitoring activity, it is shown that "monitoring then means those things that change in a system over time and space. It is a process based on surveying and surveillance, but assumes that there is a specific reason for collection of data" [12].

### **3.3. Proposed Definition for Environmental Monitoring**

„Multiple definitions have produced ambiguity of causal relations, incongruent empirical results, and difficulty in interpretation” [7]. Therefore, a definition must have a high degree of generality, which coherently encompasses all the important aspects of the domain generalized through it. Construct definition plays a foundational role in science and a good definition prevents scientific discussion from devolving into babel [6]. Considering the above, the following were taken into account for the construction of the definition of environmental monitoring:

- the purpose of environmental monitoring is environmental protection;

- as it results from legislation, monitoring itself is a standardized procedure; the standards specify the technical aspects of the monitoring: the environmental factor or the monitored pollutant; method of data collection, processing and analysis; period and frequency of monitoring; location; etc.; standardization results from the fact that environmental monitoring is very broad and requires a multi-disciplinary scientific approach [1];

- both, negative and positive effects of both human activity and natural activity (eg. volcanic eruptions) are monitored;

- monitoring should be completed with the communication of its results, being mandatory to take appropriate measures for the purpose [1].

*The proposed definition:* Environmental monitoring is a standardized form of environmental protection through which data is collected, processed and analyzed regarding the effects of human or natural activity on the environment in order to obtain information that, after its communication, can be the basis for subsequent appropriate environmental protection measures.

#### 4. Conclusions

Environmental monitoring has become a must-do at all levels (international, regional, national, local), involving various actors (governmental, local), in their various structures (ministries, departments, specialized agencies, non-governmental organizations, accredited laboratories).

All forms and methods of monitoring must and are regulated, because only the force of a normative act can demand a specific result. That is why the synergy of normative acts and specialized literature is important when addressing the complex issue of environmental monitoring.

Starting from the fact that if the legislation is not clear in defining and using the terms, the literature does not have a unitary vision. It is necessary to take steps to emphasize these aspects in order to obtain a real protection of the environment.

An important first step would be the joint action of specialists in the various fields involved in environmental monitoring with a view to establishing a unitary vision of environmental monitoring as a basic foundation to be taken up and applied in specific legislation. If monitoring is the essence of specialists in predominantly technical areas, understanding the meaning of it in front of and within the institutions involved and sometimes before the courts is the core of law specialists.

This also requires collaboration in the understanding of law enforcement and interpretation procedures. This integrative approach to the meaning and the way of interpreting and applying the legal provisions with the technical predominant, we also used it in educational projects, aiming to design and develop teaching modules, as open education resources (OERs): (i) Learning Toxicology through Open Educational Resources – TOX-OER (<https://toxoor.com>) [10]; (ii) Environmental Education – OERs for Rural Citizens (EnvEdu-OERs) ([https://envedu.unitbv.ro/en\\_US/](https://envedu.unitbv.ro/en_US/)) [5].

#### *In Memoriam* Phd. Cristina Mihaela Salcă-Rotaru

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