



MASTER ADAPT

MAInSTreaming Experiences
at Regional and local level
for ADAPTation to climate change

**GUIDELINES, PRINCIPLES AND STANDARDIZED
PROCEDURES FOR CLIMATE ANALYSIS AND
VULNERABILITY ASSESSEMENT AT REGIONAL AND
LOCAL LEVEL**

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ABSTRACT

The "Guidelines, standardized principles and procedures for climate analysis and the assessment of vulnerability at regional level" constitute the second deliverable of the preparatory action A1 - Climate analysis and vulnerability assessment at the Regional level realized within the MASTER ADAPT project, with the coordination of the Institute for Environmental Protection and Research and the contributions of Ambiente Italia srl, Lombardia Foundation for the Environment (with Ecometrics srl), IUAV University of Architecture of Venice, University of Sassari and Sardinia Region (project leader).

The Guidelines, in addition to benefiting from the previous expertise of authors and contributors in the field of vulnerability analysis to climate and risk changes, are based on the experience gained by the partnership under the A1 action on the occasion of the realization of the first deliverable of the project "Report on climate analysis and vulnerability assessment results in the pilot region (Sardinia Region) and in the areas targeted in Action C3".

The aim of this document is to provide regional and local administrators, involved in institutional paths aimed at adapting to climate change in their territories, the basic operational elements essential for the definition of a framework of scientific knowledge that is a prerequisite for planning the most appropriate adaptation measures.

The structure of the document reflects the approach proposed under Action A1 of the project, which essentially identifies two sub-actions:

- climate analysis (past and present trends, future scenarios);
- vulnerability assessment.

In fact, any Climate Change Adaptation Plan cannot ignore the knowledge of the past climate and the estimation of possible future climatic variations, which are the indispensable prerequisite for assessing the impacts of climate change on natural resources and on the various socio-economic sectors, as well as an assessment of sectoral vulnerabilities.

The experience gained in the implementation of the analysis made it possible to test each phase of the process operatively, identifying the strengths to be exploited as well as the most critical methodological aspects on which a reflection is proposed in the concluding paragraph of this document.

The methodology illustrated represents one of the first attempts to quantify the levels of vulnerability of a territory and proposes a simplified approach that, however, can hardly describe the complexity of environmental phenomena and the chain dynamics triggered by climate change. The impact chains, in fact, like any model, have the aim of reducing the complexity of the real world: the more complex the model, the more complex the assessment, the greater the time and economic resources necessary, but certainly closer to reality the results will be. Moreover, even with the aim of analyzing the Vulnerability to climate change, it is necessary to keep in mind that in reality there are many non-climatic factors that should not be neglected in the analysis.

The reliability of the results also depends on the quality of the input data. In this regard, it is recommended to devote every possible effort to the collection of quality data and the most significant data in order to populate adequate indicators, also in order to reduce the use of proxy indicators that will only feed the level of approximation of results.

Even the normalization of data is a delicate phase that can undermine the significance of the results and lead to incorrect interpretations. Depending on the threshold values used as minimum and maximum values, in

fact, the reading of the data obtained varies: if the minimum and maximum values are used, as in the case suggested in this document, the minimum value and the maximum value within the considered series, the result obtained will have a relative value with respect to that series. This means that the "red" color will mean "more vulnerable than green" but will not have an absolute "highly vulnerable" value. We therefore recommend that you take this into consideration to avoid drawing wrong conclusions.

For an evaluation that may have, instead, an absolute connotation, it will be necessary to resort to the use of specific thresholds proposed in the relevant scientific literature or to the expert judgment of the local territorial context.

As far as the weighing of the indicators is concerned, in the absence of valid scientific references, it was considered more appropriate to consider a weight equal to 1, in the knowledge that this is not the ideal choice nor the one that is closer to reality. The determinants of Vulnerability do not, in fact, have equal weight in determining the phenomena analyzed: the weight that a factor can have depends on the local context as well as on the type of other factors at stake with which it is compared. In this regard, the Guidelines propose, only by way of example, the Analytic Hierarchy Process approach (which can be useful in analyzing and supporting the understanding of complex decision-making problems).

Any procedure is adopted, even in the case of weighing it may be useful to consult local experts who can in some way orientate and provide addresses on the most correct and most responsive to reality.

Finally, it remains to think about which is the most appropriate approach in order to correctly validate the results obtained. Not being quantifiable, vulnerability remains a theoretical concept and difficult to "measure on the ground" as would require an appropriate validation procedure through checkpoints. The only "verification tools" useful for this purpose could be based, once again, on the knowledge level of the territory by local experts who can confirm or not the reliability of the results with respect to the real situation.

In a future perspective it will be necessary to promote further research and pilot applications that will allow the creation of new elements useful to overcome the critical methodological aspects mentioned above and to make further progress in this area. Improving the reliability of vulnerability analyzes will, in fact, strengthen the ability to monitor and evaluate the changes that will occur over time in a given area, both at the total value level and in individual indices and indicators, thus providing the elements necessary to political decision-makers who will have to implement adaptation measures or who will be engaged in evaluating the effectiveness of actions implemented in the meantime.