

- **DEVELOPING WFD BENTHIC INDICATORS (CORAL REEFS AND SEA GRASS BEDS) IN FRENCH OVERSEAS DEPARTMENTS – A SUMMARY AND ANALYSIS OF EXISTING WORK DEFINING ECOLOGICAL STATUS UNDER THE WATER FRAMEWORK DIRECTIVE**
- **ABSTRACT**

The Water Framework Directive (WFD) requires the development of indicators to enable an evaluation of the ecological status of fresh, transitional and coastal water bodies. Under this directive, indicators of ecological status are divided into three categories: biological, physico-chemical, and hydromorphological. This report is focused specifically on coastal biological quality elements, namely « benthic invertebrate fauna », « macroalgae » and « angiosperms », and their use in the assessment of coastal water bodies containing reefs and seagrass beds, in French overseas departments. Two principal pressures acting on these tropical coastal habitats are considered: eutrophication and sedimentation. A monitoring strategy will also need to be developed, coherent with existing programs, such as IFRECOR (French Coral Reef Initiative).

This report analyses and summarises work on the qualification of the WFD ecological status of coastal water bodies in French overseas departments. Experts on coral reefs and marine flora reviewed the reports of Martinique (Guadeloupe being aligned with Martinique), Reunion and Mayotte on proposals for WFD benthic indicator development.

In terms of « coral reef » indicators, the reports reviewed are in different stages of progress : in the Caribbean, metrics, indicators, and ecological status classes have been proposed on the basis of expert judgement ; on Reunion Island, the collection of complementary data is in progress, in particular to qualify the response of algae to eutrophication ; in Mayotte, work undertaken up until now has consisted in summarising existing monitoring data. Methodologies and sampling protocols used or suggested in the reports, as well as descriptors and parameters for the evaluation of coral community condition, are very disparate between the regions, and sometimes even within the same region. It will be important to determine the validity and rigor of any protocols for evaluating the ecological condition of coral reef communities. The relationship between environmental pressures, the responses of marine organisms, and indicators of ecological status also remain to be specified. Various types of disturbances, either natural or anthropogenic, can lead to the same responses, particularly if the chosen descriptor is not very specific. The development of a « coral reef » indicator (even in a simplified form) is imperative, but it remains to be seen whether this type of indicator is necessary for all water bodies containing coral reefs. In some cases, the development of other indicators may be more relevant, though this would require further consideration.

Work on « seagrass » indicators has begun in the French West Indies with the study of four parameters : relative abundance and density of *Thalassia testudinum* and *Syringodium filiforme*, height of the canopy of *Thalassia testudinum*, and macroalgal cover. A general condition of the seagrass bed indice has been proposed and has to be finalized. The studies outlined in this report illustrate the potential relevance of seagrass beds as indicators of the quality of coastal water bodies, although the current monitoring protocols present some limitations. Joint working should facilitate the generation of common methods for the identification of appropriate seagrass indicators. The lack of both knowledge and data on seagrass beds make the development of reference points and ecological status classes challenging. In addition, it will be necessary to collect complementary data to ensure that a 3-year monitoring frequency is sufficient to link observed biological changes to anthropogenic pressures. In particular, this should take into account the average response time of the biological parameters to climatic disturbances on tropical islands (cyclones in particular).

In conclusion, this document indicates a consensus on the need to provide scientific support in the implementation of the WFD in French DOM. The objective is not to undermine existing work, but to propose a clear methodological framework that will help deliver both short-term and medium-term WFD objectives. This methodological framework should be shared across all the French Overseas Departments, even if the biogeographic and socio-economic contexts will lead to differences, notably in the choice of descriptors and indicators for evaluation.

- **KEY WORDS (THEMATIC AND GEOGRAPHICAL AREA)**

Coral reefs, seagrass beds, angiosperms, macroalgae, indicators, Water Framework Directive, Martinique, Guadeloupe, Reunion, Mayotte.