

**The issue of outwelling in the Guadiana River Estuary (Portugal). Some findings and research suggestions in the context of recent evidence**

Alexandre Moniz de Bettencourt\*<sup>1</sup>, L.Q. dos Santos<sup>2</sup> & M.J. Lança<sup>3</sup>

(\*Author for correspondence : E-mail: np66ln@mail.telepac.pt)

<sup>(1)</sup> Biogeochemistry Group-IMAR and Department of Ecology, University of Évora, Rua Romão Ramalho, 59, 7000-671 Évora, Portugal

<sup>(2)</sup> Hydrographic Institute, Rua das Trinas, 49, 1249-093 Lisboa, Portugal

<sup>(3)</sup> Department of Animal Science, University of Évora, Apartado 94, 7001 Évora codex, Portugal

**Key words:** salt-marsh, estuary, outwelling, organic matter, nutrients

## Abstract

The “Outwelling Theory” states that salt marshes play a major role exporting production to adjacent estuarine and coastal ecosystems. However, it has been found that some marshes act as net importers instead of net exporters of organic matter and nutrients. Including mangroves and refining the analysis to include bacterioplankton, organic and stable isotope tracers, the picture became, once more, more complex, making room for a revival of the idea. The exchanges between the Castro Marim salt marsh and the main estuary were tentatively established determining periodically in a selected cross-section TSS, FSS, VSS,  $\text{NH}_4$ ,  $\text{NO}_2$ ,  $\text{NO}_3$ ,  $\text{N}_{\text{Kjeldhal}}$ ,  $\text{SiO}_4$ ,  $\text{PO}_4$ , TDP, Chlorophyll *a* and Pheopigments, measuring their fluxes along tidal cycles and computing the corresponding budgets. Apparently the sedimentary behavior of the marsh will be close to equilibrium, in the period studied. However, it will import mainly inert matter and export mainly organic matter, in the same period. Moreover, extrapolating these results to the entire Guadiana salt marshes, the exchanges of sediment does not seem to be significant. Particularly, the marshes will not significantly trap sediment transported by the main river (0.5%). It seems to follow also, that in a general way, the Guadiana salt-marshes might have a more significant role than it was anticipated, in the system economy of OM and nutrients, and their outwelling to coastal waters, assuring outputs that could amount to something like 6 % of the river load of N, 1.2% of the river load of P, and 20-57% of the river load of TOC, in an average year, and 42% of the river load of N and 35% of the river load of P in a dry year. These findings suggest that a more refined investigation, over an extended period of time, is certainly worthwhile to engage.