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Biogeochemical responses of shallow coastal lagoons to Climate Change

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The importance of climate change and global warming in the near future is becoming consensual within the scientific community (e.g. Kerr et al., 2008; Lloret et al., 2008). The surface temperature and sea level have increased during the last few years in the northern hemisphere (IPCC, 2007). Predictions for future changes include an increase of surface temperature and sea level for Europe. Moreover, the global warming phenomenon will also change the hydrological cycle and increase precipitation in northern and central Europe (IPCC, 2007). Sea level rise already threatens to overwhelm some lagoons, such as Venice and Moroccan lagoons (Snoussi et al., 2008). Shallow coastal lagoons are some of the most vulnerable systems that will be impacted by these changes (Eisenreich, 2005). Environmental impacts on coastal lagoons include an increase of water turbidity and therefore light attenuation. If these effects are strong enough, the lighted bottoms of shallow lagoons may loose a significant part of the benthic algal community. These communities are highly productive and are essential to control nutrient dynamics of the system by uptaking large amounts of nutrients both from the water column and from the sediments. A decrease in benthic algal communities and photosynthetic oxygen production will also contribute to increasing the vulnerability of the lagoons to hypoxia and anoxia. The flux of nutrients such as phosphate from the sediments may increase dramatically, further disrupting the nutrient balance and condition and promoting cyanobacterial blooms. Microbial activity is temperature dependent, therefore, the increase of temperature will increase the concentrations of ammonium within sediments. The release of phosphate and silicate will also increase with temperature. Coastal lagoons are valuable ecosystems and may be severely impacted, both ecologically and economically, by global change. Shallow coastal lagoons should be considered as sentinel systems and should be carefully monitored so that appropriate responses can be timely to mitigate the impacts from global change.

References:

Eisenreich, S.J. (2005). Climate Change and the European Water Dimension - A report to the European Water Directors. Institute for Environment and Sustainability, European Comission-Joint Research Centre. Ispra, Italy. 253pp.

Kerr, R. (2008). Global warming throws some curves in the Atlantic Ocean. Science, 322, 515.

IPCC (2007). Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K., Tignor, M., Miller, H. (eds.)]. Cambridge University Press. Cambridge, United Kingdom and New York, NY, USA, 996pp.

Lloret, J., Marín, A., Marín-Guirao, L. (2008). Is coastal lagoon eutrophication likely to be aggravated by global climate change? Estuarine, Coastal and Shelf Science, 78, 403-412.

Snoussi, M., Ouchani, T., Niazi, S. (2008). Vulnerability assessment of the impact of sea-level rise and flooding on the Moroccan coast: The case of the Mediterranean eastern zone. Estuarine, Coastal and Shelf Science, 77, 206-213.