Coastal wetland Gialova Lagoon with catchments, Greece

G. Destouni, I. Antonopoulos, K. Mazi, A. Koussis, S. Lyon, C. Prieto, J. Jarsjö, et al., 2011-12-31

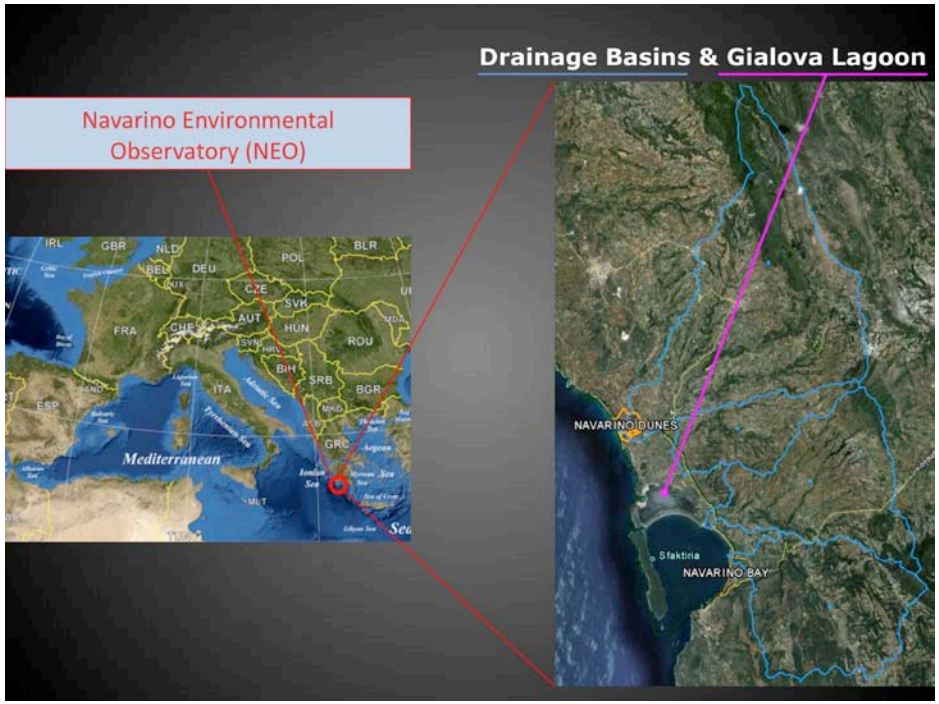

Figure. The Gialova lagoon and Navarino Bay coastline on the west coast of Peloponnese, Greece, and the four main coastal catchments, which are all located by and around the Navarino Environmental Observatory (NEO; http://navarinoneo.geo.su.se/index.php/en/). *Source: Ioannis Antonopoulos, TEMES S.A.*

Background information	The Navarino Bay and Gialova lagoon coastline on the west coast of Peloponnese, Greece, is fed by four main coastal catchments (of ~10km^2 each).

Main research and management problems	Good physical, chemical and ecological status of both inland water and seawater resources of coastal regions is required by the EU Water Framework Directive and is also generally essential for the provision of several important ecosystem services. However, coastal regions are subject to especially high water quantity, quality and ecosystem pressures from particularly large (permanent and/or transient tourism) population densities, and associated large water demands, and excess nutrient and pollutant loading to both the inland and the coastal waters and their ecosystems. Furthermore, the various water flow and discharge pathways from land toward the sea along extended coastlines are particularly complex, as they are multiple, spatiotemporally variable and often left largely unmonitored. The GWEN group study of the Gialova Lagoon-Navarino Bay coastal wetland and catchments will utilize, compile and synthesize available data and information on local-regional weather, hydrological, hydrogeological, water quality conditions to investigate the current conditions and possible historic development of flow-transport pathway partitioning, and associated travel times, interactions and tracer-nutrient discharges between soil, ground, surface, wetland and coastal waters. The study will further link the hydrological data-model assimilation results with Gialova lagoon species distribution data and information for the current (and possible historic) variability range of water level-temperature-salinity conditions, formulate relevant ecohydrological link-correlation models, and use projected future climate and land-water use change scenarios for the region as change drivers to those models in order to identify ecohydrological development scenarios for this valuable coastal wetland.
Possible end-users	Water-related local-regional-national agencies, in particular those responsible for the implementation of the EU Water Framework Directive. Environmental NGOs, such as the Hellenic Ornithological Society (HOS). The Navarino Environmental Observatory (NEO; http://navarinoneo.geo.su.se/index.php/en/) partners and associated multi-disciplinary research networks.
Site conditions	The Gialova Lagoon-Navarino Bay catchments span a coastal plain bounded by mountains with the Ionian Sea on the west. The catchments include olive tree agriculture (of famous Kalamata olives and olive oil), and high tourism-recreation, history-archeology and biodiversity values. The Gialova lagoon wetland with surroundings is a Natura 2000 protected area, an Important Bird Area, a Wild Life Reserve, and an Archeological Protected Area.

Monitoring and data	A local-regional data-information support network for this field site is established through the academic-private sector collaborative research centre NEO (http://navarinoneo.geo.su.se/index.php/en/). NEO partners (and in particular the private partner TEMES S.A.) carry out weather-hydrological-hydrogeological monitoring and can contribute with data and information for collaborative research work. NEO further provides network contacts to Greek regional-national environmental organizations with other, complementary field monitoring/information, such as the Hellenic Ornithological Society with own water level-temperature-salinity and ecological monitoring of the Gialova lagoon. This data-information basis will be further extended by own field measurements by the GWEN group and associated relevant student activities at NEO.
Site-related publications by GWEN participants	Investigations have just started for future site-specific publications. **Examples of relevant methodological publications by GWEN participants** For this coastal wetland-region data assimilation and interpretation, the study will utilize, site-specifically apply, link and further develop reported model tools for fresh-seawater interactions along coastlines, including both seawater intrusion and submarine groundwater discharge (SGD) assessments[1,2], and water flow and nutrient transport partitioning and distribution through catchments based on local-to-catchment-scale water-tracer balance and mechanistic pathway-travel time assessments[3-5]. 1. Koussis A.D., Mazi K., Destouni G., 2011. Analytical single-potential, sharp-interface solutions for regional seawater intrusion in sloping unconfined coastal aquifers, with pumping and recharge, *J Hydrol*, doi:10.1016/j.jhydrol.2011.11.012 (in press, published online). 2. Destouni G., and Prieto C., On the possibility for generic modeling of submarine groundwater discharge, *Biogeochemistry*, 66, 171-186, 2003. 3. Persson K., Jarsjö J., Destouni G., 2011. Diffuse hydrological mass transport through catchments: scenario analysis of coupled physical and biogeochemical uncertainty effects, *Hydrol. Earth Syst. Sci*., 15, 3195–3206. 4. Destouni G., Persson K., Prieto C., Jarsjö J., 2010. General quantification of catchment-scale nutrient and pollutant transport through the subsurface to surface and coastal waters, *Environ. Sci. Technol*., 44, 2048–2055. 5. Jarsjö J., Shibuo Y., Destouni G., 2008. Spatial distribution of unmonitored inland water discharges to the sea, *Journal of Hydrology*, 348, 59– 72.