Managing delicate socio-environmental impacts: Naturtejo European Geopark and the building of Alvito Reservoir at Almourao geosite (Portugal)

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The Naturtejo Geopark, in the far centre east of Portugal, bordering Spain, is a very sparsely populated region where the national government is developing policies for energy diversification, in order to keep the goals of Kyoto Protocol. Two biomass plants and 131 wind turbines spread by 4 wind power plants represent 195 MW of newly-installed power based on renewable sources. However, since 1928, 19 reservoirs have been built in the Tejo river and tributaries from this region, flooding 6435 ha of Mediterranean landscapes and storing, at the minimum,1314hm3 of water for human consumption, agriculture and electricity. Hydroelectric dams produce 430 GWh/average year of energy for almost 300000 inhabitants. This makes the Geopark strategic for decreasing national dependency on fossil fuels and to cut greenhouse gas emissions. But this effort for diminishing climate change effects has several important consequences for the environment and landscapes of the Geopark, as well as for socioeconomic diversification in the area. The National Plan for Reservoirs involves the building of the Alvito Dam, at Ocreza River, starting in 2011. Since the 1930's, the area of the Almourao geosite has been endangered by the building of the Alvito Dam. The first project included a 138 m-high concrete dam that would flood one of the most important natural areas of the region. With the integration of Naturtejo Geopark into the European & Global Geopark networks under the auspices of UNESCO, Portas de Almourao was included as one of the 16 geomonuments, an outstanding geological area for understanding Variscan Orogeny in the Iberian Massif. Beautiful megafolds and faults in Ordovician quartzites, EU priority habitats, national ecological and agriculture reserves, endangered flora and fauna, and important aquifers would be flooded indiscriminately. The Alvito hydroelectric project is a reversible reservoir which uses electricity produced by wind power plants during the night for pumping the water from the downstream Pracana dam back to the reservoir, thus producing 369 GWh/year and less than 124000 tons of CO2 emissions per year (≈ 58 million *m3* N/ year of imported natural gas).

The Naturtejo Geopark developed several strategies to protectthe Almourao geosite and surrounding cultural landscape from this nationally important project applauded by most of the local authorities: several studies were made concerning the geological heritage of Portas de Almourao that gained the interest of municipalities for future development of a national protected area; (geo)tourism products and packages were developed for tour operators; several communal discussions were participated in

and educational visits for the local public were guided and actions were taken using regional media to raise awareness about the importance of the geosite; the environmental impact studies were closely followed and discussed with the EDP national electricity company that culminated with the Geopark's declaration letter of conditions. This work for conservation of the geological heritage was fruitful by changing the place of the dam 1km upstream from Portas de Almourao and reducing its size (and consequent environmental impact) to a 93 m high wall and 1731 ha of flooded area along 27,5 km of the Ocreza valley. For the first time in Portugal, the Declaration of Environmental Impact declared the first order of importance the protection of geological heritage. Also for the first time, a geological heritage management structure got involved in the Program of Environmental Mitigation and Remediation, where the EDP and the Naturtejo Geopark must develop projects for valuing the natural and cultural heritage of the Almourao geosite and surrounding landscape.

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