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P56

**REUSE OF WASTEWATERS STORED IN FACULTATIVE PONDS:
FLOW CONDITIONS AND REFINEMENT BY ALGAL
AND BACTERIAL BIOMASS**

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Abstract

High water consumption for new agricultural practise and uncertainty about availability of water resource in summer due to climatic instability make necessary to search new available fonts. In most part of Italian territory surface water volumes are taken into civil water distribution system for domestic use and, in summer, rivers are often in dry condition before arriving in urban tracts and water quality conditions are typical of domestic wastewater more or less treated in downstream. This work explains and compares some experiences in reclamation for irrigation reuse of large flowrate of domestic wastewater. It has been focused flow velocity and water depth in storage basin as related parameters basic in limiting and balancing different biological phenomena active in wastewater remediation. O.S., nitrogenous and phosphorus removal has been studied comparing the results of three experimental research campaigns which have monitored two facultative lagoon, receiving treated wastewaters, as natural finishing system able for remediation besides for storage. The first, carried out in the Simbirizzi basin, receives the whole final outfall of Cagliari WWTP (600.000 AE). It makes a yearly volume balance for agricultural recycling and reuse and permits to avoid every discharge in seawater during summer, so it presents almost static hydraulic conditions. The second test is carried out into an internal tract of the Cesenatico harbour basin in a pulmonary area characterized by high average flow, with vertical profiles of velocity and turbulent mixing varying in function of tidal type and phase. This research is carried out by an YSI multiparameter probe into an internal channel at the limits of the transition area, at five kilometres from sea outlet. Along his length (almost 2000 m) this tract receives, in dry water conditions, only residual organic loading from Cesena WWTP (180.000 AE). These freshwater volumes, characterized by a water depth varying between 0.90 and 1.50 m, reveal behaviour very similar to facultative aerobic/anaerobic lagoons with important effects in finishing and conditioning wastewater loadings before discharging in coastal seawater.

Data permit to recognize active phenomena in aquatic ecosystem and reveal as largely prevalent, along water column, photosynthetic and aerobic oxidizing activities. As it's visible in the reported graph, profiles reveal also as not negligible an under placed active layer varying between 10 to 20 cm, where anoxic denitrification activities conditions are maintained by oxygen consumption of bottom activities. Experimental results are modelled and organized in order to discuss variations in remediation efficiency carried out in static storage basins subject to vertical stratification rather than in weakly mixed basins provided with artificial turbulent flow.
