

SUN CORAL EXOSKELETON FILTER IN AN ENGINEERED ECOSYSTEM FOR PHOSPHORUS REMOVAL FROM TREATED SEWAGE

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Abstract

Constructed wetlands (CW) and engineered ecosystems are efficient to treat wastewater and stormwater runoff. However, CW require large areas to achieve a good performance and besides, several investigations have reported insufficient phosphorus (P) removal by these systems, according to the discharge threshold limits established by most environmental legislations. The performance of natural and locally available materials as adsorbents for P removal from wastewater is therefore, an important research subject. Currently, two exotic species known as sun coral currently spread along 2,000 km of the Brazilian coast pose a severe threat to the marine biodiversity and to oil platform structures, which have motivated the Brazilian authorities to establish enforcement measures aiming at sun coral control. These species have exoskeletons with high concentrations of calcium carbonate and our previous lab-scale experiments have proved that exoskeleton-based adsorbent effectively removes P from wastewater, being a suitable material to be tested as a polishing step in full-scale treatment plants. In the present investigation, a sun coral-based filter (SCbF) constructed with fiberglass was installed as final treatment unit in a decentralized wastewater treatment plant named “engineered ecosystem”, constructed to treat sewage generated by an university campus of Rio de Janeiro State University-UERJ located in Ilha Grande, Rio de Janeiro/Brazil. The SCbF improved the P removal capacity of the system from 44% to 96%. The SCbF proved to be potentially an excellent strategy for P removal from sewage, particularly for decentralized systems and an attractive use of the sun coral exoskeleton extracted from the Brazilian coast and from other coastal areas where this invasive species requires control.

Keywords

Engineered ecosystem, Phosphorus removal, Adsorption, Sun coral-based filter.