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Modelling of Nitrogen Removal in a Free Water Surface Constructed Wetlands of Tibet, China

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Abstract: The construction of free-water surface constructed wetland (FWSCW) for wastewater treatment at high altitude region has being tried in Tibet Autonomous Region, an area with extremely cold weather and low air pressure. The FWSCW was designed to receive nitrogen loading of about 8.00 kg/ha/d and hydraulic loading of 546m³/ha/d. This study aims to develop a model for estimating nitrogen (N) dynamics in this constructed wetland situated in Maizhokunggar county alongside Lhasa river. To ensure stable temperature for healthy biological actions, a passive solar house was built. The major nitrogen transformation processes considered in this study were mineralization, nitrification, denitrification, plant uptake, plant decaying and sedimentation. The modeling results indicated a good fit between the simulated and observed data. The model shows that building of solar house could increase the efficiency of nitrogen removal. With the aid of solar house, the removal rate of total nitrogen increased from 60.26%, 65.69%, 61.75%, 56.18%, to 65.08%, 69.09%, 66.10%, 61.82% during the seasons of spring, summer, autumn and winter, respectively.

Keywords: nitrogen removal; constructed wetland; Stella; solar house; Tibet.