

石家庄滨湖人工湿地去除农业径流中COD效果的测试与分析

Measurement and analysis of effect on COD removal from agricultural runoff in Lakeside Wangjiazhuang

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中文摘要:

研究处理农业径流的滨湖人工湿地中有机物(COD_{Cr}, 化学需氧量)的去除规律可为类似湿地的设计和运行提供参考。该研究报道了滇池东岸石家庄湿地(占地12000 m²)自2002年8月投入运行后23个月中的有机物去除的季节变化规律。该湿地的优势植物种为茭草(*Zizania caduciflora*)和芦苇(*Phragmites australis*), 5条农业区汇水干渠的来水经过布水堰布水后均匀地流过湿地。2002年10月~2004年6月期间, 湿地表现出较好的拦截沟渠来水中有机物的能力, 有效地降低了滇池的外源有机物污染负荷。旱季(每年11月~翌年4月)和雨季(每年5月~10月)的平均流量分别为497.6 m³/d和747.4 m³/d。进水COD_{Cr}的负荷为36.1 g/(hm²·d)(旱季)和67.9 g/(hm²·d)(雨季), COD_{Cr}的平均浓度为87.1 mg/L(旱季)和109 mg/L(雨季)。COD_{Cr}的出水平均浓度为45.1 mg/L以下(旱季)和53.7 mg/L(雨季), 分别满足一级A标准和一级B标准(城镇污水处理厂污染物排放标准, GB 18918-2002)。运行期间的平均水温为旱季17.3℃, 雨季21.9℃, COD_{Cr}的平均去除率为48.2%以上(旱季)和51.0%(雨季)。旱季和雨季湿地中COD_{Cr}浓度沿程降低, 旱季和雨季2/3流程处的COD浓度均低于1/3流程处, 农业径流可生化性较差导致湿地中前段的COD降解不明显。旱季湿地的出水受滇池水返混的影响比雨季的大, 因此旱季1/3处和2/3处之间的浓度差小。湿地表层土壤(0~40 cm)的pH值沿程升高, 有机质沿程降低。

英文摘要:

The research of seasonal removal regularity of organic matter(chemical oxygen demand, COD) in lakeside constructed wetland can provide references for the design and operation of similar wetlands. Wangjiazhuang constructed wetland(WCW), with surface area of 12000 m², located at the eastern lakeside area of Dianchi Lake, Yunnan Province. WCW with dominated helophytes(*Zizania caduciflora* and *Phragmites australis*) has been put into operation since August 2002. The inflow from five agricultural ditches converged at a water distribution ditch, and then equally flew into WCW. WCW showed better capability for COD removal from agricultural runoff between October 2002 and June 2004. Thus WCW effectively cut the external COD load of Dianchi Lake. The average inflows of wetland in dry season (from November to next April) and rainy season (from May to October) were 497.6 and 747.4 m³/d, respectively. Influent COD_{Cr} loads during dry season and rainy season were 36.1 g/hm²/d and 67.9 g/hm²/d, respectively. The average influent and effluent COD_{Cr} concentrations and water temperature were 87.1 mg/L, less than 45.1 mg/L and 17.3℃ during dry season, and 109 mg/L, 53.7 mg/L and 21.9℃ during rainy season. The effluent water quality can meet the standard A and B of grade I discharge standard of pollutants for municipal wastewater treatment plant during dry season and rainy season. The average COD_{Cr} removal rates were larger than 48.2% during dry season and 51.0% during rainy season. The COD_{Cr} concentration decreased along the flow path of WCW. The COD_{Cr} concentration difference between the foreside and rearward of WCW was lower in dry season than that in rainy season, because water of Dianchi Lake had higher influence on the COD_{Cr} removal capability of WCW in dry season than that in rainy season. The pH value of top soil(with depth of 0~40 cm) in WCW increased along the flow path, but organic matter content decrease

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