

研究论文

扎龙湿地芦苇沼泽蒸散耗水预测

王昊¹, 许士国¹, 孙砾石²

1.大连理工大学土木水利学院, 水环境教研室, 大连 116023

2.齐齐哈尔市气象局, 齐齐哈尔 161000

收稿日期 2005-7-29 修回日期 2006-3-26 网络版发布日期: 2006-5-25

摘要 使用扎龙湿地周边5个气象站1961~2000年最高气温、最低气温、降雨、风速的逐月数据, 采用建立的经验模型计算了扎龙湿地区域1961~2000年芦苇沼泽蒸散耗水量, 在IPCC数据发布中心4个GCMs模型 (HadCM3、CCSRNIES、CSIRO-Mk2、CGCM1) 未来60a气候情景下, 预测了2001~2060年湿地芦苇沼泽的蒸散耗水量, 分析了气候变化对湿地区域芦苇沼泽蒸散耗水量变化的影响。结果表明, 基于GCMs模型发布数据的计算结果在未来的3个时段内 (2001~2020年、2021~2040年、2041~2060年) 的平均值均大于前40a平均值, 最高气温、最低气温的上升是芦苇沼泽蒸散耗水变化的决定因素, 二者升温速度的差异决定蒸散耗水的变化趋势, 根据GCMs预测的未来气候情景, 在研究区域最高气温上升1.1~3.5℃、最低气温上升1.2~3.9℃的情况下, 芦苇沼泽蒸散耗水量将增加15%~22%, 湿地区域的生态用水需求将进一步增加

关键词 [气候变化; GCMs; 最高气温; 最低气温; 蒸散耗水速度; 扎龙湿地](#)

分类号 [P343, Q143, Q948, TV211.1+1](#)

The prediction on reed swamp evapotranspiration in Zhalong wetland, China

WANG Hao¹, XU Shi-Guo¹, SUN Le-Shi²

1. Department of Civil Engineering, Dalian University of Technology 116023, China;

2. Weather Bureau of Qiqihar, Qiqihar 161000, China

Abstract Evapotranspiration (ET) of major aquatic plants in wetland is usually needed to be evaluated in water resources management to provide optimum water for wetland. Reed swamp is a typical underlying type of Zhalong wetland, and is also the critical living condition for aquatic birds, such as crane and swan. In order to study the rules of ET change in wetland, and make scientific prediction for ET water requirement during different periods, a study was performed to investigate the trend of climatic factors in Zhalong wetland. The ET for the period of one hundred years (1961 to 2060) was estimated and predicted. In addition, the effect of climate change on wetland was analyzed.

An empirical model which coupled the maximum temperature (T_{max}), the minimum temperature (T_{min}), wind speed at 2 meter (U_2), and precipitation (P), was used for ET calculation and sensitivity analysis for meteorological variables. The univariate Mann-Kendall (M-K) test was conducted to investigate the trend of meteorological variables on different research sites. During the period of 1961~2000, the meteorological data set at five weather stations around Zhalong wetland was used for ET estimation. During the period of 2001~2060, the climatic scenarios of four General Circulation models (GCMs), HadCM3, CCSRNIES, CSIRO-Mk2 and CGCM1, were utilized to predict future ET.

The M-K test of meteorological variables showed that the predicted data from GCMs could reflect the actual change trend for the study area, and the test results were reasonable. The results showed that the mean ET for the periods of 2001~2020, 2021~2040, and 2041~2060, is larger than the mean value in the past forty years. The T_{max} and the T_{min} were proved to be two dominating factors which influence ET significantly, and the difference in the increase rate between T_{ma

扩展功能	
本文信息	
▶ Supporting info	
▶ [PDF全文](OKB)	
▶ [HTML全文](OKB)	
▶ 参考文献	
服务与反馈	
▶ 把本文推荐给朋友	
▶ 加入我的书架	
▶ Email Alert	
▶ 文章反馈	
▶ 浏览反馈信息	
相关信息	
▶ 本刊中 包含“气候变化; GCMs; 最高气温; 最低气温; 蒸散耗水速度; 扎龙湿地”的相关文章	
▶ 本文作者相关文章	
· 王昊	
· 许士国	
· 孙砾石	

T_x and T_{\min} determined the change trend of ET. The results also showed that the wind speed will decrease about 0.28 percent, and precipitation will increase about 4.7 percent. The influence of wind speed and precipitation on ET will be less than one percent, which is not significant compared to T_{\max} and T_{\min} . Based on the results of GCMs prediction scenarios, the increase of T_{\max} ($1.1\sim 3.5\text{ }^{\circ}\text{C}$) and T_{\min} ($1.2\sim 3.9\text{ }^{\circ}\text{C}$) will result in additional water consumption of 15%~22% for reed swamp. In the future, the water requirement of ET in wetland will increase evidently, since the wetland surface will become dryer without significant precipitation increment, which could lead to the increase of the ecological water demand in the wetland region.

Key words climate change; GCMs; the maximal temperature; the minimum temperature; evapotranspiration rate; Zhalong wetland

DOI

通讯作者 王昊 sgxu@dlut.edu.cn