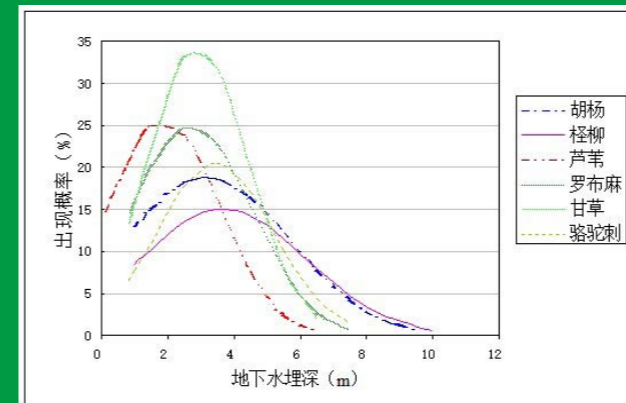


论文类成果

中国西北地区生态需水研究



干旱区典型非地带性植物群落与地下水埋深符合高斯曲线： $y = ce^{-0.5(x-u)^2/\tau^2}$

【创新性】

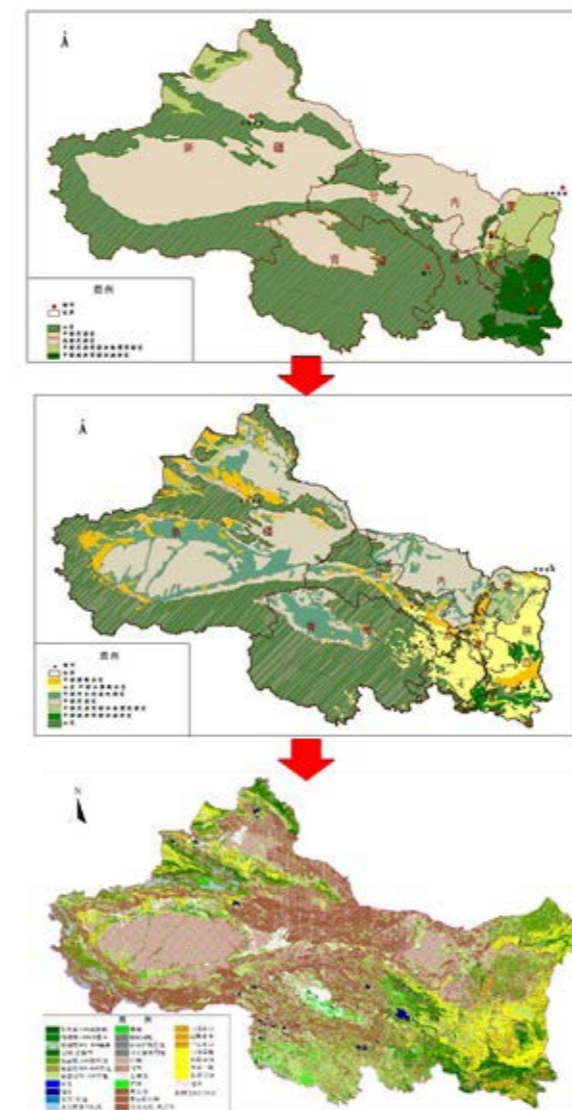
在理论上，将自然地理学中的地带性原理与水文学中的径流形成原理结合，提出植被生长需水的区域分异规律，即地带性植物生长不需要水资源支撑，非地带植物生长需要水资源支撑，从理论上区别出哪些植物生长需要水资源；并针对典型非地带性植物，研究植物群落与地下水埋深的关系，利用高斯曲线数量化，分析最适宜的地下水埋深，支撑植物耗用水定额的准确确定。在技术上，采用当时比较先进的遥感和地理信息系统技术，实现了植物分异规律的空间分区，支撑起任意大小单元的生态需水计算。在实际成果方面，首次准确量化西北地区共计 48 个四级流域涉及 14 个生态类耗水与工农生国民经济耗水，明确了干旱区径流出口后每方水的详细去处。

【影响力】

论文发表之际正值西部大开发，需求引发的关注，使其有幸被评为中国科学技术学会首届优秀论文奖。该文章基于“九五”科技攻关西北水资源项目完成，是项目的主要创新成果之一，随后该成果直接应用于工程院西北水资源项目，并支撑工程院提出“干旱区国民经济用水与生态用水应该各占 50%”的重要结论，该结论指导全国第二次水资源综合规划以及后续近 10 年的西北水利工程建设规划。论文提出的植被需水地带性规律不仅直接支撑干旱半干旱区水资源开发利用与生态建设，而且成为植被生态水文常用的普适理论抑或基础理论，论文发表近 20 年后，仍然每年有一定的引用量，到目前，文章的总下载 3538 次，总引文 541 次。

主要完成人：王芳、陈敏建、王浩、梁瑞驹、
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获奖单位：水资源所



【Innovation】

It combines the zonality theory in natural geography and the runoff formation theory in hydrology in theory, presents the regional differentiation law of water requirement for vegetation growth--water resource support is not needed in zonal vegetation growth and is needed in non-zonal vegetation growth, and identifies which plants require water resources in their growth in theory; researches the relationship between typical non-zonal vegetation communities and groundwater depth, analyzes the optimal groundwater depth through quantification using the Gaussian curve and thereby, supports the accurate determination of quotas of water consumption of vegetation. In technology, it realizes the spatial distribution of vegetation differentiation law using the remote sensing and GIS technologies, relatively advanced at that time, and backs up the calculation of ecological water requirement for varying unit. Regarding actual achievements, it quantizes 14 ecological water consumptions and industrial, agricultural, domestic and national economy's water consumptions in 48 fourth-class basins in northwestern areas, and points out the detailed destination of every square meters of runoffs flowing out mountain pass in arid areas.

【Influence】

The thesis was published during China's Western Development and aroused great concerns, thanks to which it won the First Excellent Award of China Association for Science and Technology (CAST). This thesis was completed on the basis of the northwestern water resources project of the science and technology program during the Ninth Five-Year Plan period and served as a major innovative achievement that was then directly applied to the northwestern water resources project of CAE and supported CAE to draw the important conclusion that "national economy water consumption and ecological water consumption should either take up 50% in arid areas". The conclusion guided China's second comprehensive planning of water resources and the planning of northwestern water resources projects in following 10 years. The zonal law of water requirement in vegetation, presented in the thesis, not only supports the development and utilization of water resources and ecological construction in arid and semiarid areas, but also becomes the general theory or basic theory for vegetation eco-hydrology. Though it was published nearly 20 years ago, the thesis is still cited every year and up to now, it has registered 3,538 downloads and 541 citations.

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RESEARCH ON THE ECOLOGICAL WATER REQUIREMENT IN NORTHWEST AREAS OF CHINA