



Vegetation ecological water requirement in South China

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South China covered about 20% of the total area of China, with two big rivers, Yangtze River and the Pearl River get through this area. The karst landform are widely distributed in this area. Intensive vegetation degradation and severe rocky desertification have threatened the local ecological security. Water has been a key factor limiting the eco-restoration and construction of the vegetation. However, we do not know whether the water can satisfy the vegetation ecological water demand in this area.

In this study, we explored the minimum and suitable ecological water requirement and the water use efficiency in South China based on the MOD16 datasets. The results indicated that the mean value of the minimum ecological water requirement is 528.9mm in South China, and the suitable water requirement is 686.8mm. In many parts of the Sichuan, Yunnan, Hubei Provinces, water cannot meet the minimum ecological water requirements. There needs about 100-300mm to meet the minimum ecological water requirements in these areas. The ecological water requirements in the karst area and the non-karst area were 520mm and 532mm. Severer Rocky desertification areas need more ecological water than light and potential rocky desertification area. Water requirements are also different for the different land use type. The suitable ecological water requirement lack of 89mm-136mm in the Evergreen Needle-leaf Forest, Mixed Forest, Closed Scrubland and the Croplands. Water use efficiency in the Evergreen Broad-leaf forests, Evergreen Needle-leaf Forest, Mixed Forest, Closed Scrubland were more than $1\text{kg}/\text{m}^3$, but in the croplands was $0.9\text{-}1\text{kg}/\text{m}^3$, and in the grassland was only $0.6\text{-}0.8\text{ kg}/\text{m}^3$.

This research could be helpful for improving water resource management and the rocky desertification management in South China.