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研究论文

人口、富裕及技术对2000年中国水足迹的影响

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摘要 21世纪水资源短缺问题将成为全球资源环境的首要问题，由于水资源的诸多问题与人类活动密不可分，因此辨明人类活动各因素对水资源影响作用的大小，并依此找寻发展的对策是当前水资源可持续利用研究的一个核心问题。在计算2000年中国的水足迹的基础上，应用STIRPAT模型分析了中国水足迹的影响因素，分解了人口、富裕和技术等对中国水资源的环境影响。结果表明：2000年，中国水资源的消费足迹为7678.45亿m3，人均609.3m3/a。人口数量是当前我国水足迹的一个主要驱动因子，富裕程度的提高会增加人类对水资源的总消费，气候因素和区位条件对水足迹具有显著影响，而提高土地生产能力对减少水足迹具有重要作用。在观测数据范围内，分析结果并不支持环境Kuznets曲线存在的论断。最后分析讨论了水足迹研究需要进一步完善的问题以及STIRPAT模型实证分析的政策意义。

关键词 水足迹；人口；富裕及技术；环境影响；STIRPAT模型；环境Kuznets曲线

分类号 Q14

Impacts of population, affluence and technology on water footpring in China

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Abstract Growing evidence demonstrated that humans have dramatically altered the global environment. Identifying the specific forces driving environmental impacts is a hot topic in the field of sustainable development. One key limitation to a precise understanding of anthropogenic impacts is the absence of a set of refined analytic tools.

The water footprint index has been used as a comprehensive impact measure of water use in relation to consumption of people, which indirectly reflect anthropogenic pressure on the environment. Our empirical analysis show that the China's water footprint of China is 7678.45×108 in 2000, which is 609.3m3/(cap•a). The measure of water footprint allows comparison across types of impacts by estimating the quantity of water that would be required to support the material consumption of a nation or country. The difference between provinces (cities) is large: Qinghai province who has an average water footprint of 999 m3/(cap•a) is the largest one, while Guangxi province has the lowest average water footprint, which is 477 m3/(cap•a).

With a view to dismantling the anthropogenic driving forces of water footprint, the modified IPAT-called STIRPAT（STochastic Impacts by Regression on Population(P), Affluence(A) and Technology(T)）-has been employed as a common analytic framework. Since T represents all factors that influence impacts other than population and affluence, the additional factors can be incorporated in the STIRPAT by disaggregating T in the original IPAT identity. Our analyses show that population is a major driver of water footprint, and it has a proportional effect (approximately unitar

y elasticity) on water footprint, and affluence monotonically increased the water footprint with a relative less degree than population. Natural location and climatic conditions appeared to affect the water footprint. Another important finding in the empirical study is that there is no evidence of an environmental Kuznets curve for water footprint within the range of calculated data. Some potential improvements in some further researches and suggestions to alleviate the water pressure were put forward in the last section.

Key words water footprint； population； affluence and technology； environmental impact； STIRPAT model； environmental Kuznets curve

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