

研究论文

区域生态经济系统的物质输入与输出分析——以常州市武进区为例

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摘要 运用物质流分析(MFA)方法, 对江苏省常州市武进区生态经济系统中物质输入与输出进行了系统的分析, 结果表明: (1) 随着社会经济发展和人口增长, 武进区物质输入总量及人均物质输入量也在增加, 但递增率均远小于GDP增长速率, 而物质输出总量及人均物质输出量则呈现递减趋势; (2) 在不考虑水的因素情况下, 武进区物质输入量保持较快的上升速度, 其中固体物质的增长速率远远大于气体物质的增长速率; 物质输出量则呈总体下降趋势, 其中以气体物质输出量的贡献最大, 对环境造成污染的物质以气体特别是以化石燃料燃烧排放的废气和工业废气为主; (3) 排除占大部分比例农业用水的上升, 工业用水、城镇生活用水和地下水总量及人均利用强度都在减少; 同时, 总的废水排放量及人均排放量在减少, 其中又以生活废水排放量的减少最快, 其次是工业废水; (4) 单位GDP物质输入量的变化处于波动状态, 同期的单位GDP物质输出量则呈递减趋势, 单位GDP用水量和单位GDP废水排放量则有相同的递减趋势, 表征了武进区资源利用效率的稳步提高, 区域经济增长和环境压力也在逐步脱钩。上述结果体现了武进区近年来循环经济发展模式的优势, 但还存在较多问题, 说明武进区在调整物质利用强度和提高资源利用效率方面还需下更大的功夫, 并采取相关措施, 以期提高实施循环经济战略与建设节约型社会的地位和意义。文章最后结合研究区实际情况就区域环境-经济的协调发展进行了展望, 指出了物质流分析方法在应用中的一些缺陷, 为今后该领域的进一步研究提供了借鉴。

关键词 物质流分析(MFA); 生态经济系统; 物质输入与输出; 武进区; 物质消耗强度; 物质利用效率

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Material flow analysis (MFA) of an eco-economic system: a case study of Wujin District, Changzhou

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Abstract The economy and ecological aspects of a social system are coherently linked and can be examined by its material and energy flows. In this study, we used the material flow analysis (MFA) to model the material input and output of Wujin District of Changzhou City, Jiangsu Province. We found that: (1) the total material inputs and the material inputs per capita increased with economic development, while the total material outputs and material outputs per capita decreased consistently; (2) except water, the total material inputs continue to increase, and the input of solid materials grows faster than that of gaseous materials, while the total material outputs kept reducing; and the gas outputs counted the largest portion of the output, resulting the primary environmental pollution as fossil fuel burning; (3) agricultural water use continued increasing while industrial and residential water use decreased by per capita. The total wastewater emission and the emission per capita decreased, with a faster decreasing rate of residential wastewater emission followed by industrial wastewater emission; (4) the material inputs per unit GDP varied and the material outputs per unit GDP decreased. We also found a decreasing trend in both water use and wastewater emission per unit GDP. These results suggested that the efficiency of resource use in Wujin Dis

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trict has been accelerating as the economic and environmental changes are tightly coupled. Additionally, we discussed the harmonic development between environment and economy using the Wujin District as an example. Potential limitations of MFA's application were also discussed for future research. Effective measures should be taken to raise the status and significance of practicing circular economy strategies in constructing the environmental balance of an economical system.

Key words [material flow analysis \(MFA\)](#) [eco-economic system](#) [material input-output](#) [wujin district](#) [material depleting intensity](#) [material use efficiency](#)

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