

研究论文

# 生态足迹与生态承载力非线性动力学分析

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**摘要** 考虑到进出口贸易对区域(国家)生态足迹和生态承载力产生的重要影响, 基于生态足迹模型理论建立了生态足迹、生态承载力和对外贸易三者之间的非线性动力学模型。研究表明: (1) 区域平衡态的生态足迹和生态承载力成线性关系, 在某种程度上与Mathis Wackernagel的论证相吻合; (2) 区域最大生态承载力增大将导致平衡态的生态足迹和生态承载力增大, 通过保护环境、控制建设用地、加强土地整理等增加各类生态生产性土地面积(耕地、牧草地、林地、水域等), 通过科技、资金投入、管理等提高地方单产, 不仅能提高生态承载力, 还直接关系到生态足迹的大小; (3) 一个区域或国家要实现人口、经济、资源的可持续发展, 必须确保区域单位贸易的生态足迹大于其最大生态承载力与最大生态足迹的比值。尽量多进口自然资源性的初级生物产品, 少进口高附加值的技术性产品和“奢侈性”消费品(如小汽车); 出口自然资源性的初级生物产品, 实际上是在出口生态承载力, 应多出口人力资源、科技、管理、教育等隐形的社会资源。4) 进一步揭示了贸易结构合理、自主创新对区域可持续发展的重要性。

**关键词** [生态足迹](#); [生态承载力](#); [非线性动力模型](#)

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## A nonlinear dynamic analysis of ecological footprint and biocapacity

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**Abstract** Based on the ecological footprint model and considering the major influence of import and export trade on regional ecological footprint and biocapacity, this paper constructs a nonlinear dynamic model for ecological footprint, biocapacity and foreign trade. Research results show that: (1) in a regional equilibrium state, there is a linear relationship between ecological footprint and biocapacity, which proves Mathis Wackernagel's point in a way; (2) the increase of a regional maximum biocapacity will induce the increase of equilibrium ecological footprint and biocapacity, which indicates that to increase every kind of productive and ecological land area by protecting environment, controlling building land, strengthening land management, etc., and to raise per unit regional output through science and technology, cash investment, management, etc. can not only improve biocapacity, but also directly influence the scale of ecological footprint; (3) maintained the ecological footprint of per unit trade is bigger than the ratio of maximum biocapacity to maximum ecological footprint should be for the sustainable development in a region or country. That means to import more natural-resourced primary bio-products and less technical products with high additional value and luxuries (eg., car). As a matter of fact, exporting nature-resourced primary bio-products is to export biocapacity, thus we should enlarge the export of those invisible social resources, such as human resources, science and technology, management, education, etc.; 4) rational trade structure and independent innovation are vital to regional sustainable development.

**Key words** [ecological footprint](#); [biocapacity](#); [nonlinear dynamic model](#)

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