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《产业生态学报》

1998 年冬，第 2 卷第 4 期，15–27 页

题目：朗讯产业生态学奖学金项目

作者：Robert Laudise，Ralph Taylor-Smith

关键字：学术支持，企业赞助，资助，未来方向，赠款，影响和评价

摘要：本文回顾了从 1992-1997 年期间由朗讯基金会资助的产业生态学奖学金项目，并总结了该项目的起源和历史。在此期间，该项目共资助了 33 项研究。本文列出了在此期间受到资助的全部教授名单及其的研究课题，这些课题的范围涵盖了物理、工程学、经济学、公共政策和法律。我们评估了该项目的影响，并对朗讯基金会对于新兴产业生态学研究的资助所产生的广泛影响和后果进行了客观评价。此外，我们还讨论了该领域未来发展方向，并强调了全面质量管理原则对把产业生态学理论推向实际应用的重要性。

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Lucent Industrial Ecology Fellowship Faculty Program

Robert Laudise and Ralph Taylor-Smith

Keywords:
academic support, corporate sponsorship, funding, future directions, grants, impacts and assessments

Summary:
In this report, we review the Lucent Foundation-funded Industrial Ecology Fellowship Program for the 1992-1997 period and summarize the program genesis and history. During that period, 33 fellowships were awarded. This article gives a complete listing of funded faculty fellows and their research topics, which range from physical science and engineering to economics, public policy, and law. We assess the program impacts and present an objective evaluation of the widespread influence and consequences of Lucent Foundation support of the emerging paradigm of industrial ecology. In addition, we discuss future directions for the field and emphasize the significance of total quality management concepts in the reduction of industrial ecology principles to practice.

《产业生态学报》

1998 年冬，第 2 卷第 4 期，29-43 页

题目：先学后做：产业生态学模拟和模型研究

作者：David Rejeski

关键字：环境政策，创新，学习曲线，建模，组织学习，模拟

摘要：在过去十年中，计算机技术的进步，加上虚拟原型设计和模拟技术的发展，大大改变了我们在培训、设计、产品和过程开发等方面的做法。所有这些发展代表了自社会化大规模生产模式推广以来，在基本生产方式方面最重要同时也是对环境影响最大的变化之一。这种发展不仅增加了产业生态学工具箱中的工具，他们还为我们从根本上改变认识和解决环境问题的方式提供了可能，即从学得太晚转变为在行动之前学习。产业生态学应当接受和应用这个新的学习方法，并将其广泛应用到解决在日益复杂的世界中促进社会和技术创新的挑战中去。

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Learning Before Doing: Simulation and Modeling in Industrial Ecology

David Rejeski

Keywords:
environmental policy, innovation, learning curves, modeling, organizational learning, simulation

Summary:
Over the past decade, advances in computing, combined with new techniques for virtual prototyping and simulation, have altered our approach to the areas of training, design, and product and process development. Taken collectively, these capabilities represent one of the most significant changes in the production paradigm since the beginning of mass production and one with important implications for the environment. These advances need to be viewed as more than just a new set of tools in the industrial ecology toolbox. They provide the basis for a fundamental shift in how we learn and solve environmental problems - an opportunity to move from learning too late to learning before doing. Industrial ecology can embrace and articulate this new framework for learning and apply it broadly to the challenge of facilitating social and technological change and innovation in an increasingly complex world.

《产业生态学报》
1998 年冬，第 2 卷第 4 期，45-60 页

题目：重金属平衡 I：农业生态系统的镉，铜，锌以及铅平衡研究的基本方面

作者：Simon Moolenaar, Theo M. Lexmond

关键字：农业，重金属，物质平衡，物流，土壤污染，物流分析

摘要：如何控制重金属同时又不影响土壤功能和产品质量是可持续农业的先决条件。重金属在农业土壤中积累的状况随地理区域、金属种类和农业系统变化而存在很大的差别；在一些地区，例如在荷兰和澳大利亚，重金属含量已经达到必须重视的水平。开展一项有关农业系统中隔、铜、铅和锌投入产出流量分析，以及它们在农业土壤中相应积累的研究对于制定一项确保这些重金属在农业系统中得到可持续管理的战略极其重要。本文在广泛的材料流分析和产业生态学基础上，描述了农业领域中重金属平衡研究的基本内容。我们对研究方式的选择是谨慎的，并与实际问题相关。

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Heavy Metal Balances I: General Aspects of Cadmium, Copper, Zinc, and Lead Balance Studies in Agro-Ecosystems

Simon Moolenaar and Theo M. Lexmond

Keywords:
agriculture, heavy metals, mass balance, materials flows, soil contamination, substance flow analysis

Summary:
The control of heavy metals in such a way that soil functioning and product quality are not impeded is a prerequisite to sustainable agriculture. The current status of heavy metal accumulation in agricultural soils differs widely by region, by metal, and by agricultural system; levels of concern have already been reached in several regions (for instance, in the Netherlands and Australia). An analysis of the input and output fluxes of cadmium (Cd), copper (Cu), lead (Pb), and zinc (Zn) in agriculture and of their resulting accumulation in agricultural soils is necessary to define strategies that ensure sustainable management of these metals in agricultural systems. In this article, general aspects of heavy-metal balance studies are described for the agricultural sector within the broader context of substance flow analysis and industrial ecology. The approach chosen in this study is both precautionary and related to actual problem areas.

《产业生态学报》
1998 年冬，第 2 卷第 4 期，61-77 页

题目：公司层面的可持续性指数：污染和资源效率做为可持续性的一个必要条件

作者：Daniel Tyteca

关键字：电力公司，环境定性指标，环境定量指标，线性规划，生产效率，可持续性

摘要：在回顾近期可持续发展指标发展状况的基础上，本文指出如何使用生产效率原则在公司层面上制定这类指标。生产效率理论得到一定程度的拓展，包含了可持续发展的基本问题：环境、公平和未来性。在经过拓展的生产效率概念中，效率被认为是可持续发展的必要条件。我们在使用可持续发展综合指标时，生产效率与综合表现指数共同作用时，不能放松对相关的基础信息进行追踪。因此，与其发展一个特别的综合指数，我们建议采用几个不同的指标，分别表示不同的内容（例如环境问题、社会问题）。我们以美国燃烧化石燃料的火力发电厂的一小套数据为例，阐述了可持续发展指标的定义。从可持续发展角度来看，有两个方面极其重要，即不可再生资源的使用和把就业作为一个需要最大化变量而不是需要最小化的投入。文章结尾讨论了所建议指标的意义和局限性。

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On Sustainability Indicators at the Firm-Level: Pollution and Resource Efficiency as a Necessary Condition Toward Sustainability

Daniel Tyteca

Keywords:
electric utilities, environmental indicators, environmental metrics, linear programming, productive efficiency, sustainability

Summary:
After reviewing recent attempts to develop sustainability indicators, this article shows how the principles of productive efficiency can be used to elaborate such indicators at the firm level. The theory of productive efficiency is somewhat expanded to incorporate fundamental issues of sustainable development: environment, equity, and futurity. Efficiency, in the expanded notion of productive efficiency, is viewed as a necessary condition for sustainability. Working with aggregate performance indicators, it is important not to lose track of the relevant basic information. Therefore, instead of elaborating one unique indicator, we propose to implement several kinds of indicators, each of which stresses one particular focus (e.g., environmental vs. social concerns). The definition of sustainable development indicators is illustrated with reference to a small data set of U.S. fossil fuel-fired electric utilities. In a sustainability perspective, two important aspects are stressed, namely, the use of nonrenewable resources and the inclusion of employment as a variable to maximize rather than an input to minimize. The article ends with a discussion of the significance of, and limits to, the proposed indicators.

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1998 年冬，第 2 卷第 4 期，79-92 页

题目：材料再使用模型：工业园区水回用案例分析

作者：Sara E. Keckler, David T. Allen

关键字：工业园区，产业共生，线性规划，废物处理，废水回用，水回用

摘要：我们将已经很成熟的水分配模型技术应用到位于美国休斯顿市的 Bayport 化工园区的水管理中。针对各种可能选择（包括重新设计工业用水网络，在网络中增加设施，限制网络总供水量和改变水价），我们使用了线性规划和其他数学规划方法来评估水回用机会。模型分析结果表明对于这些工厂而言，可能存在多种经济可行的水回用机会。更有普遍意义的是，这个为水回用开发的数学模型还可能适用于对其他材料再使用的研究。

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Material Reuse Modeling: A Case Study of Water Reuse in an Industrial Park

Sara E. Keckler and David T. Allen

Keywords:
industrial park, industrial symbiosis, linear programming, wastewater treatment, water reclamation, water reuse

Summary:
The techniques of water distribution modeling, a well-developed subject, have been applied to water management in an industrial park - the Bayport chemical manufacturing complex in Houston, Texas in the United States. Linear and other mathematical programming approaches were used to evaluate water reuse opportunities for a variety of scenarios, including redesigning the industrial water use network, adding a facility to the network, limiting the total water available to the network, and varying the price of water. The results of the modeling demonstrate that a number of economical water reuse opportunities may exist for this network of facilities. More generally, the types of mathematical models developed for water reuse may find application in reuse modeling for other materials.

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题目：印度人为产生的总挥发性有机物排放

作者：Chandra K. Varshney, Pratap Kumar Padhy

关键字：空气污染，人为产生的挥发性有机物(VOCs)排放，烃，臭氧，总挥发性有机物(TVOCs)，VOCs 排放清单

摘要：易挥发有机物(VOCs)对臭氧和大气中其他活性化学物质都有直接作用，并在很大程度上影响空气质量。VOCs 排放的增加主要是因为化石燃料燃烧以及相关活动的不断增长。本文给出了一个印度人为活动的 VOCs 排放清单。我们从文献中归纳出了重要来源以及获得的 VOCs 排放因素，并且尽可能地应用印度排放因素指数。VOCs 的重要来源包括：畜牧、薪材和化石燃料燃烧、稻田、制造业、石油（开采和炼制）、天然气（开采和输送）、汽车尾气排放和煤矿开采。印度每年人为排放的 VOCs 估计为 2100 万吨。由于收入（GDP）、人口、土地面积等工业和经济发展水平不同，通过比较各国 VOCs 排放清单，就可以发现这些国家之间的差别。这个 VOCs 排放清单为不同时间与国家的比较提供了基线信息。此外，它还可以用来作为制定 VOCs 排放国别控制政策的重要工具。

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Emissions of Total Volatile Organic Compounds from Anthropogenic Sources in India

Chandra K. Varshney and Pratap Kumar Padhy

Keywords:
air pollution, anthropogenic volatile organic compounds (VOCs) emissions, hydrocarbons, ozone, total volatile organic compounds (TVOCs), VOC emissions inventory

Summary:
Volatile organic compounds (VOCs) have a direct bearing on the levels of ozone and other reactive chemicals in the atmosphere and play an important role in determining air quality. Anthropogenic emission of VOCs has greatly increased due to growing consumption of fossil fuels and related activities. This article presents an emissions inventory for VOCs emitted from anthropogenic sources in India. VOC emissions factors for important source categories and activities are assembled from the literature and an effort is made to use Indian emission factors as far as possible. Important sources of VOCs include livestock, combustion of firewood and fossil fuels, rice paddy fields, manufacturing, petroleum (production and refining), natural gas (production and distribution), vehicular exhaust, and coal mining. The annual anthropogenic VOC emissions for India have been estimated to be 21 million metric tons (mt). A comparison of VOC emissions inventories for a group of countries varying in their industrial and economic development, in terms of income (gross domestic product, or GDP), population, and land area, reflects the differences among the countries. This VOC emissions inventory provides baseline information for comparisons over time and across countries. In addition, it may serve as an important tool for formulating national VOC control policies.