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# Pollution Footprint:A Type of Ecological Footprint Based on Ecosystem Services

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After nearly twenty years of development,ecological footprint has become one of the most widely methods for sustainable development assessment.The ecological footprint is,however,unable to evaluate the impacts of human activities on natural eco systems in an all-round way.There are a multitude of deficiencies in conventional ecological footprint theories.For example,nei ther does the conventional ecological footprint involve the utilization of other ecosystem services except primary product provi sion,nor it accounts for other pollutants except CO<sub>2</sub> released by human activities.In addition,there have some inherent contradi ctions involved in both the calculation methods and the selection of variables involved in the energy footprint.Through compre hensive analysis of such deficiencies,the authors indicated that the failure of the conventional ecological footprint in providing a comprehensive measurement on human impacts lies in that the assumption of the exclusive land function has prevented the n on-bioproduative commodities and services from being considered.To overcome the limitations in conventional ecological foo tprint theories,the authors suggested that the multi-functionality of land should be acknowledged.Furthermore,a concept of eco system services-based ecological footprint was proposed.The ecosystem services-based ecological footprint is defined as the a ggregated area of land and water in a variety of ecological categories that is claimed by a certain group of population to provid e all types of ecosystem services they consume.The authors also elaborated the model construction and calculation methods of ecosystem services-based ecological footprint,in particular pollution footprint.The pollution footprint,an ecological footprint b ased on pollution absorption,is a typical ecosystem services-based ecological footprint.It is noted that the pollution footprint is not a simple replacement of energy footprint in the conventional ecological footprint;it is able to account for most pollutants in curred by human activities and to be further clarified in terms of different classes or types of pollutants.Difficulties in pollution footprint calculation include 1) pollutant transfer mechanisms and 2) the determination of the quantity of pollutants for each ty pe of land cover and the capability of these land covers to accommodate pollution.The difficulty in application rests on the det ermination of the relationship among footprints of different classes or types of pollutants.

【Key Words】 : **Ecological footprint Ecosystem services Ecological footprint based on ecosystem services Pollution footprint**

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