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# The contents and methods of integrated ecosystem assessment (IEA)

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Ecosystems provide many kinds of products and services to human society. However, we still know less about current conditions of ecosystem and their future trends though they have been greatly altered by us in the past centuries. It is urgent to make an integrated ecosystem assessment in supporting decision making for ecosystem management to realize sustainable development. The conceptual framework and assessment procedures of integrated ecosystem assessment were developed in this paper. Integrated ecosystem assessment (IEA) is the basis for ecosystem management, which mainly includes the analysis of important goods and services of ecosystem, the diagnosis of ecosystem health, the prediction of future trends of ecosystem, as well as the relevant economical and social analysis. Integrated ecosystem assessment should also be carried out from a point of view of broad temporal and spatial scales, because long term ecological processes often exist in the "invisible present" and ecosystems interact with each other at different scales, which is also a challenge in the establishment of assessment indexes. The services of ecosystem are critical to the functioning of the earth's life support system. However, they have not been paid much attention in policy decision because they are not fully accepted in commercial market or not adequately in terms of comparable value with economic service and manufactured capital. Actually, they are useful in estimating the "incremental" or "marginal" value of ecosystem service. Ecosystem services can be catalogued into four levels according to their functions, and can be evaluated by using five methods. They are, (1) direct market value method, (2) indirect market value method, (3) conditional estimation value method, (4) production/cost method, and (5) actual market influence estimation value method. Actually, integrated ecosystem assessment is of practical importance mainly because it focuses much more on the trade offs among various goods and services, which is also the task of ecosystem management. Ecosystem health is a new concept in ecology, which can be interpreted as a certain condition of ecosystem. Ecosystem health is analogous to human health, and many researchers have proposed lots of sensitive ecosystem health indicators. Ecosystem health can be assessed from vigor, organization and resilience. Each aspect can be assessed by different methods and formulae. Ecosystem management is founded on the principles of preserving ecosystem integrity while maintaining sustainable benefit for human society. It is driven by explicit goals, executed by policies, protocols and practices, and need to be adjusted by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure and function. Sustainability is its ultimate goal. The principles and methods of ecosystem management are introduced, and the elements and obstacles are also discussed. Ecosystem management should be adaptive not only because our new findings in research, but also because ecosystem management requires ecologists' ongoing interaction with managers and the public. The communication should be bidirectional, which means scientists must be willing to prioritize their research with regard to critical management needs. Although there are many researches elucidating the ecosystem goods and services, health, and management respectively, their relationships has not been discussed, and their combination use in practical assessment has not been discussed. Actually, what decision makers need is integrated ecosystem assessment. That is, the coordination of these three aspects. In doing this, there are two challenges at present, the trade off of ecosystem services, and the establishment of assessing indexes regarding different temporal and spatial scales. This paper clarifies the problems.

【Key Words】 : **integrated ecosystem assessment ecosystem services ecosystem health ecosystem management**

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