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专论与综述

生态风险评价研究进展

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摘要 20多年来，生态风险评价研究经历了从环境风险到生态风险到区域生态风险评价的发展历程，风险源由单一风险源扩展到多风险源，风险受体由单一受体发展到多受体，评价范围由局地扩展到区域景观水平。区域生态风险评价就是大尺度上研究复杂环境背景下包含多风险源、多风险受体的综合风险研究。目前，区域生态风险评价的理论框架已经搭建起来，统计方法多采用相对评价法。区域生态风险评价未来的发展方向为继续加强实验和野外调查，进一步减小不确定性，逐步解决尺度推移问题。区域生态风险评价必须与经济、社会、文化相结合，才能充分发挥它在管理决策中的作用。

关键词 生态风险评价；景观；区域；大尺度；区域生态风

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Progresses of ecological risk assessment

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Abstract Risk assessment beginning at 1980s has developed greatly in content, scale and methods of assessment from one chemical and one receptor to its current application at large spatial and temporal scales in the 20 years. In the 1980s, the main assessment content was from toxicity of one chemical to human health risk. In the 1990s, risk assessment as a management tool had to be applied to populations, communities, and eventually to the ecological landscape at large scales. The risk analysis of multiple stressors, not just multiple chemicals but multiple types of agents, was also taken into account. During the late part of 1990s and early 2000s, the ecological risk assessment was broadening to include not only chemicals and ecological affairs but also a wide variety stressors, such as the impacts of human activities(urbanization, land use and land cover change, fishery and climate change, etc.) and the assessment scale was expanding to region and landscape scales.

Frameworks and statistical models are the key of regional ecological risk assessment. The risk assessment framework presented in the National Research Council(NRC) Red Book played a key role in the development of ecological risk assessment. After years of modification, the assessment framework had been improved to be perfect till 1998. The Environmental Protection Agency(EPA) framework proposed an integrated framework that covered both human health and ecological risk assessment including a detailed description of the process and showing how the process co

uld be applied to a broad range of situations. Since then, various ERA framework have been dev eloped for use in some countries(e.g. Netherlands, Australia, United Kingdom) and for specific sit uations. The statistical methods are the quantitative methods of ecological risk assessment. For o ne chemical stressor, the ratio value model and exposure-response model are adopted, but for th e multiplestressors, multiple receptors, large scale of complex regional landscape, the methods are n't suitable because many uncertainties will appear during the extending from one stressor small sc ale to multiple stressors large scale. In the regional ecological risk assessment, Relative Risk Asse ssment(RRA) based on weight-of-evidence(WOE) are used widely. WOE approaches reported i n the literature vary broadly from subjective and qualitative to quantitative and the categories of w hich include qualitative combination, expert ranking, consensus ranking, semi-quantitative rankin g and sediment quality triad. WOE approaches could be used in retrospect assessment, causatio n assessment and the whole process of ecological risk assessment.
In the future, as a universal framework for ecological management, ecological risk assessment sho uld develop deeply in resolving the problems of scale extending, uncertainty and assessment stand ard. At the background of global ecological crisis, regional ecological risk assessment will emphas ized the fields and aspects in close relationship with global changes, such as human activities, geol ogical disasters and climate affairs and ecological risk resulting from policy error and ecology safe ty, etc. Regional ecological risk assessment has the potential of becoming quantitative tools of ma nagement decision if it integrated with economy, society and culture

Key words ecological risk assessment； landscape； region； large scale； regi onal ecological risk assessment； management decisio

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