River margins as indicators of climate change

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With 2 figures and 2 tables in the text

Concepts of river margins

Over recent years the focus of landscape ecology has fallen on zones of transition between adjacent ecosystems (Hanson et al. 1988, Weins et al. 1985 and Urban et al. 1987), with much of the emphasis falling on the aquatic-terrestrial interface. These areas occur between dry land and permanent water bodies and possess distinct plant communities and characteristic soil properties (Tiner 1993) which make these areas a valuable natural and cultural resource. They have a longitudinal aspect down the water course (which is characteristic of their regional location) and a latitudinal aspect perpendicular to the water course (which is dependent on the immediate surrounding area) and a vertical gradient (dependent upon local groundwater levels), thus landscape structure and function is the result of a number of spatial scales (see Fig. 1).

Areas which are intermittently to permanently flooded often have a high nutrient turnover capacity acting as source, sink and transformer to aquatic and terrestrial ecosystems (Schlesinger 1991). The function of riparian zones can be described in terms of a cascade system, determined by the interaction of hydrology, nutrient and carbon fluxes and human activity (Chauvet & Decamps 1989), whereby material and energy are controlled by a resource spiralling concept (Newbold 1981 et al.). At present there is a need to gain a greater understanding of these zones so that criteria can be established to allow their effective management (Decamps et al. 1990). Furthermore the ecological behaviour of these ecotones must be characterised, in terms of quantitative information, so that their role in the environment can be clarified.

Climate change

It is certain that a natural greenhouse effect is in operation which keeps the Earth warmer than it would be expected to be, based upon solar radiation inputs. Emissions from human activities are increasing the concentrations of the gases which regulate this greenhouse effect (e.g. carbon dioxide) and it has been predicted that the Earth’s temperature will rise concurrently (Houghton et al. 1990). Based upon the current best estimates (using a business as usual scenario) a mean 3 °C temperature rise will occur over the next century. Such a rapid change in climate is unprecedented and will have profound consequences for all aspects of the biosphere.