## Current Research at IIASA on Environmental Conservation

The emphasis at the International Institute for Applied Systems Analysis—IIASA—is on developing a wide range of approaches, procedures, and methods, to deal with the current and emerging problems arising as mankind, technology, and Nature, intersect and interact. The tools of modern science are used for a dual purpose: to understand better such evolving situations, and to evaluate alternative policy-options and management strategies that enable us to adapt to, and benefit from, ever-changing circumstances.

A part of the research at IIASA is focused on issues in agriculture, economics, energy, the environment, and population. It is buttressed by work on new mathematical, conceptual, and modelling, approaches. The interactions of people and their activities with the rest of The Biosphere are an integral component of all these issues.

For instance, IIASA is investigating the impacts on food production of short-term climatic variations and the likely long-term effects of carbon dioxide-induced climatic changes as part of UNEP's World Climate Programme. The study seeks to clarify what changes in the level or frequency of occurrence of climate variables cause a major impact on the viability of an economic and social system. Case-studies of cold, dry, and high-altitude, marginal areas with differing farm and trade arrangements are under way to help appraise which social responses are appropriately resilient.

Our acid rain study is assessing control strategies and energy options. The transformation, transport in the atmosphere, and disposition, of emissions of sulphur dioxide and nitrogen oxides are being examined, as are the effects of concentrations of pollutants on ecosystems. A system of models is being designed for use on a national or international level. These will trace and forecast the environmental and socio-economic consequences of different energy developments in Europe as a policy-guide for the management and control of acidification.

The refinement of concepts, methods, and computerized procedures, for environmental and resource-policy design that stresses adaptive management, grows from the ecological work undertaken by myself and colleagues at IIASA in the early 1970s and reported in this Journal in the Autumn issue of 1976*. Current research interest focuses on: specific case-studies of fisheries management; the proposed large-scale, unprecedented, interregional transfers of water in the USSR; and problems of resolving conflicts over competing uses of resources.

IIASA has an advantage in studying complex problems related to resource use. As a non-governmental Institute it is able to bring together policy-makers and scholars from many cultures, socio-economic systems, and disciplines in the physical and social sciences. This approach permits analysis of an issue from diverse perspectives and avoids the trap of assuming only a single concept, method, pattern of behaviour, or solution. Our research, now entering its second decade, concerns the interactions between dynamic and constantly-changing systems.

Mankind has always lived with uncertainty. But the scale, dimension, and possible dangerous outcomes, of the problems we face have changed; what was once local and contained can now have international consequences. There is an increasing sense of our vulnerability as the existing systems undergo their cycles of growth, turbulence, transformation, and renewal. The Chinese word for crisis, consists of two characters: one means 'danger' and the other 'opportunity'. Crises in our troubled world should be regarded as creative challenges.

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* *See* the account by the then Director of IIASA, Dr Roger E. Levien, entitled 'Ecological Management from an International Perspective', published in *Environmental Conservation*, **3**(3), pp. 183–4, 1976.—Ed.

## Survival at the Water's Edge?

In those transitional zones where land and water meet and merge, there lives a community of flora and fauna that is of outstanding importance and yet is at special risk. The Council of Europe's latest campaign sets out to stimulate action to preserve and maintain these areas—returning them, wherever possible, to their natural state. Achievement of this aim should not only guarantee the survival of the plants and animals themselves, but also ensure that resources which are vitally needed by Man continue to be available in future.

Action is needed to reverse the damage that was done when massed resources of mechanical technology were used to shape new shores and river banks and to pen rivers and streams within new and rigid confines. In the process, rivers were straightened and riparian forest, banks green with reeds and other semi-aquatics, freshwater flats and salt-marshes, were lost. Thus, in many parts of Europe, vital spawning, hatching, and feeding, grounds for fish and birds, have disappeared with alarming rapidity.

Industry sprang up along the new banks that had been created with the help of dams and dikes, and oil-tanks, cooling towers, and chimneys, became regular features of the scene. Now a steadily increasingly quantity of waste is carried downstream to the sea. The riverside plant-life, which once helped to repair the damage, has disappeared. For years, too, the leisure boom has been taking millions of people on weekend trips or an annual pilgrimage to rivers, lakes, and the sea. Mass-hotels and camping sites have taken over much of the free space that was left. At the same time, the discharge of waste has combined with oil pollution to make bathing in rivers and off beaches ever more dubious.

We must remember that the built-up shores and river banks of today were for centuries—and particularly when hunting and collecting were major human activities—areas of vital importance to Man himself. In the shallows, he gathered shell-fish and set his fish-traps. From the stones that littered the shore, he probably manufactured some of his first weapons. Among the reeds, he found birds' nests filled with eggs and lay in wait for the larger animals when they came down to drink.

Today we still feel an atavistic urge to linger on the seashore, searching through the flotsam and driftwood and unconsciously responding to that sense of closeness to the sources of life which Man has always felt in the