

the cleansing of air are examples of direct benefits of human society. On a larger scale, natural communities play an important role in removing carbon dioxide and releasing oxygen on land, in freshwaters and in the oceans.

Natural communities are part of the very complex environment in which man lives—one in which so many factors are interrelated and inter-dependent that it is often difficult to determine what is cause and what is effect. The problem man faces is how to cope with this tangled web and extract the resources needed for his welfare without impairing the system that sustains him.

It is difficult, if not impossible, to divorce the need for programs pertaining to natural communities from the total effort in ecology. Accordingly, this report treats natural communities in the context of a broader ecological effort.

The first section of the report describes activities that are needed to advance scientific understanding of natural plant and animal communities and their interactions with man. It also describes needs for protected natural areas for continuing study; and national needs for research, surveys, and education. Current activities of federal agencies are discussed in the second section. A third section includes specific recommendations for action by the Federal Government.

I. FINDINGS AND NATIONAL CENTER NEEDS

Recent increases in the human population and advances in technology have resulted in an increasing number of environmental changes. A considerable body of knowledge of ecological relationships has been developed and constructively brought to bear on optimizing these changes. Too often, however, there is inadequate information about them to develop comprehensive judgments regarding the full extent and manner in which they are advantageous or detrimental and some of the changes are clearly unfavorable. Also, conflicts frequently arise among man's multitude of purposes. These conflicts demand an increasing amount of knowledge to provide the basis for sound decisions; e.g., decisions to whether areas of land should best be used for economic or aesthetic purposes, the extent and form in which pollutants may be introduced into the environment, and the extent and procedures by which the weather may be modified without unfavorably influencing the environment.

Much is already known, of course, about natural communities; some of it learned in studies of other environments, some in response to urgent practical needs and a goodly share gathered in response to purely scientific curiosity. But there remains a need to more fully understand the contributions these areas can and do make to the national welfare.

The following discussions outline the specific national needs for improving our scientific understanding of natural communities.

Protected Research Natural Areas

In ecological studies of natural plant and animal communities, field areas are needed as outdoor laboratories. A series of land and water research reserves—established in such a fashion as to provide protection for extended periods of time—is essential. The series should include examples of all important natural ecosystems, some available only for observation; others for manipulation. A joint effort by the Department of Agriculture and the Department of Interior (with AEC and Department of Defense cooperation) has already resulted in designation on Federal Lands of 336 areas that are available for observational studies. Additional locations will be needed to obtain representation of all ecological types.

Research

More research on environmental matters is needed. In the United States this is not primarily because new problems have arisen, though there are many, but because of the new, enlarged scale on which the old problems—subsistence, health, and the adjustment of population to resources—must now be faced. For example, sulfur bacteria and other decomposers play a role in the economy of nature that is now only dimly sensed; interference with it was inconceivable a generation ago. The oxygen content of the atmosphere, on which all human and animal life depends, is probably regulated by the combined activities of sulfur bacteria and green plants, neither being more important than the other. But the bacterial fraction, being less understood, is more open to disastrous interference by some environmental pollutant.