As previously indicated, we need to improve our understanding of the processes by which natural plant and animal communities survive and change and interact with man. Not only does optimum management of natural communities depend upon such knowledge, but also management of cultivated lands and fisheries can be improved by such understanding. Scientific team efforts are required to answer many of the important ecological questions. Research by biologists, physical and social scientists, and engineers at many locations is needed to develop improved methods and practices which will assure protection and proper utilization of natural communities.

Research principally in universities, the Federal Government and private foundations has contributed much to current understanding of natural systems, but in terms of foreseeable needs our knowledge must be greatly increased.

Studies conducted or sponsored by many government agencies are mainly directly at "economic species"—those most directly useful or harmful to man. These studies fall short of telling us what happens to the innumerable other species involved in biologically indispensable functions.

Understanding of biological processes at the individual, species, population, community, and ecosystem levels of integration is basic to their manipulation in man's best interests. Federal agencies should consider (1) increasing their ecologically oriented research activities along the lines of their specialties; (2) developing a concerted integration of effort among the agencies; and (3) lending their strong support, professional talent, and other resources in interorganizational efforts with universities, private corporations, and state agencies in the advancement of scientific understanding of natural communities. The general objectives of a needed research effort are described by four general headings.

Fundamental processes operating in and affecting plant and animal communities.—There is need for an improved understanding of the fundamental structure and the processes of natural communities which govern the development, size and fluctuations of their plant and animal populations. Additional information is needed about the mechanisms that control energy flow and organic matter production in plant and animal communities. There is also need for studies on the effects of natural and man caused influences on the condition and functions of these communities.

The information obtained would be useful in (a) maintaining the diversity and stability of natural communities; (b) predicting the influence of environmental alterations; (c) deriving principles useful in crop, domestic animal and fish production, and (d) arriving at optimum management techniques for most effective utilization of our wildlands.

Impact of plant and animal communities on man.—Additional information is needed about the role of natural areas in maintaining the equilibrium of the earth environment, and toward improving our understanding of the indispensable services rendered to man by the natural biota. Examples of such services are the uptake of carbon dioxide and the release of oxygen by plants, and the cycling of water and essential mineral nutrients.

There is also a need for studies of natural communities to determine their role in harboring organisms harmful to man and to identify plant and animal species which may have potential usefulness for him.

Natural areas are also major sources of recreational aesthetic enjoyment. Additional information is needed to determine how opportunities for public use of these areas can be enhanced, while their beauty and utility are retained.

Impact of man on plant and animal communities.—Improved understanding is needed of the purposeful and inadvertent modifications of natural communities caused by human activities. Our society is increasingly the source of major stresses on natural communities. It is imperative that we gain understanding which will enable us to protect, utilize and enjoy these areas.

Research is needed to find ways to alleviate or rectify any undesirable consequences of environmental alteration resulting from such things as weather modification, industrial and agricultural practices and waste disposal. Some innovations could be mutually beneficial to man and natural communities.

Methodology, instrumentation, and taxonomy.—Better techniques are needed to enable more accurate observation and sampling of organisms under various environmental conditions. Improved systems and instrumentation for sampling and analysis of biological, chemical, and physical processes in natural environments are also required.

Accurate taxonomy and descriptive ecology are essential foundations for ecological investigations, for other types of biological research, and for bioenviron-