I mention these things because it will bear upon some of the remarks I make later on. With the background in physics and geophysics, interest in biology, experience in the field and in research and ecology, it is this combination that perhaps gives a different viewpoint than people trained purely and strictly in biology or ecology.

The basic subject with which we are concerned this morning has to do with the natural history of the planet Earth and the complexity of ecosystems. I should define this term. An ecosystem is the sum total of the organisms and the physical environment within a given region. It may be the forest and the atmosphere around it and the soil beneath. It may be a lake, a valley or it could be a city, for that matter. Ecologists have described many ecosystems well. They have described many plant and animal communities thoroughly, but describing is far from understanding. It is not sufficient to understand a single organism; the ecologist must understand simultaneously the interaction of all organisms and the environment including the atmosphere and the soil.

In many respects this is the most difficult of all the sciences. It does not leave out a single branch of science; it involves physics and chemistry, mathematics as a tool, geology, even astronomy, meteorology, all of biology, all the aspects of physiology, morphology, anatomy, whatever you wish to mention; these all combine and integrate in the subject of ecology.

Our lack of understanding of natural habitats of ecosystems is enormous. We are literally in the stone age of ecology. Modern science is capable of greatly improved understanding, of vastly superior techniques, of methodology capable of assimilating knowledge from many branches of science and applying this knowledge to understanding plant and animal communities.

Mankind is living incredibly dangerously. We are living with and disturbing, disrupting and attempting to manage the earth's surface without understanding. We fight a war in the tropics little understanding the complexity of the tropical environment. We attempt to supply food and technology to underdeveloped nations without knowledge or understanding of their natural habitats. We dam canyons in the arid West; we divert whole watersheds and often we do not understand the impact of this on the ecology of the region. Droughts are accelerated by man and floods, and of course can be controlled also by man. Pesticides, herbicides, poison our fish and fowl, plants and people. We do not know the cycles for many of these chemicals as they go from soil to plants to animals to atmosphere, to rain and fallout back into the soil.

We change the natural, diverse, complex ecosystems, which have considerable placticity, into highly vulnerable and simple productive ecosystems of agriculture. This is one of the great dramatic changes that has taken place clear across this country from coast to coast, taking out the grasslands of the Midwest and the forests of the North, and changing the arid desert and replacing them with the simple ecosystem of agriculture. You take the natural habitat, which has diversity of plants and animals which can take enormous shock and climatic change and put in its place a very simplified ecosystem, namely wheat or corn or oats—we must do this, of course, in many areas, but