STATEMENT OF DAVID M. GATES, DIRECTOR, MISSOURI BOTANICAL GARDEN, ST. LOUIS, MO.

Ecology is a very complex, difficult basic science. It is a holistic science that incorporates all other branches of science and for this very reason is less specific and more diverse. Ecology is the very epitomy of science itself. The ecology of terrestrial natural history involves an understanding of man and of the biota and environment of the planet Earth. Ecologists have been very few in number, the science of ecology is relatively new, and basically it has only begun to flourish as a brilliant intellectual discipline. The potential for ecological thought and ideas is enormous.

The vast number of applications for ecology to the welfare of man is both a challenge and a threat. Every single activity of man perturbs an ecosystem that was different prior to the hand of man. Man exploits and uses the energy and resources of ecosystems and finally wishes desperately to understand and manage the ecosystem through rationale. Man replaces complex, stable ecosystems with monocultures which are subject to a potential instability. The demands on the ecologist for advice with respect to the management of ecosystems is enormous and yet it is the complexity of the problems which makes it so apparent that ecologists are too few with too little information and method.

Never in the history of mankind have ecologists received the support and inducement comparable with the complexity and diversity of their subject matter. Ecologists, for reasons often beyond their control, have been able to only dabble in the science of ecology. By virtue of constraints within the educational system, by traditions, and by other limitations (some fiscal), the ecologists have been unable to cope with the enormity of ecological problems. This statement can be spelled out explicitly in terms of methodology, equipment, data handling, and basic analytical technique. Ecology requires a strong theoretical structure which is built on an erudite understanding of biological systems, a deep understanding of individual organisms, a grasp of molecular and evolutionary principles, and a thorough application of mathematical techniques. Few, if any, ecologists have ever received such training. It is crystal clear that modern science is absolutely capable of producing ecologists of this calibre.

The ecologist can advise well and demonstrably concerning a wise course of action with regard to many of man's pressing environmental problems. Yet the ability of the ecologist to give the "best" advice is often limited by the complexity of the problem. Two types of individuals are desperately needed for the immediate future: the ecologist who is trained as a basic scientist with as much of the knowledge of science (physics, chemistry, mathematics, biology, and sociology) as possible, who will work on the fundamentals of ecology; and the environmental engineer who is trained as the applied scientist to direct his effort towards the management of environmental problems con-