HAWAII IBP SYNTHESIS:
1. BRIEF INTRODUCTORY SURVEY

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IBP, the International Biological Program was the first internationally coordinated, multi-disciplinary ecological research program which focussed on the ECOSYSTEM as the study object. Officially, the research objective was to study the biological basis of organic production in the world's major ecosystems. About 60 nations participated in the Program. Rather large research teams were organized in Russia, Japan, East and West Germany, England, France, Canada, Australia, and the U. S. The operational phase lasted a decade, from 1965 through 1975.

In the U. S., two major component programs were developed, a Human Adaptability component, concerned with the study of human populations living in extreme environments, and an Environmental component, concerned with the natural science aspects, particularly with the structure and function of major ecosystems. Teams of each 80-150 natural scientists were organized to study five mainland biomes in the U. S.: Tundra, Grassland, Desert, Eastern Deciduous Forest, and Western Coniferous Forest. The research emphasis of the Biome studies was on ecosystem metabolism, i.e., Photosynthesis, Respiration, Decomposition, Consumer Relations, and Mineral Cycling. In addition, three smaller research projects, with teams of 20-50 scientists were organized on the theme of Ecosystem Structure and Evolutionary Biology. Two of these worked on comparisons of similar ecosystems in geographically disjunct places: one was the Mediterranean Scrub ecosystem comparison between California and Chile; the other, the Desert Scrub and mesquite ecosystem comparison between Arizona and Venezuela. Ours was the third, focussing on Island Ecosystem Stability and Evolution.

By legislative mandate, the National Science Foundation received an annual allotment of about $6 to 10 million. Of this, the mainland biome studies received $1 to 2 million per year. The three Ecosystem Structure and Evolution Study programs received from $200,000 to $500,000 per year.

The funds were highly competitive. We got the first slice in 1970 after three times rewriting our proposal, and then managed to maintain approximately a $300,000 per year budget for our suggested five-year program from 1970-75.

The broader research aims of the Hawaii IBP were two-fold: (1) to concentrate on aspects that are unique and different in island ecosystems as compared to continental ecosystems and (2) to assist in solving regional problems relating primarily to wildland management and conservation of biological resourses. We developed four general objectives, two primarily ecological, two primarily evolutionary. The evolutionary objectives were:

(1) To determine why some organisms in Hawaii have undergone speciation, while some of the most successful have not.

(2) To determine the rates of evolution for selected organism groups and the factors affecting these rates.

The ecological objectives were:

(1) To determine why some ecosystems in Hawai'i are stable, some fragile.

(2) To develop models relating to the variables that contribute to stability and diversity in Hawaiian ecosystems.

In relation to each general objective we established a number of working hypotheses, which we attempted to test during the course of our study.

Approximately 55 researchers participated in the Hawaii IBP, mostly from the University of Hawaii and Bishop Museum, but a few also from the mainland. The participating field biologists represented different specialities, primarily botany, ecology, zoology, entomology, and genetics. About 30 graduate students were employed and worked on theses and dissertations sponsored through the Hawaii IBP. Twenty-nine dissertations and theses were completed. Seventy-seven Technical Reports were produced and over 70 journal articles were published or are in press.

Currently, we are in the final phase of completing a book manuscript, a synthesis of our results entitled, ISLAND ECOSYSTEMS: Biological Organization in Selected Hawaiian Ecosystems.

For the purpose of synthesis we developed four themes, which will be presented as separate parts in the book. Each has three or four chapters. The synthesis themes are:

1. Distribution of Island Biota along a Mountain Gradient

2. Community Structure and Niche Differentiation in Selected Hawaiin Ecosystems.

3. Temporal Relationships of Island Biota

4. Genetic Variation within Island Species

In each of these themes, which we will briefly interpret in the following talks, we covered a slice of the four general objectives mentioned earlier.

For integrated studies we selected two major sites, the Mauna Loa transect and the Kilauea rain forest. A third site was added when Frank Howarth discovered the Hawaiian Lava Tube Ecosystem. Other sites were used for validation as necessary by some participants. Thus, a major investment of our research efforts was right here in Hawaii Volcanoes National Park and in its immediate neighborhood. Some of our results, therefore, should have a direct bearing on Park resources interpretation and management.