IBP: Predictive ecology biome by biome

The International Biological Program was set up in 1965 to study the biological environment and man's place in it. Sixty nations, including the United States, are currently involved.

U.S. IBP scientists are studying large slices of the environment, such as grasslands and forests, to see what makes them tick and to make computer models of them (SN: 10/23/71, p. 282; 7/29/72, p. 78). U.S. IBP scientists are studying the effects of different environmental stresses on people, such as high altitudes and migration (SN:3/4/72, p. 154; 6/17/72, p. 395). U.S. IBP scientists are also trying to see what biological controls might be applied to pests in different environments.

As the IBP moves along to its termination date of June 1974, several questions become pressing. Will the aims of the U.S. IBP be fulfilled by the time the IBP ends? Will the U.S. IBP have a widespread and positive impact on ecological science? Scientists attending the annual meeting of the U.S. IBP in Washington last week indicated that progress is being made toward reaching these goals.

Stanley Auerbach of the Oak Ridge National Laboratory and director of the Eastern Deciduous Forest Biome Studies, reported that his team has already completed computer models for some of the ecosystems within the Eastern forests and is now verifying the models. The models are for movement of water in soils; how lakes and the fish in them behave; how chemical elements, whether nutrients or pollutants, move through the forest floor. Such models already offer predictive value. They can predict, for example, the effects of thermal pollution or of eutrophy on lakes.

Paul Baker of Pennsylvania State University and director of the IBP Human Adaptability Studies reported that his team has found that Amazon Indians have quite a few scrambled chromosomes, which suggests that if scrambled chromosomes are detected among civilized populations, they should not necessarily be attributed to pollutants and other insults of the civilized environment. Baker's team has also found that Amazon Indians are virtually free of heart disease. So were the Aleutians of Alaska until they started adopting the ways of modern civilization. Indians living at high altitudes in Peru have little heart disease, even when they migrate to lower altitudes. So far, human adaptability studies do not offer a unifying explanation for why these less civilized peoples might escape heart disease. The Amazon Indians, for example, do not eat salt. The Peruvian Indians eat a high carbohydrate diet. The IBP team does have evidence, however, that trace elements in the diet may be critical to the health of different populations. Low magnesium intake in Thailand, for example, has been linked with sudden deaths among infants.

Along with the U.S. Department of Agriculture and the University of California, the IBP is looking into the effects of biological controls over pests in different environments. Although this IBP effort has only been on for a few months, it is already coming up with some findings, according to Joe C. Ball of the University of California at Albany and one of the scientists in the IBP program. For example, the IBP team has found that a number of soybean strains can resist the Mexican bean beetle. Some viruses may be carried by plants without economic damage. Presently they are trying to see what parasites from Hong Kong can do to protect Florida's citrus trees.

As the IBP comes to maturity, there is little doubt that the U.S. IBP is making some valuable contributions to ecological science. John Reed of the University of Wisconsin and chairman of the U.S. IBP points out that a thousand American scientists are working on IBP projects. American IBP scientists are starting to publish their findings in journals that are read by the scientific community at large. As IBP scientists around the world amass information, they are collaborating with U.S. IBP scientists. Last August, for example, 70 IBP scientists from many nations, including Russia, met in Seattle and put their environmental data into U.S. IBP computers, so that computer models of global environments can be drawn up. The U.S. IBP contributed to the United Nations Conference on the Human Environment in June (SN. 6/24/72, p. 404). Cambridge University Press in England is publishing a synthesis of global IBP efforts, which includes the U.S. efforts.

Most crucially, Reed says, the U.S. IBP is bringing together scientists from many disciplines and having them work together as a team toward specified goals. The United States and Canada have been world leaders in the integrated ecosystem analysis approach, says Frank Blair of the University of Texas, Austin, and vice-chairman of the International Special Committee for the IBP. "I thing we have sold the approach on an international basis."

The U.S. IBP, Reed indicates, is also doing an outstanding job in making predictive computer models of ecosystems. "Prediction," he stresses, "is the important word." The better the models can predict this or that change on the ecosystems they represent, the more valuable they will be as tools for the management of relevant ecosystems.

The U.S. IBP, however, has faced some serious obstacles. For example, Auerbach says, there has been a shortage of ecologists who are trained in computers and math and who can model ecosystems. Also, as Baker points out, the U.S. IBP human-adaptability studies have been hampered by lack of funds. "I cannot say," Baker admits, "whether we have succeeded or not yet." The U.S. IBP also faces some challenges. One, Reed stresses, is to make all the information the IBP collects useful to the public. "We are also concerned," he says, "with how this new, big multidisciplinary activity can be picked up at the national and international level."

Blair points out that the UNESCO Man and Biosphere Program that is now underway was completely patterned after IBP. After IBP terminates, Blair says, U.S. IBP efforts should move under other auspices, perhaps under the UNESCO program, and emphasize man's effects on various ecosystems. U.S. IBP efforts, he says, could also profit from more money. Presently IBP garners $11 million annually from the National Science Foundation, various government agencies and the Smithsonian Institution—about the cost of one F11 fighter. □

U.S./U.S.S.R. Bering Sea weather study

The earth's oceans are the single most important factor in weather patterns. In order to predict the weather accurately on a global scale, scientists need to be able to monitor ocean conditions daily. Such a large operation would best be done by satellite but the techniques of such remote sensing are still in the developmental stages. Experiments are being carried out to correlate known ocean and sea conditions with satellite photography and aircraft measurements.

NASA announced this week plans to carry out one of the recommendations of the August 1971 Joint U.S./U.S.S.R. Working Group on Satellite Meterology. Between Feb. 15 and March 7 NASA and the Academy of Sciences of U.S.S.R. will conduct joint measurements of sea ice, sea surface and atmospheric conditions in the Bering Sea from ships and instrumented aircraft. Measurements are to be carried out by Soviet weather ships and an IL/18 aircraft and by a U.S. Coast Guard icebreaker and an instrumented Convair 990.

NASA says the purpose of the experiment is to obtain and exchange microwave measurements of the sea surface at varying temperatures and sea states,