INTERNAL REPORT 50

IBP RESEARCH IN POLAND, CZECHOSLOVAKIA, BELGIUM, YUGOSLAVIA, AND NETHERLANDS--

SUMMER 1972

Hans Riekerk
University of Washington

FOR REVIEW ONLY

NOT FOR PUBLICATION

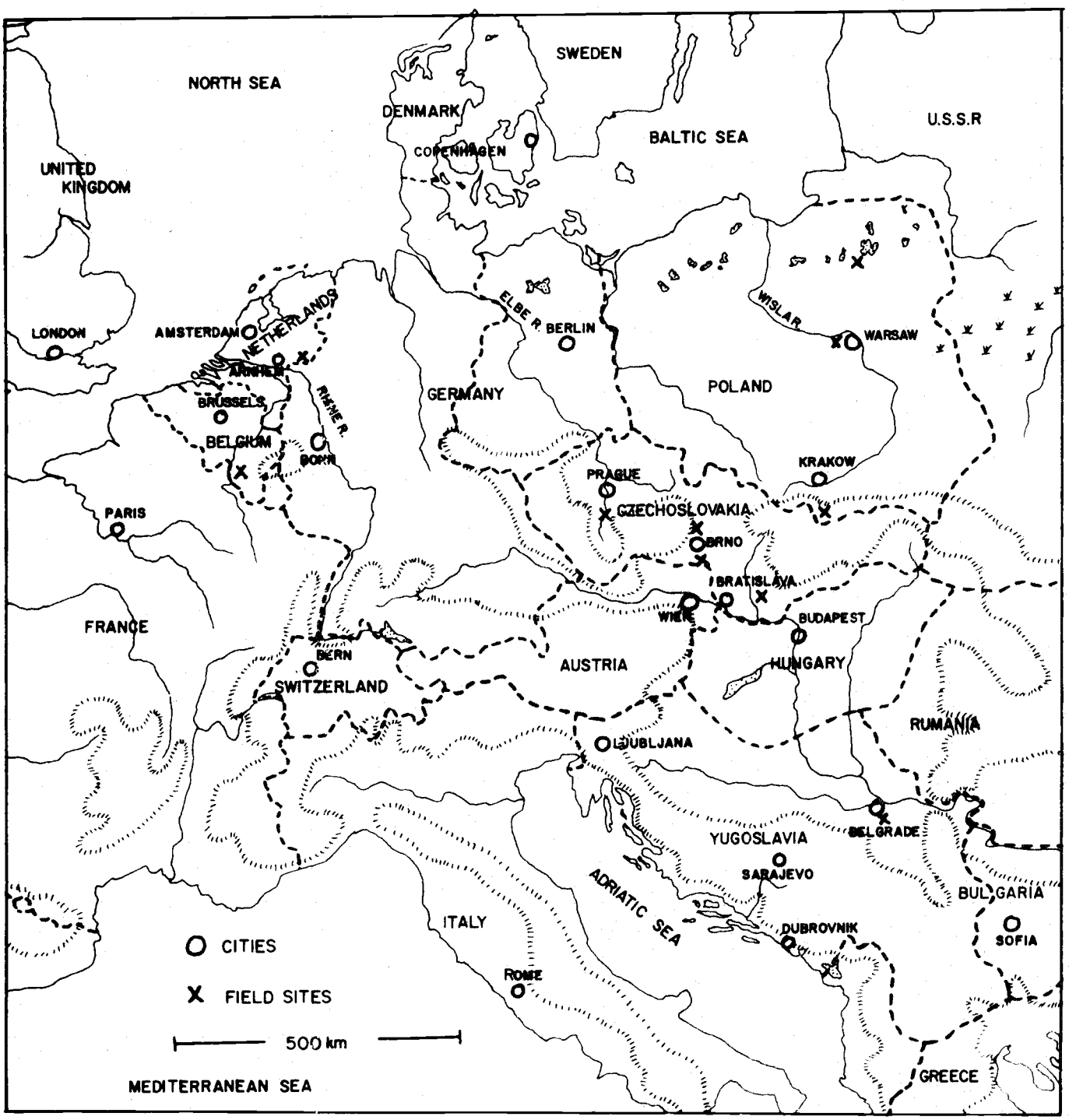

Figure 1. European IBP research sites visited during the summer, 1972.

INTRODUCTION

In the past few years the Coniferous Forest Biome (CFB) program has developed working contacts with scientists in Germany, Japan, and Australia. The success of these cooperative arrangements led to a continued exploration of coordination with scientists in other countries. This paper reports on a tour conducted through Belgium, Holland, Poland, Czechoslovakia, and Yugoslavia during the summer of 1972 (Figure 1).

The objectives of the tour were to investigate ways and means of developing: (1) direct communications between scientists within subject matter areas, thus bypassing elaborate information channels of formal reports and publications; (2) cooperative field and modeling projects focused on specific subsystems such as decomposition processes, food chain processes, eutrophication-control processes, and the like; and (3) visiting scientist exchange programs for specific training, modeling, or research projects. The discussions during the tour with scientists combined with the visits of study sites in the various countries formed a basis for judgment as to which scientists of the CFB could profit most from specific exchanges of information and possible visiting scientist exchanges.

The tour was formally organized through the CFB director and the national IBP executive committee, which operates within the auspices of the (U.S.) National Academy of Sciences. The National Academy of Sciences in turn is in formal contact with the corresponding academies or representative organizations in the visited countries. These formal channels of communication are necessary for travel, especially in the Eastern European countries where the host scientists need formal permission to bring their visitors to research laboratories and to outlying research areas. Similarly, in order to visit the United States these scientists need formal invitations from a Biome director through these channels before their cases will be considered by the respective government agencies.

Funding of the tour to Eastern Europe was derived mainly from the U.S. Foreign Currency Program administered by Mr. Whitehead of the Smithsonian Institution in Washington, D.C. (see Appendix C). Local travel and per diem funds were disbursed from the same program by the U.S. embassies upon my arrival in Poland and Yugoslavia. More use should be made of these funds for travel of visiting scientists, especially to Poland (Shapley 1972). Funding for local travel and per diem in Belgium, Holland, and Czechoslovakia was budgeted and disbursed by the CFB central office.

Logistics for the tour were fairly simple and good, but required considerable lead time. Correspondence from the Eastern European countries may take a month or two to reach destination. A reentry permit required for me by the U.S. Immigration Service (as pointed out to me by Mr. Conway during the briefing session at the Smithsonian Institution) was requested and obtained belatedly, and this brought some delay and rearrangement in the proposed travel program. This delay had consequences in Yugoslavia since summer vacations are en masse during August and all institutions were practically closed down. Local travel and hotels are fairly good, but again in Eastern

European countries advance reservations are generally needed. Because of the scarcity of hotel rooms, several hotels in Czechoslovakia charged fully for single occupancy of twin-bed rooms. Communication with most scientists in the English language was fair to good. At least an understanding of the German language is very helpful in Eastern European countries.

GENERAL OBSERVATIONS

The high population density of Europe produces a startling impression when one is accustomed to the Coniferous Forest Biome area in the western regions of the United States. This density is apparent from the frequency of cities and towns in the landscape, the often small landholdings, and the amount of air and water pollution. Most cities have extensive suburban areas occupied mostly by new high-rise apartment buildings, while the downtown areas usually have retained their historical features created by different styles, long-time wear, and black, weathered surfaces. Ecological institutions are usually located outside the cities, close to field sites but farther away from political power centers.

The small agricultural landholdings are readily apparent from the air and usually are the consequence of repeated subdivisions by generations of farmers. Land reform measures have been successful in some countries, notably Czechoslovakia, but the patterns of small properties usually have been retained in the immediate vicinity of the villages. Within this context several of the leading ecologists expressed to me considerable interest and concern for the problem of ecological instability associated with larger agricultural landholdings (of higher management efficiency) and lower crop diversity in the landscape. The traditional, inefficient, small-property patterns or some intermediate size distribution may in the long run be more economical.

It is difficult to discern man-caused air pollution from the natural dust load in air when one travels by plane during the hot summer months, however, large banks of brown-gray air often with associated cloud and smog formations near industrial regions can be observed. Also, an impression of a continuous heaviness of filtered sunlight across all of Europe can be perceived. Water pollution is serious, as only in the high mountains and in the limestone areas (Yugoslavia) were clear waters observed. A heat wave during the summer created submarginal conditions for fish in slow-moving waterways, and many dead fish were observed, presumably because of an excessively high biological oxygen demand by microorganisms. Curiously enough, fishing in these troubled waters is a very common pastime, but the catch is usually not meant for consumption. Swimming and bathing in these waters is usually avoided by the public, and sometimes even prohibited. I once developed an irritating rash lasting a few days after a bath with slightly colored water in a hotel.

People were generally very helpful, cooperative, and hospitable. Only once did I have problems with police when I unknowingly walked by a small military camp and took pictures of the forests and landscape near Avala, Yugoslavia. In several countries the language barrier with people in restaurants and on the street was very much a handicap, but usually an understanding of German and French made it possible to achieve some communication. Most information about customs, thinking, and feelings, however, was obtained from those

scientists who spent extra time and effort to show the countryside and city structures. Quite a number of these people expressly interrupted their summer holidays or weekend days to participate in the field trips, discussions, and CFB slide talks.

Most IBP work in the visited countries was terminated or in the final stages of data assembly and synthesis. This is not surprising in the light of an early start as compared with the CFB program. Most IBP work was organized and funded through the respective academies of sciences, and the general structures of these programs were usually along the section lines of the IBP. Within the sections of productivity it was common to find subdivision of labor by several institutions with strong backgrounds in such aspects as primary productivity, zoology, aquatic biology, or fisheries. Discussion of results on a national level was usually on annual information meetings but, as everywhere else, the European scientists experienced considerable difficulty with integration at the study-site level of work. Nowhere was integration achieved between terrestrial and aquatic study programs on one study area, but several visited areas certainly had good potentials.

An interesting aspect of several IBP programs was the inclusion of wetland forest ecosystems representing maximum productivity systems. These communities generally were located on river floodplains on rich alluvial soils with an unlimited supply of water during the growing season.

Ongoing post-IBP work was channeled principally through the UNESCO "Man and Biosphere" (MAB) program (see Appendix D). Continuation of the principles of teamwork, integration, and cooperative synthesis developed during the IBP was very much apparent in the new national programs. A strong emphasis was placed on the application of ecological research to questions concerning land management, pollution, and ecological stability and diversity.

Interest and further development of ecosystem or subsystem modeling as a means of synthesis was expressed by several, principally of the younger generation of ecological scientists. It could be very useful if the United States program could develop training modeling workshops in strategic points in Europe, such as Warsaw in Poland. Such a location would be fairly central, facilitate attendance by East European scientists, and make use of the excess foreign currency funds. Computers, however, are scarce, small, and not very well developed, and the establishment of a set of satellite "computer sites" associated with the large sophisticated centers of the United States should be investigated (Shapley 1972).

NATIONAL IBP EFFORTS

The tour covered selected IBP projects in Belgium, Holland, Poland, Czechoslovakia, and Yugoslavia. The following account will also be organized in the same way, merely as a matter of convenience. Because of time limitations and the absence of many scientists on leave for summer holidays, it was possible to visit only a few institutions and study sites and to interview a limited number of scientists. Therefore this report of necessity will show considerable biases and omissions, but nevertheless a general idea of the IBP efforts was obtained.

Belgium

The IBP in Belgium is under the direction of Professor DUVIGNEAUD, head of the Laboratoire de Botanique Systematique at d'Ecologie de l'Universite Libre de Bruxelles. The IBP is organized under the auspices of the Academie Royale de Belgique and supported mainly by the Ministere de l'Education Nationale et de la Culture.

Terrestrial forest productivity studies have been focused on a forest near Virelles (Duvigneaud, Denaeyer, Ambroes, and Timperman 1971) about 90 km south of Brussels, and supporting, less-intensive study sites are situated elsewhere in the Ardennes region (Duvigneaud and Froment 1969). More recently the focus of effort has been placed on the Mirwart county forest about 90 km southeast of Brussels halfway between Rochefort and St. Hubert in the Ardennes (Duvigneaud, Paulet, Kestemont, Tanghe, Denaeyer--De Smet, Schnock, and Timperman 1972, Denaeyer--De Smet and Duvigneaud 1972). Several institutions cooperate within these study areas such as the Catholic University of Louvain, with Professor BERTHET studying decomposition organisms and processes. The Brussels team uses standard ecosystem study methods as described in IBP handbooks and patterned after the Solling project in Germany. In fact, these Belgian and German terrestrial studies work in direct cooperation with the Bab project in Czechoslovakia. Overall responsibility for synthesis of data from these three projects is in the hands of Professor DUVIGNEAUD. Synthesis consists mainly of comparative interpretations of charts, diagrams, graphs, and tables of budget-type data, and some more detailed explanations from process studies.

The study site in the Mirwart Forest at 390 m elevation is divided over two forest types, 130-year-old beech and 55-year-old spruce, located on an acidic (pH = 4) soil type derived from silica-rich schists of sedimentary origin. The dark A horizon in the spruce forest appears to be only slightly deeper than that in the beech forest. Forest floor thicknesses are similar. Litter dating in the beech forest floor is facilitated by bud scale distributions. Air thermohydrographs, soil mercury thermometers, and recording rain gages represent standard equipment, as are litterfall screens, crown wash troughs, and stemflow bands. Periodic forest floor, soil, and tree biomass sampling is being done outside the plot areas. A thinning operation in the spruce forest left the fenced plot untouched.

Primary productivity studies are focused on the vegetation biomass, including root systems, and increment analysis presently under the direction of Professor DUVIGNEAUD and Ms. KESTEMONT (Duvigneaud, Paulet, Kestemont et al. 1972). Dr. GALOUX and co-workers studied in detail the microclimates of the various study sites (Galoux, Schnock, and Grulois 1967). Interpretation of chemical data from biomass, litterfall, and rainwash samples is the responsibility of Dr. DENAEYER--DE SMET (Denaeyer--De Smet and Duvigneaud 1972). A beginning has been made in soil solution sampling (with buried funnels) and chemical analysis by Mr. VAN SEVEREN. Decomposition rates are being measured by Ms. LEDEL in cooperation with Dr. FROMENT, using stacked thin nylon bags filled with fresh litter. Studies of food chains including vertebrates was done by Dr. GASPAR and co-workers. Most routine sampling and maintenance of the fenced plots is in the hands of Mr. TIMPERMAN. Integration with hydrologic studies was not apparent. Most aquatic studies are focused on eutrophication

and pollution problems.

Holland

The IBP in Holland (The Netherlands) is under the direction of Professor VERVELDE of the State Agricultural University in Wageningen. The program is organized under the auspices of the Royal Netherlands Academy of Sciences and Letters and is supported by the governmental department of arts and sciences. The terrestrial productivity program is under the direction of Dr. VAN DOBBEN of the Institute for Biological Field Research (ITBON) in Arnhem. These studies are concentrated in the Meerdink Forest located in "het Woold," about 50 km east of Arnhem (Drift 1969). The 135-year-old oak-beech forest on level sandy soil is primarily characterized by a high water table (50 cm deep), owing to an underlying, impermeable glacial till.

This terrestrial program is presently in the closing stages of data systhesis and reports, and only a few studies are continued in the field on a nonintensive basis. Considerable information on the soil biology and decomposition processes has been accumulated because of a long-standing interest by the investigators involved. Dr. VAN DER DRIFT conducted soil fauna and decomposition studies in addition to the standard (allometric) vegetation biomass, soil, litterfall, and rainwash studies (Drift 1971). Estimates of net primary productivity have been derived from vegetation analysis and harvests. Estimates of secondary productivity have been derived from analyses of fecal pellets and missing leaf area measurements. Dr. DE BOOIS focused studies on mycorrhiza and decomposition processes, employing litterbags, cellulose, and nylon colonization net substrates (Nagel--De Boois and Jansen 1971). No hydrological studies have been conducted in the same area except for some analyses of surface water draining into the small Dambeek flowing alongside the experimental area. The hydrobiological work is under the direction of Dr. GOLTERMAN of the Hydrobiological Institute in Niewersluis, about 20 km southeast of Amsterdam, and most field work is conducted elsewhere, notably in the lakes district in the northeastern part of the country. These studies are focused on eutrophication of the lake systems and pollution problems of many of the creeks and rivers.

Poland

The IBP work in Poland was organized and administered through the Polish Academy of Sciences and under the direction of Professor PETRUSEWICZ of the Institute of Ecology in Dziekanow, about 20 km north of Warsaw (Petrusewicz 1971). Other participating institutions also derived some funds from their respective governmental departments. Presently, IBP-like studies are being conducted within a national program under the auspices of MAB, and are coordinated and administered through the institute of Ecology. These new programs evolved from IBP efforts and have been focused more on ecological aspects of land management practices and problems. As in other countries, the "substrate" of IBP ideas has germinated centers of teams and cooperative projects with scientists and institutions that were ready for this medium. Still, it remains a difficult problem to construct and maintain a coherent ecological program integrating many of these new centers with well-established institutions.

IBP research at the Institute of Ecology itself reflects a large interest in the food chain processes and consumer dynamics. A field site of pine-oak-alden in the nearby Kampinos Forest on poorly drained sandy soils has been studied for the past ten years. IBP projects added detailed vegetation and soil inventory studies. A number of investigations under way are focused on the food chain of soil fauna to large vertebrates such as wild boar. Studies on ants and Collembola by Dr. and Ms. KACZMAREK (Kaczmarek 1970) are being integrated with those on predatorial carabid beetles by Dr. GRUM (Grum 1971) and small rodents by Dr. BUJALSKA (Bujalska 1971). These studies are supplemented by litterfall and decomposition process studies. Grazing rates by insects in tree crowns have been estimated by analysis of droppings and of missing leaf area planimetry. Hydrologic characteristics are mainly determined by the nearby Wisla River, but soil solution studies in well-drained areas are being initiated by Ing. KUROWSKI. These studies are the result of the interest in mineral cycling as developed from the total ecosystem studies and soil fauna actions. A considerable volume of papers is being published in Ecologia Polska of the institute, edited by Ms. SERAFINSKA.

IBP studies of a similar nature, but with more emphasis on vegetation and biomass production and physiological processes, have been conducted under the direction of Dr. MEDWECKA-KORNAS in forests near Krakow in south Poland. Geomorphologically, the region is an old coastal area abutting the Carpathian Mountain range with mostly sandstone and limestone formations. The extensive areas of iron and coal deposits in the Silesian region 100 km northwest of Krakow have attracted a dense network of industrial complexes, producing air pollution which is quite noticeable in Krakow. Therefore it is of interest in the new MAB studies to assess the impact and effects of the incorporation of solid and gaseous pollutants on the forest ecosystems studied by the IBP research.

The original IBP forest ecosystem field studies have been terminated and are now in various stages of data analysis and synthesis. One field site was located on (again) the Wisla River floodplain 20 km east of Krakow in the oak-hornbeam (and pine) forest near Niepolomice (Medweckiej-Kornas 1971). Sections of this forest have been without forest management practices since 1940 and several natural reserves have been established. Standard IBP measurements of vegetation, fauna, soil, litterfall, and decomposition processes have been made. In addition, some detailed plant physiological process studies have been made of assimilation, respiration, and evapotranspiration. Energy flow and balance diagrams, and phosphorus and potassium nutrient budgets have been assembled and will be published soon in Studia Naturae A of the Polish Academy of Sciences. Nutrient uptake by the vegetation was estimated by chemical analysis of current growth biomass samples and litterfall, and periodically collected rainwash samples. Other (and older) IBP forested study sites were located about 30 km north of Krakow in the Ojcoe National Park (in a 70-year-old stand of beech), in the Kwiatowka Reserve (in a 100-year-old xerophytic oak stand), and in the Lipny Dol Reserve (100-year-old moist mixed hardwoods stand), (Medweckiej-Kornas 1967). The soils generally were well drained and were derived from sedimentary bedrock.

The new study site being developed in conjunction with the MAB program is located in the Ponice Forest, about 80 km south of Krakow in the Nowy Tang

district. This area is at an elevation of about 700 m in the foothills of the Carpathian Mountains. Precipitation is about 1200 mm/year, and the soils are derived from sand- and siltstone. The predominantly coniferous forest vegetation is dominated by 150- to 200-year-old fir, spruce, and beech. A good field station has been built within easy reach of the nearest power-line. Already routine vegetation, soil, climate, and hydrological investigations are under way. A coordination network has been surveyed in the area for purposes of systematic and transect sampling. Other disciplines focused on the study area are phytoclimatology (Dr. KLEIN), forest entomology (Dr. BORUSIEWICZ), hydrology (Dr. BZOWSKI), mineral cycling (Dr. DENISIUK), and primary productivity (Dr. MEDWECKA-KORNAS).

Aquatic IBP studies in Poland have been developed mainly from the ongoing freshwater biological studies of the Institute of Ecology under the direction of Dr. KAJAK. Excellent field laboratory facilities and equipment are in use at Lake Mikowaiki in the great Mazurian Lakes district about 180 km northeast of Warsaw. These lakes were formed by glacial action in the extensive sand deposits of the Pleistocene period. The mainly coniferous forest vegetation around the lakes is composed of spruce and pine plantations. The aquatic studies have been focused on eutrophication-control processes, and some littoral zone studies by Dr. GRABOWSKI and associated with commercial reed production. The littoral zone studies developed correlations between assimilatory surfaces (reed leaves and stems) and biomass production, and also quantified the conditions for transpiration patterns.

Dr. KAJAK studied the water chemistry and nutrient enrichment effects using culture bags suspended in the water column. He also coordinated experiments in fertilization and the introduction of new planktivore fish species in five lakes with work of the Inland Fisheries Institute at Olsztyn. Dr. LAWACZ and Ms. PLANTER investigated organic matter fractions in natural waters by means of freeze concentration techniques in combination with molecular sieve fractionation and ultraviolet combustion methods (Lawacz 1970). The amount of dissolved organic matter often exceeds the amount of particulate detritus. Detritus sinking and sedimentation rates were studied using suspended sediment traps (Lawacz 1969), and data were checked with brick-dust labeling of lake bottom sediments. Dr. GLIWICZ followed the community dynamics of plankton, focusing on algal size distributions and zooplankton feeding abilities by means of nerve poison techniques. Zooplankton appeared to be overgrazing nanophytoplankton (algae <20 µm) while the larger phyto-plankton could develop into a bloom by nutrient enrichment. Dr. STANCZYKOWSKA studied the filtering efficiency of bivalve mollusks (invading from southern Europe) with reference to their water-cleanup capacity and role.

Presently, the aquatic studies have also been incorporated in the MAB program and are oriented more toward the applicability of the acquired ecological information and understanding to human welfare problems such as eutrophication and fish production. The aquatic segment of the 5-year program involves 16 institutions of hydrobiology and limnology, and includes physical and mathematical aspects of the ecosystem studies.

Czechoslovakia

The IBP work in Czechoslovakia has been organized and administered through the Czechoslovakian Academy of Sciences and is directed by Dr. HADAC of the Institute of Landscape Ecology in Pruhonice u. Praha, about 10 km southeast of Prague. The IBP work also has been financially supplemented by other governmental agencies through university and research institution structures. Traditional fragmentation into scientific subject matter areas within the Academy of Sciences is complicated here by the dual political structures of the two rather autonomous states (Bohemia-Moravia and Slovakia) within the republic.

A number of terrestrial coniferous and deciduous, as well as aquatic, study programs have been in operation in a variety of ecosystems within the country, depending upon the special strengths and interests of the participating scientists and their institutions. (See Appendix E for 1972 report.)

Coniferous forest ecosystem studies have been coordinated by Ing. VINS of the Research Institute of Forest and Game Management in Zbraslav-Strnady, about 30 km south of Prague. IBP research areas have been located in Bohemia-Moravia in natural spruce forests in the Carpathian Mountains about 150 km east of Prague, and in fir plantations of the Olomucany Forest, about 30 km northeast of Brno. More recently the multidisciplinary project "Zelivka" has been developed by Ing. VINS with 15 other scientists and concentrated on an experimental 100-ha drainage within the watershed of the city of Prague, about 100 km southeast of Prague. This multidisciplinary program is structured within the national program for MAB, which is under the direction of Ing. KOLEK of the Institute of Botany, of the Slovak Academy of Sciences in Bratislava. The Zelivka project is intended to reach the manipulative stage after seven years of inventory and calibration studies. Ing. VINS also developed some tree growth modeling based on tree ring analyses of stem and branches (Vins 1966). Others at the Institute include Ings. SOBOTKA, LANGKRAMER, and MRAZ, who focused microbiological studies on problems of decomposition processes (Mraz and Langkramer 1971), and Ing. UROSEVIC studying the role of insects on bud and seed developments.

Coniferous forest research in the fir plantation north of Brno is under the direction of Professor PENKA of the Faculty of Forestry in the College of Agricultural Science in Brno. Dr. PENKA and his associates have expressed considerable interest in a visiting scientist exchange program. The study area is located in the School Forest near the village of Kritiny. The 52-year-old plantation of Abies alba, on shallow pseudo-gley soils derived from shale and limestone, has been investigated with standard IBP techniques. Scaffolding encloses a 24-m-high dominant sample tree for detailed atmospheric and tree physiological studies by Ing. VASICEK, using battery powered equipment and sensors. Biomass studies under the direction of Dr. VYSKOT include root systems excavated over rather long distances (Vyskot 1972). Another similar but less intensively studied research site is located nearby but in a beech-fir-oak forest on well-drained soil derived from sedimentary rocks. Dr. PELISEK assisted with soil classification and inventory work (Pelisek 1971). Ing. KLIMO studied soil solutions in this plot by means of simple drain-type lysimeters that complement the standard litterfall and rainwash collections. The measured annual transfers of humic (40 kg/ha)

and fulvic (160 kg/ha) acids in soil solutions leached through the forest floor. Some studies of consumers and food chains are being conducted, making use of various snap-traps and drop traps for tree- and ground-dwelling invertebrates and small vertebrates.

A brief tour through a section of the large School Forest (ca. 11,000 ha) under the guidance of Dr. VYSKOT showed some of the results of intensive forest management and silvicultural practices with group shelterwood systems in oak-beech stands that have been developed over the past 50 years. Spruce and fir plantations grow very well, but are more affected by occasionally severe drought conditions than are the native hardwoods.

Deciduous forest ecosystem studies in the Czechoslovak IBP have been conducted by Dr. PENKA in Brno and by Dr. JURKO of the Institute of Botany, Slovak Academy of Sciences, in Bratislava. The earlier mentioned study plot in beech-fir-oak north of Brno is complemented by a well-developed study site about 60 km southeast of Brno near Breclav in the Lednice Forest (Pelisek 1971). This forest of mixed hardwoods dominated by oak and dense undergrowth is located on the flood plain of the Dyer River with poorly drained black soils developed on recent alluvial silts and clays overlying older sand deposits. About 20 scientists from different disciplines in Brno and Bratislava have developed a team operating out of the new facilities installed mainly with IBP funds, including an access road and a powerline. The 1-ha study plot has been equipped with standard IBP instrumentation scattered randomly and systematically over the area. Biometeorological equipment is operating from a 42-m-high tower and recording is done on a data logger. Six additional small microclimate stations have been equipped with air temperature and humidity recorders, mercury soil thermometers, Piche evaporimeters, and Belany pyrometers. Destructive biomass analyses, leaf area estimates, and phenological studies have been made on four tree species and many undergrowth species just outside the study plot. Also, statistical allometric relations have been developed to estimate biomass per unit area with the plot inventory and map data. Chemical analyses of all biomass, litterfall, rainwash, and groundwater samples have been made for evaluation of nutrient budgets. Standard decomposition studies include litter bag weight losses, but enzymatic processes and products receive more attention. Soil respiration is being measured with soil samples placed in a Warburg apparatus. Food chain processes are being focused on invertebrates by periodic sampling of branches with leaves, stembark, and forest floor. Photoplanimetric methods are being used to estimate leaf consumption, which can be considerable for the oaks. Oaks often put out one to two new flushes per year. Tree physiological studies of some detail are being conducted by Dr. PENKA and Ing. CERMAK, who are presently concentrating on the transpiration stream studied by means of the electrical conductivity of sap (Penka 1967). Photosynthesis will be measured by gas exchange methods in the future, but now the only estimates being made are by the leaf disc method from leaves sampled from tree-towers (Vins 1966). Some interest in the influence of atmospheric static electricity on plant physiology was indicated.

The deciduous forest ecosystem study site under the direction of Dr. JURKO of Bratislava (and in cooperation with Professor DUVIGNEAUD of Brussels) is located in the forest of Bab, near Nitra and about 70 km

northeast of Bratislava. The mixed hardwoods vegetation is dominated by oak and hornbeam and developed out of an old coppice forest (reason for absence of beech) growing on rather level soils derived from loess desposits which overlie sands and clays. A detailed report of an information meeting was issued in 1970 (Jurko 1970).

The study site contains 18-m-high scaffolding near dominant trees with provisions for intensive tree physiological investigations under the direction of Ing. KOLEK, such as assimilation and transpiration, gas exchange, transpiration stream, and leaf disc water-deficit studies. A meteorological tower 32 m in height has been erected and provided with a complete set of climatological instruments recording on a data logger in the main building about 50 m away. A lower duplicate tower and set of instruments has been installed about 150 m away in open farmland surrounding the 66-ha forest. The 1-ha IBP sample plot is provided with standard equipment sampling litterfall and rainwash, complemented with mercury soil thermometers and a few recording rain gages. The annual litterfall measurement provides a basis for the annual leaf production by correlations made between late summer leaf areas and weights and dead litterfall leaves (Kubicek 1971). Biomass and seasonal growth estimates of crowns, stems, and roots have been made by Dr. BISKUPSKY (Biskupsky 1971) and Ings. OSZLANYA and KUBICEK from trees and ground vegetation (Palmonaria spp. on 1-m^2 quadrants) outside the plot area. Chemical analyses have been made of the samples by Ings. BUBLINEC and HRASKO for nutrient budget estimates. Secondary productivity has been the most difficult to estimate because of the great variations of invertebrate species, numbers, and instars. Canopy insects have been studied as to the taxonomic spectrum, population densities, and the dynamics of selected species. Estimates have been made of consumption by measurements of missing leaf area. Biomass fluctuations of soil fauna have been measured by frequent soil sampling (Zajonc 1969). Decomposition processes are still being investigated by cellulose loss in field and laboratory conditions, and by identification of the main organisms responsible. Nitrification and denitrification processes and photosynthesis by soil algae are also being studied in the soils of the study area. Most of the work in the area essentially has been completed and the information is now in the synthesis and reporting stages. Several reports containing data, graphs, diagrams, and tables are in preparation for publication. Information meetings with participants of other institutions in the nation are being held on an annual basis.

A tour through the Borinka forest about 30 km northwest of Bratislava was made with Dr. BISKUPSKY who explained the silvicultural group shelterwood and group selection regeneration systems in the extensive pure beech stands. Sun scalding of bark is the main problem, and repeated small harvests in increasingly larger spots successfully develop regeneration of beech. Introduction of spruce, fir, and Douglas-fir in these areas is being attempted. Browsing by deer is readily apparent from comparison with fenced-in regeneration areas.

The IBP freshwater biology research is well developed and covers a variety of aquatic systems such as reservoirs, fishponds and creeks, and the large Danube River. Dr. HRBACEK of the Hydrobiological Laboratory of the Czechoslovakia Academy of Sciences in Prague directs the rather detailed studies of the Slapy reservoir on the Vltava River (Hrbacek 1971). An

excellent field station about 35 km south of Prague has been developed a number of years ago from existing bridge-builders' facilities and presently is the focal point of a number of studies conducted by local, national, and international scientists. Reservoir characteristics of warmer water (consumption of cold bottom waters for power generation) and the large length (40 km) are being compared with other large water bodies. Sampling over the whole length of the lake has indicated the existence of "clouds" of watermasses moving through the reservoir within 30 days. This contributes considerably to the variabiltiy in estimates of rates of total productivity. Also, thermal stratification sometimes cannot develop when high flow-through rates occur. Some detailed studies are now focused by Dr. HRBACEK on plankton community dynamics and associated nutrient chemistry. The procedure involves pumping of lake water through refrigerated bottles containing organisms. Mathematical modeling is being attempted by Dr. STRASKRABA by superimposing the observed biological patterns and mechanisms over previously developed physiochemical models. Dr. HRUSKA is working on benthic invertebrates. Fish populations are being studied by means of echo-sounding techniques. Aquatic decomposition processes are evaluated by biological oxygen demand (BOD) measurements, by estimates of fluctuations in seston concentrations, and by the fractionation of organic matter into compounds such as carbohydrates, proteins, enzymes, and so on.

Follow-up of IBP has been well developed in a national program, parts of which fall under the auspices of MAB. This new national program has been described in a master plan, of which subprogram VI under the direction of Ing. KOLEK of Bratislava covers much of the ecological research as it is related to land management problems. Each subprogram again has been detailed into work-objectives, tasks, associated scientists and institutions, estimated man-hours, and funds allocated by the Academy of Sciences. Considerable resources also are being contributed by participating institutions.

Yugoslavia

The IBP in Yugoslavia is under the direction of Professor JELENIC and organized through the Union of Yugoslav Scientific Biological Societies. There are member societies within each of the six states of the republic, each of which is in turn responsible for the regional administration and funding of IBP research. Because of this organizational and political structure it has been difficult to achieve in practice a fully integrated national program. Rather uneven research development, depending upon the resources available and the specific interests and strengths of the participating institutions has resulted.

During the visit in this country most scientists were on leave for the holidays and institutions practically closed up. Ing. KOJIC of the Institute for Biological Research at Belgrade interrupted his seacoast vacation to provide some information on the IBP structure, and location and characteristics of a few study areas.

The Institute for Biological Research cooperates with the agriculture and forestry faculties of the university in ecological research, which is concentrated on two sites near Belgrade. The older of the two IBP sites was about 90 km northwest of Belgrade and located in the Fruska Gora Mountains bordering the Danube River near Novi Sad. The mixed hardwood

vegetation (dominated by oak) is representative of the central areas of the country characterized by well-drained soils developed from serpentine and limestone formations. The new IBP site is closer to Belgrade on Avala Mountain, about 20 km south of the city. The vegetation is similar, but the soils are mainly developed from sandstone and limestone formations. The oak-hornbeam vegetation mixed with beech and linden on the more moist and sun-protected slopes has been strongly influenced by active land management practices and consequently the forest appears to be rather young (about 50 years old), but developing well in terms of species frequencies and distributions. Interestingly, a property on the southwest slope of the hill and near the highway has good plantations of a variety of coniferous trees grouped in small areas by species, such as Sequoia, Pseudotsuga, Tsuga, Libocedrus, and Picea.

Terrestrial studies on the research areas were of the general inventory type, including standard techniques for biomass production, vegetation analysis, soil mapping and chemical analysis, and microclimate monitoring of environmental variables. Plant physiological studies by Dr. TODOROVIC and Ing. KOJIC included water relations such as transpiration, osmotic pressure, and water deficit measurements (leaf disc methods). Some work had been concentrated on the light compensation point in photosynthesis-respiration relations. Net biomass production was also estimated by annual vegetation (standing crop) measurements. Work of ecophysiological nature is presently being done by Dr. JANKOVIC to correlate vegetation growth and species structure with environmental factors of temperature and moisture stress. Decomposition studies are focused on carbon dioxide evolution patterns from soil samples (using hydroxide traps), and on microbiological methods of organism enumeration and quantification. Invertebrate consumption studies were divided into those consumers of the tree crowns and stems, and those of the forest floor and the soil. Vertebrate studies concentrated on the food chains involving small rodents.

Aquatic studies have been conducted in the large Danube River and in several of the smaller rivers and lake systems of the limestone karst formations. There does not appear to be any integrated work done on a unit watershed basis; unit watersheds may be hard to find on the generally porous geologic substrates. The predominantly limestone geology of the central and coastal mountain ranges has a profound effect on the water quality and clarity of the rivers, lakes, and coastal marine waters. Also, it is not uncommon to observe whole rivers emerging from or disappearing into a mountain side.

On a transect traveled from coastal Dubrovnik (south) to inland Sarajevo (north) it was apparent that the porosity of the limestone combined with the Mediterranean summer-dry climate created the unique conditions for the vegetation type characteristic of the Mediterranean with many drought resistant plants, including several Pinus species (Pinus heldreichii Christ.). Many of the coastal mountain sides are covered with low shrubs, but the presence of a fenced and apparently thriving pine plantation suggested considerable site degradation by the ubiquitous flocks of sheep. Further north, beyond some magnificent karst-formed canyons of the clear Neretva River, the vegetation gradually changes toward toward the mixed hardwoods of the central highlands with a scattering of Pinus peuce Griseb. on the

mountaintops and very steep slopes. The soils derived from the limestone bedrock at higher and moister elevations are generally richly brown and crumbly. No natural coniferous forest stands were encountered on this trip. Coniferous forests are restricted principally to the northern part of the country near Ljubljana in the southernmost extensions of the Austrian alpine mountain ranges. IBP work in that region is being directed by Dr. SUSNIK of the Institute la Biologista, Ljubljana.

REFERENCES

BISKUPSKY, V. 1971. Productivite primaire des forests temperees caducifollees in Europe orientale (Tchecoslovaquie, Bulgarie, Hongrie). Ecol. Conserv. 4:289-292.

BUJALSKA, G. 1971. Self-regulation of reproduction in an island population of Clethrionomys glareolus (Schreber, 1780). Ann. Zool. Fenn. 8:91-93.

DRIFT, J. van der. 1969. Annual Report. Inst. Biol. Field Res., Arnhem, Neth. 79 p.

———. 1971. Production and decomposition of organic matter in an oakwood in the Netherlands. Ecol. Conserv. 4:631-634.

DENAEYER--DE SMET, S., and P. DUVIGNEAUD. 1972. Comparaison du cycle des polyelements biogenes dans une hetraie (Fagetum) et une pessiere (Piceetum) etablies sur meme roche-mere, a Mirwart (Ardenne luxembourgeoise) [Comparison of the biogenic polyelements cycle in a beech-wood (Fagetum) and a spruce-stand (Piceetum) on the same bedrock, at Mirwart (Ardenne luxembourgeoise)]. Bull. Soc. Bot. Belg. 105:197-205. (English summary)

DUVIGNEAUD, P., S. DENAEYER, P. AMBROES, and J. TIMPERMAN. 1971. Recherches sur l'ecosysteme foret: Biomasse, productivite et cycle des polyelements biogenes dans l'ecosysteme "chenaie caducifoliee" (Essai de phytogeochimie forestiere). Inst. R. Sci. Nat. Belg., Mem. 164. 101 p.

DUVIGNEAUD, P., and A. FROMENT. 1969. Elements biogenes de l'edaphotope et phytocenose forestiere. Bull. Inst. R. Sci. Nat. Belg. 45(25):1-48.

DUVIGNEAUD, P., E. PAULET, P. KESTEMONT, M. TANGHIE, S. DENAEYER--DE SMET, G. SCHNOCK, and J. TIMPERMAN. 1972. Productivite comparee d'une hetraie (Fagetum) et d'une pessiere (Piceetum), etablies sur meme roche-mere, a Mirwart (Ardenne luxembourgeoise) [Compared productivity of a beech-wood (Fagetum) and a spruce-wood (Piceetum) established on the same bedrock, at Mirwart (Ardenne luxembourgeoise).] Bull. Soc. R. Bot. Belg. 105:183-195. (English summary)

GALOUX, A., G. SCHNOCK, and J. GRULOIS. 1967 Les installations ecoclimatologiques. Recherches sur l'Ecosysteme Foret, Ser. B: La Chenaie Melangee calciole de Vire-les-Blaimont. 40 p. + charts and plates.

GRUM, L. 1971. Remarks on the differentiation in Carabidae mobility. Ekol. Pol. 19(3):47-56.

HRBACEK, J. 1971. Eleventh annual report. Hydrobiol. Lab. Czech. Acad. Sci., Praha. 43 p.

JURKO, A. 1970. Research project Bab (IBP) progress report 1. Bot. Inst. Slovak Acad. Sci., Bratislava, Czech. 240 p.

KACZMAREK, W. 1970. Die Bedeutung der Organizehen Retention und der Boden Organisms as Regulations faktoren im Stoffhaushalt der Landokosystem. Colloquim Pedobiologiae, Dijon, 1970. Publ. 71-7, Institut National de la Rocherche Agranomique, Paris.

KUBICEK, F. 1971. Leaf area estimation in Quercus petraea using linear regression equations. Photosynthetica 5(4):426-428.

LAWACZ, W. 1969. The characteristics of sinking materials and the formation of bottom deposits in a eutrophic lake. Mitt. Int. Verein. Limnol. 17:319-331.

———. 1970. Formy wystepowania materii organicznej w wodach i metody jej badania. (The organic matter in natural waters and methods of its investigation.) Wiad. Ekol. 16(1):55-67.

MEDWECKIEJ-KORNAS, A. (ed.). 1967. Ecosystem studies in a beech forest and meadow in the Ojcow National Park. Zaklad Ochrony Przyrody Polskiej Akademii Nauk. 213 p. (In Polish, with English summaries.)

———. (ed.) 1971. Nature of the northern part of Niepolomice Forest and its conservation. Part 1. Zakl. Ochr. Przyr. Pol. Akad. 52 p. (In Polish, with English summaries.)

MRAZ, K., and O. LANGKRAMER. 1971. Forest humus forms and their soil organisms, p. 427-430. IN: B. Novak, J. Macura, M. Kutilek, J. Pokorna-Kozova, and V. Tichy (eds.). Trans. Int. Symp. Humus Planta V, Prague, 13-17 September 1971.

NAGEL--DE BOOIS, H. M., and E. JANSEN. 1971. The growth of fungal mycelium in forest soil layers. Rev. Ecol. Biol. 8(4):509-520.

PELISEK, J. 1971. Soils of Czechoslovakia. Soil Sci. 111(3):163-169.

———. 1972. The development of research in Czechoslovakia over 1965-70 in the fields of science concerned with forest environment. Lesnictvi 18(45):649-659.

PENKA, M. 1967. Types of the daily course of transpiration rate in seedings of forest trees. Biol. Plant. (Praha) 9(6):407-415.

PETRUSEWICZ, K. 1971. Report on scientific activities for 1970. Polish Academy of Sciences, Institute of Ecology and Department of Animal Evolutionism and Ecology and Department of Hydrobiology of the Institute of Zoology, Warsaw University.

SHAPLEY, D. 1972. To Poland with Love: U.S. Brass, Scientists Warm to Copernicus Fete. Science 177: 683-684.

VINS, B. 1966. Scaffolding for work in tree crowns. Silvae Genet. 15(3):89-91.

———. 1970. Methods and use of tree ring analyses in Czechoslovakia, p. 67-73. IN: J. H. G. Smith and J. Worrall, eds. Proceedings, Conference on tree-ring analysis with special reference to northwest America, Vancouver, B.C., 19-20 Febrary 1970. (Univ. British Columbia, Faculty of Forestry Bull. 7.)

VYSKOT, M. 1972. New trends in the science of silviculture. Lesnictvi 18(45):605-622.

ZAJONC, I. 1969. Synusia analysis of earthworms (Lumbricidae oligochaeta) in the oak-hornbeam forest in south-west Slovakia. Ecol. Conserv. 4:443-452.

APPENDIX A	List of People and Addresses
APPENDIX B	Foreign Currency Program Specifications
APPENDIX C	Man and Biosphere Program
APPENDIX D	Report of Czechoslovak IBP

APPENDIX A

List of People

USA

Mr. K. D. Whitehead - Deputy Director

Mr. R. Conroy - Information Specialist

Foreign Currency Program
Office of International Activities
Smithsonian Institution
Washington, D.C. 20560

Belgium

Dr. P. Duvigneaud - Laboratoire de Botanique Systematique et d'Ecologie, 28 Avenue Paul Heger, 1050 Bruxelles

Ds. P. Kestemont "

Dr. S. Denayer-De Smet "

Dr. A. Galoux "

Ds. P. Ledel "

Ds. J. P. Van Severen "

Mr. J. Timperman "

Dr. A. Froment "

Dr. C. Gaspar "

Dr. Berthet - Catholic University of Louvain, 4 Rue Krahen, Louvain

Holland

Dr. G. J. Vervelde - Institute for Biological and Chemical Research of Agricultural Crops, Bornsesteeg 65, Wageningen

Dr. W. Van Dobben - Institute for Biological Field Research Kemperbergerweg 11, Arnhem

Dr. J. Van Der Drift "

Ds. R. De Boois "

Dr. H. L. Golterman - Limnological Institute "Vijverhof" Niewersluis

Poland

Dr. K. Petrusewicz - Institute of Ecology, Polish Academy of Sciences, Dziekanow, Lesny k. Warszawy, Poland

Dr. L. Grum "

Dr. G. Bujalska "

Dr. W. Lawacz "

Dr. A. Kajak "

Dr. W. Kaczmarek "

Ds. M. Kaczmarek "

Ms. G. Serafinska "

Ing. C. Kurowski "

Dr. Z. M. Gliwicz "

Dr. A. Grabowski "

Dr. A. Stanczykowska "

Ing. M. Planter "

Dr. A. Medwecka - Kornas - Nature Conservation Research Center, Polish Academy of Sciences, Lubicz 46, Krakow

Dr. J. Klein "

Dr. Z. Denisiuk "

Dr. Bzowski "

Dr. K. Borusiewicz "

Czechoslovakia

Dr. E. Hadac - Institute of Landscape Ecology, Czechoslovak Academy of Sciences, Pruhonice u. Prahy

Czechoslovakia

Dr. A. Jurko - Institute of Botany, Slovak Academy of Sciences, Dubravaka cesta 26, Bratislava

Ds. J. Kolek "

Ing. F. Kubicek "

Ing. J. Hrasko - Research Institute of Soil Science and Nutrition of Plants, Roznavska 1536, Bratislava

Ing. J. Oszlanyi - Forestry Management Research Institute at Zvolen, Drienova 5, Bratislava

Dr. V. Biskupsky "

Dr. J. Hrbacek - Hydrobiological Laboratory, Czechoslovak Academy of Sciences, Vltavska 17, Praha 5

Dr. M. Straskraba "

Dr. V. Hruska "

Ing. B. Vins Forestry and Game Management Research Institute, Zbraslav n. Vlt. -Strnady

Ing. A. Sobotka "

Ing. O. Langkramer "

Ing. K. Mraz "

Ing. B. Urosevic "

Dr. M. Penka Faculty of Forestry, University of Agriculture, Brno.

Dr. M. Vyskot "

Ing. J. Cermak "

Ing. E. Klimo "

Ing. F. Vasicek "

Dr. J. Pelisek "

Yugoslavia

Dr. D. Jelenic - Nemanjina 6, P. O. Box 127, Zemun

Dr. M. Todorovic - Institute for Biological Research, 29 Novembra 142, Beograd

Dr. M. M. Jankovic "

Ing. Kojic "

APPENDIX B

NSF 71-10

National Science Foundation

Office of International Programs

Washington, D.C. 20550

March 18, 1971

Special Foreign Currency Awards for Research, Science Education, and Related Activities.

1. The National Science Foundation is presently considering proposals for support of scientific activities overseas which will incur costs payable in the currencies of Burma, Guinea, India, Morocco, Pakistan, Poland, Tunisia, United Arab Republic (Egypt), or Yugoslavia. These Special Foreign Currency Awards offer no dollar support, but may include support of the costs of international transportation.

2. Proposals will be considered for support of research, science education, and related activities which employ, advance, or promote the application of the scholarly disciplines of the:

Biological & Medical Sciences (excluding clinical aspects): cellular biology, environmental and systematic biology, molecular biology, physiological processes, psychobiology;

Engineering Sciences: engineering chemistry, engineering energetics, engineering materials, engineering mechanics, engineering systems;

Mathematical & Physical Sciences: astronomy, chemistry, mathematics, physics;

Social Sciences: anthropology, economic and social geography, economics, linguistics, political science, social psychology, sociology;

Environmental Sciences: atmospheric sciences, earth sciences, oceanography including biological oceanography.

Activities of interdisciplinary or multidisciplinary character are eligible, as are activities dealing with scientific-technical policy and planning, technological assessment, organization and management of scientific and technical resources and establishments, planning and direction of national or international scientific programs,

formation and training of scientific and technical cadres, systems of scientific-technical information and documentation, and the history and philosophy of science.

3. Support is available for activities of the following classes:

a. Cooperative Research and Study

Counterpart proposals of American and foreign institutions may be submitted for support of collaborative scientific research or study under the direction of co-principal investigators of the United States and of the foreign country.

b. Visiting American Scientist

A foreign educational institution or scientific organization may request funds to support an appointment of a Visiting American Scientist. The terms of the proposed appointment should be agreed between the host organization and the American scientist before submission of the proposal.

c. Scientific Resources and Services

Foreign institutions or organizations and international institutions or organizations operating in excess currency countries may apply for support to assist them in rendering research, science education, or other scientific services, the performance or accomplishment of which will provide a significant contribution to U.S. national or international objectives for the advancement or application of scientific knowledge, the strengthening of scientific or technical education and training, or the improvement of systems for the acquisition and dissemination of scientific-technical data and information.

d. American Research and Training

Subject to approval by appropriate foreign institutional, organizational and governmental officials, scientists at U.S. institutions may apply for support to conduct research or study abroad, and American institutions may apply for support to conduct projects for the advanced or specialized training of Americans abroad. Requests by American institutions may include requests for funds necessary for participation of scientists or students of the host country as well as for support of American scientists or students.

e. Science Advancement

Support is offered to American and/or foreign or international organizations for the conduct of joint conferences, meetings, symposia, and seminars for the international exchange of scientific or technical information; for the planning of scientific research, education, or information programs or projects; and for discussion of problems of scientific-technical policy, technological assessment, and organization and management of scientific resources and establishments. Support is also offered for joint studies on any of these topics.

f. International Travel

Subject to limitations affecting use of currencies of particular countries, support is offered for defrayal of the costs of international travel for the purpose of participation by United States scientists in meetings or other scientific activities overseas and for participation by overseas scientists in meetings or other scientific activities in the United States or elsewhere.

4. The Foundation's Special Foreign Currency Program for Research, Science Education, and Related Activities is conducted to encourage and support scientific cooperation between the United States and the participating countries. Criteria for selection of proposals and applications, within the limits of available funds, include:

a. Merit, evaluated in terms of contributing to:
   (1) strengthening and increase of durable professional relationships and cooperation between the scientific communities of the United States and foreign countries;
   (2) advancement of scientific knowledge, strengthening of scientific research potential, or furtherance of the application of science and technology to the alleviation of human, economic, or social problems;

b. Contribution of the proposed activity to the commitments and objectives of the institutions or organizations with which the participating scientists are affiliated;

c. Qualifications of participating scientists;

d. Availability of necessary facilities.

5. The Foundation will give preferential encouragement to joint and copperative endeavors and, when an activity is not fully collaborative between an American and a foreign institution or organization, to proposals providing for participation of foreign nationals in an American project or of American nationals in a project of a foreign institution. Agreement on the nature and scope of a cooperative project should be reached by the American and foreign principals before submission of their proposals. Proposals should include evidence of agreements or other arrangements for scientific cooperation or for participation in the project by nationals of the other country.

6. Proposals may be submitted at any time. Official approval by foreign authorities before the award is made is customarily essential. Cooperating foreign scientists should request their institutional officers to forward their approval through appropriate channels to the American Embassy in their country. During the period March-June 1971, consideration is being given to proposals for activities with starting dates earlier than January 1, 1972.

APPENDIX C

V GENERAL ASSEMBLY

AGENDA ITEM: 7.32
SCIBP: 40/72

THE MAN AND BIOSPHERE PROGRAMME OF UNESCO

The first meeting of the International Coordinating Council for MAB took place in November 1971. The following summary is taken from the Final Report of the Council, an edited version published in 'Nature and Resources' Vo. VIII, No. 1, January 1972 and details of meetings of panels of experts as available in IBP Central Office. This summary is intended as a background note to Agenda Item 7.32.

Objectives

The general objective of the programme is to develop the basis within the natural and social sciences for the rational use and conservation of the resources of the biosphere and for the improvement of the global relationship between man and the environment; to predict the consequences of today's actions on tomorrow's world, and thereby to increase man's ability to manage efficiently the natural resources of the biosphere.

Criteria for the Selection of Projects

The council recommended five criteria for the selection of projects. These are concerned with the provision of information essential to rational decisions on the use of natural resources, the need to produce applicable results within a short to medium term, the need for international cooperation, standardization of methods and synthesis of results, the need for the projects to be within the scope of UNESCO responsibilities and that they should be of intrinsic scientific value as contributing to an understanding of interrelationships between man and the biosphere. A further six points are concerned with the allocation of priorities.

Scientific Approach to MAB

The Final Report of the Co-ordinating Council recognizes four main aspects of the scientific approach to the programme. Two of these are concerned with the detailed approach as contributing to the analysis of ecosystems and to studies of the impact of man on the environment and the environment on man. The remaining two sections are concerned with the levels of spatial integration to be adopted in different projects contributing to the programme and with the development of forecasting methods for rational and responsible use of the biosphere.

Scientific Content of MAB

The Council reviewed the large number of research themes originally outlined in Document 16 C/78 and narrowed these down to a series of 13 international research projects. This list is not final or definitive and it is the intention of the Council that the programme will remain flexible. The titles of the projects are listed below:

1. Ecological effects of increasing human activities on tropical and subtropical forest ecosystems.

2. Ecological effects of different land uses and management practices on temperate and mediterranean forest landscapes.

3. Impact of human activities and land-use practices on grazing lands: savannah grassland (from temperate to arid areas), tundra.

4. Impact of human activities on the dynamics of arid and semi-arid zone ecosystems, with particular attention to the effects of irrigation.

5. Ecological effects of human activities on the value and resources of lakes, marshes, rivers, deltas, estuaries and coastal zones.

6. Impact of human activities on mountain ecosystems.

7. Ecology and rational use of island ecosystems.

8. Conservation of natural areas and of the genetic material they contain.

9. Ecological assessment of pest management and fertilizer use on terrestrial and aquatic ecosystems.

10. Effects on man and his environment of major engineering works.

11. Ecological aspects of energy utilization in urban and industrial systems.

12. Interactions between environmental transformations and genetic and and demographic changes.

13. Perception of environmental quality.

Bureau and Secretariat

The Bureau of the Council is made up of the elected Chairman and four Vice-Chairmen. The present Chairman is Prof. F. Bourliere, and the four Vice-Chairmen are Dr. D. R. King (USA), Dr. V. Kovda (USSR), Prof. M. A. Kassas (Egypt) and Dr. R. Misra (India). The Secretariat of the council consists of Dr. M. Batisse, Director of the Natural Resources Division together with Dr. F. Di Castri, secretary of the council and a number of other staff members including Dr. M. Hadley, former IBP/PT Co-ordinator.

Organization and Implementation

The Co-ordinating Council decided that it would be premature to establish formal working groups for the implementation and organization of the programme until Member States had had time to study the recommendations of the council and define the nature and extent of their participation in the programme. It was however recommended that a number of panels of experts should be convened before the second session of the Council. It was also decided that an ad hoc working group consisting of the Bureau together with the Chairmen or representatives of panels of experts as well as

representatives of cooperating international organizations and other specialists that the Bureau might wish to invite should be convened late in 1972. This ad hoc working group should formulate and coordinate proposals for future work of the programme and make recommendations on the number and terms of reference of working groups to the second session of the council, in March 1973.

IBP Liaison

A considerable number of IBP personnel have assisted in the preparations by UNESCO for the man and Biosphere programme. The role of IBP in establishing an effective network of scientists concerned with the environment is recognized in the Final Report of the Council as is the experience of IBP in establishing a basis for the comparability of results and the future role of the IBP Handbook series in environmental education and training. The statutes of the Council provide for consultations with ICSU and its affiliated organizations including IBP as well as the representation of the ICSU family on meetings of the Council, its committees and working groups.

Apart from the considerable input into the planning of MAB, IBP has also been consulted by the MAB Secretariat over the planning and membership of the various panels of experts. Both these and the Secretariat include a strong representation of scientists involved in IBP research and planning. The following panels of experts have already met or are scheduled to meet in the near future:

Panel on the role of systems analysis and modeling. Paris, 18 - 20 April 1972.

Panel on Project No. 1 - Ecological effects of increasing human activities on tropical and subtropical forest ecosystems, Paris, 16-18 May 1972

Panel on Project No. 12 - Interactions between environmental transformations and genetic and demographic changes Paris, 23-25 May 1972.

Panel on Project No. 5 - Ecological effects of human activities on the value and resources of lakes, marshes, rivers, deltas, estuaries, and coastal zones. London, 19-21 September 1972.

The present overlap of Officers and staff between MAP and SCIBP has done much to ensure close contact. It is hoped that these contacts will continue and that any appropriate transfer of IBP initiated activities to MAB will take place smoothly at national and international levels.

National Committees

As in the case of IBP, all work conducted under MAB (other than its coordination) will depend on national initiatives and national finance. Accordingly all countries which are members of UNESCO have been invited to establish national MAB committees. It is understood that many have already responded and that in some cases there is an overlap in membership between national MAB committees and IBP committees.

APPENDIX D

V G.A.
Agenda Item 9.1

V GENERAL ASSEMBLY

Seattle, 4-6 September 1972

REPORT OF CZECHOSLOVAK IBP NATIONAL COMMITTEE
(National Activities in Phase III of the IBP)

Research

In Czechoslovakia, the national IBP projects and their funding will continue, in most cases, also during the Phase III of the IBP. The following table gives an idea of the amount of work spent on IBP research in Czechoslovakia.

Table

Approximate number of hours (in thousands) spent and planned to be spent, till the end of the IBP in 1974, on research falling under various IBP national projects in Czechoslovakia, by individual sections.

Section	Graduate Scientists	Technical Staff	Together
PT	309	726.5	1,035.5
PP	370	445	815
CT	335	118	453
PF	191	89	280
HA	204	59	263
UM	91.5	86	177.5
TOTAL	1,500.5	1,523.5	3,024

The IBP research has also had a great impact, both direct and indirect, on the education of both undergraduates and graduate students. Altogether some 65 first-degree (undergraduate) and about 40 graduate (CSc) theses have been or are being worked out in connection with various IBP projects.

Summarizing and Synthesis of IBP Projects

Apart from the production of several research reports already published or well under way, arrangements are being made for publications summarizing and evaluating the results of our IBP research. The Czechoslovak IBP national committee has recommended the publication of some 13 final national publications in total, most of them in English or French, with the majority of them appearing as separate volumes, and a few as large review articles in scientific journals.

The working group for PT and PP is planning three volumes dealing with the results of the research in the woodlands, grasslands and wetlands,

respectively, one inter-biome regional synthesis for Southern Moravia, three volumes dealing, respectively, with the photosynthetic production in agricultural crops, algal mass cultures and wetland plants, and two review articles dealing, respectively, with photosynthesis in relation to water balance in the plants, and with symbiotic nitrogen fixation. The results of the "Initial Level" photosynthesis experiments have been summarized in two papers.

The CT working group is planning two volumes dealing with landscape ecology (in Southern Bohemia and Central Slovakia, respectively), one volume on the conservation of forest ecosystems, and a summary of other CT projects in Czechoslovakia. Check sheets have been worked out for all Czechoslovak territories under any kind of protection by the Nature Conservancy (about 750 pp. in total).

The principal results of the Czechoslovak PF research will be published in one large volume, and the HA working group is planning two such volumes. No special national final publication is envisaged by our UM working group, but a few Czechoslovak authors will take part in the UM international IBP syntheses Czechoslovak research workers will also contribute to the international IBP syntheses planned within the sections PT, PP and PF, and by the Photosynthesis Liaison, Wetlands, Small Mammals, and Granivorous Birds working groups.

Transfer of Research Activities after IBP

All the Czechoslovak national IBP syntheses ought to be completed by 1975-76. A number of research projects will be continued under national auspices. At the same time, some of them are likely to form part of the Czechoslovak contribution to UNESCO's programme on "Man and Biosphere" (MAB). A Czechoslovak national committee for the MAB has been established, with the IBP well represented on it. The exact scope and contents of the Czechoslovak participation in the MAB programme are likely to be specified more precisely in the near future. It is hoped that links will also be established with other world programmes on ecology and conservation.

Praha, 18th August 1972

Professor Emil Hadac
Corresponding member of the Czechoslovak Academy of Sciences
Chairman of the Czechoslovak IBP National Committee