

APPENDIX B

Activities of ICSU Unions and Associated Scientific Groups relevant to this Report

INTERNATIONAL ASTRONOMICAL UNION (IAU)

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As a part of its study of all phenomena in outer space, the Union has immediate concern with the identification and preservation of remaining sites for dark sky optical stellar astronomy. It maintains close contact with UNESCO and ICSU, and co-sponsors a number of meetings organized by other ICSU bodies (Contopoulos, 1974a, 1974b; Contopoulos and Jappel 1974). *IAU Information Bulletin* is published biannually and contains information on past and future meetings, symposia and colloquia, summary minutes, recent administrative decisions, publications, and personal notes. Twelve to twenty symposia and colloquia are held on specialized topics during each triennium. The proceedings of each has its own title and edition.

IAU has created a permanent commission for the study of the protection of astronomical sites, such as the Canary Islands, Baja California, and Mauna Kea, Hawaii. This commission met in August at the XVIth General Assembly of IAU in Grenoble, France. R. Cayrel of France is the newly elected chairman. M. F. Walker of USA is the past chairman.

INTERNATIONAL UNION OF BIOCHEMISTRY (IUB)

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INTERNATIONAL UNION OF BIOLOGICAL SCIENCES (IUBS)

International Association of Ecology (INTECOL)

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As a part of its concern with ecological investigations, the association advances the view that agro-ecosystems function as ecological systems; and promotes determination of similarities and/or differences in the regularities governing the ecological processes occurring in agro-, natural, and semi-natural ecosystems and assessment of the role of agro-ecosystems within the total ecological landscape.

It sponsors collaboration on problems of tropical ecology, ecology of small mammals, plankton ecology, and ecology of graminivorous birds.

It promotes comparative ecological analysis of urban environments (a cooperative project with MAB and UNEP) and study of the structure and functioning of human settlements as ecological systems.

It is organizing a working group on desert ecosystems.

INTECOL has sponsored numerous symposia including the Third International Symposium on Tropical Biology (Lubumbashi, Zaire, 1974), the First International Congress of Ecology (The Hague, 1974), and Biological Rhythms in the Marine Environment (Baruch Institute for Marine Biology and Coastal Research, 1975).

It publishes three journals, *Oecologia*, *Agro-Ecosystems*, and *Urban Ecology*, and a bimonthly *Newsletter*. The *Newsletter* includes reports of MAB programme activities and is distributed to ecologists in developing countries (Golley and Medina 1975, Hasler 1975, Junk 1975).

INTERNATIONAL ASSOCIATION OF MICROBIOLOGICAL SOCIETIES (IAMS)

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Acting through its World Federation for Culture Collections (WFCC), which is also an IUBS federation, the association seeks to promote the preservation of microbial genetic resources as well as making these available to developing countries. Through its International Commission on Microbial Ecology (ICOME), also an IUBS commission, the association promotes microbial ecology and its environmental applications such as biological nitrogen fixation and waste utilization. IAMS, WFCC, and ICOME are actively involved in the work of the

UNEP/UNESCO/ICRO panel on microbiology which helps guide and implement the UNEP/UNESCO programme on the use and preservation of microbial genetic resources for deployment in environmental management. This programme organizes conferences and training courses and envisages the creation of a network of Microbiological Resources Centres in the three regions of the developing world.

INTERNATIONAL UNION FOR PURE AND APPLIED BIOPHYSICS (IUPAB)

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The union is involved in basic scientific research as well as seeking ways and means to use modern biophysical techniques for the solution of current problems in areas such as drug testing, medical physics, environmental pollution, energy conversion, desalination, enzyme and microbiological engineering, and genetic manipulation in plants and animals.

An important part of the union's activities lies in helping scientists in developing countries to learn and apply the sophisticated approaches on which the rapid advances of biophysics in recent years have often depended. This is done by holding symposia and summer schools in such countries, through the provision of travel funds for attendance at meetings held in the USA and Western Europe, by sending teams of IUPAB Lecturers to give seminars at appropriate centres, and by producing textbooks with their special needs in mind.

The union arranges an international congress covering the whole field of biophysics every third year, alternating with those of IUB and IUPS, while its scientific commissions sponsor specialized symposia at more frequent intervals, usually in conjunction with other organizations.

The official journal of the union is the *Quarterly Reviews of Biophysics*, published by the Cambridge University Press. This contains critical and up-to-date articles on a wide range of biophysical topics, written by authors who have made significant contributions to the subject. In addition, the Union sponsors a new series of Biophysics texts, also to be published in due course by the Cambridge University Press.

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY (IUPAC)

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IUPAC covers the whole field of chemistry and fosters advances in that science. It operates under six main divisions, viz. Physical, Organic, Inorganic, Analytical,

Macromolecular, and Applied. While several of these divisions are concerned to some extent with environmental matters, the Division of Applied Chemistry is particularly concerned with problems of environmental importance. Much of the work is related to methods of identification and analysis, and some with detailed chemical structure.

The following is a brief listing by title of topics under active study, arranged under general headings.

Food additives – Methods for collaborative study of non-volatile nitrosamines in food; methods for nitrite and nitrates in food; collaborative study of methods for multi-antioxidants in food; urethane in beverages; N-heterocyclic carcinogens in food; migration of PVDC derived from food packaging; residues in edible products from treated livestock; priority of study of analytical problems relative to food additive use.

Food contaminants – Collection of information on food contaminants derived from food packaging; determination of mycotoxin in foodstuffs; multi-mycotoxin analysis; use of animal waste for animal feed; determination of lead and cadmium in food; determination of copper in food; selenium in foods; determination of fluoride; single cell proteins; minicolumn methods for mycotoxins; mycotoxin formation during shipment of foodstuffs, sampling plans for mycotoxin analysis; mycotoxin residues in food of animal origin; TLC method for Ochratoxin; method of determination for aflatoxin M2 in dairy products.

Oils and fats – Organochlorine pesticide residues in fats and oils; trace plastic polymers in oils and fats; contaminant plastics polymers in oils and fats.

Air quality – Reliability in air quality data; chemicals with long-term effects; chemicals of ecological significance; sampling strategy; calibration and verification of automatic monitors; evaluation of biological and air quality information; source identification of transition products and ultimate fate; characteristics of aerosols; sulphur acidic aerosols; organic isocyanates; metals in air.

Terminal pesticide residues – Insecticides (toxaphene, cyclodienes, carbamates, pyrethroids, organophosphates), herbicides, fungicides, fumigants; photo-decomposition of pesticides, environmental significance of ETU, effect of food processing on pesticide residues.

Pesticide residue analysis – Organochlorines and organophosphorus compounds; fumigants; carbamate herbicides, insecticides and fungicides; systemic fungicides; other fungicides; organotins; rethrans; synergists; influence of post-harvest factors on the amount of residues; lower limits of residue analytical methods; statistical treatment of analytical data; selective GLC detectors; confirmatory tests for residues and metabolites; liquid chromatography; adsorbents and GLC-phases.

Water quality – Pollution abatement in industry; microbiological aspects of effluent treatment; nomenclature in water chemistry.

Reclamation of solid wastes – Identification of solid waste problems on an international basis.

Symposia and Conferences

Fifth International Fermentation Symposium, 28 June–3 July 1976, Berlin

International Symposium on Advances in Smoking of Foods, 7–10 September 1976, Warsaw

Third International Symposium on Mycotoxins in Foodstuffs, 16–18 September 1976, Paris

Third International Symposium on Genetics of Industrial Micro-organisms, 5–9 June 1978, Madison

Fourth International Congress of Pesticide Chemistry, 24–28 July 1978. Zurich

Sixth International Fermentation Symposium, 1980

INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS (IUGG)

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The objectives of the union are to promote and co-ordinate physical, chemical, and mathematical studies of the earth and its immediate spatial environment. It has been a major participant in the activities of most of the international scientific programmes which ICSU has sponsored. In particular, the IUGG has been responsible for initiating the collaborative action which led to such intensive world-wide co-operative research programmes as the International Geophysical Year (1957–58), the Upper Mantle Project (1964–70), and, more currently, the Global Atmospheric Research Programme (1970–80). At the present time the IUGG is involved in the work of the ICSU Scientific Committees for Antarctic (SCAR), Oceanic (SCOR), Space (COSPAR), and Water (COWAR) Research, on Problems of the Environment (SCOPE), on Solar Terrestrial Physics (SCOSTEP), and several inter-union commissions including radiometeorology (IUCRM), geodynamics (ICG), and the planned co-ordinating committee on the Moon and Planets (CCMP). It is also represented on the Teaching of Science Committee (CTS) and on the Committee for Science and Technology in Developing Countries (COSTED). The IUGG gives particular emphasis to the scientific problems of developing areas by sponsoring symposia relevant to the scientific needs of the Third World (Geodesy in Africa,

International Water Resources, etc.). The Union also co-sponsors the Federation of Astronomical and Geophysical Services (FAGS) and serves on the Panel for the World Data Centres (WDC's) as well as the ICSU Committee on Data for Science and Technology (CODATA).

IUGG contains 7 semi-autonomous international associations, each responsible for a specific range of studies within the overall scope of the Union's activities and each with a substructure. The disciplines covered by the associations are: Geodesy (IAG), Seismology and Physics of the Earth's Interior (IASPEI), Volcanology and Chemistry of the Earth's Interior (IAVCEI), Geomagnetism and Aeronomy (IAGA), Meteorology and Atmospheric Physics (IAMAP), Hydrological Sciences (IAHS), Physical Sciences of the Ocean (IAPSO).

The union and the associations publish information bulletins periodically as well as the proceedings of meetings of the associations and of symposia sponsored by the associations. The following bulletins are issued by the union and the associations which also publish more specialized bulletins from time to time (data compilations, etc.): *IUGG, Comptes Rendus of the General Assemblies, IUGG Chronicle* (6 times per annum); *IAG Bulletin Geodesique* (quarterly); *IAVCEI, Bulletin Volcanologique* (semi-annually); *IAHS, Bulletin des Sciences Hydrologiques* (quarterly); *IAGA News* (irregularly); *IAMAP News Bulletin* (irregularly); *IAPSO, Proces Verbaux* (2–4 years), *Publications Scientifiques* (irregularly).

INTERNATIONAL GEOGRAPHICAL UNION (IGU)

World Land Use Survey Commission

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The commission endeavours to further worldwide execution of land use surveys, within a general information system, as a tool for rational land use planning and management. Through its members, it investigates specific land use problems and prepares reports on the findings.

The *World Land Use Survey Series* is published by Geographical Publications Ltd., Berkhamsted, Herts., England in close co-operation with the commission.

Commission on Medical Geography

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The commission is concerned with the study of the geography of health, disease, and health sources. It investigates spatial relations as affected by the space-ecology of disease and the responses to it in varying patterns of health. It works mainly by liaison services, such as publication of the *Medical Geography Newsletter*, and through numerous seminars and symposia.

Working Group on the Dynamics of Shoreline Erosion

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 AUSTRALIA

The working group is compiling a survey of the extent of advance or recession of the world's shorelines (with special references to sandy beaches) during the past century and relating the changes determined to shore processes.

It prepared a preliminary report on world shoreline changes for the IGU Congress (Moscow, 1976) and will thereafter proceed to completion of the survey, with detailed research on coastal sectors identified as of special scientific importance.

It intends to ask IGU to establish a Commission on the Coastal Environment for 1976–80 to complete the project on shoreline changes and to compile further data on:

- (1) case histories of the impact of man's activities on the coastal environment;
- (2) nature and location of sites of special scientific interest on the world's coasts;
- (3) guidelines for environmental management in coastal regions.

Commission on Man and Environment

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 University of Colorado
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 USA

The commission sponsors collaboration among geographers in comparative analysis of the environmental effects of technological development (Nelson and Scace 1974), the comparative analysis of social response to natural hazards (White 1974), the experience with establishment and management of natural preserves (Nelson, in press), man-environment theory, the mapping of environmental perturbations, the environmental impacts of growth on the urban fringe, evaluation

of environmental effects of complex river development, and environmental constraints upon economic development.

Commission on Present Day Geomorphic Processes

Dr. O. Slaymaker
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 Vancouver, B.C., CANADA

In its work with land forming processes, the commission has endeavoured to establish quantitative field experiments with comparable techniques to evaluate rates of geomorphic processes in various climatic and lithologic environments. It has concentrated its efforts on mountain, arid, and tropical processes. The commission has held four symposia in Canada (1972), West Germany (1973), Israel (1974), and Zaire (1975). (Alexandre 1976, Poser 1974, Schick et al. 1974, Slaymaker and McPherson 1972).

Commission on Geography in Education

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The commission is concerned with the various aspects of environmental education which can be treated in geography at school level with some reference to human settlement. Its goal is to produce teaching units suitable for secondary school use. It held regional meetings of experts on the teaching of geography in Southeast Asia and Oceania (Singapore, 1972), in Southeast Asia and the Southwest Pacific (Sydney, 1973), and in South and East Asia (Delhi, 1974).

Sydney workshop teaching units were reproduced by UNESCO in 1975; Delhi workshop units will be completed in 1977.

Commission on Agricultural Typology

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 POLAND

The commission is involved in a typological classification of agriculture on a world, national, and regional scale, which includes modelling of the various

agricultural systems. Environmental problems generally are not emphasized except when interpreting the reasons why individual types of agriculture have developed in specific places. (Kostrowicki 1974, 1968, 1964; Kostrowicki and Tyszkiewicz 1970).

The commission was discontinued after 1976.

Working Group on Problems of Desertification in and around Arid Lands

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 AUSTRALIA

The working group collects evidence on the nature and causes of environmental changes contributing to the extension of deserts into marginal areas or an intensification of desert conditions within arid regions, including both man-made and natural changes. The Alice Springs, Australia, Field Conference (1974) was organized to deal with these problems. A conference report was subsequently submitted to UNESCO (Division of Ecological Sciences).

INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)

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For the most part the union and its commissions, committees, and affiliated organizations pursue basic scientific knowledge and practical applications to everyday problems in roughly equal measure. International collaboration under the aegis of the union promotes the sharing of ideas as well as data, and leads to the dissemination of the most advanced concepts. Harmonizing the results of research in one country with those of neighbouring countries yields a coherent picture of a whole region – even an entire continent – and raises the value of local increments to the geologic framework.

The union participates in all ICSU committees: SCOPE, SCAR, SCOR, COWAR, COSTED, CODATA, the Abstracting Board, and the Committee on Science Teaching.

The International Geological Correlation Programme is an unusual joint undertaking of IUGS (a non-governmental scientific union) and UNESCO (an intergovernmental body). IGCP is designed to promote international geologic research and to advance the application of geology in the developing countries. In many of these countries the best chance for promoting sound and orderly economic growth is through more effective use of resources of energy, minerals, and water.

The principal benefits of commission, committee, and association activities are the findings from the technical sessions and field conferences organized around the most significant problems in geology and in the most important field areas, the assembling of working groups for concerted attacks on special subjects, and the catalytic effect these have in focussing research on the main problems of the earth. The research results are published in standard serials of the geological sciences. The union itself publishes only the Quarterly Journal of IUGS, generally known as the *Geological Newsletter*. The Newsletter furnishes an up-to-date directory of all organizations affiliated with the union, a calendar of major geological meetings, agendas for many sessions, and summary accounts of meetings.

INTERNATIONAL UNION OF NUTRITIONAL SCIENCES (IUNS)

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The unbalanced diet and uneven distribution of nutrients comprise the primary problems that the union addresses in its scientific work. It is involved in scientific investigations of serious nutritional deficiencies, particularly in the developing countries. It promotes international co-operation in nutrition, encourages research, education, and training through its six commissions and thirty-two committees, and provides a means of communication with other appropriate organizations.

It collaborates closely with UNESCO and ICSU, of which it has been a member since 1968. Further, the union works with WHO, enjoys consultative status with FAO, UNICEF, and ECOSOC (Roster), and is an Associate member of CIOMS. The Union co-sponsors meetings organized by regional and other nutrition associations.

The *IUNS Newsletter* is published once or twice annually. The main objective of the Newsletter is to increase contact with the Adhering Bodies and to make the scientific activities of the IUNS better known among nutrition societies throughout the world.

Reports from the work of the Committees are available as IUNS publications.

The *IUNS Directory* comprises the statutes and rules of procedure; Adhering Bodies, Commissions, and Committees; permanent IUNS representatives in different organizations; and addresses of nutritionists involved in IUNS.

INTERNATIONAL UNION OF PURE AND APPLIED PHYSICS (IUPAP)

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 CANADA

IUPAP co-operates with inter-union groups on problems of the environment and nominates experts to inter-union groups.

Under a proposal from the International Commission on Acoustics (ICA), SCOPE established a co-ordinating group to foster co-operative research on topics related to noise pollution. Professor A. Lara-Saenz was appointed Chairman of the group. Four working groups were organized as follows:

- W.G. 1 Hearing Threshold Levels of Isolated Human Populations
ICA Rep. – E. A. G. Shaw, Organizing Secretary – J. J. Knight
- W.G. 2 Noise Propagation in the Atmospheric Boundary Layer
ICA Rep. – J. Igarashi, Organizing Secretary – T. F. W. Emblenton
- W.G. 3 Noise Propagation in Buildings
ICA Rep. – A. Lara-Saenz, Organizing Secretary – G. Sacerdote
- W.G. 4 Effects of Noise on Wildlife Communication
ICA Reps. – I. J. Hirsch and J. Bosquet,
Animator – J. L. Fletcher

They have undertaken a series of reports in preparation for the 1977 International Congress on Acoustics.

INTERNATIONAL UNION OF PHYSIOLOGICAL SCIENCES (IUPS)

Commission on Environmental Physiology

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The commission organized meetings in Jerusalem (1975) and Indonesia (1975) and participated in organizing the International Congress of Physiological Sciences in Delhi (1975). Currently it is organizing a Satellite Symposium in Strasbourg in 1977.

Commission on Thermal Physiology

Dr. John Bligh
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The commission's activities have often related to environmental problems.

INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS
(IUTAM)

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The union organizes several international symposia each year, many of which deal with basic processes in the environment. These include turbulent dispersion in the atmosphere and ocean, high-speed computer simulation of fluid dynamic phenomena, physical structure of shock waves, multi-phase flows, improvement in combustion efficiency, ground-water contamination, desalination, and noise pollution. Other IUTAM activities cover the statistical aspects of monitoring network design including optimization of time-space sampling grids, and the space-time response of measuring devices to fluctuating data; simulation modelling involving the representation of physical and biological processes by high-speed computing methods of fluid dynamics used for mathematical modelling of atmospheric and oceanographic phenomena; processes involving the magnitudes and rates of material flows in biogeochemical studies; and mathematical modelling of dispersion of pollutants involving their sources, transport, and magnitude of exposure in order to provide the information required in environmental toxicology and the planning of human settlements. (Bowden et al. 1967, Bretherton et al. 1966, Davidson et al. 1969, Frenkiel 1962, Frenkiel and Munn 1974, Frenkiel and Sheppard 1959, Frenkiel and Stewartson 1969, Krautchenko and Sirieys 1966, Kuchemann 1956).

SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH (SCAR)

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Many SCAR activities are directed to understanding aspects of the Antarctic Environment. This includes the extensive continuing national programmes in biology, glaciology, geology, meteorology, geodesy, and cartography, human biology and medicine, solid earth geophysics, upper atmosphere physics, and oceanography. These activities are detailed in annual national reports to SCAR which also contain bibliographies of published scientific papers.

The SCAR system of permanent Working Groups or Groups of Specialists ensures that the national efforts in the different scientific fields are brought together and discussed, and that important problems for future investigation are identified. It also provides the framework for collaborative studies by two or more nations where such an approach is desirable.

In addition to the scientific Working Groups, SCAR has a permanent Working Group on Logistics, which provides a forum for interchange of national ideas on logistic support for scientific studies, and plans technical research on logistic problems.

From time to time on the recommendation of its appropriate subsidiary group, SCAR sponsors scientific symposia in collaboration with other relevant ICSU bodies. These have included: SCAR/WMO Symposium on Antarctic Meteorology, (Melbourne, 1959); Antarctic Symposium, (Buenos Aires, 1959); IASH/SCAR Symposium on Antarctic Glaciology, (Helsinki, 1960); SCAR Logistics Symposium, (Boulder, 1962); SCAR/IUBS Symposium on Antarctic Biology, (Paris, 1962); SCAR/IUGS Symposium on Antarctic Geology, (Cape Town, 1962); SCAR/SCOR/IAPO/IUBS Symposium on Antarctic Oceanography, (Santiago, 1966); ICPM/WMO/SCAR Symposium on Polar Meteorology, (Geneva, 1966); SCAR/IUBS/SCIBP Symposium on Antarctic Ecology, (Cambridge, 1968); SCAR/IASH International Symposium on Antarctic Glaciological Exploration (ISAGE), (Hanover, 1968); SCAR/IUGS Symposium on Antarctic Geology and Solid Earth Geophysics, (Oslo, 1970); IAPSO/SCOR/IABO/CMG Congress 'The Ocean World' (SCAR half-day on 'Antarctic Ice and Water Masses'), (Tokyo, 1970); SCAR/ICPM/WMO Symposium 'Energy Fluxes over Polar Surfaces', (Moscow, 1971); Technical and Scientific Problems Affecting Antarctic Telecommunications, (Sandefjord, 1972); SCAR/IUBS/IUPS Human Biology and Medicine in the Antarctic, (Cambridge, 1972); SCOR/SCAR Polar Oceans Conference, (Montreal, 1974); SCAR/IUBS Antarctic Biology 'Adaptations within Antarctic Ecosystems,' (Washington, 1974).

Other activities of SCAR include the production and exchange through national committees of environmental impact statements relating to plans for new major scientific projects; a variety of projects that have relevance to climatic change which include activities of SCAR Working Groups on meteorology, Glaciology, geology, and the SCAR Group of Specialists on Late Cenozoic Studies; work on the possible impact on the environment of the Treaty Area and other ecosystems dependent on the Antarctic environment if mineral exploration and/or exploitation were to occur there; and formulation of proposals for and regular reviews of Specially Protected Areas and Sites of Special Scientific Interest. SCAR has been involved in this activity, in collaboration with the Antarctic Treaty Consultative meetings, since the early 1960's. The Group of Specialists on Living Resources of the Southern Ocean, jointly sponsored by SCOR, has been assigned the task of assessing the present state of knowledge of the Antarctic marine ecosystem and recommending research programmes to permit effective conservation, management, and utilization of the living resources of the region. The SCAR Group of Specialists on Seals has an advisory role to signatory governments under the 1972 Convention for the Conservation of Antarctic Seals.

Regular distribution of information on scientific programmes between SCAR nations, which enables specialists to be aware of all investigations being made in the Antarctic in their particular discipline, is achieved by individual contact and

participation in scientific meetings, and through regular distribution by national committees of annual reports of their achievements and future plans.

SCAR Bulletin is published three times a year at the Scott Polar Research Institute, Cambridge and contains accounts of SCAR meetings, their resolutions and recommendations, accounts of Antarctic symposia, lists of names and addresses of SCAR members and Working Groups, annual lists of scientific stations and various papers of Antarctic interest. A Spanish translation of the *Bulletin* is published subsequently by the Instituto Antartico Argentino, Buenos Aires. (Adie 1964, 1970; Australian Academy of Science 1960; Carrick et al. 1964; Currie 1968; Deacon 1971; Edholm and Gunderson 1973; Gow et al. 1970; Holdgate 1970; National Academy of Sciences 1963; SCAR 1972; Sheffield 1972; WMO 1967, 1973; van Zinderen Bakker 1969, 1973).

SPECIAL COMMITTEE ON THE INTERNATIONAL BIOLOGICAL PROGRAMME (SCIBP)

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SCIBP was responsible for organizing world programmes on biological productivity and human welfare for the decade from 1964 to 1974. The programme is now at an end, and the Scientific Committee has been disbanded. The publication stage of IBP is still progressing and 30 volumes of international syntheses have been published so far. These provide a solid basis of reference for SCOPE's continuing biological activities.

SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH (SCOR)

Mr. R. I. Currie
Secretary
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Oban, Argyll PA34 4AD
UNITED KINGDOM

The committee is concerned primarily with basic scientific problems which affect the environment of the sea. SCOR projects with particular interest in advancing the understanding of the environment and the effects of human activity upon it are studies dealing with paleo-oceanography, pollution of the Baltic, river inputs to ocean systems, influence of the ocean on climate, and other research projects related to the ocean environment. Activities of a number of SCOR Working

Groups have some relevance to the broad problem of ocean-atmosphere interaction.

SCOR is an official scientific advisory body to the Intergovernmental Oceanographic Commission and to the UNESCO Division of Marine Sciences. Reports of SCOR Working Groups are sometimes published in *SCOR Proceedings*, an eight page monthly publication which constitutes the record of SCOR achievements, sometimes as numbers in the series *UNESCO Technical Papers in Marine Science* and sometimes as *UNESCO Monographs on Oceanographic Methodology*. Its work with intercalibration and standardization of measurements and data, and international oceanographic tables which are published by UNESCO, is especially useful to environmental science.

SCOR Working Groups

WG 10 – Oceanographic Tables and Standards

Chairman: Professor K. Grasshoff

Terms of Reference: To carry out all the necessary preparatory work for publishing new oceanographic tables; to advise on the certification of the standard sea water; to advise on such further investigations as may be desirable.

WG 34 – Internal Dynamics of the Ocean

Chairman: Professor A. Robinson, USA

Terms of Reference: To identify the critical scientific problems of the internal dynamics of the ocean and to suggest the most appropriate ways to study them; to advise on the design of mid-ocean dynamics experiments.

WG 36 – Coastal and Equatorial Upwelling Processes

Chairman: Dr. K. N. Fedorov, USSR

Terms of Reference: To review present knowledge of the physical, chemical, and biological processes involved in coastal and equatorial upwelling; to evaluate strategies for the investigation of these processes and recommend appropriate investigations; to examine the application of these recommendations in the upwelling region of Northwest Africa.

WG 38 – Ocean Processes in the Antarctic

Chairman: Dr. T. Kvinge, Norway

Terms of Reference: To recommend observational and theoretical studies to facilitate the design of a major study of the circulation of the Antarctic ocean. The group will take into account the findings of WGs 34 and 38 and integrate their recommendation with the plans of WG 47.

WG 40 – Paleo-oceanography

Professor T. van Ardel
School of Oceanography
State University
Corvallis, Oregon 93771
USA

WG 42 – Baltic Pollution

Dr. G. Kullenberg
Institut for Fysisk Oceanografi
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DENMARK

WG 46 – River Inputs to Ocean Systems

Professor D. Lal
Physical Research Laboratory
Navrangpure, Ahmedabad 38009
INDIA

WG 47 – Oceanographic Programmes During FGGE

Chairman: Professor H. Stommel, USA

Terms of Reference: To develop plans for comprehensive oceanographic programmes associated with FGEE and to assist other appropriate international and national bodies in the implementing of such programmes.

WG 48 – Influence of Ocean on Climate

Professor H. Charnock
Institute of Oceanographic Sciences
Wormley, Godalming, Surrey
UNITED KINGDOM

WG 49 – Mathematical Modelling of Oceanic Processes

Chairman: Dr. K. Bryan, USA

Terms of Reference: To review the findings of other SCOR working groups as they relate to the mathematical modelling of oceanic processes, and to advise on the objectives and design of relevant numerical models.

WG 50 – Biological Effects of Ocean Variability

Chairman: Dr. A. R. Longhurst, UK

Terms of Reference: To review data from biological monitoring programmes and relate those to ocean climatological data from the same regions and periods, to consider the synthesis of such data and the hypotheses that could be erected to account for the observed interactions, and to assist in the organization of a Special Symposium for the JOA in which selected case studies of the interactions between environmental changes and those in the distribution and abundance of fish stocks or other organisms could be presented.

WG 54 – Living Resources of the Southern Ocean

Chairman: S. Z. El-Sayed, USA

Terms of Reference: To assess the present state of knowledge of the Antarctic marine ecosystem from the point of view of structure, dynamic functions, and biomass of the organisms at different trophic levels; to encourage and stimulate investigations of the ecology and population dynamics of the organisms at different trophic levels with particular reference to krill, squid, fishes, and whales; to maintain liaison with FAO; to advise SCAR and SCOR and through them, other international organizations and in particular to respond to relevant recommendations, conveyed to the group by SCAR or SCOR of IOC and the Antarctic Treaty Consultative Meetings.

WG 55 – Prediction of ‘El Niño’

Membership to be established.

Terms of Reference: To examine possible prediction schemes and indices for ‘El Niño’ and to recommend the research needed to define the processes that should be taken into account in such forecasting procedures.

COMMITTEE ON SPACE RESEARCH (COSPAR)

Working Group 6 (WG 6)

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The Working Group is concerned with application of space-based technology to problems of the earth and its atmosphere. This includes providing the Scientific Committee on Antarctic Research with a detailed review of space possibilities related to research and operational problems in the Antarctic, and providing the United Nations with information on cost effectiveness of space-based observations for earth surveys.

The *panel on Meteorology and Climate* studies the feasibility of space-based observing systems to provide global meteorological observations for numerical experimentation on the limit of atmospheric predictability; evaluates space-based observing systems that could be implemented to address observational needs of basic climate studies; and applies space technology to observations needed for environmental studies. The panel contributed to the development of the Global Atmospheric Research Programme (GARP). It has organized numerous symposia on space-based systems for meteorology including a comprehensive symposium (Philadelphia, 1976) with COSPAR, WMO, JOC, IUGG/IAMP, AMS on 'Meteorological Observations from Satellites: Their Contribution to the FGGG.'

The *panel on Earth resources and Environment* conducts informal discussions of the status of activity in various countries related to using remote sensing techniques in studies of resource management and environmental problems. It organized a symposium (Konstanz, 1973) on 'Approaches to Earth Survey Problems through the Use of Space Techniques'; and a workshop (San Jose dos Campos, Brazil, 1974) on remote sensing techniques for earth resource problems in Latin America, Asia, and Africa. It is organizing with WMO and FAO a symposium for its 1977 annual meeting on 'Satellite Contributions to Food Information Systems' and producing manuals on space-based techniques for earth resource studies for use in developing countries. It prepared a document for SCOPE indicating the feasibility of monitoring factors identified as important in studies of the environment by space techniques.

The *panel on Stratospheric and Mesospheric Meteorology* co-ordinates rocket launchings to study specific features of the stratosphere and mesosphere. It served as a forum for discussion of results of stratospheric circulation problems, photochemical equilibrium of the ozone layer, and dynamics of sudden stratospheric warmings in early winter at high latitudes; and organized discussions of results from the WMO-sponsored rocket intercomparison campaigns.

The *Ad Hoc Panel on Monitoring Pollution from Space* investigates space-based possibilities for the detection and monitoring of a variety of pollutants important to life processes and the quality of the environment.

A joint COSPAR/IAMAP (IUGG) *Ad Hoc Working Group on Calibration and Intercomparison of Rocket and Satellite Radiation Instruments* is working to achieve standardized calibration procedures; and organized a symposium on the problems of calibration and intercomparison at the IUGG General Assembly (Grenoble, 1975).

Papers presented at all working sessions will be published together in an issue of the *Journal of the Optical Society of America*.

Arbeitsgruppe Biophysikalische Raumforschung

Professor Dr. H. Buecker
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The working group is concerned with possibilities for survival of terrestrial organisms in space or on other planets, with possible deleterious effects of space or planetary atmospheres on terrestrial organisms, and with biological indicators sensitive to toxic agents. It works to establish effective planetary quarantine requirements, ascertain hazards to astronauts during space flights, and estimate the probability of existence of extraterrestrial life.

(Bock 1974; Buecker et al. 1976, 1974, 1972, 1971, 1970; Buecker and Horneck 1975, 1970, 1969a, 1969b; Frankenberg-Schwager et al. 1975; Horneck et al. 1971; Horneck and Buecker, 1971; de Mendonca 1974; Taylor et al. 1974.)

COMMITTEE ON SCIENCE AND TECHNOLOGY IN DEVELOPING COUNTRIES (COSTED)

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The Committee's goal is to foster the growth of science and technology in the developing countries. It co-ordinates and encourages efforts by the International Scientific Unions to assist the developing countries; works with the special and scientific committees of ICSU in order to facilitate the greatest possible participation in their programmes by scientists of the developing countries; fosters affiliations with COSTED of national or regional committees which could identify scientific and technical problems related to development and recommend programmes and other activities for COSTED; provides liaison and advisory services, when requested, to international and regional scientific development organizations such as the specialized agencies of the UN and the non-governmental organizations active in this field; and considers the methodology of using science and technology to assist the developing countries.

COSTED has responded to specific requests from national scientific organizations of several developing countries by arranging missions to these countries. It has also endeavoured to identify the problems of developing countries and see how the ICSU Unions, Committees, and National Organisations could best help in solving them (Role of Science and Technology in Developing Countries 1971).

COSTED recognizes the vital role which science teaching has to play in the developing countries and has embarked on a programme of meetings for studying, in depth, the role of science teaching. It has evolved a programme whereby the

problems of natural resources and the environment can be linked with the problem of science teaching and an integrated programme undertaken (Science Education in Developing Countries 1973).

Recognizing the need for providing support for young scientists to attend scientific meetings, COSTED awards travel fellowships to young scientists from developing countries.

A COSTED Newsletter, to be issued four times every year, began in 1976.

COSTED has organized a series of meetings to study the impact of the utilization of natural resources on the welfare of the developing countries. The first meeting of the series entitled 'Resources and the Environment – the Role of Science Education' was held in Accra, Ghana in January 1975, with special emphasis on soil and water. The second meeting, co-sponsored by CTS, IUGG, and SCOPE was held in Kuala Lumpur, Malaysia in April 1976, with special emphasis on minerals.

SPECIAL COMMITTEE ON SOLAR-TERRESTRIAL PHYSICS (SCOSTEP)

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The committee promotes the study of correlations between solar-terrestrial physical phenomena and meteorological-climatological patterns.

It is undertaking the Middle Atmospheric Programme (MAP), endorsed by COSPAR, IUGG, IAGA, and IAMAP. MAP will consider the structure, energetics, dynamics, and compositions of the regions from the tropopause to the top of the mesosphere (100 km). It will be a worldwide programme of co-ordinated observations using all available techniques. It is intended that MAP will continue into the 1980's.

The International Magnetospheric Study (IMS) will deal with the magnetosphere solar wind, interplanetary magnetic fields, energetic particles, solar flares, and geomagnetic substorms. IMS is scheduled for 1976–78, but undoubtedly will be extended.

Another programme, Monitoring the Sun–Earth Environment (MONSEE) is a service-oriented programme to collect, store, and disseminate solar-terrestrial physics data. Data collection is handled through the WDC (Allen 1976; Dyer 1974, 1975, 1976 (continuing); Shapley et al. 1975; Shea 1975 (continuing)).

SCIENTIFIC COMMITTEE ON WATER RESEARCH (COWAR)

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UNITED KINGDOM

This committee has been involved in extensive study of man-made lakes. A large interdisciplinary international symposium was held (Knoxville, 1971). A register of large man-made lakes around the world is being compiled. A register of small man-made lakes, which are calculated to have a total environmental effect even greater than the large lakes, will follow.

Arid land irrigation is another major activity of the Committee. An international interdisciplinary symposium (Alexandria, 1976) brought together physical, biological, chemical, medical, and social information. A joint working group (SCOPE, COWAR, UNESCO, etc.) prepared an analysis of arid land irrigation studies after the symposium.

COWAR is also involved actively in studies on water weeds and their effects on water flow, water control, irrigation, and long-term changes in water quality, in close association with the International Hydrological Programme of UNESCO.

The future of water research within ICSU is under study by a small Ad Hoc Committee whose report is expected during 1976. (Ackermann et al. 1973, SCOPE 1972).

GLOBAL ATMOSPHERIC RESEARCH PROGRAMME (GARP)

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Jointly organized by the International Council of Scientific Unions and the World Meteorological Organisation, GARP was established in 1967 to study the physical processes of the atmosphere that are essential for the understanding of the large-scale fluctuations which control changes of the weather, and for a better understanding of the physical basis of climate. Its establishment recognizes the fact that scientific and technological developments in meteorology and related fields present an unprecedented opportunity for advancing man's knowledge of atmospheric processes and for applying such knowledge for practical purposes.

The work is structured into sub-programmes, the central one of which is the Global Sub-programme, with the objective of obtaining a global data set adequate to provide initial and verifying data for global models of atmospheric behaviour. The principal effort in this sub-programme is the First GARP Global Experiment (1977–1979) – an international effort of data gathering and analysis unprecedented in scope. The first major experiment to be completed in the series, the GARP Atlantic Tropical Experiment, was successfully carried out in 1974.

GARP is predicated on the assumption that numerical models provide an indispensable tool, and the Numerical Experimentation Sub-programme not only attempts to lead to the improvement of models but gives guidance for the planning of observations.

Other sub-programmes have as principal objectives the determination of improved techniques for parameterizing physical processes too small in scale to be

defined by global numerical models or realistic observing networks. These include the Tropical, Polar, Monsoon, Climate Dynamics, Radiation, and Air-Surface Interaction Sub-programmes.

GARP issues a number of publications based on its research activities. These are the *GARP Publications Series*, the *GARP Special Report Series*, the *GATE Reports*, and the *GARP Newsletter*.

COMMITTEE ON TEACHING SCIENCE (CTS)

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The committee includes in its programme a study of the relevance of science education, particularly integrated science, to environmental problems. It assists in the development and improvement of science education at all levels, co-ordinates the activities of the teaching committees of the individual scientific unions, and initiates activities in multidisciplinary aspects of science education.

CTS sponsors jointly with COSTED and SCOPE regional seminars (Ghana, 1975; Kuala Lumpur, Malaysia, 1976) at university level on the study of the environment and natural resources and the design of science courses relevant to the understanding and possible solution of some of their related problems.

With UNESCO support, CTS established an International Council of Associations for Science Education (ICASE), which has separate officers and executive committee. Within two years of its foundation in 1973, ICASE had 28 member associations and was developing its own programme of activities, including publications for science teachers, a newsletter, a directory and guide to science teachers' associations and the organization of regional seminars for science teachers.

FEDERATION DES SERVICES PERMANENTS D'ASTRONOMIE ET DE GÉOPHYSIQUE (FAGS)

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The federation of Astronomical and Geophysical Services consists of the following Permanent Services, each of which is engaged on the compilation, evaluation, and analysis of data from observing stations that are distributed widely around the world.

1895	International Polar Motion Service	Mizusawa, Japan
1911	Bureau International de l'Heure	Paris, France
1928	Quarterly Bulletin on Solar Activity	Zurich, Switzerland
1932	Permanent Service for Geomagnetic Indices	De Bilt, Netherlands
1933	Permanent Service for Mean Sea Level	Bidston, England
1953	Bureau Gravimetrique International	Paris, France
1960	International Centre for Earth Tides	Brussels, Belgium
1961	Scientific Ballooning and Radiation Monitoring Organisation	St. Maur, France
1962	International Ursigram and World Days Service	Meudon, France
1967	Permanent Service on the Fluctuations of Glaciers	Zurich, Switzerland

The date is that of the formation of the Service or of its predecessor in the same field; the title indicates the field of activity of the Service; the place is the present location of the Service.

Each Service works under the scientific direction of a Directing Board, which is appointed by one or more of the scientific unions, IAU, IUGG, and URSI. The Board determines the type of data to be collected, the methods of reduction and analysis to be used, and the format of the publication for the results. The Federation is guided for administrative and financial purposes by a Council composed of representatives of the three Unions and of ICSU. Grants, totalling about \$50,000 per year, are made to FAGS by ICSU and UNESCO; the Council allocates these funds to the Services in accordance with the general policy of the Unions. Most of the costs of the individual Services and all of the costs of data acquisition are borne by the host institutions and the observing stations. The international funds are used primarily to meet the special expenses involved in reducing and publishing the data to meet the requirements of the international scientific community.

The Services in FAGS are directly concerned with the time-varying characteristics of the Earth–Sun environment. In these areas of study, small but significant trends and periodic changes become evident only after the careful statistical examination of long sequences of observations. Their detection and correlation help scientists to understand the processes that control or influence such important phenomena as the weather and climate, radio communications, earthquakes, and changes in sea level. The improvement of our capabilities for observation and computation makes it vital that these sequences of observation of environmental indicators be continued and that the data be made available for general use in convenient forms.

PANEL ON WORLD DATA CENTRES (WDC's)

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The system of World Data Centres was established for the International Geophysical Year, 1957–1958 and has continued with only minor changes to serve the solar-geophysical community.

The thirty-odd branches of the WDC system are grouped into two 'universal centres' (that is, those that maintain a complete collection of all kinds of data), namely, WDC–A in the the USA and WDC–B in the USSR; other branches scattered through Western and Central Europe, Japan, and India are collectively known as WDC–C. The WDC–C Centres are actually independent centres dealing mainly in data from only one or a small number of disciplines.

The WDC system collects and archives data in the following fields: solar-terrestrial physics (solar, interplanetary, and ionospheric phenomena; the variable component of the geomagnetic field; auroras, airglow, and cosmic rays); space research; oceanography; glaciology; solid-earth geophysics (seismology, tsunamis, marine geology and geophysics, gravimetry, earth tides, recent movements of the earth's crust, rotation of the earth, the stationary or slowly changing component of the geomagnetic field, and paleo- and archeomagnetism; volcanology and geothermic will be added); and meteorology (Dyer 1973).

Annual directories of recent guides and/or supplements to the *Consolidated Guide* are planned until it becomes too obsolete to use, at which time a new revised 'Fourth Consolidated Guide' will be published. No annual updates have been published yet.

PACIFIC SCIENCE ASSOCIATION (PSA)

Pacific Science Association
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USA

The association is devoted to the study of the scientific problems of the Pacific region. It has identified five scientific areas of critical concern wherein it concentrates its research efforts.

Mineral Resources: the extreme importance of mineral resources in the Pacific, in light of current and anticipated world demand and of the welfare of Pacific island peoples and environments, requires generation and development of new research.

The Social and Professional Conditions of Scientific Work in Rapidly Developing Countries: in light of the numerous problems affecting Pacific peoples and their

environment under the particular stresses of rapid change (social, technological, economic, political, and physical). Matters needing immediate attention are the training of indigenous personnel, the development of appropriate manpower infrastructures, the according of equitable professional prestige, the protection of traditional lifestyles and traditions, and the preservation of natural features.

Ecology and the Rational Management of Island Ecosystems: the aims of the Man and Biosphere (MAB) Project 7 programme and the objectives of the association are viewed as coincident in this area, and there is a need for liaison with the sponsoring body, participating governments, and the natural and social scientists engaged in this broad co-operative endeavour.

Conservation of Natural Areas and of the Genetic Material they contain: the establishment of so-called biosphere reserves is of exceptional value in the Pacific where so many natural areas and their components have suffered degradation as a result of development, the introduction of alien species, and the absence of information and controls. This is an area of mutual interest to the PSA and MAB Project 8.

The Ecological Impact of Human Activities and Conflicts in Resource Allocation in Coastal Zones: the greater proportion of the population of the Pacific is concentrated in coastal areas and is dependent upon coastal waters and marginal wetlands for a wide variety of resources. Great demands have been placed upon these resources and yet the study of this vital land-sea interface has been neglected. MAB project 5E works closely with PSA in this area (Force and Bishop 1975).

Inter-congresses of PSA are held at four-year intervals. The theme of 'Appropriate Technology' has been chosen for the third Inter-congress to be held in Bali, Indonesia in July, 1977. Scientific committees of interest to SCOPE are the following:

- Freshwater Sciences – Professor Syuiti Mori, Otsu Hydrobiological Station, Kyoto University, Otsu, Shiga-Ken, 520–01, Japan
- Geography – Dr. R. G. Ward, Dept. of Human Geography, Australian National University, Canberra
- Marine Sciences – Dr. V. I. Ilichev, Institute of Oceanology, Academy of Sciences of the USSR, Vladivostok, USSR
- Pacific Islands Ecosystems (Mandate of this Committee to be considered by the Pacific Science Council during the Third Inter-congress, July 1977)
- Scientific Study of Coral Reefs – Dr. R. T. Tsuda, Marine Laboratory, The University of Guam, P.O. Box EK, Agana, Guam 96910, USA
- Solid Earth Sciences – Dr. N. A. Shilo, Northeast USSR Scientific Research Institute, Magadan, USSR

INTERNATIONAL UNION FOR QUATERNARY RESEARCH (INQUA)

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 Secretary Treasurer
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In its efforts to advance understanding of the Quaternary environment, the INQUA studies Quaternary deposits with regard to economic value and engineering considerations, and hopes to publish a worldwide series of maps of Quaternary deposits.

It advocates establishing working groups of scientists from developing nations with personnel and material support from developed countries to study environmental problems. INQUA seeks to support local scientists in their investigations of environmental problems by organization of scientific meetings.

Environment meetings were held in Uppsala and Brazil in 1975.

INTERNATIONAL SOCIETY OF SOIL SCIENCE (ISSS)

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The society seeks to improve the scientific basis for management of land resources, specifically: international assessment of available land resources, global assessment of land degradation hazards, and planning for effective land use.

In working toward these objectives, ISSS collaborates with UNESCO, FAO, UNEP, and UNDP. The global assessment of land degradation, which is carried out by FAO in co-operation with UNEP, UNESCO, and ISSS, will be completed in its first phase by the end of 1978. The publication of the FAO/UNESCO Soil Map of the World is in an advanced stage of completion (FAO 1965 and continuing).

INTERNATIONAL ASSOCIATION ON WATER POLLUTION
RESEARCH (IAWPR)

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 REPUBLIC OF SOUTH AFRICA

The association deals with all aspects of water pollution control in surface, underground, and marine waters. It holds biennial conferences on water pollution abatement (Sydney 1976); and holds more specialized conferences on designated problems. (*Water Research*; Eckenfelder and Cecil 1972; Jenkins 1973, Jenkins and Ives 1973).