APPENDIX B: ANNOTATED BIBLIOGRAPHY

Foreword: The papers are catalogued, using the following classifications:

1. General principles of monitoring
2. Monitoring in remote areas
3. Regional monitoring
4. Impact monitoring
5. Remote sensing
6. Stratosphere
7. Troposphere
8. Urban air pollution
9. Oceans and enclosed seas
10. Rivers, lakes, ground water, snow and ice
11. Soils
12. Biological monitoring
13. Food and drinking water
14. Epidemiological monitoring
15. Sociological and economic monitoring
16. Source strength monitoring

Under each classification, the year of publication is given, followed by an indicator number. For example, reference 3.71.2 implies that this is paper no. 2 published in 1971 under the classification, "regional monitoring".
I. GENERAL PRINCIPLES OF MONITORING


These Proceedings of a symposium contain useful papers on monitoring the air and water environments.


These symposium proceedings contain many useful insights into the principles and practical operational considerations associated with network design.


Chapter 3 (pp. 167-222) is a detailed discussion of the scientific requirements for international environmental monitoring. A number of specific recommendations are made.


The problem of monitoring the biosphere is discussed, and a general framework for biological monitoring is presented. The report also includes a compilation of parameters suggested by numerous experts for monitoring on a global scale.


Chapters 2 and 3 include discussions of time and space considerations in the design of monitoring networks.


A description is given of operating and planned international and national environmental monitoring activities.


A proposal for a global monitoring program is given.


This wide-ranging interdisciplinary examination of the problems of international environmental monitoring is recommended reading.


Some monitoring principles are enunciated, based on the needs for data to determine biological harm commitments of various pollutants.


This document is a basic reference on international environmental monitoring.


This report contains an action plan for global environmental monitoring, a listing of existing (1971) programs, and a useful bibliography.


The principles of monitoring are discussed in relation to objectives.


The basic principles used for monitoring, assessing and controlling radioactive contamination of the environment are described.


Present levels of ionizing radiation in various media around the world are given.


An example is given of aflatoxin levels in diets, in which 2432 samples were taken, with all but 124 at an undetectable level. A statistical analysis of these data is made using the gamma distribution.

See also: 9.65.1., 12.71.2.

2. MONITORING IN REMOTE AREAS


The contamination of sea-water samples during laboratory
analysis for trace elements is discussed.


The loss of trace elements by absorption onto the walls of containers (used for storing seawater samples) is investigated.


The author includes information on secular trends in solar radiation at 4 stations in the USSR, as well as trends in the dust contents of glacier firm samples, dating back to 1800, taken from the Maili Plateau, Kazbek, USSR.


Measurements of light-scattering made with an integrating nephelometer at Point Barrow, Alaska and Mount Olympus, Washington, USA, suggest that a background level of aerosol exists and that the concept of a background is applicable.


This paper includes data on CO₂ baseline trends at Mauna Loa and the South Pole.


An evaluation is presented of the baseline qualities of the Mauna Loa site for particulate sampling.


The problem of attempting to interpret secular trends (years 1948-1970) in the abundance of plankton in the North Atlantic is discussed. Several monitoring principles are mentioned.


A monitoring program at high-altitude observatories in North and South America and Africa is described. Daily determinations of the solar constant over 50 years can be used to search for trends in atmospheric transmission of sunlight.

2.73.2. “Vertical and seasonal variability of fish eggs and larvae at ocean weather station India,” R. Williams and P.J.B. Hart.
The seasonal cycle of zooplankton abundance at a baseline station is described.

The seasonal cycle of phytoplankton productivity at a baseline location is described, using chlorophyll $a$ and total cell volume as indicators.

A baseline station in the subarctic part of Finland is described.

Measurements of fluorocarbons in air and the water during the voyage of the RRS Shackleton from the United Kingdom to Antarctica, are reported.

Electrical conductivity values are reported from Mauna Loa and from ocean research vessels.

Aitken nuclei concentrations are reported for the North Atlantic Ocean and Greenland.

This manual contains recommended analysis procedures for a number of trace gases.

See also: 1.72.2, 3.72.1, 7.74.3, 7.74.4, 9.73.1, 12.70.1, 12.72.1, 14.71.2.

3. REGIONAL MONITORING

The trends in solar radiation are presented for 6 stations in the USSR, dating back 40 years in most cases and to 1895 at Voikovo.

3.71.1. "WMO operations manual for sampling and analysis techniques for chemical constituents in air and precipitation,"
This manual contains siting criteria for baseline and regional stations, as well as operating procedures.

Concentrations of PCB's, DDT and dieldrin in plankton are measured at a number of stations from the Firth of Clyde in Scotland to Ocean Weather Station India. There is a gradient of concentrations from the polluted estuary to the Weather Station baseline location.

In this non-specialist report, the author recommends regular monitoring for agricultural and forest pests so that spraying can be planned more effectively.


4. IMPACT MONITORING

See: 1.72.2, 5.70.1, 5.71.2, 5.71.4, 5.73.2, 5.73.3, 5.73.4, 7.74.4, 9.72.1, 9.72.2, 9.73.2, 9.73.3, 11.72.2, 12.73.1, 12.73.2, 13.71.1, 13.72.1, 14.71.2, 14.73.4.

5. REMOTE SENSING

5.70.1 “Study to evaluate the utility of aerial surveillance methods in water quality monitoring,” Pub. No. 41, California State Water Resources Control Board, California, USA, 1970, 100 pp.
It is concluded that the following useful quantities can be monitored with remote-sensing devices: oil spills, thermal anomalies in surface water, algae blooms, turbidity, coloured discharges and shoreline erosion or development.

Based on measurements made from a low-flying aircraft over the Atlantic off Cape Cod, the possibility of monitoring chlorophyll concentrations by remote sensing is discussed.

5.71.1. “Meteorological aspects of atmospheric pollution and possibilities of observation from space,” K.Y. Kondratyev and

The possibility is discussed of using satellites to monitor atmospheric pollution and industrial thermal anomalies.


A feasibility study on monitoring air pollution from satellites is reported.


In a case study, satellite data have confirmed ground-based observations of turbidity in the Los Angeles area.


This report was prepared by a group of 25 experts and discusses preliminary design considerations for monitoring (by remote sensing) a number of climatic parameters, including atmospheric particles and trace gases.


The principles of remote sensing are discussed, and the available techniques are described.

5.73.2. "Remote sensing of oil slicks," S. Axelsson and E. Ohlsson, Ambio 2 (1973), 70-76.

The technical problems associated with remote sensing of oil slicks are discussed.


An ERTS photograph on Aug. 16, 1972 of the New York Bight demonstrates the potential of remote sensing of ocean dumping.

5.73.4. "Water temperature surveys in the vicinity of power stations with special reference to infra-red techniques." D.J. Moore and K.W. James, Water Res. 7, 807-820.

Remote sensing of thermal pollution downstream from a power station is described.

A survey is given of the techniques available for remote sensing of air pollution.

See also: 7-74-4

6. STRATOSPHERE


A summary is given of United States observing programs for detection of stratospheric constituents. These activities are part of the Climatic Impact Assessment Program.


Measurements of the far-infrared emission spectrum of the stratosphere were made from Concorde 002 during its tour of the Far East in 1972. The spectra have been analyzed to obtain concentrations of H_2O, O_3, HNO_3, N_2O, and NO_2.


Stratospheric sulphate concentrations obtained in the Southern Hemisphere in the years 1962-1971 are analyzed for trends. The authors suggest that volcanic emissions are an important stratospheric source for sulphate particles.


In 1971 a program was begun to make bimonthly balloon soundings to determine the vertical profile of submicron dust in two size ranges, the ozone, water vapor, and temperature from eight different stations distributed in both the northern and southern hemispheres. Additional soundings are made from both poles each winter.

6.73.5. “Measurement of high-altitude air quality using aircraft,” R.A. Rudey, P.J. Perkins, NASA/Lewis Research Center, Cleveland,

The minor atmospheric constituents associated with and affected by aircraft exhaust emissions at altitudes from 6 to 20 km will be monitored in flight programs presently being implemented. A Global Atmospheric Sampling Program using Boeing 747 airlines is found to be feasible in studies conducted by airlines and airframe companies. Worldwide monitoring in the troposphere and the lower stratosphere is planned.

7. TROPOSPHERE


Concentrations of pesticides in airborne samples over the Barbados have been determined.


Trends are presented over the years 1955 to 1968 in the chemical constituents of precipitation at regional stations in Western Europe.


The question of international monitoring of air quality is discussed in Section 7, pp. 390-395.


The precipitation chemistry monitoring network in the USSR is described, and some results are presented.


Global budgets are presented for sulphur compounds, CO₂, CO, nitrogen compounds and hydrocarbons. Secular trends are given in some cases.


Using data on the chemical composition of precipitation obtained from 28 stations in the USSR from 1958 to 1965, space correlation coefficients are calculated, yielding information on methods of optimizing network densities. A number
of important earlier papers (in Russian) by L.S. Gandin and associates, on the principles of optimizing network densities of meteorological fields, are referenced.


These Proceedings of a Symposium held in Norway contain a survey paper (Vol. 1) on network design by H.L. Ferguson, and a group of related papers (Vol. 2) by D.R. Davis, C.C. Kisiel and L. Duckstein; C. V. Cole, G.A. Kulkarni and G.D. Khatavkar; D.M. Herschfield, G.H. Comer and B. Levy; and P. Hutchinson.


An increase in daytime summer haziness from 1962 to 1969 is reported from the airports at Akron, Ohio, Lexington, Ky., and Memphis, Tenn.


This report contains the recommendations for aerobiological monitoring and research, agreed upon by a group of 25 experts at a workshop held in Toronto in April, 1973.


The US and international aerobiology programs of IBP are described. A useful bibliography is included.


The present state of development of the World Weather Watch is described. The required supplementary systems are discussed.


Isotope concentrations in precipitation from a world network are given for the years 1968-69.


The meteorological influences on the migrations of airborne pests, particularly desert locusts and African armyworms, are described.

Aerobiology pilot studies in the Nordic countries are described.


Specific recommendations are given for research and monitoring of tropospheric aerosols.


Since 1953, the number of hours of haze, smoke and dust has decreased in winter in all the major Canadian cities. The most marked summer effect is a substantial increase in haziness in the Atlantic Provinces and Eastern Quebec. It is speculated that this is due to an increase in photochemical activity.


Some preliminary results are given from the OECD West European long-range sulphur transport study.


This important symposium contains a number of significant papers on atmospheric trace gases, including new estimates of source and sink strengths.


The proceedings of this conference contain a large number of important references on air pollution.


A description is given of rationale and existing programs for monitoring global air pollution.

See also: 1-72-2, 2-69-1, 2-70-1, 2-72-1, 2-73-1, 2-73-5, 2-74-1, 3-70-1, 3-71-1, 5-71-1, 5-71-2, 5-71-3, 5-71-4.

8. URBAN AIR POLLUTION


Trends in urban air quality in the USA over the period 1958-1968 are discussed. Some data on rural trends are also included.

A questionnaire was sent to local, county, state and regional air pollution control agencies in the USA, seeking information on siting and physical design of air monitoring stations. This paper is an analysis of the replies.


The design of urban air quality networks is discussed.


Air pollution trends over the period 1951-1968 in the United Kingdom are described and discussed.


The CO concentrations at a monitoring station are compared with those at surrounding points in Los Angeles County.


The question of designing urban air pollution monitoring networks is considered. The author emphasizes that design considerations in a city containing multiple low-level emissions are different from those in a city containing one or a few tall chimneys.


The problem of optimizing dustfall and sulfation networks in St. Louis, Mo. is discussed.

Using Chicago as an example, the problems associated with siting urban air quality stations are discussed.


The small-scale urban variations in concentrations of total suspended particulates, as well as the fractions of lead, benzene-soluble organics and polycyclic aromatic hydrocarbons, are described. The implications for epidemiological studies are discussed.

See also: 7.72.2., 7.74.4., 14.73.2., 14.73.4.

9. OCEANS AND ENCLOSSED SEAS


The principles and methodologies for oceanic monitoring are included in this monograph.


This paper includes a brief description of a monitoring program for pesticides in oysters in the coastal waters of the USA.


A monitoring program for pesticide residues in oysters was begun in 1965. As of 1969, there were 170 permanent sampling stations in the coastal waters of the USA. Monthly samples are analyzed.


First results are reported from a pilot study of the Baltic. The concentrations of some trace metals are given, based on measurements obtained from an international network of stations.


For the coastal waters of Britain, concentrations of heavy metals in samples of sea water, suspended matter, seaweed,
porphyra and limpets are given. Seaweed concentrations show little change over a 10-yr period.


A plankton atlas for the North Atlantic is presented, based on measurements made with the Continuous Plankton Recorder, developed in 1931 and now towed by a number of merchant and weather ships.


IOC consultant Dr. D. Eisma has summarized and evaluated the responses received from member states to the IOC/WMO questionnaire on national and regional marine pollution monitoring programs, and to the IOC questionnaire on monitoring of riverborne pollutants and marine pollution pilot studies. Dr. Eisma also makes some suggestions for a practical international marine pollution monitoring program.


The heavy metal contents in samples of seawater, seaweed, and the muscles of fish in British coastal waters are presented. The results are mainly for the year 1971 but in the case of seaweed, a comparison is given for the years 1961 and 1970.


A box model for oceanic pollution is used as a basis for designing a monitoring network.


A program for biological monitoring of the oceans is proposed.

See also: 2.68.1., 2.72.2., 2.73.2., 2.73.3., 2.73.5., 5.73.2., 5.73.3.

10. RIVERS, LAKES, GROUND WATER, SNOW AND ICE


A listing is given of the world network of IHD stations.


A pilot study is reported of pesticide residues in south Swedish streams, using Gammarus pulex as an indicator organism.

Low pH values are reported from some lakes in Northern Ontario.

See also: 1.64.1, 9.73.2, 11.72.1.

11. SOILS


A description is given of the Scandinavian network for the chemistry of lakes and river water, the Swedish networks for pesticides, heavy metals and the chemistry of natural soils, and the European network for precipitation chemistry. Some results are given.


A marked difference is found in the trace-element concentrations of urban and rural soils in Scotland.

12. BIOLOGICAL MONITORING


Pesticide concentrations were measured in seals and porpoises in Scotland and Canada far from source regions.


A trend analysis is presented of 210Pb in lichens in northern Sweden over the period 1961-1969. A comparison is made with other published results from the Northern Hemisphere.


A collaborative study is described in which organochlorine residues in wildlife were monitored in 17 laboratories in 11 countries.

Regional surveys of moss are reported from Sweden. Chemical analysis for heavy metals has shown the effects of industrial and urban sources as far as 50-60 km away.


A proposal is described for biological monitoring of the global chemical environment. A rationale is provided.


Tundra biome studies in the USSR, Austria, Canada, Finland, Ireland, Norway, Sweden, UK and USA are described.


The most critical phases in the planning and execution of vegetation surveys lies in the selection of suitable sampling methods and of appropriate analytical techniques. Various theoretical models concerned with these problems are discussed in terms of type of information required, economy of effort, and efficiency of operation.


Compared to higher plants, lichens are extremely sensitive to sulfurous pollution. The authors make specific recommendations concerning a methodology for monitoring lichens.


Experiments with radioactive mercury-tagged flyash show that mosses take up and retain mercury to a greater extent than grasses do.

See also: 1.70.3., 1.70.6., 1.71.1., 7.73.1., 7.73.2., 7.73.5., 7.73.6, 10.72.2.

13. FOOD AND DRINKING WATER


Based on a composite Canadian diet, the daily intake of pesticides is determined.


Based on a composite Canadian diet, the intake of 7 heavy metals is determined.

See also: 1.72.2.
14. EPIDEMIOLOGICAL MONITORING


The WHO serum reference bank program is described.


The principles of epidemiological monitoring are discussed.


Nutritional studies of populations in New Zealand and in some remote Pacific islands are described.


Using data from the UN Demography Yearbook, 1967, the seasonal variations of total mortality in the 1920’s and the 1960’s in 18 countries are compared.


Using data from 10 districts in Chicago, and other data from 14 countries, the effect of population density on a number of health indicators is examined.


For three cities in the USA, relationships are sought between mortality and air pollution and weather.


An epidemiological study of asthma diagnoses in the emergency wards of 3 New York hospitals is described. The records are for the years 1969-1971.


The CHESS epidemiological studies in the USA are discussed.

15. SOCIOLOGICAL AND ECONOMIC MONITORING

A report is given of a Symposium on human annoyance as related to environmental health. Some of the topics include odors, airborne irritants, noise, urban crowding, food and water pollutants, aesthetic factors and housing conditions.

See also: 14.73.1.

16. SOURCE STRENGTH MONITORING


The fuel energy use in the USA over the period 1920-1970 is discussed.


Estimates are presented of the world industrial production of CO₂ over the last 40 years.


A proposal to establish an international registry of potentially toxic chemicals is described.


Predictions are made to the year 1990 of the emissions of oxides of nitrogen from aircraft flying in the stratosphere.


The mass of natural aerosol injected into the atmosphere by desert wind systems of the Khamisinic type has been estimated, and used to infer the global dust input into the atmosphere due to deserts to be about 128 million metric tons per year.

See also: 1.70.2. (pp. 257-306), 7.72.2.