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WATER QUALITY MONITORING IN THE ASIAN AND PACIFIC REGION

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C. The GEMS/WATER programme in ESCAP countries*

1. General

(a) Project design and development

The Global Environmental Monitoring System (GEMS), initiated in 1974 as a means to promote and co-ordinate the collection of environmental data, consists of four major programme areas: climate-related monitoring, monitoring of renewable resources, monitoring of oceans and seas, and health-related monitoring. As part of the latter group of projects, the global water quality monitoring project, referred to as GEMS/WATER, was established in 1976 jointly by WHO, UNESCO, WMO and UNEP.

The objectives of this project are to:

- (a) Collaborate with member States in the establishment of new water monitoring systems and to strengthen existing ones;
- (b) Improve the validity and comparability of water quality data within and between member States; and
- (c) Assess the incidence and long-term trends of water pollution by selected persistent and hazardous substances.

The implementation of the project is based on the active participation of relevant national authorities which routinely monitor the quality of their water resources at selected locations and provide the data for global synthesis and dissemination. Wherever possible, the stations for the global network were selected from existing local, national or regional programmes, and in some cases, new ones were established.

The development of the monitoring network required the definition of types and number of sampling sites, selection of site location, parameters to be measured, frequency and techniques of measurement, methods of data handling and processing, and techniques of data analysis. Guidance on these aspects of the project were provided through the GEMS/WATER Operational Guide which serves as a basic reference to all project participants.

Subsequently, monitoring stations were designated at points of water abstraction for public supply, in important fishing and recreational areas, at points of abstraction for agricultural uses, at points of confluence and where rivers discharge into lakes or oceans or where international boundaries are crossed. When designating such stations, network

design criteria were observed which take into account the regional allocation of stations according to their national water quality regime, effects of various types of human activities on this quality, description of representative geophysiological and socio-economic regions, problems of international rivers and lakes, and the importance of extended aquifers for various uses.

Based on these and related criteria, the global network was designed to include ultimately about 1,200 stations. The goal for the first phase of the project (1977-1981) was to establish a skeleton network of about 300 to 400 stations, using those which already exist wherever feasible. By mid-1983, a total of 448 stations had been formally designated by the on-site national authorities in 59 countries. Not all of these have yet taken up routine submission of monitoring data, and the distribution with regard to water-bodies is shown in table 1.

Table 1. Station distribution

<i>Stations</i>	<i>Designated</i>	<i>Reporting</i>
In rivers	301	255 (October 1984)
Lakes/reservoirs	62	43 (June 1983)
Ground-water	85	61 (June 1983)
Total	448	359

The water quality variables measured in these stations include natural constituents, anthropogenic ones, as well as indicators thereof. They were divided into three categories:

- (a) Basic variables which include 13 physical, chemical and microbiological determinands;
- (b) Globally significant pollutants including cadmium, mercury, lead, plus selected organochlorine compounds;
- (c) Optional determinands covering other constituents and water quality characteristics of importance related to the monitoring site.

In addition, hydrological measurements are to be carried out and guidelines on analytical quality control procedures were provided.

For the purpose of data handling, a global data centre was established at the Canada Centre for Inland Waters, Burlington, which serves as the WHO Collaborating Centre for Surface and Ground Water Quality. Limited data were received for 1978 and regular reporting commenced for

* Prepared by Mr. Michel Meybeck as the WHO technical contribution to the regional seminar on water quality monitoring at Beijing. However, due to unavoidable circumstances it was not possible for this paper to be presented during the seminar.