# AMIS

## Air Management Information System

WHO

# A Healthy Cities Programme for Urban Air Quality Management

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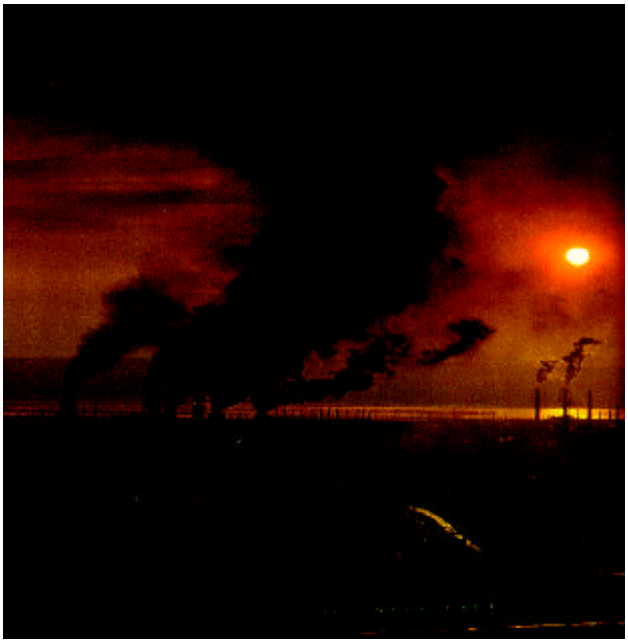
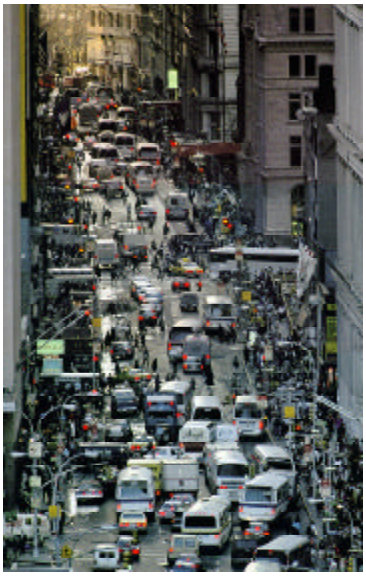
## Introduction

The purpose of this brochure is to describe the framework and scope of the new WHO Air Management Information System AMIS inaugurated in January 1997 and the Global Air Quality Partnership network. This programme is the successor of the Global Environmental Monitoring System GEMS/AIR now continued under the umbrella of the Healthy Cities programme. In this brochure it is aimed to introduce AMIS to a wider audience including potential users, interested cities, international organizations and others.



*Industrial air pollution plays a major role in Eastern Europe*

## Urban Air Pollution - A Threat to Health



*Traffic jam in New York*

Urban areas have dense aggregation of man- made air pollution sources; such as motor vehicle traffic, industrial factories, and residential cooking and heating. Urban air pollution not only poses a threat to human health and the urban environment, it also makes a significant contribution to regional and global atmospheric pollution problems: global warming, ozone layer depletion, and the transboundary transport of air pollutants. Urban populations and pollution sources are growing very rapidly leading both to an increase in the emissions of pollutants, and the number of people exposed directly to these pollutants. According to the WHO report "Health and Environment in Sustainable Development" published in 1997 about three million deaths are due to suspended particulate matter globally each year: 2.8 million due to indoor exposures and 0.2 million due to ambient exposures.

To assess the potential impact of air pollution on human health and the environment, and to develop effective air pollution management measures, it is necessary to have a reliable, relevant knowledge of the time pattern, spatial distribution, and sources of air pollutant concentrations in an area. 'Winter Smog', formed by combinations of suspended particulate matter and some gaseous air pollutants under certain weather conditions is a visible sign of poor air quality in a city. 'Summer smog', formed from ozone and other oxidants is a

less obvious indication of poor air quality. Smog inducing pollutants, like most of the common air pollutants must be measured with appropriate equipment. Air quality monitoring is a necessary ingredient to air quality management.

*About 1.5 billion people worldwide are exposed to urban air pollution*

## Healthy Cities: A Worldwide Movement

The WHO Healthy Cities programme is fundamentally about the links between living conditions, environmental conditions and health. In a Healthy City project serious attention is paid to the proposition that health can be improved through improved living conditions, particularly environmental pollution control interventions. All the city and municipal agencies concerned with energy, food, agriculture, macroeconomic planning, housing, land-use, transportation and other areas, are required to examine the environmental health implications of their policies and programmes, and adjust them to better promote health and a healthy environment.

The Healthy Cities programme works with cities to help them make health part of the agenda of city and local government, and supports the formation of partnerships for health between community and local government, and the private sector.

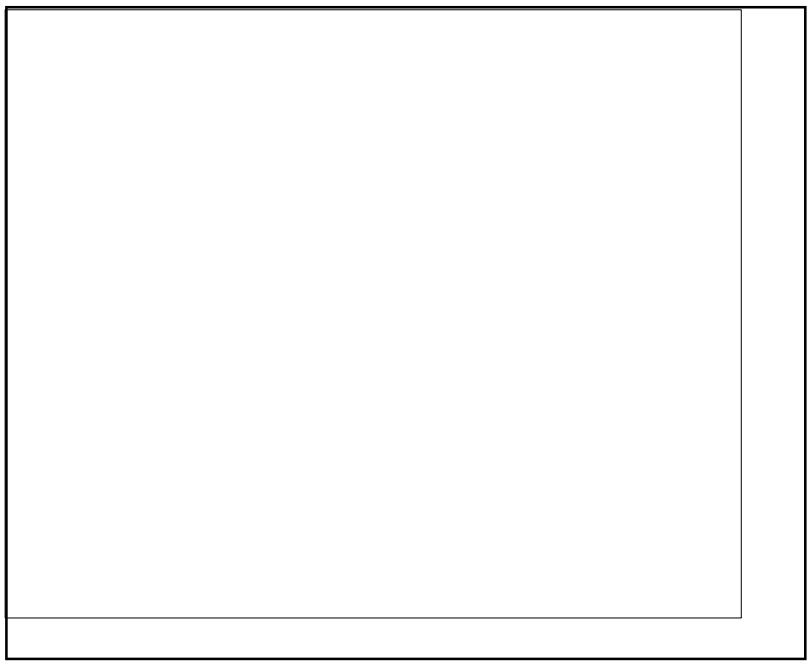
*Emmissions by power plants contribute significantly in developed countries and dominantly in developing countires*

It provides mechanisms for linking the health sector and health programmes to the work of local and city governments. There are the "settings" and "issues" Task Force mechanisms, where the "settings" are the schools, neighbourhoods, food-markets, workplaces etc.; and the "issues" are major urban issues such

as urban population growth, poverty, water supply and sanitation, urban air pollution, women's health, violence and so on.

It helps the city administration undertake city-wide consultations and vision workshops, so people discuss their problems and also their view of the future direction of the city; and it helps the city to formulate city and local health plans.

Since local and urban development are influenced by many national ministries/agencies, attention may be paid by national ministries to a national urban health policy that can support these city level activities. The application of national air quality standards, supported by city-wide monitoring is such a measure. This could be suitably be followed up by incorporating urban air quality management plans into the municipal health plan process. The settings that support health are indicated in the figure.



# GEMS/AIR Programme: 1973 - 1995: Historical Achievements

## 1. Programme Objectives

GEMS/AIR evolved from a World Health Organisation urban air quality monitoring pilot project, that started in 1973. From 1975 to 1995, the World Health Organization (WHO) and the United Nations Environment Programme (UNEP) jointly operated the programme as a component of the United Nations system-wide Global Environment Monitoring System (GEMS). GEMS is a component of the UN Earthwatch system.

Industrial emission play a major role in developing countries

The original objectives of GEMS/AIR were:

- to strengthen urban air pollution monitoring and assessment capabilities in participating countries;
- to improve the validity and comparability of data amongst cities;
- to provide global assessments on levels and trends of urban air pollutants, and their effect on human and ecosystem health.
- to collect air pollution concentration data for sulphur dioxide and suspended particulate matter

GEMS/AIR monitoring stations are run by national city authorities who voluntarily contribute their data to the GEMS/AIR database. Participating cities represent a wide range of climatic, topographic, and socioeconomic conditions; with different air quality management capabilities. GEMS/AIR was the only global programme which provided long-term air pollution monitoring data for cities in developing countries. Thus the programme enabled the production

of global assessments of the levels and trends of urban air pollution and air pollution management capabilities.

In 1991, a meeting of government-designated experts recommended that the GEMS/AIR programme be redirected to provide the comprehensive information needed for rational air pollution management. Five fields of activities were subsequently covered by the GEMS/AIR programme.

1. Coordination of data collection in the global monitoring network
2. Development of appropriate methodologies
3. Preparation of population and environmental exposure assessments
4. Provision of technical support and training
5. Initiation of special studies

Accordingly, the concrete objectives of GEMS/AIR were extended to include:

- Expansion to cover additional air pollution compounds such as nitrogen oxides, ozone, carbon monoxide and lead; and to facilitate their reporting to the central GEMS/AIR database run by the United States Environmental Protection Agency (USEPA);
- Improvement of data quality;
- Helping cities to develop air pollution abatement strategies;
- Use of QC/QA procedures to ensure comparability and compatibility of data;
- Development of a QA plan to reflect the different monitoring goals of different participants
- Allowing for different levels of data quality; as long as it is data of known quality appropriate for its intended use.

An additional brainstorming meeting of experts in 1994 scrutinized and more accurately specified the objectives of GEMS/AIR. It

was agreed to provide the tools of air quality management including the use of: monitoring, emissions inventories, dispersion modelling, and estimates of population and environmental exposure; to also incorporate air pollution abatement strategies into GEMS/AIR objectives.

Air pollution in industrial areas of
Eastern Europe

## 2. Programme Activities

In accordance with the biennial programme and budget cycles of the United Nations system, the previous work plan covered the years 1994 and 1995. The key programme activities for this period are highlighted as follows.

### Revitalization of Reporting and Capacity Building

In 1994/1995 the programme focused on both revitalizing participant reporting and on encouraging new countries to join the programme. GEMS/AIR also placed importance on cooperating with member states in strengthening their national monitoring network. A closer collaboration between the GEMS/AIR coordinator and local collaborators has helped and will increasingly help to improve air quality reporting. A detailed study considering and comparing the

air quality management capacities of 20 cities was recently completed. quality reporting. A detailed study considering and comparing the air quality management capacities of 20 cities was recently completed.

**Data Quality Assurance**

Data validation and hence the reliability and comparability of the monitoring data is considered a crucial element of the programme. This is being achieved by means of collaborative reviews through UNEP/WHO GEMS/AIR Regional Collaborating Centres; such reviews were performed in Northern and Sub Saharan Africa, South America, South East Asia, and Eastern Europe.

**Data Storage, Representation and Access**

Data were put into the Aerometric Information Retrieval System (AIRS) managed by United States Environmental Protection Agency under the auspices of UNEP/WHO. The summary database can be accessed in the Internet (http://www.epa.gov/docs/AIRSExec/). It was also planned to run the complete database via the Internet.

**Realization of Twinning Projects**

A Twinning Project is an arrangement between a donor agency and a recipient country or city to transfer used but operational monitoring devices and provide for shipment costs and some training. A first twinning arrangement was initiated between Ventura County as a donor agency and Manila, the Philippines

*Air pollution by a power plant in Russia*

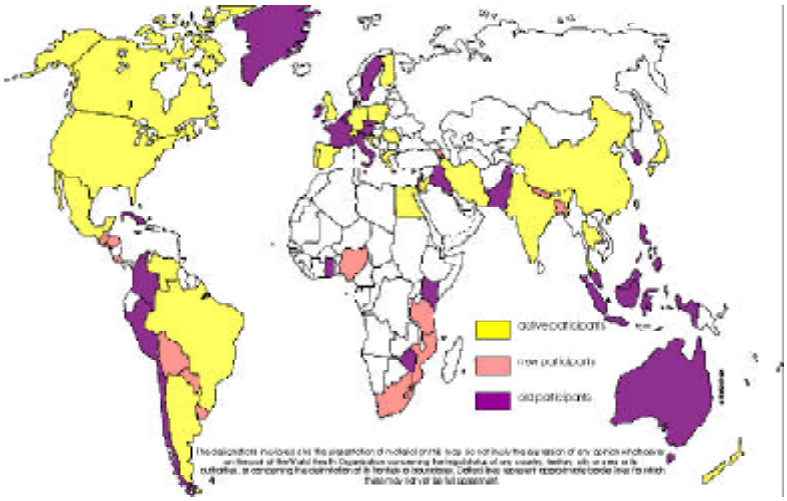
as a recipient city.

Additional twinning arrangements are being implemented between other donors from the United States and the Netherlands and Ghana, Kenya, Nepal, and Tanzania.

**Training Courses and Workshops**

GEMS/AIR is committed to training national experts in air quality management. In the 1994/1995 biennium UNEP/WHO training courses on air pollution monitoring and management were held in Amman, Jordan, Nagpur, India, and Beijing, China.

In order to develop the tool of rapid emissions inventories an expert meeting was convened in Research Triangle Park, NC, USA, to finalize a tutorial program design on the Rapid Inventory Assessment System (RIAS). At the same time, the Decision Support System for Industrial Pollution Control (DSS IPC) developed by the WHO Regional Office for the Americas (AMRO/PAHO) and the World Bank was tested and refined.




Active, old, and new participants of GEMS/Air

## 3. Programme Outputs

Numerous papers have been published in the past 20 years of AMIS the most recent ones being the following.

### Urban Air Pollution in Megacities of the World, 1992

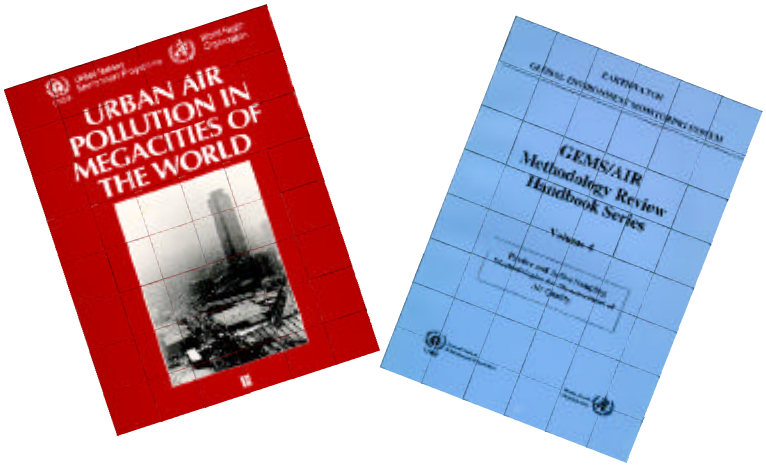
This report presents data and assesses air quality in Bangkok, Beijing, Bombay, Buenos Aires, Cairo, Calcutta, Delhi, Jakarta, Karachi, London, Los Angeles, Manila, Mexico City, Moscow, New York, Rio de Janeiro, Sao Paulo, Seoul, Shanghai and Tokyo.

### GEMS/AIR Methodology Review Handbook Series

Five volumes of this series appeared:

**Vol. 1:** Quality Assurance in Urban Air Quality Monitoring, UNEP/WHO 1994

**Vol. 2:** Primary Standard Calibration Methods and Network Intercalibrations for Air Quality Monitoring, UNEP/WHO 1994



**Vol. 3:** Measurement of Suspended Particulate Matter in Ambient Air, UNEP/WHO 1994

**Vol. 4:** Passive and Active Sampling Methodologies for Measurement of Air Quality, UNEP/WHO 1994

**Vol. 5:** Guidelines for Collaborative Reviews, UNEP/WHO 1995

**GEMS/AIR City Air Quality Trends**

Three volumes of this series appeared:

Vol. 1: Bangkok, Beijing, Bombay, London, Sao Paulo, Shanghai, Tehran, Tokyo, Wroclaw, Zagreb; UNEP/WHO, 1992

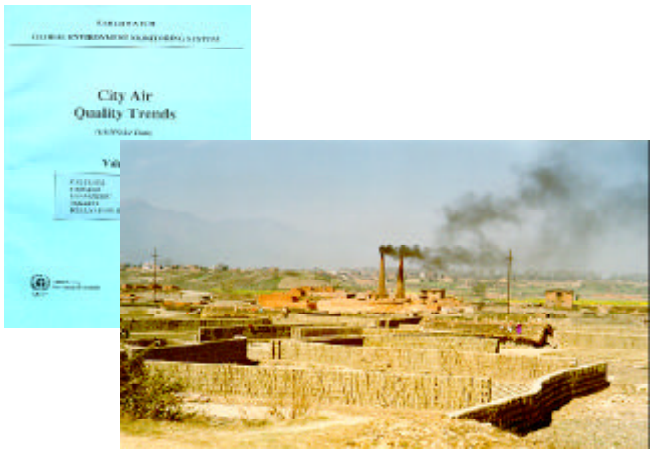
Vol. 2: Athens, Cairo, Caracas, Christchurch, Hong Kong, Los Angeles, Madrid, New York, Shenyang, Toronto, UNEP/WHO 1993

Vol. 3: Calcutta, Chicago, Guangzhou, Jakarta, Kuala Lumpur, Lisbon, Santiago de Chile, Sydney, Tel Aviv, Warsaw, UNEP/WHO, 1995

**GEMS/AIR Reports and Studies**

GEMS/AIR Air Quality Management and Assessment Capabilities in 20 Major Cities, MARC/UNEP/WHO 1996

Assessment of Sources of Air, Water, and Land Pollution, Part One: Rapid Inventory Techniques in environmental Pollution WHO/PEP/GETNET/93.1-A; Part Two: Approaches for Consideration in for-




*Industrial air pollution from brick kiln factories in Kathmandu Valley, Nepal*

mulating Environmental Control Strategies; by Alexander Economopoulos, WHO/PEP/GETNET/93.1-B , 1993

Air Pollution Monitoring Capabilities in Six African Cities, Norskk Institutt for Luftforskning (NILU) on behalf of WHO/UNEP, NILU RR 1/96, O-93066, 1997

UNEP/HEM GEMS/AIR Workshop on the GEMS/AIR System of Collaborative Reviews, UNEP/WHO 1994

Report on the International Expert Consultations on the UNEP/WHO GEMS/AIR Programme and the proposed GEMS/AIR Global Urban Air Pollution Assessment, 1994

Review of GEMS/AIR Monitoring Station - South East Asia Region, NEERI on behalf of UNEP/WHO, 1996

Review of GEMS/AIR Monitoring Station - South East Asia Region, NEERI on behalf of UNEP/WHO, 1994

Collaborative Reviews of Eastern European Cities, UBA, Federal Environmental Agency, Institute for Water, Soil and Air Hygiene

(WaBoLu), WHO Collaborating Centre for Air Quality Management on behalf of UNEP/WHO, 1997

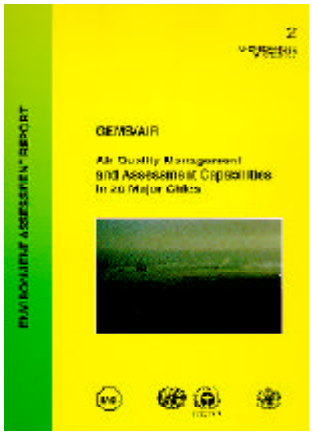
Assignment Report for WHO/UNEP: Preliminary Assessment of the Status of Air Pollution Measurement and Data Use in Sao Paulo, Brazil; Santiago, Chile; and Quito, Ecuador; USEPA, Research Triangle Park, NC, USA, 1994

Report on the GEMS/AIR Regional Training Course on Air Quality Monitoring, 23-27 October 1994, Amman, Jordan, UNEP/WHO 1995

Report on the GEMS/AIR Training Course on Air Pollution Management, 11-20 September, 1995, Nagpur, India, WHO 1996

Report on the National Training Course on GEMS/AIR Air Pollution Monitoring and Management, 20-24 November 1995, Beijing, China, WHO 1996

GEMS/AIR: A Global Programme for Urban Air Quality Monitoring and Assessment, UNEP/WHO, 1993 (in Arabic, Chinese, English, French, Russian, Spanish,)




**PC programme**

Decision Support System for Industrial Pollution Control (DSS IPC), PC programme for the assessment of air emission inventories, liquid and solid waste inventories, estimation of pollution in air, water, and soil, PAHO/World Bank, 1995

Sometimes a single factory in a developing country emits more sulphur dioxide than Norway and Denmark together

# Creating a Global Air Quality Partnership

## Air Management Information System AMIS

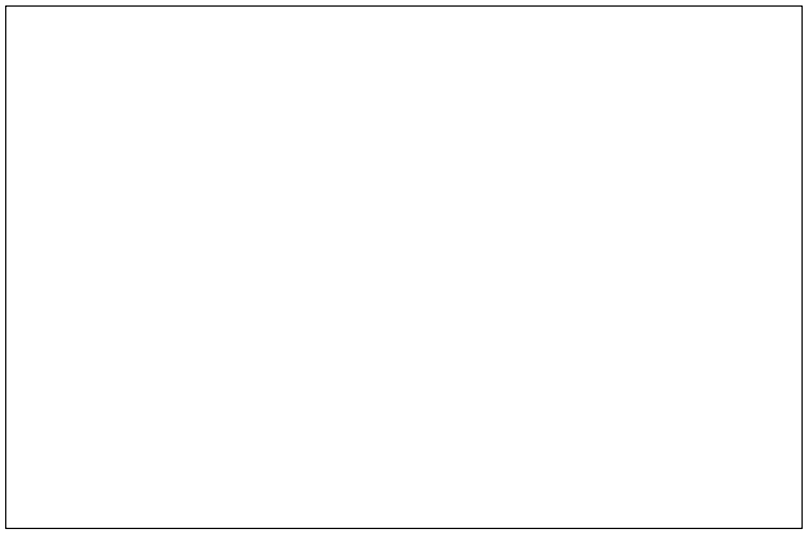
The Air Management Information System (AMIS) is a programme developed by WHO under the umbrella of the Healthy Cities Programme. AMIS has the objective to transfer information on air pollutant concentrations and air quality management tools between countries. In this context AMIS acts as a global air quality information exchange system. AMIS programme activity areas include

- Coordinating databases with information on air quality issues in major and megacities;
- Acting as an information broker between countries;
- Providing and widely distributing technical documents on air quality monitoring and management;
- Publishing and widely distributing Annual Trend Reviews on air pollutant concentrations;
- Providing training courses with respect to air quality monitoring and management;
- Running Regional Collaborative Centres to support data transfer activities, perform training courses and implement twinning projects.

AMIS is a set of user friendly MS ACCESS based databases. The core database contains summary statistics of air pollution data like annual means, 95-percentiles, and the number of days on which WHO guidelines are exceeded. Any compound for which WHO air

quality guidelines exist can be entered into the database. Data handling is easy and data validation can be assured with relatively little means. Diskettes and compact disks are now produced. In the existing version data (mostly from 1986 to 1995) from about 60 cities in 30 countries are represented. Moreover, a report of the data will be produced. All these items will be made available to AMIS participants and also distributed to interested non profit organisations free of charge.
Data for this and other AMIS databases which are being planned (see box) could be collected via WHO Regional Offices and AMIS Regional Collaborating Centres. For the core database it is intended to increase the number of contributing cities to 100 by end 1997 and 300 by end of the millennium.

The whole framework of AMIS depicted in the diagramme below. It contains all the ingredients necessary for air pollution management



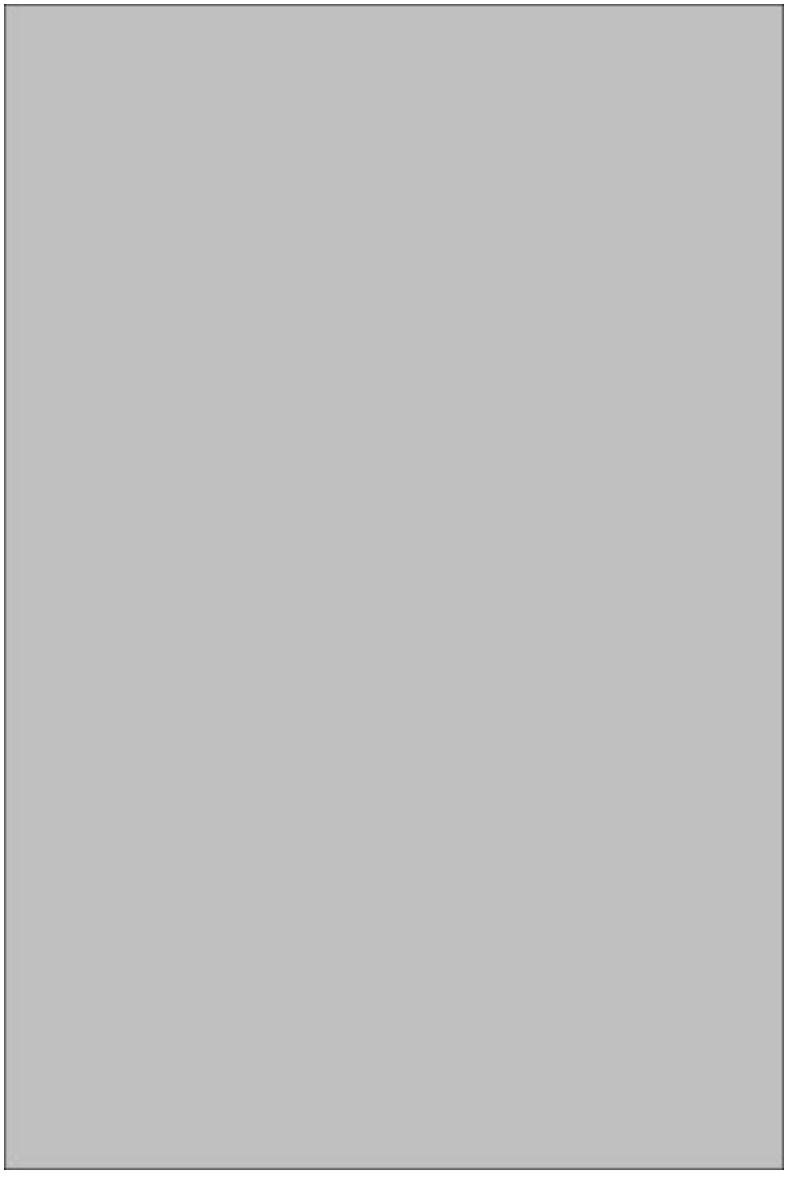
Other AMIS databases which are being planned or developed will start from the same user friendly structure of the AMIS core database. These additional databases are listed in the box.

WHO air quality guidelines and countries' air quality standards;
Characterisation of emissions of major and megacities;
Reference to other air quality databases;
Addresses of AMIS participants;
Addresses of monitoring device manufacturers;
Addresses of training institutions;
Use and accessibility of dispersion models including information on where to access these models;
Indoor air pollution levels in urban and rural areas;
Noise pollution levels in major and megacities.
Air quality management capabilities and procedures of cities;
Control actions and magnitude of their costs;
Adverse effects on air pollution on health and magnitude of their costs.

The Air Management Information System is planned as as component of a Global Air quality Partnership, which can be visualized as an information turntable provided and used by members, see figure below. It is envisaged that all members provide and have access to information.

The Global Air Quality Partnership will be operated by members establishing an internet link with the Air Management Information System enabling members to contribute and use information. The GEMS/Air Information System will categorise information provided by:

**Global Air Quality Partnership**



type (eg data, data summaries, software, publications, etc),

subject (eg air quality standards, dispersion models, emissions, ambient air quality, methodologies, dose-response, etc)

geography (continent, nation, region, city)

other relevant information (eg global socio-economic data, global health data, other environmental data)

Some hypothetical examples of how members may use the Global Air Quality Partnership may help to visualise how the system works.

Example 1

The World Bank is considering project options in India and wishes to view summary air quality information for various cities. It contacts the Air Management Information System using the internet and downloads information on AMIS network cities in India.

Example 2

A city in South America wishes to urgently receive some information on methodologies for measuring an air pollutant it is not currently measuring. It contacts the AMIS using the internet and downloads information from the GEMS/Air Methodology Review Handbook Series, and information on methodologies used in other countries, stored in their internet home pages, and accessed through the Air Management Information System. The city can then assess the various methods, and chose a method suitable for the particular situation of that city.

Example 3

An international aid agency in Scandinavia wishes to collect some summary air quality information on several countries in South East

Asia to be included in broad-ranging country assessments. It contacts the Air Management Information System using the internet and downloads information from the GEMS/Air Megacities Report and the City Air Quality Trends Reports, which are published and can be readily entered into the information system. It may wish to update this information with data from the AMIS database, and supplement it with information from World Bank reports and Asia Development Bank reports stored in their internethome pages, and accessed through the Air Management Information System, or scanned from printed reports and entered on the AMIS .

Example 4

An officer with a national EPA needs to develop some strategies for reducing concentrations of a particular air pollutant, and reads in a conference paper of an approach tried in a European city with initial success. The officer wishes to determine if the initial success was maintained. By contacting the Air Management Information System, the officer finds that information on the ambient concentrations of the pollutant in that city is available from the European Union database, held by RIVM, and available through the Global Air Qual ity Partnership link on the internet. In addition, internet links to the OECD would provide access to the advanced air quality reporting index, which provides a summary of trends of various air pollutants in the major cities of OECD member states.

# 1. AMIS objectives

The objectives of the AMIS programme include:

- Conducting global assessments of air quality
- Acting as a global data and information broker for air quality management issues in the sense of the Global Air Quality Partnership
- Facilitating review and validation of assessments and establishing codes of best practice.
- Identifying and establishing AMIS Regional Collaborating Centres, and experts to coordinate and support activities according to the needs of the regions.
- Producing technical documents in support of all aspects ofair quality management.
- Running a global database with validated data from an expanded number of cities.
- Conducting annual reviews and distributing them widely

*Traffic emmissions affect the health of most vulnerable groups*

## 2. AMIS: The Challenge Ahead

In recognition of the growing challenges faced as a result of escalating global urbanisation, the overall perspectives of AMIS for the year 1997 to 2005 are:

- Provision of an international network for the distribution of the comprehensive information needed for rational air quality management.

- Provision of an international framework for coordinated and valid monitoring of urban air quality, effective data management, and reliable information dissemination;

- Development of methodologies, adapted to the specific needs of participating countries, required for the comprehensive monitoring, assessment and management of urban air quality;

**AMIS Programme Activity Areas (1997 - 2005)**

1. Coordination of the global management network
2. Development of appropriate methodologies
3. Preparation of assessments
4. Provision of technical support & training
5. Initiation of special studies
6. Development of information transfer instruments.

- Production of comprehensive assessments which include levels and trends of urban air quality, pollution sources, and options for abatement, as well as of potential health and environmental effects;

- Strengthening of urban air quality monitoring networks, assessment and management capabilities in developing countries by provision of technical support and training

- Performance of special studies to contribute to the understanding of key global, regional, and focal air pollution issues.

- Development of AMIS tools to a better assessment of the air pollution situation.

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*Industrial air pollution in Eastern Europe*

*Human exposure to air pollution in the vicinity of a cement-factory in Lithuania.*

## 3. AMIS Programme Structure

AMIS and the Global Air Quality Partnership are based on the voluntary collaboration of participating cities. Local focal points implement the programme at the city level. Overall programme operation is supported and coordinated by the World Health Organisation (WHO) through its Urban Environmental Health (UEH) Unit in Geneva and its Regional Offices and AMIS Regional Collaborating Centres.

A brick kiln factory in South East Asia

AMIS seeks to augment the resources at its disposal through collaboration with other actors in this field; including the World Bank, the United Nations Development Programme (UNDP), United Nations Centre for Human Settlements (UNCHS), and the Commission of the European Communities (CEC). Other partners will also be welcome to the Air Management Information System. When the full system is implemented with about 300 cities as partners of the Global Air Quality Partnership it could be imagined to make the AMIS self sustainably supported by a very a low contribution from each participant of the partnership.

## 4. AMIS Programme Resources

WHO hopes to be in a position to continue to provide the baseline support to the operation of the programme in terms of manpower and operational funds; enabling the implementation of core activities. However, additional funds are needed, if the full potential of the programme is to be realised. In particular, additional funding has to be allocated to help countries develop their air pollution management capabilities, the first step being establishment and operation of air pollution monitoring networks. Training and technical support programmes will be needed to establish the necessary capabilities in major cities in Africa, the Middle East and Latin America. Extra funds will also be needed to support special studies which provide the basic information necessary to respond to emerging issues and changing conditions.

Many cities in the developing world have only limited resources available for the management of urban air quality. It is the responsibility of the international community to assist such cities in reducing present and potential risks from poor air quality; both for human health and the environment. It is in the interest of the international community to strengthen effective urban air pollution management. AMIS will seek additional financial and other resources from international and national sources, and to channel them into effective use.

*Environmental effects of air pollution*

## 5. The building blocks of AMIS
## Activity Area 1:
## The Global Management Network

**Coordination of the Global Management Network**

- Routine collection of monitoring data from participating cities
- Collection of emission inventories and supporting data
- Provision of easy-to-use PC-run dispersion models
- Provision of network collaborative reviews, and oversight of quality assurance
- Operation of global database
- Evaluation of monitoring data, and preparation of data reports
- Expansion of the programme in terms of cities and pollutants

Provision of information on urban air pollution monitoring and management in the participating countries is the heart of the AMIS programme. It links cities together and enables the transfer and sharing of knowledge and experience about air quality management. It provides an effective framework for coordinated, valid and comparable monitoring of urban air quality. It also leads to effective data management and utilisation and reliable dissemination of information. Network participants provide selected urban air pollution monitoring data and additional descriptive information to the global database. Thus the programme enables data and information compilation on a global scale and the production of assessments on the occurrences of urban air pollution worldwide. AMIS conducts this work in strategic alliances with other international programmes dealing with the urban environment to meet common objectives.

In the future AMIS will become a global service for data information and knowledge sharing and dissemination. It will be a reliable information broker, working in close collaboration with other agencies. It is developing a AMIS information system, available through the internet which will provide summary information on air quality in the major cities of the world; air quality management tools such as

modelling software; AMIS publications, air quality guidelines, health and dose-response data, relevant socioeconomic data, and information and access to databases held by national ad international agencies

In AMIS, this network will be expanded to many more major cities in all parts of the world. The aim is to have 300 participating cities by the end of the decade, including 50 major cities with a population of more than 3 million. The programme already includes, in addition to sulphur dioxide ($SO_2$) and suspended particulate matter (SPM), summary data on all common air pollutants, such as carbon monoxide (CO), nitrogen oxides (NO, $NO_2$), ozone ($O_3$), and lead (Pb). Other compounds can be easily incorporated.

In addition to the AMIS core database of air pollutant concentrations the planned indoor air quality and noise level databases will be constructed during summer 1997 and subsequently filled with data. The existing database with the addresses of the AMIS participants will be adapted to the general AMIS structure to make it more user friendly.

*In developed countries more than 50% of emissions are caused by traffic*

## Activity Area 2:
## Methodology Development

The development of appropriate methodologies supports both the collection of air quality data and the management of air pollution by participating countries. Suitable methodologies are identified and recommended to participants; utilising their existing knowledge and expertise. Before publication, handbooks and technical reviews are discussed in expert workshops so that international consensus is attained.

**Development of Appropriate Methodologies**

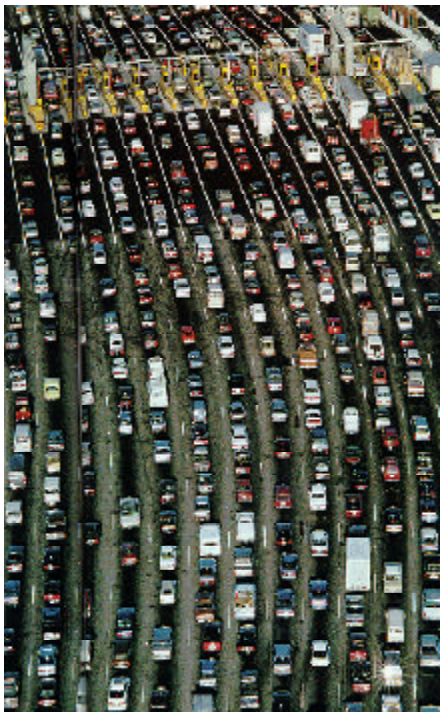
- Production of methodology handbooks on network design, sampling and analytical methods, and assessment techniques
- Development of support tools for emission inventories and air pollution management
- Development of monitoring data transfer software
- Establishment of global guidelines on urban air quality

In AMIS, the development of methodologies will focus on the further harmonisation of network design, sampling and analytical methods, and assessment procedures, so that data from the various cities and networks can be better compared. The programme aims to continue the production of methodology review handbooks and software tools; covering the whole urban air monitoring field from network design to data interpretation and assessment, as well as air pollution management tools.

Thus, information on tools such as dispersion modelling, e.g. on under which circumstances to apply which models and from where to get them will also be distributed. Information on control actions and the magnitude of their costs, of health effects caused by air pollution and the magnitude of their costs to the society will be provided as well. Methodologies will also cover the fields of indoor air pollution and noise levels with the intention to incite people to address these problems, in particular in developing countries.

## Activity Area 3: Environmental Assessments

Assessments of ambient and indoor air pollution and noise levels and estimation of exposure of the general population are the major outputs of the programme and seek a consensus view on pollution trends, issues and management needs. They are based on the information collected through the AMIS network and information available in the external scientific literature and technical reports. AMIS assessments evaluate the reliability of data and interpret this data, with additional information in terms of potential health and environmental impacts. Global and topic-specific assessments are supplemented by summary data reports, e.g. the City Air Quality Trends series.



Traffic congestion in Los Angeles

In AMIS, future global synoptic assessments will compile and assess AMIS network data as well as other available relevant information, examining the data in terms of the established WHO air quality and noise guidelines, assessing the risks facing human health and sensitive ecosystems. Topic-specific assessments will focus on problems of specific and current interest, and on regional issues. City-specific assessments will cover pollutant emissions and

sources, meteorological and topographical factors affecting pollutant dispersion, ambient pollutant concentrations, noise levels, and the resulting risk faced by urban population and the environment. They will also consider relevant options available for pollution management. Assess ments will be coordinated by the WHO/HQs/ UEH and the AMIS Regional Collaborating Centres.

**Preparation of Assessments**

- Global assessment of urban air pollution levels and trends
- Topic-specific assessments in areas of current interest
- City-specific assessments for selected cities
- Annual reports of AMIS monitoring data
- Summary reports of air pollution concentrations and trends in the AMIS network

*Industrial air pollution urban areas*

## Activity Area 4:
## Technical Cooperation and Training

Technical support and specific training enables cities, especially those in less developed countries, to monitor, assess, and manage air quality. Cities are encouraged to fully participate in and take advantage of the AMIS programme. This programme element will continue to be instrumental in strengthening monitoring and assessment capabilities in participating cities. It further provides a mechanism to enable developed and developing countries to share experience. While actual capacity building in such cities certainly exceeds the financial and technical capabilities of the AMIS programme, the programme will continue to serve as an effective framework for cost-effective technical support and technology transfer.

AMIS training workshops will be organised for participants in Africa, Asia, and Latin America, covering all aspects of air pollution monitoring, emissions inventories, assessment, and management. Furthermore, the Regional Collaborating Centres will be established in 1998.

**Provision of Technical Support & Training**

- Support for regional training courses and expert advice on air pollution
- Training in use of rapid assessment methods for developing emission inventories
- Strengthening of regional review teams and support centres
- Support of technology transfer in the field of air pollution monitoring and management
- Training in use of dispersion models

Sulphur dioxide from a smelter in Peru ...

## Activity Area 5: Special Studies

The initiation of special studies is a programme element that allows AMIS to rapidly examine emerging issues or new air quality or noise requirements. The results of these studies will improve the understanding of key global, regional and local air and noise pollution issues. Implementation of the studies will depend on participating cities and the availability of extra resources.

**Initiation of Special Studies**

- Evaluation of the effectiveness of air pollution management programmes
- Quantification of ambient air pollution contribution to pollutant exposure
- Contribution of urban $SO_2$ and $NO_2$ emission to regional acid depositions
- Contribution of urban precursor emissions to photochemical smog formation in downwind urban and rural areas
- Global survey of $NO_2$ and $O_3$ levels in urban areas

... affects the health of workers and nearby living inhabitants

AMIS aims to complete five special studies by the end of the decade. Various topics have already been proposed covering a wide range of issues. New topics may be proposed by programme participants.

## Activity Area 6:
## Tools and Instruments

AMIS makes use of several tools through which the methodology gets wider application and which facilitates the production of specific outputs. Examples are the following:

### Collaborative Reviews

Collaborative reviews examine the capacities and capabilities of a city to monitor and manage air quality. They:

- identify the areas of need
- provide support to network participants in obtaining data of known quality appropriate for their intended use, and
- determine the comparability of data within the network and improve it.

These reviews are conducted under the motto of "scientists help scientists" or "technicians help technicians".

Collaborative reviews were performed for Latin America, South East Asia, Eastern Europe and Africa.

### Rapid Inventory Assessment System (RIAS)

For an easy and rough but in most cases sufficiently accurate estimation of the emissions of point, area, and line sources, a scheme has been developed to obtain a fairly reliable emissions inventory for an urban area. This scheme has been published under the umbrella of the Inter-Agency Project on Risk Management; a collaboration programme between UNEP, WHO, United Nations Industrial Development Organization (UNIDO), and the International Atomic Energy Agency (IAEA). The RIAS is presently being adapted for use on a PC. This program will enable air pollution abatement engineers

to develop emissions inventories as a basis for air pollutant concentration simulations and estimations of the success of control actions. When used together with a source-receptor-model it will assist to causally attribute the impacts of various pollutants to the sources.

## Training Courses

Regular regional training courses for AMIS participants and those interested in future participation in AMIS are essential for obtaining data of known quality. These workshops cover: the health and environmental effects of air pollution, ambient air monitoring objectives, air quality guidelines, standards and regulations, monitoring devices and networks, siting criteria, data requirements, quality control and assurance, problems of ambient air monitoring methods, costs and benefits of air pollution monitoring, and database considerations. Furthermore, training on the rapid emission inventory approach includes the consideration of alternative source inventory approaches: the source and control system modelling approach, and exercises in source assessment and air quality modelling. Future training courses will consider appropriate dispersion models in more detail, their use in particular situations, as well as population and environment exposure estimates.

*Air pollution in South East Asia*

**Decision Support System for Industrial Pollution Control**

A PC programme has been developed to estimate industrial emissions, the effectiveness of control measures, resulting concentrations and costs of control actions. This programme supports decision makers in deciding on appropriate control actions at minimum costs.

*Urban air pollution in Kathmandu, Nepal.*

**Future Tools**

In addition to the tools already used by AMIS future tools will include

- information on dispersion models
- estimates of human and environmental exposure by using appropriate models
- cost benefit analysis
- use of socioeconomic data in deriving population exposure
- use of damage functions.

## How to participate in AMIS.

Air and water pollution in a city of Poland

AMIS focuses on air pollution and its related health and environmental effects in major cities. Any city in a UN member country can join the programme. Participation, however, should be formalised by the national governments. Cities can join the programme by announcing their interest directly to WHO (see addresses on back cover) or alternatively through their national WHO focal points. Cities or countries should designate an AMIS coordinator, ideally a person in charge of the operation of city monitoring networks or air quality management issues. In the case of cities already monitoring air pollution routinely, the AMIS management will send to the coordinator detailed information on the organisation of the global programme, including technical information about monitoring site characterisation and global data management. The AMIS management and the local coordinator will then choose at least four suitable monitoring sites, representing clean, residential, commercial, and industrial influence in the city centre or in suburbs. Summary data from these sites will be incorporated into the core database. AMIS can assist in identifying appropriate monitoring equipment, help to define appropriate data evaluation, advise on suitable control action, provide help in risk assessment, and, hopefully, in finding appropriate funding sources.

Several advantages exist for participants in the Air Management Information System and the Global Air Quality Partnership:

**AMIS participants share:**

- Air quality management experience among metropolitan areas
- Intercountry research on air pollution topics of common interest
- Experience exchange through regional workshops and training courses
- Action plans
- Reports on case studies
- Demonstration projects

**AMIS participants receive:**

- GEMS/AIR Methodology Review Handbook Series
- City Air Quality Trends
- AMIS Bulletin
- DSS IPC programme
- CD ROM with AMIS database and other information on air quality management

**AMIS participants enjoy:**

- Support in quality assurance of data and quality assuranceplans
- Collaborative reviews of facilities and capabilities AMIS Collaborating Centres
- Data of known quality appropriate for the intended use.

## For further information please contact

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*Industrial activities in developing countries of Eastern Europe jeopardize the health of the population*