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Report on the First HEM Programme and Technical Advisory Group (PTAG) Meeting

Munich, Neuherberg, 11-12 May 1992

United Nations Environment Programme

UNEP

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1. Introduction and participation

The first HEM PTAG meeting took place at the GSF Research Centre for Environment and Health in Munich/Neuherberg, on May 11 and 12, 1992.

It is the purpose of the PTAG to oversee, advise, and evaluate HEM´s programme (excerpt of the HEM Project Document, Annex 1). The members of the HEM-PTAG are listed in Annex 2, and a list of participants in the first meeting is given in Annex 3.

2. Opening of the meeting

The meeting commenced with opening remarks from Dr. M. D. Gwynne. He outlined the origin and history of the Harmonization of Environmental Measurement Programme (HEM). The decision to establish HEM originated in a request to UNEP by the 13th Economic Summit, itself based on a call by the Environmental Experts of the Economic Summit Countries for an improvement and harmonization of techniques and practices for environmental measurements. The HEM programme was established by UNEP as a part of Earthwatch under the auspices of the Global Environment Monitoring System (GEMS). The core costs for the project are at present provided in equal proportions by the Federal Government of Germany and UNEP, with additional contributions from the Government of Norway and the State of Bavaria. Dr. H. Keune is the present Director. The HEM Office is located on the campus of the GSF Research Centre for Environment and Health in Munich/Neuherberg, which is supported by funds from the Federal Government of Germany (Ministry of Research and Technology) and the State of Bavaria. GSF is the supporting agency for the UNEP-HEM office.

Dr. Gwynne made clear that it was the task of the PTAG not only to advise UNEP and the other funding agencies on the scientific and technical value and feasibility of the HEM programme, but also on the development of the programme in the light of available resources and on approaches to finding additional sources of support. This task is thus considerably broader than that of a Scientific Advisory Committee (SAC), which is restricted to advising on and evaluating the scientific soundness of a programme.

-- Professor J. Klein, the Scientific Director of the GSF, welcomed the PTAG participants and described briefly the main focus of activities in the research centre. The GSF programme is divided into three sectors - Ecology (Environment), Biology, and Health - with a total of 26 Institutes, Departments and Project Groups covering a wide range of aspects of environment and health including soil ecology, hydrology, ecological chemistry, toxicology, inhalation effects, haematology and medical informatics.

3.   Introduction to HEM

Dr. H. Keune gave a brief overview of the HEM programme and activities. He outlined the mission of the programme, the structure, and the operational strategy. Harmonization of environmental measurements is approached through:
- provision of information and facilitation of information exchange
- harmonization through quality assurance and control
- harmonization through agreement on terminology and systems of classification.

The HEM programme is intended to play a **catalytic and coordinating role** in the promotion of activities aimed at improved harmonization of environmental measurement by international organizations and across scientific communities.

The basic staffing structure, the financial structure, and the financial support to the programme were also outlined.

4.   Election of Rapporteur and Chairman

Dr. I. M. Pacyna from Norway was elected Chairman, and Professor C. Magadza from Zimbabwe was elected Rapporteur.

5.   Form of the Discussion

The group considered the basic concepts, approaches and progress in all four of the current activity areas of the HEM programme. These are:

- *Harmonization of sectoral environmental measurement*, specifically to investigate means of improving the comparability and compatibility of data, means for obtaining agreement between measurement and analytical techniques and data management procedures and for determining the value of assessment procedures for air quality

- *Harmonization of natural resource classifications*, specifically to investigate the extent to which different classification systems are compatible, and to obtain international agreement on practical classification systems for natural resources that are appropriate to be implemented on different spatial scales, focussing initially on vegetation cover.

- *Reference materials*, specifically to develop a directory and database of reference materials to ensure adequate and proper analytical quality control and quality assurance procedures for environmental measurement

- *HEM metadatabase*, specifically to collect, compile, and disseminate information on existing activities in fields related to environmental monitoring and assessment including quality assurance.

This was followed by a general discussion of the programme and future developments. The group felt that the lines of enquiry were extremely valuable and the proposed outputs potentially very useful to a wide community, and that these approaches should be further expanded within the limits of available resources. Provision of information on who is doing what and where was seen to be an essential and basic task for HEM, and development of the metadatabase to be important as an integrating tool for the whole programme. The group gave general recommendations for the whole programme, as well as specific recommendations on activities in the four areas, and suggestions for additional activities.

6. General Recommendations

6.1. The international Programme and Technical Advisory Group (PTAG) endorsed the work programme of HEM and fully approved the activities carried out so far. The PTAG recommends that HEM should continue its work within the current four activity areas:
- sectoral environmental measurements

- natural resource classifications
- reference materials, and
- HEM metadatabase

6.2. It is recommended to have HEM as a long term programme composed of specific projects related to major activity areas of HEM.

6.3. It is recommended that UNEP should elaborate a long term strategy for support which will assure the future security of the agreed HEM work programme.

7.   Specific recommendations and general discussion

After review of the current HEM programmes and keeping within the broad mission of HEM, specific suggestions were made in the following areas for the coming years, in which HEM could focus attention or encourage additional approaches in the field of environmental research and monitoring as resources permit.

7.1. Identifying and cataloguing information on a world-wide basis to bring attention to the agencies and institutions engaged in environmental research and measurements, was seen to be an essential task for HEM.

7.2. In air quality measurements, HEM should seek ways of ensuring that urban air quality data is compatible with regional and global data, and raising awareness of existing good quality data sets from urban monitoring programmes which could be useful for scientists concerned with regional and global change.

7.3. HEM should work to identify centres of expertise in all monitoring sectors, based on the strengths and value of their existing programmes and data. Further, an effort should be made with the concurrence of the identified agencies to publicize these programmes and centres so that they are used to the fullest extent possible to further science and resolve environmental issues, with the end result being the identification of centres of excellence in the fields of environmental measurement and research.

7.4. HEM should identify current environmental and scientific issues where thematic or spatial coverage is inadequate and where there is a need for improved harmonization, and explore approaches to improving harmonization and data collection and dissemination in

these areas. HEM should not attempt to initiate harmonization activities in areas where good harmonization activities exist; it should however know about these activities and foster their use and the dissemination of information about them.

7.5 HEM should not attempt to define standard ways of measurement for adoption on a world wide basis but rather concentrate on ensuring that environmental data are compatible and comparable. When there are concerns in a particular area of monitoring,

HEM should convene international expert groups to resolve such issues. In particular HEM could conduct, preside over, and publish the results of, such meetings, instrument comparisons, and other such activities that will lead to better comparability and unification of environmental data sets.

7.6. HEM should continue to emphasize the importance of quality control and quality assurance procedures in achieving harmonization of environmental monitoring data. Such procedures should form an integral component of monitoring and assessment, and their implementation is best left to appropriate technical experts working within particular programmes. However, HEM should help bring together, and foster cooperation between, these technical experts to ensure compatibility over the years.

7.7. The PTAG recognized the importance of global vegetation mapping and monitoring, both from the point of view of vegetation as an important natural resource and because of its influence on global material and energy cycles. Mapping of vegetation at continental or global scales is resource-intensive and will commonly require the integration of maps from various sources. Similarly, vegetation monitoring by successive mapping of the same area at intervals in time demands that the individual maps are comparable. For these aims to be realised, a common classification framework needs to be developed to allow existing and future maps to be inter-related. The PTAG endorsed the proposals of HEM to focus on the development of such a common framework, which would allow classification to be performed according to a standard system at any spatial scale and would provide the basis for formal documentation of the characteristics and limitations of published vegetation maps.

7.8. In its attempt to identify reference materials, HEM should concentrate on those which are well-researched and documented in the scientific literature. The identification and use of such reference materials should be regarded as an important means of providing the environmental community with long term standards that can be used year after year to validate multiyear data records and measurement and instrumental methods. A need for

quality control for "reference materials" was addressed during the discussion, and it was concluded that HEM should not neglect this issue.

7.9. HEM should attempt to identify and elaborate on information describing relevant environmental specimen banks, and consider developing a catalogue of reference habitats and sites on which there have been long term ecological and monitoring studies.

7.10. HEM's underlying goal in all its activities should be to process and disseminate information on relevant activities especially between different geographical areas, time and spatial scales and across different environmental disciplines. HEM should, therefore, be encouraged to continue its meta-database activities and in particular the development of a framework for operating both the main HEM meta-database (i.e. a database about programmes, institutions, and databases) and particular sub-databases on selected topics or sectors (e.g. the ongoing reference materials database, and specimen bank database). The value of entries in these databases would be greatly enhanced if each contained a list of the data sets and time series that it contains. A database field on relevant publications should be added where this is not already the case. Where possible, programmes and data sets should be identified in relation to specific scientific objectives and particular global or regional problems. A catalogue of methods of measurement of selected parameters would be extremely useful, particularly for developing countries.

7.11. The PTAG felt that, on the whole, a thesaurus approach should be used for searching the databases and it encouraged HEM to liaise with Infoterra, EC, ESA, OECD and others over the possible use and/or development of the thesauri presently used by each of these organizations. It was, however, recognized that the thesauri might not prove suitable for HEM so that a new thesaurus might have to be developed, but this should be designed to accommodate thesauri already in use. The PTAG strongly supports the development of a PC based system suitable for distribution off-line.

8. Recommendations for Additional Activities

The PTAG committee came up with several suggestions for future activities that HEM could take up as staff and resources become available. Approaches to these should be considered at the next PTAG meeting when Phase III of the HEM programme is discussed.

8.1. Identify, collect and disseminate information in such a way to help describe and quantify chemical cycling, especially across the oceans, atmosphere, land surfaces and the biosphere, (including the interfaces), in all scales and time frames. This effort should

attempt to identify data sets and agencies from different environmental disciplines that can contribute information to help understand the complete chemical cycling of elements that are important to the understanding of environmental changes (i.e. the carbon, nitrogen, phosphorus, sulphur and other elemental cycles in all domains).

8.2. Identify and disseminate information about data sets that connect satellite and ground based measurements so that harmonization of these two often competing measurement platforms can be maximized. Emphasize where ground based measurements can be used for validation of measurements based on satellite images (ground truth) and conversely where satellite measurements can be utilized to effectively extend the spatial validity of point-source ground measurements. Catalogue methodologies used for interpretation of remote-sensing data, including sufficient descriptors to enable the identification of relevant areas of scientific enquiry.

8.3. Land degradation was seen to be a further area of pressing need which warrants attention as a specific activity.

9. Next meeting   The next meeting is tentatively scheduled for 4/5 February, 1993.

First HEM Programme and Technical Advisory Group (PTAG) meeting

11/12 May 1992
in Munich/Neuherberg

<u>11. May 1992</u>

9.00 a.m.	Opening of the first HEM PTAG meeting	Dr. M. D. Gwynne
9.15 a.m.	Welcome address by the Director of GSF	Prof. Dr. J. Klein
9.30 a.m.	Overview of the HEM programme	Dr. H. Keune
10.30 a.m.	Coffee break	
11.00 a.m.	Discussion of the HEM approach	
11.30 a.m.	Presentation of activity area II * "Sectoral Environmental Measurements"	Dr. A. B. Murray
12.00 a.m.	Discussion of activity area II	
12.30 a.m.	Lunch break	
2.00 p.m.	Presentation of activity area III * "Natural Resource Classifications"	Dr. A. B. Murray
2.30 p.m.	Discussion of activity area III	
3.00 p.m.	Presentation of activity area IV * "Reference Materials"	Dr. H. Keune
3.30 p.m.	Discussion of activity area IV	
4.00 p.m.	Coffee break	
4.30 p.m.	Presentation of activity area V * "HEM meta database"	A. Theisen
5.00 p.m.	Discussion of activity area V	
5.30 p.m.	General Discussion of the HEM programme	
6.30 p.m.	Close of session	
8.00 p.m.	Dinner	

* Activity areas according to the HEM project document chapter 4.4

12. May 1992

9.00 a.m.	Information Flow and Documentation	L. Tsai Köster
9.15 a.m.	Financial Status of HEM; Contributions to HEM	Dr. H. Keune
9.30 a.m.	Evaluation of the HEM Programme	
11.00 a.m.	Coffee break	
11.30 a.m.	Recommendations for the further development of HEM	
1.00 p.m.	Close of meeting	
	Lunch at GSF cafeteria	

Excerpt from the HEM project document

Section 1:   Background and legislative authority

1.1   Background

Quantitative determination of the physical, chemical and biological conditions of the environment are essential for characterising the present state of the environment and for establishing trends and cause and effect correlations. They are further needed for the provision of predictive capabilities and early warnings and the stipulation of management and policy options analysis. Without integration of information, derived from nay different national and international programmes, we cannot gain insight into or quantify apparent changes in the resources and habitats of the Earth. This insight can only come from information based on data from organized and systematic measurements that are consistent and comparable on both spatial and temporal basis on a global scale. The use of data and information and the demands on the data quality have increased sharply in the last decade. These demands will increase further as new environmental programmes are established to forecast environmental changes, new regulations are implemented at all levels of society and population pressure on the environment challenge sustainable development of natural resources.

Many organisations are involved in the collection, analysis and dissemination of environmental information, often in specific subject areas. Independent programmes develop their own strategies for collecting and analysing data and information. This results in significant variations between different programmes in sampling methods, measurement methodology, quality assurance, data documentation etc. and often makes it impossible to assess the quality of the data and use results obtained from different programmes for global/regional integrated and comprehensive analyses. Global co-ordination and improvement of comparability of both environmental data collection and information handling are, therefore, necessary.

No organisation currently records and integrates information on a world-wide basis on environmental programmes, database compilations, and methods of data distribution. Harmonization of monitoring methods is also a neglected area. This situation hampers co-operation and integration between organisations dealing with the monitoring and assessment of the global environment, and often leads to non-comparability of environmental data on global and regional scales.

These problems were recognised and resulted in a call, in 1986, by the environmental Experts of the Economic Summit Countries for an improvement and harmonization of techniques and practices for environmental measurements. The 13th Economic Summit in Venice, in 1987, consequently called upon UNEP, under the auspices of Earthwatch, to institute a forum for information exchange and consultation. The Executive Director of UNEP as a consequence of UNEP Governing Council Decision GC.14/24 convened a meeting of experts from interested countries and competent international organisations including the International Standardization Organisation (ISO) and the International Council

of Scientific Unions (ICSU) to consider the best means to achieve progress in the improvement and harmonization of environmental measurement, including the possibility of instituting a forum for information exchange and consultation and to appeal to interested governments to support such a meeting of experts. In accordance with this decision, the Executive Director of UNEP asked the Government of the Federal Republic of Germany to host this meeting of experts. The meeting was held in Munich from 9-11 December 1987.

The meeting recommended that the Executive Director of UNEP establish within Earthwatch, under the mandate of GEMS, a project on the Harmonization of Environmental Measurement (HEM) as soon as appropriate resources became available. With funds from the Government of Bavaria a Harmonization of Environmental Measurement Project was set up in Munich in August 1989.

During the first operational year (phase 1) of the HEM project, HEM produced a draft report on environmental monitoring and information management programmes, established links with relevant organisations and studied the feasibility of conducting pilot projects on environmental specimen banking and land resource classification systems. HEM held two expert meetings to advise on the development and implementation of HEM activities.

The current project is based on the recommendations of those expert meetings and on subsequent agreement between UNEP, Germany and GSF on the work programme for HEM 1991-1993. It will have to involve scientists worldwide and is aimed to stimulate a process for developing practical and scientific recommendations/guidelines for helping governments to set meaningful environmental standards, and helping to provide scientist with standard methods to get reliable, comparable, and compatible data for use, for example, in model validation and assessments.

1.2 Legislative authority

- Governing Council Decisions
- GC 14/24 "Improvement and Harmonization of Environmental Measurement",
- GC 15/38 "Harmonization of Environmental Measurements"
- GC 16/L.18 "Improvement and Harmonization of Environmental Measurement"

Section 2: Objectives and achievement indicators

2.1 Objectives

2.1.1 Long-term objectives

To enhance the compatibility and quality of information on the state of the environment world-wide in order to improve the provision to policy making bodies, international programmes and to the scientific community, of the harmonized information required for the sound management of environmental resources.

2.1.2   Short-term objectives

a)   To contribute in reaching an international agreement on harmonized measurement, analytical data management, and in assessment procedures for specific groups of variables in particular environmental sectors, starting with air quality.

b)   To provide outputs suitable for inclusion in the work of technical and legal experts towards the development of conventions or protocols such as climate change and biological diversity.

c)   To assist in the development of adequate national and international harmonized analytical quality control and quality assurance procedures by providing information on and access to standard reference materials.

d)   To promote globally the integrated approach to environmental monitoring and assessment allowing comparison of data from different areas through improved and internationally accepted natural resource classifications.

e)   To provide a global information system on programmes and activities dealing with environmental data and their mode of operation, to be used by relevant national authorities, international organizations and the scientific community for planning and sound management of environmental resources.

2.2 Achievement indicators for long- and short-term objectives

-   The number of expert groups convened by HEM or cooperating organisations having agreed upon harmonization of environmental guidelines or recommendations for variables in particular environmental sectors e.g. air quality

-   The number of expert groups convened by HEM or cooperating organisations having agreed upon natural resource classification systems or on recommendations for classifying natural resources;

-   The number of international organisations actively cooperating with the HEM project;

-   The number of requests for publications produced by or through the HEM project;

-   The use of HEM publications judged by requests to be added to the HEM distribution list;

-   The number of requests for information from the HEM project;

-   The number of national authorities, international organisations and other elements of the scientific community participating in and supporting information collection, compilation and dissemination activities conducted by HEM.

Section 3: Outputs, follow-up activities, inputs and assumptions

3.1 Outputs

I. Recommendations for internationally acceptable guidelines for measurement, analytical data management, and assessment procedures for specific groups of variables/substances causing particular environmental problems, e.g. air quality, etc. (150 copies, English only).

Topic-specific reports reflecting the outcome of the expert group meetings.

II. An annotated catalogue of existing natural resource classification systems pertaining to vegetation (200 copies, English only).

First recommendations towards an international practical classification system of global vegetation (500 copies, English only).

III. A standard (reference) materials database.
A directory for standard (reference) materials including methods for obtaining such reference materials (500 copies, English only);
Periodically updated reports and directories.

IV. A meta-database containing information on:

- international environmental monitoring and assessment programmes and activities and their mode of operation with regard to objectives, data collection and analytical quality assurance procedures, measurement techniques and data handling and dissemination procedures,
- natural resource classification systems and models used for environmental monitoring and management,
- existing relevant environmental databases,
- periodical outputs from the meta-database (numbers according to distribution list, English only):
    - a Survey on Environmental Monitoring, Data and Information, and Harmonization Programmes of International Organizations (1000 copies, English only);
    - an inventory, complementary to the above survey, of the mode of operation, methods and instrumentation of the institutions active in environment monitoring programmes (1000 copies, English only);
    - a directory of existing and planned environmental databases and their specifications, to be developed by MARC in conjunction with HEM (100 copies, English only).

V. Reports on HEM's participation in international conferences, workshops, and exhibitions (Geotechnica 1991; ISY - Munich 1992).

VI. HEM reports:
    - Review and evaluation report on HEM phase II and report on the strategy for HEM phase III, August 1983 (100 copies, English only).

- Report of the HEM Expert Group Meeting on the HEM meta-database, July 1990, Munich (100 copies, English only).
- Reports on the various Expert Group Meetings on specific topics of the HEM work programme, (100 copies each, English only).
- Report on the design, implementation, and operation of the HEM meta-database, January 1992, (100 copies, English only).
- Annual HEM reports (200 copies, English only).
- Review and evaluation report on HEM phase II and report on the strategy for HEM phase III, August 1993 (100 copies, English only).
- Quarterly HEM newsletter (1000 copies, English only).

3.2 Use of outputs

The outputs related to the improvement and harmonization of sectoral environmental measurements - initially in the area of air quality measurements - will help governments to set meaningful standards and help to provide scientists with standard methods for getting reliable, comparable and compatible data for use, for example, for mode validation and in assessments.

A practical natural resource classification e.g. on vegetation will form a valuable input into the work of technical and legal experts towards a convention or protocol on biological diversity.

The standard (reference) materials database and directory will be used as a source of information on types, location, sources, etc. of standard reference materials essential for analytical quality assurance procedures without which there can be no adequate harmonization of environmental measurements.

The outputs produced by HEM will help to inform organizations active in environmental monitoring, assessment, and research, government agencies, scientific institutions and scientists on what other organizations and groups are doing, which methods and techniques they are using, which data they can provide in what quality, and which formats are being used.

This information will allow better integration and harmonization of environmental measurement and monitoring and promote data uniformity and comparability between different programmes and thus help to avoid duplication of efforts within the world community.

Projected users of HEM information and data include: the United Nations system in general, ICSU and other scientific NGOs, governments including those of developing countries, and the international scientific community.

The outputs will help to provide those developing countries, which still have little or no access to internationally conducted programmes, with comprehensive information on who is doing what in the field of environmental monitoring and assessment.

The HEM meta-database will be used by HEM in establishing priorities for harmonization in the field of environmental measurement and data handling to provide basic information for other GEMS groups, and as a source for HEM publications.

3.3 Follow-up action

Detailed development of phase III of the HEM project based on activities and their outcomes in the main work areas during phase II and the recommendations of the mid-project evaluation.

3.4 Activities (to be carried out with or through relevant United Nations organisations or other sectoral expert bodies).

This project phase will sharpen focus on two existing activity areas and add two new activities based largely on the recommendations of the original expert meeting held in Munich in 1987. Work on all four concentration areas will be carried out simultaneously.

The work areas are:

- Sectoral environmental measurements: Will focus on specific groups of variables in a particular sector - air quality is perhaps the most important environment sector needing attention at present - to reach agreement on measurement, analytical and data management procedures and their value to assessment processes.

- Natural resource classifications: To obtain international agreement on practical classification systems for natural resources and therewith to provide outputs of value to the work of technical and legal experts e.g. towards a convention or protocol on biological diversity.

- Standard (reference) materials database and directory: To ensure adequate and proper analytical quality control and quality assurance procedures related to environmental measurements thus leading to improved harmonization of environmental measurements.

- Meta-database: To collect, compile, and disseminate information on existing activities carried out at global, regional and national levels in the fields related to environmental monitoring and assessment including quality assurance.

This programme will be carried out in co-operation, or through, relevant competent sectoral organisations such as WHO, WMO, IUCN, WCMC, IEO, GRID-Geneva and GEMS-MARC, and in association with ISO, ICSU and other bodies as deemed appropriate.

As outlined, the project will help to provide scientific and practical guidelines and recommendations for the production of reliable, comparable and compatible environmental data for environmental assessment and management purposes. Such guidelines and recommendations will be of use both to governments and the scientific community and will help to ensure improved harmonization of environmental measurements.

I. Establishment of an international Programme and Technical Advisory Group (PTAG) to oversee, advise, and evaluate HEM's programme; to meet as required but not less than once per year. PTAG initially will comprise of three senior sectoral experts (atmosphere, oceans, terrestrial natural resources) and a representative of UNEP, GSF and the German Ministry of the Environment. Additional experts may be co-opted on an ad hoc basis for particular discussion points as required. The Director of the HEM project will act as Secretary of PTAG.

II. Activities related to the improvement of sectoral environmental measurements:

   (a) Development of a background paper (concept) on the improvement of air quality measurements (e.g. acidic deposition forming substances, respirable suspended particulate matter, selected radiative trace gases) by external experts working in close co-operation with WMO, WHO, ECE, EEC, ISO and others as appropriate. This background paper will take into account the existing/ongoing activities concerning harmonization of air quality measurements.

   (b) Discussion of the background paper (concept) by Experts to give advice and develop recommendations on the choice of sector and sector variables for improved harmonization studies through HEM.

   (c) Preparing and undertaking workshops to define the specific needs of harmonization and to develop guidelines/handbooks to aid in the improvement of measurements, and analytical, data management, and assessment procedures.

   (d) Annual check of achievements by the international Programme and Technical Advisory Group (PTAG, see I above).

III. Activities related to vegetation and other resource classifications to be carried out in close contact with the World Conservation Monitoring Centre (WCMC), the International Union for the Conservation of Nature and Natural Resources (IUCN) and other relevant organisations:

   (a) Collection of relevant background information (catalogue) on existing systems of vegetation classification.

   (b) Expert Group Meetings to discuss the catalogue and evaluate the various systems in use, based upon this review, suggest a general vegetation classification system that can be used universally from the ground to space imagery.

   (c) After discussion in the PTAG (see I above) and according to the recommendations of the experts design a strategy for testing the recommended system and obtaining its general acceptance and international use.

IV. Activities related to the establishment of a standard reference materials database and directory:

(a) Collection of information of existing organisations/groups dealing with standard reference materials and their mode of operation; development of a proposal for the design of a database.

(b) Collection of information on the actual standards materials held at each centre, the methods of preparation, limitations to use, distribution practices, and ordering procedures.

(c) Presentation of the material at the first PTAG meeting to discuss structure and format of a database on standard reference materials.

(d) Development and operation of the database, its continuous update, and production of outputs.

V. Activities related to the development of HEM meta-database:

(a) Development of the requirements and the design for the HEM information system by external database experts together with HEM staff (concept, hardware, software, etc.)

(b) Establishment of a pilot meta-database

(c) Systematic collection, analysis and dissemination of information (test phase).

(d) Operation of the HEM Information System (meta-database) and periodical production of updated information on existing activities in the field of environmental monitoring and assessment at global, regional and national levels.

(e) Expert Group Meetings:
- to discuss, review and finally agree upon the concept and design for the HEM Information system put forward by the external design group, October-November 1991 in Munich, and
- to discuss, review and finally agree upon the test phase of the meta-database, September 1992 in Munich (12 experts, basically the same group as was invited by GEMS/PAC for the meeting in July 1990)

VI. Establish links with relevant international organizations and national institutions.

HEM PTAG Members

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4. Prof. J. Paasivirta, Univ. Jyväskylä, Finland
5. Dr. J.M. Pacyna, NILU, Norway
6. Dr. B. Walker, CSIRO, Australia
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7. Dr. B. Wyatt, ITE, United Kingdom

Ex officio Members

A representative from:

UNEP GEMS/PAC
GSF (Research Centre for Environment and Health)
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Secretariat

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of the first HEM PTAG Meeting
11/12 May 1992, Munich

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List of Background Documents

Activity area I - Programme Development:

- Annual Report for Phase I

- HEM Newsletter *HEMiSphere, Nos. 1 to 3*

Activity area II - Sectoral Environmental Measurements

- Urban Air Quality Monitoring - Methodology and Quality Assurance Implications

  Paper prepared for the Government Designated Experts Meeting on GEMS/Air held in

  Geneva, Nov. 1991

- Quality Assurance in Urban Air Quality Monitoring. Draft for a GEMS/Air Broschure

  (Methodology Review Handbook Series)

Activity area III - Natural Resource Classifications

- Vegetation Classification. A Review for Harmonization of Maps. First draft of

  background paper prepared by a consultant

- Harmonization of Environmental Simulation Models. Rossolovsky, S. (Background

  paper for a project started by the HEM office under the German-Russian Co-operation

  scheme)

- Strategy for Harmonizing of Classification Systems to Improve Environmental

  Measurements. Korotkov, K. (Background paper prepared under the German-Russian

  Co-operation scheme)

Activity area IV - Reference Materials Database and Directory

- A Survey of Institutions, Organizations and Laboratories Manufacturing, Supplying or

  Using Reference Materials (Draft)

- Environmental Specimen Banking (ESB), an Essential Part in Integrated Ecological
  Monitoring on a Global Scale. Keune, H.; Proceedings of the International Symposium
  on Biological and Environmental Specimen Banking, Vienna, 1991

Activity area V - Meta-database (HEMIS)

- A Survey of Environmental Monitoring & Information Management Programmes of
  International Organizations, 2nd edition, April 1991

- Directory of Organizations and Institutes Active in Environmental Monitoring, 1st
  edition, April 1992

- Environmental Databases and Information Management Programmes of International
  Organizations. Keune, H.,

  Theisen, A.; Proceedings of the 6th Symposium on Computer Science for

  Environmental Protection, Munich, December 1991

- Discussion Paper for the 2nd HEM Meta-database Expert Group meeting, Munich
  October 1991

- Report of the 2nd HEM Meta-database Expert Group Meeting, Munich October 1991

- User Requirements for Harmonization of Environmental Measurement Information
  System HEMIS. Crain, I. K.; Report to be published in the GEMS Report Series in
  1992

Activity area VI - Development of Contacts/Public Relations

- HEM flyer

- Broschure for the Exhibition "Local and Global Change - Research and Coordination
  Tasks of International Organizations" at GEOTECHNICA '91, Cologne, September
  1991

- HEM activity report on the International Special Exhibition "Die Erde im Wandel -
  Local and Global Change"

- HEM activity report on its participation in the European International Space Year (ISY)
  Conference, Munich 1992