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Item 5 (j) of the provisional agenda*

**Matters for consideration or action by the Conference of the Parties:
effectiveness evaluation**

Global monitoring report under the global monitoring plan for effectiveness evaluation**

Note by the Secretariat

1. At its third meeting, the Conference of the Parties adopted decision SC-3/19 on effectiveness evaluation by which, among other things, the Conference of the Parties established regional organization groups and a coordination group with the mandates and terms of reference specified in the annex to the decision.
2. In accordance with the terms of reference, the regional organization groups prepared the regional monitoring reports contained in document UNEP/POPS/COP-4/INF/19 and the coordination group prepared the global monitoring report that is set forth in annex to the present note.

* UNEP/POPS/COP.4/1.

** Mandate for the action described in the present note contained in: Stockholm Convention, Article 16; report of the Conference of the Parties of the work of its first meeting (UNEP/POPS/COP.1/31), annex I, decision SC-1/13; report on the work of its second meeting (UNEP/POPS/COP.2/30), annex I, decision SC-2/13; and report on the work of its third meeting (UNEP/POPS/COP.3/30), annex I, decision SC-3/19.

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Annex

Global monitoring report

Introduction

1. Article 16 of the Stockholm Convention requires the Conference of the Parties to evaluate the effectiveness of the Convention commencing four years after its date of entry into force and regularly thereafter. That evaluation is to be based on available scientific, environmental, technical and economic information, including monitoring reports on the levels of persistent organic pollutants in the environment.
2. To assist in that task, at its third meeting the Conference of the Parties adopted the global monitoring plan for persistent organic pollutants and the implementation plan for the first effectiveness evaluation (decision SC-3/19). The first evaluation was undertaken to obtain comparable data on air levels and human exposure (breast milk or human blood) from all five United Nations regions to serve as baselines for future evaluations. It should be understood that the baseline in the current context was set to determine trends of increase or decrease in persistent organic pollutant levels in both the short and long term. Five regional organization groups and a global coordination group were established to implement the global monitoring plan and to provide the Conference with reports summarizing and presenting the data on a regional basis.
3. The present report, prepared by the coordination group, summarizes the data compiled by the regional organization group of each United Nations region and makes recommendations to guide the implementation of subsequent evaluations.

A. Overview of availability of baseline data in the regions

4. The overall conclusion reached was that there are data on air and human milk or blood in all five United Nations regions that can be used as a baseline for future evaluations. All regions noted, however, that data were missing in some significant subregions.
5. Information on data availability from the regional reports is summarized in table 1. It highlights the regions and subregions that possess data and indicates whether that information meets the established data quality criteria outlined in annex I to the implementation plan for the global monitoring plan and is adequate to serve as a baseline. It also highlights the degree to which capacity needs to be strengthened to ensure a sustainable monitoring programme for the future. More detailed information is presented in the regional summaries that follow.

Table 1. Summary of availability of persistent organic pollutant data and monitoring capacity in the regions

<i>Region and subregion</i>	<i>Baseline levels* in air</i>	<i>Baseline levels in human milk or blood</i>	<i>Capacity adequacy†</i>	<i>Monitoring programmes</i>
Africa				
North Africa	██████████	██████████	██████████	██████████
Southern Africa	██████████	██████████	██████████	██████████
East Africa	██████████	██████████	██████████	██████████
West Africa	██████████	██████████	██████████	██████████
Central Africa	██████████	██████████	██████████	██████████
Island States	██████████	██████████	██████████	██████████
Asia and the Pacific				
Pacific Islands	██████████	██████████	██████████	██████████
East Asia	██████████	██████████	██████████	██████████
South Asia	██████████	██████████	██████████	██████████
West Asia	██████████	██████████	██████████	██████████
Central and Eastern Europe				
Central Europe	██████████	██████████	██████████	██████████
Eastern Europe	██████████	██████████	██████████	██████████
Latin America and the Caribbean				
Mesoamerica	██████████	██████████	██████████	██████████
Caribbean	██████████	██████████	██████████	██████████
Andean	██████████	██████████	██████████	██████████
Southern Cone	██████████	██████████	██████████	██████████
Western Europe and other States				
North America	██████████	██████████	██████████	██████████
North and Western Europe	██████████	██████████	██████████	██████████
Australia and New Zealand	██████████	██████████	██████████	██████████
Mediterranean rim	██████████	██████████	██████████	██████████
Arctic	██████████	██████████	██████████	██████████
Antarctic	██████████	██████████	██████████	██████████

Adequate/available
 Partially adequate/available
 Not adequate/available

B. Conclusions and recommendations

1. Baseline levels of persistent organic pollutants

6. Adequate baseline levels of persistent organic pollutants in air and human milk or blood, together with information about current trends, are available from a relatively small number of existing national and international programmes. In some regions the baseline levels are provided by new, nationally supported persistent organic pollutant monitoring activities. In several regions where major data gaps had been identified, initial air monitoring and human milk data have been generated through strategic partnerships with established monitoring programmes within the framework of project activities; however, continuation of these monitoring activities will depend on further capacity-building and support (see also conclusions and recommendations 2 and 7 below).

* When there is some information of suitable quality from one time studies or projects that could be used for comparison in future evaluations but no established programme to ensure data for future evaluations, the baseline is described as partially adequate.

† When the basic infrastructure is present for monitoring and analysis, but resources to ensure the continued viability of the programme are not ensured, the capacity is described as partially adequate.

(a) Recommendation 1

7. Established national and international monitoring programmes should be maintained. Newly initiated activities should be transformed into sustainable long-term programmes through stable strategic partnerships, capacity-building and the gradual increase of national commitment and support.

Identified gaps and capacity-building to fill them

8. Although baseline levels of persistent organic pollutants are available from all United Nations regions, long-term monitoring programmes are lacking in most subregions and even entire continents. In several subregions, baseline levels are unavailable owing to a lack of capacity and, sometimes, insufficient institutional support. There is already some analytical capacity available in countries and, with targeted training and upgrading, laboratories could be brought up to standard to serve global monitoring and evaluation needs.

(b) Recommendation 2

9. Further step-by-step capacity-building through strategic partnerships should receive sufficient support from the Stockholm Convention financial mechanism and other donors to build on the new monitoring initiatives, to expand on them to fill the identified gaps in geographic coverage and to make them more sustainable. A gradual increase in national commitment and support should be encouraged at the same time. Capacity-building could be undertaken in training and targeted advice provided to enable laboratories in developing countries to contribute high-quality data to the global monitoring plan.

Interval for future evaluations

10. As an effective interval for future evaluations, six years would enable a substantial body of information to accumulate from contributing programmes and would also enhance statistical interpretation. A lesser period would not be cost-efficient in terms of the effort involved, while a longer period would leave the Conference of the Parties uninformed of important information on environmental levels.

(c) Recommendation 3

11. Effectiveness evaluations should take place at six-year intervals with a report to the Conference of the Parties at the end of each period.

Media

12. Ambient air and human milk or blood are suitable media for evaluating changes in persistent organic pollutant levels over time on a global scale. Several current programmes are, however, monitoring levels of persistent organic pollutants on a long-term basis in region-specific media, which can provide valuable additional information.

(d) Recommendation 4

13. For future evaluations, all regions should continue monitoring and reporting levels of persistent organic pollutants in the current core media. When available, additional data on levels in other media can be used in the evaluation to help to assess trends.

Data comparability

14. For interpreting changes in levels of persistent organic pollutants over time, data collected within a programme should be comparable. Ensuring data comparability between various air monitoring programmes is difficult, given the numerous sources of uncertainty. For modelling and evaluation of long-range transport or for semi-quantitative spatial comparisons of persistent organic pollutant levels, however, comparability of data between the programmes is desirable, and could be assessed and resolved through inter-comparison studies. Some of the physical and chemical properties of persistent organic pollutants are temperature-dependent and levels of persistent organic pollutants may be influenced by year-to-year climate variability. Climate variability also affects the meteorological patterns that deliver persistent organic pollutants to background sites. It is important to understand better those influences to ensure that data are interpreted correctly. For data from human milk or blood, comparability between programmes is hampered by the impact of various factors on the results: the location of the study; the age, sex and ethnicity of the subjects; social factors; and the laboratory conducting the analysis. The human milk survey coordinated by WHO, which uses a harmonized

sampling protocol and a single laboratory, provides data sets that are comparable over time and between the regions.

(e) Recommendation 5

15. Efforts should be focused to achieve comparable data sets over time. Comparability between air monitoring programmes should be increased in support of modelling and assessment of the global long-range transport of persistent organic pollutants (see also conclusion and recommendation 6 below). Studies on year-to-year climate influences on levels of persistent organic pollutants in various environmental media should be encouraged.

Long-range transport of persistent organic pollutants

16. The absence of long-term regional monitoring programmes on persistent organic pollutants prevented most regions from investigating and evaluating the long-range transport of those substances. A comprehensive effectiveness evaluation of the Convention will not be possible in the absence of such information, as atmospheric transport is important for the delivery of persistent organic pollutants to background sites. This topic spans more than one region and should include regular assessment on a global scale.

(f) Recommendation 6

17. Future evaluations of changes in persistent organic pollutant levels over time should include information on regional and global environmental transport. A coordinated cross-regional approach to analysis and assessment of data to meet that objective should be established.

Future programmes

18. While data are available to use as a baseline, it is equally important that monitoring programmes continue so that data are available in the future to compare with that baseline. Long-term monitoring programmes need to consider the minimum data required to investigate temporal trends for effectiveness evaluations as described in the guidance on the global monitoring plan. For regions lacking programmes, the minimum requirement for air monitoring would include continuous monitoring at the initial number of sampling points that provided the baseline data. The milk survey should be conducted at least once in the evaluation period.

(g) Recommendation 7

19. The initial focus of any capacity-building should be on establishing a continuous monitoring programme that, at least in the case of air monitoring, focuses on a small number of sampling sites to produce the data that are needed for future effectiveness evaluations. Once such a programme is made sustainable, further strengthening could build on this foundation in a step-by-step approach. This could include improved resolution of sampling in space and time with careful consideration given to the guidance on the global monitoring plan and the added value of additional sampling points.

Impediments to the implementation of the global monitoring plan

20. While the first evaluation was successful in establishing in some subregions a baseline that can be used for future evaluations, some data are not yet available or complete owing to lack of resources or delays in implementation of activities or projects. Those delays can be attributed to difficulties in communication, the time taken to obtain responses and commitments to proposals, and, occasionally, a lack of response to or rejection of the invitation to participate in initiatives. Successful implementation of future evaluations will need the full engagement of the Parties and the cooperation of the relevant government departments.

(h) Recommendation 8

21. The Conference of the Parties should remind Parties of the need to engage actively in the implementation of the global monitoring plan and the effectiveness evaluation, which would include ensuring that the official contact points have the support needed to fulfil their duties, keeping the Secretariat informed of any changes in names or addresses of contact points, making the relevant groups within their country aware of the Convention, its objectives and benefits, and encouraging the mobilization of national resources to support the implementation of the Convention at the national level.

Regional monitoring reports summaries[‡]

A. African region

1. Overview of the region

1. Africa is one of the largest United Nations regions with an area of 40,065,721 square miles and is divided into Northern Africa, Southern Africa, Eastern Africa, Western Africa, Central Africa and the island States. The region is characterized by six climatic zones that influence the movement and distribution of persistent organic pollutants. In addition, the region faces challenges associated with hot and humid climatic conditions that promote the growth of a myriad of pests and disease vectors. Persistent organic pollutants have been used in many sectors, including agriculture, public health and industry. Other challenges include endemic poverty, malaria epidemics and marked vulnerability to environmental issues linked to climate change, desertification, loss of biodiversity and the effects of the mismanagement of hazardous chemicals and wastes. The key challenges related to persistent organic pollutants include: lack of knowledge and information on hazards, risks and safer alternatives; lack of legislation or enforcement measures; weaknesses in the technical infrastructure; and a shortage of qualified human resources. To participate in the first evaluation, the collection of comparable data on core media in the region relied exclusively on technical and financial assistance opportunities provided by the Convention according to Articles 12 and 13. It is worth noting, however, that there is some reliable capacity in both the academic and institutional sectors at the national and regional levels that, with capacity-building, would be able to contribute to future monitoring programmes.

2. Contributing and collaborating programmes

2. The African region collaborated with the following programmes and strategic partners to obtain data on the core media: the MONET-Africa project coordinated by the Centre of Excellence in Environmental Chemistry and Ecotoxicology, Brno, Czech Republic (RECETOX); the Global Atmospheric Passive Sampling (GAPS) programme coordinated by Environment Canada for ambient air data; and WHO for human milk data. The selected strategic partners had consolidated expertise in their respective area for sampling, analysis and interpretation of results in accordance with the criteria contained in the implementation plan for the first effectiveness evaluation. The implementation of the MONET-Africa project and WHO milk survey was facilitated by coordination, technical assistance and financial support from the Stockholm Convention Secretariat, the Chemicals Branch of the UNEP Division of Technology, Industry and Economics (UNEP Chemicals) and the Global Environment Facility. Some academic and research institutions within the region also helped to provide data on other media and, to a limited extent, on human milk and blood.

B. Main findings

1. Baseline levels of persistent organic pollutants in air

3. The available monitoring data for air provide indicative information about persistent organic pollutant levels in the region. Most of the data were provided by the strategic pilot activities established in 2008 and, if they are continued, will provide a sufficient baseline upon which future evaluations can draw. GAPS data were collected from 2005 to 2006 but only in four countries: Egypt, Ghana, Malawi and South Africa. The MONET-Africa pilot project was implemented in 2008 to bridge the significant spatial data gaps. Fifteen countries in the region participated in the ambient air monitoring programme: Congo, Democratic Republic of the Congo, Egypt, Ethiopia, Ghana, Kenya, Mali, Mauritius, Nigeria, Senegal, South Africa, Sudan, Togo, Tunisia and Zambia. Sites ranged from continental, rural and urban backgrounds to those heavily affected by industrial activities or old burdens of pollution.

4. The monitoring data demonstrated that ambient air in Africa was contaminated by persistent organic pollutants currently listed under the Convention. Such contamination should be considered to be an issue of concern since all the selected countries recorded pesticides above the quantification limit. In some cases, the low metabolite to parent persistent organic pollutant pesticide ratios revealed recent or current usage of persistent organic pollutant compounds. The levels of polychlorinated biphenyls (PCBs) measured in urban and industrial sites in the region were comparable to those measured at industrial sites in Europe. In addition, all sites were found to be contaminated by varying types of

[‡] These summaries have been condensed. The full executive summaries are found in the individual regional monitoring reports.

polychlorinated dibenzo-dioxins and furans (PCDDs/PCDFs), the main sources of which were attributed to industrial activities and open burning processes. Several sites (Mount Kenya in Kenya, Timbuktu in Mali, the Molopo and Barberspan nature reserves in South Africa and Reduit in Mauritius) were found to be good candidates for future background monitoring of the continent. All those findings should be applied when planning not only the future monitoring programmes but also the national regulations pursuant to the implementation plans targeting reduction or elimination of persistent organic pollutants.

2. Baseline levels of persistent organic pollutants in human milk or blood

5. The available persistent organic pollutant monitoring data for human milk were obtained from Egypt for the samples submitted during the third round of the WHO milk survey and from the Sudan for the samples submitted during the fourth round of the survey. Additional data are being obtained from the United Nations Environment Programme-WHO milk survey, a supplementary data collection activity initiated in 2008 to fill data gaps for the first effectiveness evaluation. The data provide indicative levels of persistent organic pollutants against which the changes in levels over time could be assessed.

3. Levels of persistent organic pollutants in other media

6. Data on levels of persistent organic pollutants in other media – soil, water, sediments and food – were extracted from published research activities in the region. There is a lack of organized monitoring programmes with well-established protocols for monitoring persistent organic pollutants in other media, which means that the available data only provide indicative levels of persistent organic pollutants in the region. They show that all persistent organic pollutants under annexes A and B of the Convention contaminate the ecosystems and the local population through the examined media, which should be an issue of concern throughout the region. The data also show that the existing capacity for persistent organic pollutant analysis is mainly for persistent organic pollutant pesticides and PCBs. With capacity-building within the framework of a regionally harmonized monitoring programme, the regional and national institutions would be able to contribute to production of data for the global monitoring plan.

4. Long-range transport of persistent organic pollutants

7. The absence of sufficiently long-term regional monitoring programmes on persistent organic pollutants did not permit comprehensive investigation and evaluation of long-range transport and temporal trends of persistent organic pollutants in the region. This is because most of the data were produced in a framework of six months during the project to produce supplementary data initiated in October 2007. Preliminary analysis of back trajectories was, however, conducted using the air data collected by the MONET-Africa monitoring programme in 2008.

5. Data gaps

8. The available core media persistent organic pollutant monitoring data were mainly provided through the strategic data collection activities established in 2008. Quantitative comparisons of levels of persistent organic pollutants across countries proved extremely difficult, given the lack of adequate data and their completeness, and the short period covered for the established supplementary data collection activities. Generally, the region lacks long-term established programmes with good regional representation to assess comprehensively time trends in persistent organic pollutant levels, long-range transport and spatial distribution. In that regard, the following were identified as key data gaps: no systematic monitoring of persistent organic pollutants in the core media (ambient air and human milk or blood) is taking place; milk data are needed for some subregions; data on PCBs are extremely limited; and almost no data on PCDDs/PCDFs are available.

6. Capacity-building needs

9. To fill the existing data gaps, capacity-building for persistent organic pollutant monitoring remains a high priority for most countries and the region. This includes: building human capacity to analyse and manage persistent organic pollutants; supporting dedicated regional laboratories with the necessary high-resolution equipment for analysis of all persistent organic pollutant compounds; supporting a regional approach to persistent organic pollutant monitoring by establishing regional programmes with standardized protocols to determine persistent organic pollutants in core media and non-core media; providing basic consumables and equipment to national laboratories to support their involvement in regional programmes; involving national regional institutions in proficiency testing and

upgrading their performances in persistent organic pollutant analysis; promoting regional data-sharing and storage; supporting specimen banking for future evaluations; and supporting regional communication between the regional organization groups and focal points.

7. Future monitoring programmes

10. Future evaluations would benefit from maintaining continuous monitoring programmes to support the generation of baseline data in the region; maintaining and enhancing regional coverage of the established strategic programmes to provide additional data in the core media; continued monitoring to produce comparable data to support the assessment of trends and levels determined in the core media, together with at least one additional medium of regional priority; incorporation of candidate persistent organic pollutants into the monitoring programmes; enhancing participation of regional institutions and laboratories through the analysis of parallel samples; facilitating inter-laboratory calibration and training activities; and establishing regional specimen bank and database for the core media.

C. Conclusions and recommendations

11. The available persistent organic pollutant data are partially adequate and most of the subregions have only one or two sampling sites participating in established monitoring activities. Given the lack of established persistent organic pollutant monitoring programmes with adequate regional representation, Africa depended exclusively on strategic activities and partnerships established in 2008 with such partners as GAPS, RECETOX and WHO to produce regional persistent organic pollutant data for ambient air and human milk.

12. Most of the data from other media in the region were retrieved from published literature emanating from individual research activities and therefore can only be used for indicative purposes. There is limited human capacity in the region to provide comparable data in the core media. The data from other media such as water, sediments, soil and foodstuff, however, indicate the existing expertise within the region, and with capacity-building would enable the region to participate meaningfully in future evaluations.

13. Several institutions in the region conduct research on persistent organic pollutants but have weak analytical, data handling and storage capacities. The limited analytical capacity available is characterized by weaknesses in the analytical infrastructure among the regional institutions and laboratories to analyse persistent organic pollutants, with most institutions capable of analysing only a few persistent organic pollutant pesticides and PCBs, but the capacity to analyse PCDDs and PCDFs is non-existent. There is need for support in the form of technical assistance to boost the analytical capacity of the regional institutions to participate fully in persistent organic pollutants monitoring and production of comparable data for the global monitoring plan.

14. The region suffers from weak information exchange and communication networks that hinder the judicious implementation of global monitoring plan activities. While most African countries are Parties to the Stockholm Convention and many have produced and submitted their national implementation plans to the Conference of the Parties, there are still limited coordination and collaborative activities at the national and regional levels. There is also limited coordination between the regional institutions dealing with persistent organic pollutants and other chemicals under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the Stockholm Convention.

15. To ensure a cost-effective implementation of future evaluations it will be necessary to provide additional support to maintain the current strategic global monitoring plan activities – ambient air monitoring and the human milk survey – so that adequate persistent organic pollutant data in core media continue to be produced to assess temporal trends and long-range transport patterns.

16. To facilitate this, it is recommended that the capacity of existing regional structures, such as the regional centres under the Basel and Stockholm conventions and the New Partnership for Africa's Development, be strengthened. In addition, Global Environment Facility regional proposals should be developed to support analytical capacity-building in the region to enable regional institutions and laboratories to produce high-quality comparable data for the global monitoring plan. This should include enhancement of human capacities in a network of regional institutions and laboratories using harmonized persistent organic pollutant monitoring protocols for each core media. In addition, capacity-building programmes supported by the Global Environment Facility could be used to build the capacity of identified national and regional laboratories to conduct persistent organic pollutant analyses

in support of the monitoring programmes and to provide regional training in persistent organic pollutant analysis and data handling. It is also recommended that a regional monitoring programme be established to produce comparable data in at least one suitable region-specific medium to support the data obtained in the core media.

17. It is recommended that more countries participate in persistent organic pollutant monitoring programmes. Partnerships and collaboration in the global monitoring plan and other related activities in the region should also be strengthened through bilateral or multilateral partnerships as part of regional Global Environment Facility projects and the joint European Commission and African, Caribbean and Pacific Group of States capacity-building initiatives.

18. The coverage of UNEP Chemicals regional information exchange activities, for example the chemical information exchange network, should be enhanced to raise the awareness of government officials, such as ministers of environment and finance, about the importance of persistent organic pollutant monitoring activities.

19. National task forces on the global monitoring plan, comprising Stockholm Convention focal points, national contacts and local stakeholders, to oversee and coordinate activities related to the global monitoring plan at the national level should be formed. This would support the mainstreaming of chemical management, including persistent organic pollutant monitoring, into the regional and national development agenda to strengthen persistent organic pollutant activities in the region.

Asia and the Pacific region

A. Overview of the region

20. The Asia and the Pacific region is located in tropical, subtropical temperate and subarctic climate areas, with many countries under the strong influence of the monsoon climate. The region is characterized by significant agricultural and industrial activities to support the large number of people, some 59 per cent of the world population. Many countries in the region have historically used persistent organic pollutants: for example, DDT for vector control and PCBs for industrial use. Some persistent organic pollutant substances continue to be used under specific exemptions in agricultures, fisheries and industries. In this region, there are 62 States, of which 43 countries are in the Stockholm Convention ratification, acceptance, approval or accession stage. Most are developing countries or countries with economies in transition.

B. Contributing and collaborating programmes

1. Type of information used

21. Several international and national persistent organic pollutant monitoring programmes on air and human milk exist. For air, passive sampling was conducted in Fiji in collaboration with RECETOX. Under the POPs monitoring project in East Asian countries initiated by Japan, sampling occurred in eight countries (Cambodia, Indonesia, Japan, Mongolia, Philippines, Republic of Korea, Thailand and Viet Nam). In China and Japan, some ambient persistent organic pollutant air monitoring programmes exist. For human milk, China (Hong Kong Special Administrative Region), Fiji, Kiribati and the Philippines have been involved in the third or fourth rounds of the WHO milk survey. China, India and Japan also have some national persistent organic pollutant monitoring programmes in human milk or blood.

22. It should be noted that few countries reported persistent organic pollutant data. Some have been collecting persistent organic pollutant data for longer and more intensively than others, but most have not.

2. Criteria to select the information

23. The data were mainly collected over the period 1998–2008. Some earlier data of historical importance are, however, presented and briefly described. The data were submitted through the focal point of each Party and evaluated by the regional organization group members based on information on analytical procedures, quality assurance and quality control protocols and other parameters. In addition to data on core media, the monitoring data on non-core media, such as water, soil and biota, were also collected as supplementary data and are briefly discussed.

24. In the newly established monitoring programmes, the methods for sampling and analysis of persistent organic pollutants in air and human samples were conducted in accordance with the guidance on the global monitoring plan. For the data reported and published earlier, however, various methods for sampling and analysis for persistent organic pollutant testing have been applied. Most persistent organic pollutant analyses described in the report included quality assurance and quality control procedures. Given the differences in analytical procedures used, the criteria for quality assurance, quality control and data validation from various countries differed significantly.

C. Main findings

25. The current report provides baseline information of persistent organic pollutants in ambient air and human milk from parts of the Asia and the Pacific region. Comprehensive spatial and temporal data on persistent organic pollutant monitoring are only available in a few countries of the region, such as Japan. Some countries are currently developing their monitoring programmes and inventories, while others continue to lack the capacity to monitor persistent organic pollutants. Because monitoring data do not exist in most countries, substantial efforts will be needed to fill data and technical gaps in the region to enable long-range transport of persistent organic pollutants to be assessed.

1. Baseline levels of persistent organic pollutants in air

26. In the Pacific and East Asian subregions, some baseline data on ambient air exist for the first effectiveness evaluation. Such data sets are, however, lacking in the South and West Asian subregions.

27. In China, 11 background sampling sites were selected and high-volume particulate matter (PM₁₀) sampling was carried out to analyse dioxins and other persistent organic pollutants. In the Hong Kong Special Administrative Region, monitoring of some persistent organic pollutants (dioxins and total PCBs) in ambient air has been conducted since mid-1997 as part of the regular toxic air pollutants monitoring programme. Fiji conducted a pilot study using passive samplers for the determination of persistent organic pollutants in ambient air from June 2006 to May 2007 at three sampling sites in collaboration with RECETOX.

28. In India, there are few historical studies of persistent organic pollutants and they are not conclusively reflective of persistent organic pollutant levels in ambient air. Japan has been monitoring persistent organic pollutants in the air by high-volume sampler since 1997 for dioxins, and since 2002 for the other persistent organic pollutants. In addition, background air monitoring has been conducted every month on Hateruma island since 2004 using a high-volume sampler. In Oman, air samples were analysed for DDT in 2005.

29. The POPs monitoring project in East Asian countries has been monitoring persistent organic pollutants (nine pesticides) in air using high-volume samplers in Cambodia, Indonesia, Mongolia, Philippines, Republic of Korea, Thailand and Viet Nam since 2005.

30. Generally, the reported levels of persistent organic pollutants in air were, on average, on the high side when compared with concentrations in other parts of the world. The reported data provide baseline information of persistent organic pollutants in some countries. Some persistent organic pollutants were, however, not detected either because the levels were extremely low or because the detection limits of the analytical method used were not sufficiently low. This might result in difficulties in future comparisons. In addition, some data were collected at a particular period of the year, which only provides a snapshot, and more data will be necessary to assess long-range transport.

2. Baseline levels of persistent organic pollutants in human milk or blood

31. For many countries in the region, there is generally even less information available on the levels of persistent organic pollutants in human tissue than those in air.

32. In China, a human milk survey was performed in 2007–2008, covering 12 provinces and 6 metropolises. The Hong Kong Special Administrative Region participated in the third round of the WHO human milk survey, while Fiji and Kiribati monitored persistent organic pollutants in human milk within the framework of the fourth round.

33. Reports are available on the levels of pesticide residues in human blood samples from India in 2005. India also reported data of DDT and hexachlorocyclohexane (HCH) in human milk samples from 1979 to 1986. In addition, India also has limited data on other persistent organic pollutants (for example, chlordane, DDT, hexachlorobenzene (HCB), PCBs and dioxins) from human milk monitoring programmes.

34. In Japan, the Ministry of the Environment reported the results of monitoring persistent organic pollutants in human milk and blood in 2004 and 2005. There are also human milk monitoring data for PCBs and some pesticides since 1972, and for dioxins since 1973. Human blood monitoring also took place in several sites in Japan between 1980 and 2005.

35. For human samples, the data are lacking over much of the region and more data are needed to provide a baseline for future evaluations. Trends data in Japan, however, show a clear decline in dioxins, PCBs and other persistent organic pollutant levels over recent decades.

3. Levels of persistent organic pollutants in other media

36. Three countries (India, Japan and Syrian Arab Republic) reported persistent organic pollutant levels in other media, such as water, sediment and biota.

4. Long-range transport of persistent organic pollutants

37. The absence of sufficiently long-term regional monitoring programmes on persistent organic pollutants does not enable long-range transport to be fully investigated and evaluated. Some preliminary investigation has been conducted, however, including back-trajectory analysis of air monitoring data in the East Asian monitoring programme and the development of the long-range transport models.

5. Data gaps

38. While Japan has been continuously monitoring persistent organic pollutants throughout the nation with well-established programmes and facilities, China has recently begun a persistent organic pollutant inventory for ambient air and human milk data. Facilities for such monitoring and inventory are limited, especially for dioxins analysis. In addition, the knowledge base and techniques of specialists in parts of the region cannot meet the requirements of up-to-date administration. In some cases, there is also insufficient quality control and data validation.

6. Capacity-building needs

39. Capacity-building for persistent organic pollutant monitoring programmes for most countries in the region remains the top priority recommendation. More high-quality data on the levels of persistent organic pollutants are needed to obtain a baseline of persistent organic pollutants in the region. In particular, resources are required to improve analytical facilities and methods for the determination of persistent organic pollutants. This entails more trained personnel and the acquisition of appropriate analytical facilities and the funds to maintain and operate the instruments. A major effort associated with improving analytical capability for persistent organic pollutants needs also to ensure good quality assurance and quality control procedures in laboratories, which may include the regular use of reference standards and certified reference materials, regional training programmes, inter-laboratory comparison exercises and the identification of reference laboratories in the region for specific persistent organic pollutants.

7. Future programmes

40. There are some national programmes, for example in China and Japan, that will continue to provide persistent organic pollutant monitoring data for the future evaluation. The East Asian POPs monitoring programme will also continue. Many of the data in the present report, however, were obtained from one-time projects. A mechanism will need to be established to collect comparable data for future evaluations.

D. Conclusions and recommendations

41. There are some baseline data on ambient air for the first effectiveness evaluation in the Pacific and East Asian subregions. On the other hand, such data sets are lacking in the South and West Asian subregions. For human tissue, data are lacking in most of the region and more are needed to provide a baseline for future evaluation.

42. For future evaluations, establishment of regional and subregional long-term persistent organic pollutant monitoring programmes such as the East Asian POPs monitoring programme are needed.

43. The following were identified as capacity-building needs: performance of inter-calibration tests; improving skills for sampling and analysis; strengthening the infrastructure in existing laboratories to provide capability to analyse the core media; institution of quality assurance and quality control policies

and procedures; and financial assistance to establish long-term programmes and self-sufficient laboratories.

44. To support the implementation of the Stockholm Convention in countries and to improve the scientific knowledge on how to analyse accurately persistent organic pollutants in relevant media (at least the core media), persistent organic pollutant laboratories within the region have to implement modern and robust methods according to international scientific standard, adapt them to their circumstances and prove their capabilities by successful participation in international intercomparison studies. Capacity-building for persistent organic pollutant laboratories is considered to be one of the priorities in this region.

45. Countries are also encouraged to seek opportunities for sharing regional monitoring data and for developing multi-country approaches and joint programmes to secure international funding, in addition to working with neighbouring countries to produce subregional data.

46. It is suggested that, to fill gaps and cover needs, further financial and technical support for persistent organic pollutant monitoring should be provided according to Articles 12 and 13 of the Convention.

Central and Eastern Europe

A. Overview of the region

47. According to the United Nations structure, the Central and Eastern Europe region comprises 23 countries. For the purpose of the first evaluation, five Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) were added to the Central and Eastern Europe regional report.

48. There is no current production of persistent organic pollutants in the region, but organochlorine pesticides (OCPs) and PCBs were produced in some countries. The main sources of persistent organic pollutant pollution are obsolete and unused pesticides in agriculture, persistent organic pollutant-containing equipment, use of industrial technologies resulting in unintentional releases of dioxins and furans and formation of dioxins and furans in open combustion. The major sources of atmospheric contamination are evaporation from old open systems (paint and wood protecting layers, softeners), from dumping sites and waste incinerators and from operational or dumped transformers, condensers, hydraulic systems and other PCB-containing devices.

B. Contributing and collaborating programmes

49. The only long-term monitoring programme focused on persistent organic pollutants in ambient air performed in the region is the integrated monitoring programme at the Košetice observatory in the Czech Republic, which is also a part of the European Monitoring and Evaluation Programme (EMEP) of the United Nations Economic Commission for Europe Convention on Long-range Transboundary Air Pollution. Atmospheric persistent organic pollutants have been measured using a high-volume active sampler since 1988, sampling and analytical methods have been consistent since 1996. Twelve years of monitoring data from the Košetice observatory were used for an assessment of the long-term trends of persistent organic pollutants in ambient air at the Central European continental scale. Results demonstrated that long-term background monitoring is not only an excellent way to study regional levels and trends but also a powerful tool to evaluate the impact of various local and regional events – from industrial accidents to natural disasters.

50. The majority of information on persistent organic pollutant levels in ambient air in the region is derived from passive air monitoring projects. The model passive air monitoring network (MONET-CZ) has been developed in the Czech Republic since 2003 as a contribution to the continuing national persistent organic pollutant inventory in the country. It currently consists of 37 sampling sites (industrial, urban, rural and mountain), including 15 background sites and a variety of sites influenced by primary and secondary persistent organic pollutant sources. Based on the monitoring from this network, various aspects of the persistent organic pollutant contamination can be assessed, from an impact of point sources or old burdens, through spatial or seasonal variability, to the long-term trends in background areas.

51. Based on the experience from the Czech monitoring network, the MONET-CEEC project was initiated for Central and Eastern European countries in 2006 with the goal of building the monitoring capacity in that region. A network of partner institutions was established and they cooperated in

designing the pilot screening study in the region in 2006–2008. Transfer of know-how, educational and training activities were a significant part of the project.

52. Sampling sites for three phases of the project were selected in cooperation with the local partners in all participating countries (with the exception of Albania and Georgia). A background site was included in most countries as a potential candidate of background monitoring for the effectiveness evaluation of the Stockholm Convention. Whenever possible, a range of other sites (rural, urban and industrial) was also selected to study a range of contamination, possible sources and spatial variations. Soil samples were collected from the air sampling sites as part of the study.

C. Main findings

1. Baseline levels of persistent organic pollutants in air

53. The Czech Republic is the first of the signatory countries to the Stockholm Convention to offer a fully developed and functional tool capable of providing information on levels of persistent organic pollutants and the long-term trends in these levels in Central Europe. This data set, with established time trends for the past 12 years, can itself serve the evaluation of future trends in the atmospheric concentration of persistent organic pollutants. Parallel passive air sampler (PAS) monitoring over the last five years in Košetice, a centrepiece of the PAS network in the Czech Republic, gives another unique calibration dataset. The background station in Košetice could serve as a regional air monitoring superstation using both active and passive sampling. Košetice is the only station that serves three major air monitoring programmes generating persistent organic pollutant data for the GMP: EMEP, MONET and GAPS. The results from the MONET networks revealed great differences between the persistent organic pollutant levels in the individual countries. While the highest median levels of studied persistent organic pollutants were found in Southern Europe and the Russian Federation, the lowest values were measured in Central Europe and the Baltic countries.

54. Median PCB concentrations in air were highest in Bosnia and Herzegovina, Montenegro, Russian Federation, Romania and Serbia. Generally, the sites in Central Europe (Czech Republic, Hungary and Poland) demonstrated significantly lower concentrations (20–50 per cent) than those in Southern and Eastern Europe. When looking at background sites, higher PCB concentrations were measured in Bosnia and Herzegovina, Croatia, Montenegro and Serbia. All EMEP stations recorded extremely low levels.

55. Median atmospheric concentration of DDTs was highest in the Republic of Moldova and Romania, while it was an order of magnitude lower in Croatia and Montenegro and five times lower in the Czech Republic, Poland and Slovenia. DDT levels at background sites were highest in the Republic of Moldova and Romania, and also elevated in Bulgaria, Czech Republic and Hungary.

56. Atmospheric levels of HCB were found to be quite uniform in the Central and Eastern European region with the exception of Bosnia and Herzegovina and the Russian Federation. The EMEP station in Košetice recorded higher HCB concentrations than all the other background sites.

57. Some of the candidate persistent organic pollutants (for example, HCHs and pentachlorobenzene), together with polyaromatic hydrocarbons, were also measured at all MONET sites.

58. Air samples from the industrial sites in Romania and the Russian Federation had extremely high levels of HCHs. The median level in this set of samples was one order of magnitude higher than those in other countries.

59. Elevated median levels of HCHs at background sites were observed in Hungary, Montenegro, Republic of Moldova, Romania and Serbia. The lowest concentrations were found in Croatia, Estonia, Poland and Slovenia.

60. Although these results are not representative of all countries, they provide an extremely good baseline level for continuous and coordinated background persistent organic pollutant monitoring in the region. It can be concluded that the passive sampling technique is fully applicable in long-term monitoring projects and capable of determining levels of persistent organic pollutants in ambient air, evaluating the spatial and temporal trends in distribution of persistent organic pollutants, assessing the impact evaluation of point and diffusive sources and assessing short- and long-range transport of persistent organic pollutants.

2. Baseline levels of persistent organic pollutants in human milk or blood

61. Some data on persistent organic pollutant levels in human milk or blood were collected during 1998–2008 and are available from 11 of 28 countries in the region: Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Poland, Romania, Russian Federation, Slovakia, Ukraine and Uzbekistan.

62. Countries such as Bulgaria, Croatia, Czech Republic, Hungary, Romania, Russian Federation, Slovakia and Ukraine participated in the third round of the WHO-coordinated exposure study on PCB, PCDD and PCDF levels in human milk. Within this study, OCPs (chlordane, DDT, dieldrin, endrin, heptachlor, HCB and toxaphene) were also determined in human milk samples from Bulgaria, Czech Republic, Russian Federation and Ukraine. The Czech Republic, Hungary and Slovakia also participated in the fourth round.

63. The highest PCB levels were found in milk samples collected from the Czech Republic and Slovakia both in the third and fourth rounds. Surprisingly, the highest dioxin-like PCB, expressed as WHO₉₈ TEQ, was found in milk samples from Ukraine, although marker PCB levels were several times lower than those in samples from the Czech Republic and Slovakia.

64. Other countries, such as Azerbaijan, Georgia, Lithuania, Republic of Moldova and Tajikistan, are participating in the United Nations Environment Programme-WHO human milk survey being conducted in the second half of 2008. Results are expected in the autumn of 2009.

3. Levels of persistent organic pollutants in other media

65. Monitoring programmes focused on other environmental media (water, sediments, soils and food) and mainly OCPs and PCBs exist in many countries of the region, but the programmes are not harmonized and not fully comparable. These data can, however, be used in future evaluations.

4. Data gaps

66. There is a general lack of information on the levels of persistent organic pollutants in the countries of Central and Eastern Europe. The situation is better in the Czech Republic, Poland, Slovakia and Slovenia; satisfactory information on persistent organic pollutant pesticide levels exists in other countries, such as Bulgaria, Croatia and Hungary. In the rest of the countries, data available on persistent organic pollutant sources and levels are extremely limited. There is no systematic monitoring of persistent organic pollutants in the environment or humans in the countries of the former Yugoslavia and the former Soviet Union, especially the largest – the Russian Federation and Ukraine.

67. There is a particular deficit in the area of PCDD and PCDF measurements and human exposure studies in most countries. Available monitoring programmes focus mainly on OCPs, PCBs and in some cases polycyclic aromatic hydrocarbons. Monitoring of PCDDs and PCDFs is rather rare (human milk in the Czech Republic); in other countries there are data from occasional or research activities (Croatia, Estonia, Montenegro, Poland, Russian Federation, Slovakia and Slovenia).

68. Persistent organic pollutants in ambient air have been monitored on a long-term basis using active and passive sampling methods in the Czech Republic since 1988 and 2003, respectively. With that exception, no systematic and regular human biomonitoring of persistent organic pollutants has been performed in Central and Eastern Europe since 1998.

69. For the purpose of the current report, no data on persistent organic pollutant levels in human milk or maternal blood were available from 12 of the 28 countries of the Central and Eastern Europe region (Albania, Armenia, Belarus, Bosnia and Herzegovina, Estonia, Kazakhstan, Kyrgyzstan, Montenegro, Serbia, Slovenia, the former Yugoslav Republic of Macedonia and Turkmenistan).

5. Capacity-building needs

70. The following capacity needs were identified in the region: strengthening the infrastructure so that existing laboratories are able to analyse the core media (that is, capacity to analyse other media might already exist); strengthening the implementation of quality assurance and quality control procedures (including meeting the needs for standards and consumables); strengthening the skills for the sampling and analysis; in-laboratory training and further assistance for the analyses of PCDDs and PCDFs and other persistent organic pollutants; and inter-calibration tests. RECETOX and the Norwegian Institute for Air Research have offered to serve as the strategic partners for passive air sampling and analysis and the EMEP Meteorological Synthesizing Centre-East has offered modelling data to supplement monitoring information.

6. Future programmes

71. Based on the present report, one background site suitable for continuous persistent organic pollutant monitoring should be selected in each country in cooperation with local authorities. A Central and Eastern Europe regional background monitoring network consisting of selected sites can be initiated in January 2009, supported from the budget of the Central and Eastern European persistent organic pollutant centre, RECETOX and national sources. The MONET-CEEC background network can serve as a backbone to which the national PAS monitoring projects can be attached. In this way, it can also serve the purpose of capacity-building in the region by organizing inter-calibration studies, training courses and the transfer of knowledge (RECETOX summer school in environmental chemistry and ecotoxicology).

D. Conclusions and recommendations

72. In conclusion, data on persistent organic pollution contamination of ambient air in the Central and Eastern European region are insufficient and the lack of regular monitoring is a priority problem. It is possible, however, to use the existing data as a baseline for future evaluation.

73. The data from the milk survey reflect the national level of contamination and can be used as baseline level of information in future evaluations. The available data are insufficient to provide any reasonable regional comparison.

74. Based on the evaluation of the technical and financial capabilities of available local laboratories it has been concluded that they are capable of providing OCP and PCB analyses of environmental and food samples. These laboratories, however, require resources to obtain or replace equipment, and to attract and train the required skilled personnel.

Latin America and the Caribbean region

A. Overview of the region

75. The Latin America and the Caribbean region includes 33 countries, covers a surface area of more than 20 million square kilometres and contains four subregions – Andean, Caribbean, Mesoamerica and Southern Cone – all with their own special features and rich biodiversity. Most of the countries are Parties of the Stockholm Convention and some are signatories; however, only 10 of the 33 countries have completed their national implementation plans (Argentina, Barbados, Bolivia, Chile, Ecuador, Mexico, Panama, Peru, Saint Lucia and Uruguay), including emission inventories for dioxins and furans, PCBs inventories and legacy persistent organic pollutant pesticides stockpiles. The region faces many problems related to pollution, including persistent organic pollutants. The high biodiversity, extreme climatic conditions and differences in social and economic development in the region require monitoring efforts to have a high spatial resolution.

76. A regional organization group was established to define and implement the regional strategy for information gathering, including capacity-building and establishment of strategic partnerships, and for developing the current report.

B. Contributing and collaborating programmes

77. The programmes contributing data to the present report were GAPS and the United Nations Environment Programme-WHO human milk survey. Additional information was provided by the respective countries through the regional organization group members, after a request for data and scientific literature reports. Those were used to provide information from media other than core media and assess long-range transport. Quality data that were comparable were selected.

78. The GAPS programme used polyurethane foam (PUF) passive samplers and hydrophobic polyaromatic resin (XAD) high-volume active samplers, which have varying deployment times and temporal resolution. PUF samplers were more often used in the region; however, XAD samplers were deployed together with PUF samplers in some sites allowing for comparison between the two sampling systems. The analyses were conducted by Environment Canada. The PUF samplers were analysed for PCBs and some chlorinated pesticides, and XAD samplers for chlorinated pesticides only.

79. The other programme contributing data to the present report is the WHO human milk survey, a global monitoring programme for persistent organic pollutants in human milk. These samples were analysed by a WHO reference laboratory in Freiburg, Germany for dioxins, furans, PCB and selected pesticides. No other persistent organic pollutant monitoring programmes were identified within the region.

C. Main findings

1. Baseline levels of persistent organic pollutants in air

80. The data available for baseline concentrations in air media come from the GAPS programme (2005–2006) that ran for over one year and involved 8 of the 33 countries from the region: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba and Mexico. They do not provide sufficient information to describe persistent organic pollutant contamination in the whole region.

81. Concentrations of pesticides are higher in rural and agricultural areas. Many pesticides analysed did not show values above the detection limits and there was much variability in the data. A seasonal variation of PCBs was identified in a report from Mexico using active air sampling; as the study lasted only two years, no temporal trend could be observed.

82. The GAPS programme does not include data on dioxins and furans. High levels of dioxins and furans were, however, reported in a study of air in Sao Paulo, Brazil, one of the largest urban settings in the region. Argentina, Brazil, Chile and Mexico are developing projects for air monitoring of persistent organic pollutants, carried out using national resources, but the data are not yet available.

2. Baseline levels of persistent organic pollutants in human milk or blood

83. Low levels of dioxins and furans in Brazilian human milk were detected in the third round of the WHO human milk survey with an average of 4.07 pg/g (as WHO toxic equivalents), and 1.78 pg/g fat of dioxin-like PCBs and 16.2 pg/g fat for marker PCBs. The levels were one of the lowest reported concentrations in this round. The fourth round is in progress and a higher participation of countries of the region is expected. The representativeness of such data is, however, too limited to provide a good regional overview.

84. A human maternal blood study administrated by the World Bank (2005–2006), provides data for Mexico. Unfortunately, the data are insufficient to define a baseline for the entire region, indicating the need for a regional human monitoring programme.

3. Levels of persistent organic pollutants in other media

85. Various countries of the region reported information relative to the presence of persistent organic pollutants in media other than the core media. Information relative to soil and sediment was supplied by Antigua and Barbuda. Information on human adipose tissue was reported by Mexico. Brazil reported several studies relative to persistent organic pollutants in human media. Barbados reported the routine monitoring of groundwater. In these cases there was no information to indicate what measures had been taken to ensure the quality of the data.

4. Long-range transport

86. There is some evidence in the scientific literature regarding the occurrence of long-range transport within the region. The absence of long-term regional monitoring programmes on persistent organic pollutants does not, however, enable the region to investigate the issue of long-range transport.

5. Data gaps

87. There are significant data gaps, in particular to establish temporal trends of persistent organic pollutants in the core media. There is a need to expand the existing monitoring network, which should begin with regional efforts to develop regionally managed monitoring programmes. Monitoring capabilities exist in at least four countries within the region. The region, however, needs to create sound scientific monitoring programmes using local resources, as all the existing programmes are supported by external funding, which limits their sustainability. The commitment of countries to supporting monitoring programmes should be based on their willingness to establish a regional structure able to support monitoring programmes on a long-term basis.

88. More research is needed to assess the transport of persistent organic pollutants through the atmosphere within the region's boundaries. The absence of continuous monitoring programmes covering the region is one of the limiting factors to establishing temporal and spatial trends; this represents the most important gap.

6. Capacity-building needs

89. Capacity-building in areas such as the design of monitoring programmes, the need for personnel trained in the analysis of persistent organic pollutants and aid for improving laboratory facilities would help to establish a solid programme within the region.

90. Building capabilities and stimulating synergies appear to be the way to proceed to create a sustainable monitoring programme.

7. Future monitoring programmes

91. Future evaluations could benefit from continuous programmes; however a higher commitment is needed from the region to build local capacity both for monitoring and analysis. The existing regional organization group could play a key role in coordinating actions that would enable the development of monitoring programmes that contribute to a regional network; however provision of financial support should be envisaged.

92. Future monitoring of milk and blood samples should consider the relationships between both kinds of measurements to understand better the exposure of vulnerable groups as indicators to protect future generations, as stated in the Millennium Development Goals and the Stockholm Convention.

D. Conclusions and recommendations

93. The available monitoring data provide insufficient information about baseline persistent organic pollutant levels in ambient air and human against which changes in these levels over time may be evaluated. For the regional monitoring programme to be effective, analytical capability for persistent organic pollutant monitoring especially for dioxins and furans will have to be enhanced. In addition, a common strategy, financial support and human resources will be required.

94. The Latin American and Caribbean region should formalize a coordinating structure to develop a regional action plan. This would enable countries to evaluate options available and actions necessary to meet the requirements of the Stockholm Convention for persistent organic pollutant monitoring; develop a regional monitoring programme with indication of scope, limitations, costs and benefits; and identify requirements for capacity-building and external assistance.

95. It is imperative to forge synergies between countries. Interaction between Governments, academic institutions, industry and non-governmental organizations will be required, both at the national and the regional levels, to build a successful strategy to face the challenge of monitoring persistent organic pollutant levels in the core media of the global monitoring plan.

Western Europe and others group

A. Overview of the region

96. The Western European and others group comprises 28 nations in Western Europe, North America and Australasia. The region is not a coherent geographical unit. Its membership is divided into three continents and two hemispheres. A comprehensive summary of the characteristics of the region can be found in the United Nations Environment Programme-Global Environment Facility 2002 reports on regionally based assessment of persistent toxic substances.

B. Contributing and collaborative programmes

97. Information used to provide the basis of the region review was taken from existing international and national programmes and activities. Survey responses obtained by the Secretariat in 2006 and 2007 were reviewed and candidate programmes selected through their demonstrated compliance with the criteria contained in the implementation plan for the first evaluation reports. The contributing programmes are therefore believed to be maintaining necessary arrangements to ensure that their monitoring information can be compared with results from the same programme both in the past and in the future for the purpose of determining temporal trends for effectiveness evaluation.

C. Main findings

1. Baseline levels of persistent organic pollutants in air

98. The available monitoring data from several current programmes that cover a large part of the region provided information considered to be sufficient for establishing baseline levels for most persistent organic pollutants. Levels are generally decreasing in air or have done so and have now levelled off at low levels with some exceptions.

2. Baseline levels of persistent organic pollutants in human milk or blood

99. The available monitoring data from two international organizations (WHO and the Arctic Monitoring and Assessment Programme) and several national programmes provided information considered to be sufficient for establishing baseline levels for most persistent organic pollutants. Some OCPs (e.g., aldrin and endrin) are present in such low concentrations in human milk and blood from the general population that trends will most likely not be detected. For those substances where sufficient information is available to suggest trends, a decline is indicated in most areas over the past 10–15 year period. In these cases levels are now low in relation to exposure guidelines used by health agencies.

100. For some populations of Arctic indigenous peoples, programmes had not (at the time of preparing the present report) reported sufficient data to detect clear decreasing trends. Here some persistent organic pollutant levels remain a concern relative to exposure guidelines used by health agencies. The reasons for this include high dietary exposure and the chemical and physical properties of persistent organic pollutants at low temperatures.

3. Levels of persistent organic pollutants in other media

101. A number of existing monitoring programmes are producing information in a variety of media that could be of value for future effectiveness evaluation.

4. Long-range transport of persistent organic pollutants

102. Studies reviewed from existing programmes using the three approaches described in the implementation plan illustrate the regional and global environmental transport of persistent organic pollutants on subregional, regional, continental and intercontinental scales and provide understanding to the data observed at air sampling sites. These demonstrate that a comprehensive evaluation of the Convention is impossible in the absence of information on long-range transport of persistent organic pollutants. Some of the most important physical and chemical properties of persistent organic pollutants that determine how they move and are partitioned in the environment are temperature dependant. Persistent organic pollutant levels observed at a sampling site can therefore be influenced by climate change and climate variability. Results indicate that this is now being observed in at least one Arctic monitoring site, where recent warming may be facilitating re-emission of HCB, PCBs and DDT from surface environmental compartments.

5. Data gaps

103. Although the availability of information from existing programmes is not geographically homogeneous, much of the region is rich in information. Exceptions are the Mediterranean rim and Australia and New Zealand, which lack programmes. Possible strategies to tackle this situation are outlined below.

6. Capacity-building needs

104. Some institutional and organizational capacity-building is required to establish and maintain programmes in subregions where data gaps in the core media exist.

7. Future programmes

105. The ability to compare persistent organic pollutant levels over time within existing national and international programmes makes their long-term viability of utmost importance for future trends analysis to evaluate the effectiveness of the Convention. Several programmes in the region have measured, in core and or non-core media, substances that are under consideration by the Persistent Organic Pollutants Review Committee. If these substances are added to the Convention in the future, some time series may therefore be readily available for future evaluations.

D. Conclusions and recommendations

106. In addition to conclusions on the levels and trends of persistent organic pollutants in the region described in the section above on main findings, the following points are important in terms of the long-term efficiency of effectiveness evaluation.

107. *Air*: For many of the OCPs listed as persistent organic pollutants under the Convention, concentrations in air have decreased over the past 10–15 years and are now levelling off. Current air concentrations are largely governed by environmental cycling between soil, water and the atmosphere and are dependent on climate change and variability (as noted above for HCB, PCBs and DDT). Some OCPs (e.g., heptachlor, mirex, endrin and dieldrin) are present at such low concentrations that trends cannot be detected. Air concentrations of industrial chemicals (e.g., PCBs) and unintentionally produced combustion by-products (e.g., dioxins and furans) have also shown declining trends and current air burdens are associated with both cycling of previously deposited chemical and continued emissions from point sources (e.g., electrical equipment and industrial activity).

108. *Human media*: The review demonstrated that levels of the Stockholm Convention persistent organic pollutants in human media are heavily influenced by social, cultural and ethnic factors that determine patterns of dietary exposure and by age. Sampling strategies for new activities that focus on being able to examine data from the same age group of people of the same sex and in the same area will therefore offer the best prospects for being able to detect changes in levels of persistent organic pollutants over time periods appropriate for the effectiveness evaluation of the Convention.

109. *Periodicity of effectiveness evaluation*: It is concluded that six years is an optimal time period for the repetitive review of environmental data in the context of effectiveness evaluation of the Convention. This suggestion is made on the basis of the trends reported in the Western Europe and others region by contributing programmes that have established long time series of information on persistent organic pollutants in a variety of environmental media. The identification of changes in levels over time requires a series of data points. An interval of at least six years will enable a substantial body of information to accumulate from contributing programmes and will also enhance statistical interpretation. A lesser period would not be cost effective in terms of the effort involved. A longer period would leave the Conference of the Parties uninformed of important information on environmental levels.

110. *Comparability of data*: Each of the existing programmes that contributed information for the Western Europe and others review has their own procedures for maintaining intra-programme comparability of information. Since the use of different analytical laboratories is a major source of variance, however, it was concluded that it was unrealistic to expect comparability between all programmes. It is therefore recommended that future efforts are focused to promote internal comparability within programmes over time for both the present and the future. While this conclusion generally means that there will be very limited direct comparability between regions, significant exceptions are evident, such as the WHO-coordinated human milk programme that uses a single laboratory. The extensive use of such measures as utilization of common analytical laboratories and data centres has demonstrated the possibility of achieving adequate comparability between well-established programmes in the Western Europe and others region. An example is the collaborative practices of the Arctic Monitoring and Assessment Programme, the European Monitoring and Evaluation Programme of the Convention on Long-range Transboundary Air Pollution, the Convention for the Protection of the Marine Environment of the North-East Atlantic and the Helsinki Commission of the Convention on the Protection of the Marine Environment of the Baltic Sea Area.

111. *Spatial and qualitative resolution*: In some geographical areas of the region there is a general absence of continuing established environmental monitoring of persistent organic pollutants in the core media although in these cases there is usually a good understanding from past discrete surveys of what these levels are. Similarly, in some areas there is a lack of information on some substances, (e.g., dioxins and furans). It is therefore recommended that, in the future when little information is available from existing activities in a subregion because candidate activities are not part of a current monitoring programme, information can be reported from such activities provided that they meet the other implementation plan data quality criteria.

112. *Spatial enhancement*: A more informative strategy to improve the ability of the Conference of the Parties to observe changes in persistent organic pollutant levels over time in areas presently lacking established monitoring programmes would be the establishment of new monitoring arrangements. If such steps are taken, it is recommended that careful attention be paid to ensuring the best possible

comparability of data within such programmes. Passive samplers have been demonstrated to be a cost-effective approach for resolving regional data gaps for air.

113. *Mediterranean rim*: The review found a lower amount of information over many parts of the Mediterranean rim. It is therefore recommended that steps be explored for enhancing long-term cooperation in persistent organic pollutant monitoring in this area to improve the information base for future effectiveness evaluations of the Convention.

114. *Australia and New Zealand*: Currently there are no systematic, repetitive, national-scale monitoring programmes in Australia and New Zealand for the measurement of persistent organic pollutants in the core media. Levels of dioxins and furans, along with some of the other Convention persistent organic pollutants have, however, been measured in the core media in Australia and New Zealand on a targeted basis. If repeated, such measurements could potentially contribute towards establishing a baseline for later trend analysis. Australia is exploring options, including the feasibility of a repetitive programme.

115. *The objective of regional and global environmental transport studies of persistent organic pollutants in effectiveness evaluation*: The Conference of the Parties has not clarified its expectations with regard to this requirement from Article 16 of the Convention. The present review has shown that the levels of persistent organic pollutants measured at an air sampling site cannot be understood without considering the key processes that have transported persistent organic pollutants thereto. It is therefore recommended that an appropriate objective for future evaluations include the presentation of information on regional and global environmental transport to enable the Conference of the Parties to understand the levels of persistent organic pollutants observed at the reported air sampling sites.

116. *Possible next steps for the evaluation of global environmental transport of persistent organic pollutants in future effectiveness evaluations*: The present report has confirmed that the three methods to tackle this issue listed in the implementation plan complement one other. The topic, however, spans all regions and it is therefore recommended that the Conference of the Parties consider ways to provide itself with a plan or process to develop a coordinated cross-regional approach to meet the environmental transport objective. This could be done independently through the formation of a time-limited expert task force or in conjunction with the coordination group.

117. *Climate change and climate variability*: The review concluded that the effects of the climate on the transport and partitioning of persistent organic pollutants had the potential to complicate significantly the interpretation of measurements of persistent organic pollutants in environmental media in future evaluations. It is therefore recommended that the Conference of the Parties consider how to encourage studies on climate influences on levels of persistent organic pollutants in environmental media. This may best be undertaken in cooperation with the existing monitoring programmes and in conjunction with the proposed expert work on regional and global transport.

118. *Non-core media*: A number of existing monitoring programmes are producing information in a variety of media that could be of value for future effectiveness evaluation. A species that is a good environmental indicator of persistent organic pollutant levels (and with a rich existing body of monitoring information) in one region may, however, be absent in another region. For future evaluations, it is recommended that the Conference of the Parties consider a two-track media strategy. One track, termed "global core media" would be common to all regions and would comprise the present core media. The other track would be termed "specific regional and subregional media". It would contain non-core media and be specific to a region or subregion. If such a strategy is adopted, all regions could be encouraged to report trends on persistent organic pollutants in the best available data sets from existing programmes in their regions and subregions. This flexibility would recognize that regions are unique. Guidance would be necessary on types of other media suitable for temporal trends analysis.

119. Lastly, the regional organization group wishes to re-emphasize that the information reviewed to provide a baseline and to inform the Conference of the Parties of current trends in the Western Europe and others region is mainly available from only a relatively small number of existing international programmes. An important element of their long-term viability is the continued efficacy of the contributing national programmes upon which they often depend. The ability to compare persistent organic pollutant levels over time within these national and international programmes therefore makes their long-term viability of utmost importance for future trends analysis to evaluate the effectiveness of the Convention.