

SUPPORT TO THE GLOBAL MONITORING PLAN OF POPS IN WEST AFRICA AND EAST-SOUTHERN AFRICA: KENYA REPORT

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Introduction

The Stockholm Convention on Persistent Organic Pollutants (POPs)¹ entered into force 17 May, 2004. As of 12 December, 2006 the Convention had 136 Parties. The objective of the Stockholm Convention on POPs can be stated as to: Protect human health and the environment from persistent organic pollutants by reducing or eliminating releases to the environment

Article 16 of the Stockholm Convention requires the Conference of the Parties (COP) to periodically review the effectiveness of the Convention. The first phase of the evaluation was due to commence four years after its entry into force. The effectiveness evaluation was to be conducted on the basis of information, including comparable monitoring data on the presence of the chemicals listed in Annexes A, B, and C of the Convention, and on their regional and global transport. To initiate consideration of this task UNEP Chemicals hosted a Workshop to “Develop a POPs Global Monitoring Programme (GMP) to Support the Effectiveness Evaluation of the Stockholm Convention on POPs”, The present work is part of the efforts towards providing data towards this evaluation.

Objective

A key objective of GMP is to provide a harmonized organizational framework for the collection of comparable monitoring data and / or information on the presence of the POPs listed in Annexes A, B and C of the Convention in order to identify trends in levels over time as well as to provide information on their regional and global environmental transport. In addition it was aimed at increasing the capacity for monitoring of POPs in various media. The work presented here took this into consideration in order to fulfil the key objective of having comparable data. Prior to this program, there had been no systematic monitoring of POPs listed in Annex A, B, and C of the Convention in Kenya, in a manner that would allow for comparison of data with other regions. The POPs addressed in this work are :Aldrin, Chlordane, Dieldrin, Heptachlor, Hexachlorobenzene, PCBs. Other pesticides not referred to in the Convention were also analysed.

Materials and methods

The methodology and materials used in this work followed the recommendations as outlined in the guidance documents of GMP². Kabete, which was the selected site, is situated approximately 10km from the city center of Nairobi, the capital city of Kenya. It is a rural urban setting that is removed from any industrial activity. The site also serves as a meteorological site. A total of 5 passive air samplers were mounted and exposed according to the following regime: I: 1st April - 30th June; II: 30th June - 4th Oct; III: 4th Oct - 31st Dec

Extraction and analysis of sediments and puff discs

Sediment samples were extracted by Soxhlet method. Sediment samples weighing 20g were homogenized treated with 60 grams of baked anhydrous sodium sulphate and ground to powder in a mortar. The samples were allowed to stay overnight to dry after which they were spiked with PCB155 as an internal standard and then subjected to Soxhlet extraction using 3:1 hexane-acetone mixture for 16 hours. Samples consisting of PUF discs were also subjected to the same extraction process.

The extracts were then cleaned using deactivated alumina and sodium sulphate and fractionated through a silica column by eluting with isoctane followed by diethyl-ether/isoctane in the ratio of 3:17. Analysis was carried out using a micro ECD detector on Agilent 6890N using HP5 capillary column of dimensions 30 m x 320 µm x 0.25 µm. The following temperature program was utilised: 90 °C for 3 minutes then ramped to 150 °C at 15 °C/min and held for 5 minutes followed by a ramp to 180 °C at 4 °C/min and held for 5 minutes, then ramped to

250 °C at 2 °C/min followed by another ramp to 275 °C at 10 °C/min and held time for two minutes. Nitrogen of 99.995% purity was used as both the carrier and makeup gas. A carrier gas constant flow rate of 2 ml/min was maintained throughout all the analyses, whereas the makeup gas was maintained at a constant flow of 30 ml/min.

Results and discussion:

The results for sediments and air compared favorably with a those obtained in a previous study carried out at the same site in 2008³. This indicated that there has been no radical change in the use of these pops in the country. The levels are also comparable to similar sites in other regions in Africa³. However, the levels found in fish were slightly higher than those reported from other countries. It should however be noted that these results were only a batch sample and thus cannot be considered as being reflective of the status of pops level in fish. However they are indicative of a need to develop a continuous monitoring program in order to establish the mean levels in order to eliminate transient values. Notable is the presence of DDT which has not been used in the country for a very long time, thus raising the question of its source. The results are summarized in Table 1.

Table 1: Results of concentrations of POPs in various media

POP	Sediments ng/Kg	Air ng/filter (i)	Fish ng/Kg
PCB 28	76.32	6.407	47.40
PCB 52	103.1	0 (nd)	0 (nd)
PCB 101	65.35	8.358	0 (nd)
PCB 118	0 (nd)	9.010	0 (nd)
PCB 153	41.10	3.672	80.00
PCB 105	1950	0 (nd)	0 (nd)
PCB 138	0 (nd)	5.963	0 (nd)
PCB 156	0 (nd)	0 (nd)	0 (nd)
PCB 180	0 (nd)	5.706	53.29
BHC	54.87	49.52	381.0
Heptachlor	0 (nd)	0 (nd)	0 (nd)
Aldrin	60.89	55.00	462.0
Oxychlorane	4.010	3.790	366.0
Cis Heptachlor	0 (nd)	0 (nd)	21.46
Trans Heptachlor	0 (nd)	0 (nd)	0 (nd)
Transnonochlor	1.975	10.89	0 (nd)
Cis Chlordane	0 (nd)	0 (nd)	0 (nd)
op-DDE	1.017	0.785	17.73
pp-DDE	3.17	3.17	180.0
Dieldrin	63.33	22.54	1894
op-DDD	0 (nd)	0 (nd)	29.49
pp-DDT	13.70	5.080	166.0
op-DDT/pp-DDD	0 (nd)	0 (nd)	0 (nd)

nd – not detected

Conclusions

The program enabled the country to contribute POPs comparable data to the GMP and in additions increased the capacity for POPs analysis in various media.

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References:

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2. UNEP (2004). Guidance for a Global Monitoring Programme for Persistent Organic Pollutants 1st edition
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