Highlights and outcomes of the UNEP/GEF GMP1 projects

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Content

- Context, set-up and terminal evaluation outcome
- Capacity building
- Results from measurements in core matrices
- Results from measurements in other matrices
- Recommendations from countries

'Assessment of Existing and Capacity Building Needs to Analyze POPs'	´Support implementation of the Global Monitoring Plan´	´Developing tools and methods for analysis of new POPs	´Continuing sup-port to implemen-tation of the GMP´
12 initial POPs Pilot global	12 initial POPs; regional GMP core matrices	9 new POPs (+1+1) GMP core matrices	23 POPs GMP core matrices
Develop basis for POPs analysis, guidance, hands-on training courses	6 regional projects/3 UN regions; 32 countries; guidance; hands-on training, data generation	Pilot; core matrix added; guidance, one training, data generation	4 regional projects; 43 countries; guidance, training, data generation
GEF, JPN, CDN POPs F.	**GEF, SAICM QSP, SSC**	**GEF, BRS, EU**	**GEF**
Databank of POPs laboratories http://212.203.125.2/databank/Laboratory/Search.aspx			
Interlaboratory assessments (2007/2008; 2010/2011 and 2012/2013; 2016/2017 and 2018/2019)			

Objective of the GMP projects

- “to assess and strengthen the existing capacity for POPs analysis worldwide and the capacity building needs in developing countries to analyze POPs; and
- Generate data for POPs in core matrices for the Global Monitoring Plan (GMP) of POPs”;
- Close collaboration is established between UNEP, the Secretariat of the BRS Conventions, the global and regional organisation groups under the Stockholm Convention, regional centers, academia, and the private sector;
- Projects are country-driven.

Six projects in three regions

Pacific: 8 countries

- **GEF:** FJI, KIR, NIU, WSM , PLW, SLB, TUV, MHL

West Africa: 6 countries

- **GEF:** COD, GHA, MLI, NGA, SEN, TGO

East and Southern Africa: 6 countries

- **GEF:** EGY , ETH, KEN, MUS, UGA, ZMB

GRULAC: 8 + 4 countries

- **GEF:** ATG, BRA, CHL, ECU, JAM, MEX, PER, URY
  SAICM QSP: BHS, BRB, HTI; CUB

Total: 32 countries

Organisational summary

- **Four medium size projects** "Supporting the Implementation of the Global Monitoring Plan of POPs in Eastern and Southern African countries; in Latin America and Caribbean States; in West Africa; and in the Pacific Islands Region)"
- Implementation: 2009-2012 by UNEP/DGEF and executed by UNEP/DTIE
- Two SAICM QSP projects: Cuba and 3-country project (BHS, BRB, HTI);
- Collaboration with regional coordination institutions in the four regions:
  - Department of Chemistry, University of Nairobi, Kenya
  - Environmental Toxicology and Quality Control Laboratory of the Central Veterinary Laboratory (ETQCL), Bamako, Mali
  - University of the South Pacific (USP), Fiji
  - Basel Convention Coordinating Centre Stockholm Convention Regional Centre, Uruguay (BCCC/SCRC)
- coordinating institutions at national level.

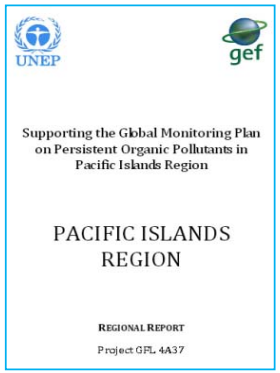
GMP1: Overview

- 2009–2012: Chemicals Branch implemented six projects to build regional capacity on analysis and data generation for POPs in core matrices for the GMP
- Common goal: enable the participating countries of four sub-regions (Eastern and Southern Africa, West Africa, GRULAC and Pacific Islands) to contribute to the global report submitted to the Stockholm Convention COP

Western Africa

E+S Africa

Pacific Islands

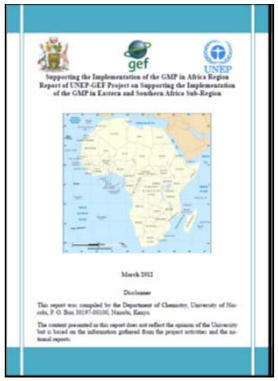


GRULAC

Regional reports, national reports, training reports, reports of results from mirror analysis, workshop reports, photos, and training materials available at:
http://www.unep.org/chemicalsandwaste/POPsandScience/AnalysisandMonitoring/GlobalMonitoringPlan/GMPImplementation2009-2012/tabid/1059888/Default.aspx

POPs Analysis and Monitoring

	Regional and national reports	Training reports
Pacific Islands Region	- GMP Regional Report of Pacific Islands Region - GMP National Report of Kiribati - GMP National Report of Marshall Islands - GMP National Report of Niue - GMP National Report of Palau - GMP National Report of Solomon Islands - GMP National Report of Samoa	- Fiji Training Report
GRULAC Region	- GMP Regional Report of GRULAC Region (en, sp) - GMP National Report of Antigua and Barbuda - GMP National Report of Brazil - GMP National Report of Chile - GMP National Report of Ecuador - GMP National Report of Jamaica - GMP National Report of Mexico (sp) - GMP National Report of Peru (sp)	- Regional Report for GRULAC - Reports of Antigua and Barbuda (en, sp); Brazil (sp); Chile (sp); Ecuador (sp); Jamaica (en, sp); Mexico (sp); Peru (sp); Uruguay (sp)
East and South Africa	- GMP Regional Report of E+S Africa - GMP National Report of Egypt - GMP National Report of Ethiopia - GMP National Report of Kenya - GMP National Report of Mauritius - GMP National Report of Uganda - GMP National Report of Zambia	- Egypt Training Report - Kenya Training Report - Mauritius Training Report - Zambia Training Report
West Africa	- GMP Regional Report of West Africa (en, fr) - GMP National Report of DR Congo (fr) - GMP National Report of Ghana - GMP National Report of Mali (fr) - GMP National Report of Nigeria - GMP National Report of Senegal (fr) - GMP National Report of Togo (fr)	- Ghana Training Report - Mali Training Report - Senegal Training Report
Cross-cuttings	- IVM Mirror samples Final Report (Africa, Pacific, Barbados) - MTM Report. Analysis of dl POPs in PUF samples (Africa and Pacific Islands) - MTM Report dl-POPs in National Samples - UNEP Report: Passive air sampling (PAS)	
Interlaboratory Assessments	- Biennial Global Interlaboratory Assessment on POPs – Round 1	



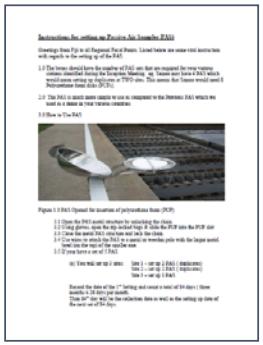
http://www.unep.org/chemicalsandwaste/POPsandScience/AnalysisandMonitoring/GlobalMonitoringPlan/GMPImplementation2009-2012/tabid/1059888/Default.aspx

POPs Analysis and Monitoring

SOPs and supporting materials

Pacific Islands Region

- SOP Regional Guidance for Mothers Collecting Milk Samples
- USP-IAS Instructions for PAS



GRULAC Region

- Guide for PAS (en, sp)
- SOP Cleaning of glassware (en, sp)
- SOP Collection of mothers' milk (en, sp)
- SOP Indicator PCB in air (en, sp)
- SOP Indicator PCB in fish (en, sp)
- SOP Indicator PCB in mothers' milk (en, sp)
- SOP OCP en aire (en, sp)
- SOP OCP en leche materna (en, sp)
- SOP OCP en pescado (en, sp)
- SOP OCP en sedimentos (en, sp)
- SOP PCDD PCDF dl-PCB en aire (en, sp)
- SOP PCDD PCDF dl-PCB en leche materna (en, sp)
- SOP PCDD PCDF dl-PCB en pescado (en, sp)
- SOP PCDD PCDF dl-PCB en sedimentos (en, sp)

East and South Africa

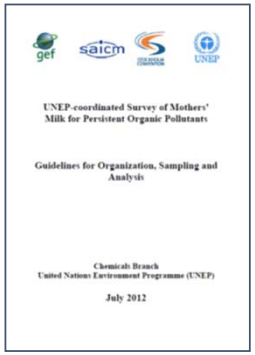
- SOP Kenya: Mothers' Milk
- SOP Recetox PAS

West Africa

- SOP in passive air sampling (PAS)

Cross-cuttings

- Guidance for organisation, sampling and analysis of human milk



http://www.unep.org/chemicalsandwaste/POPsandScience/AnalysisandMonitoring/GlobalMonitoringPlan/GMPImplementation2009-2012/tabid/1059888/Default.aspx

Proyecto de Capacitación y Cooperación Científica para la implementación del Programa Global de Monitoreo (GMP) de Contaminantes Orgánicos Persistentes (COPs) bajo el auspicio del Convenio de Estocolmo

Dr. Esteban Abad Holgado

Director del Laboratorio de Dioxinas

Barcelona, 20

Report of UNEP Capacity Building for POP analysis – On-Site Training of Staff of the Laboratory of the Department of Chemistry of the University of Nairobi, Kenya

18-22 October 2010

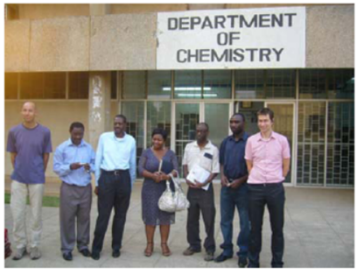
Martin van Velzen

Institute for Environmental Studies (IVM), VU University, Amsterdam, the Netherlands

Report of UNEP Capacity Building for POP analysis – On-Site Training of Staff of the Laboratory of the Department of Chemistry, University of Zambia, Lusaka, Zambia, 11-22 October 2010

Stefan van Leeuwen, Sjoerd van Beuzekom

Institute for Environmental Studies (IVM), VU University, Amsterdam, the Netherlands



Report of UNEP capacity building for POP analysis – On-site training of staff of Quality Control of Agricultural Products (QCAP) at the Central Laboratory of Residue Analysis of Pesticides & Heavy Metals in Food in Giza, Egypt, 1-4 November 2010

Jessika Hagberg and Anna Kärrman

MTM Research Centre, School of Science and Technology, Örebro University, Sweden

2011-03-09

Report of UNEP Capacity Building for POP analysis - On-Site Training of Staff of Laboratory of Environmental Quality Control Laboratory of Ceres-Locustox in Dakar, Senegal 4 – 12 October 2010

Jacco Koekkoek

Institute for Environmental Studies (IVM), VU University, Amsterdam, the Netherlands

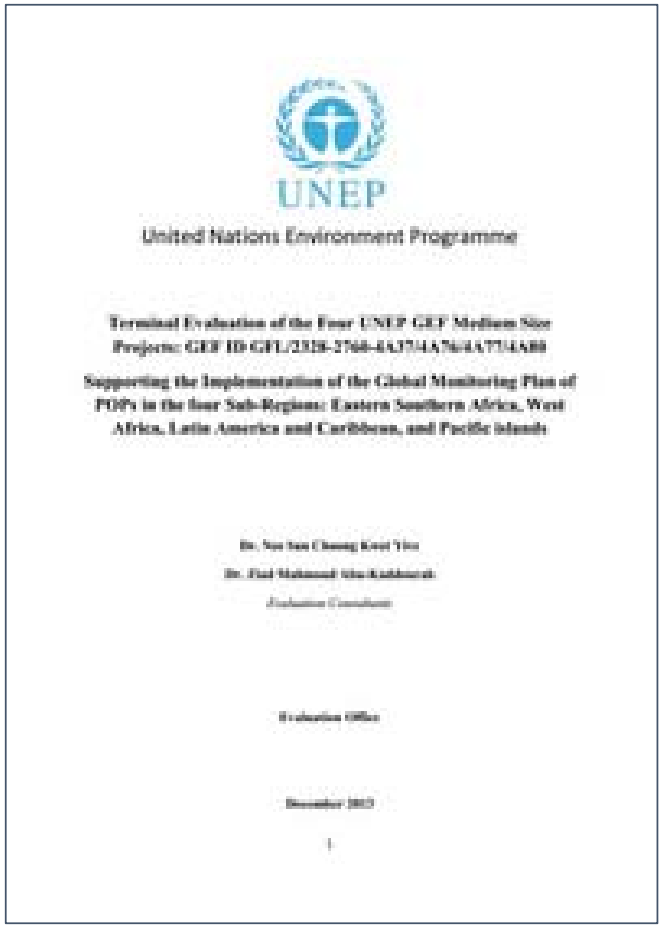
Report of UNEP Capacity Building for POP Analysis – On-Site Training of Staff of Laboratory of the Directorate of Government Analytical Laboratory in Kampala, Uganda, 2-12 August 2010

Jacob de Boer, Kees Swart

Institute for Environmental Studies (IVM), VU University, Amsterdam, the Netherlands

HFiedler GMP2 Africa

Terminal evaluation: The overall rating


UNEP

United Nations Environment Programme

Terminal Evaluation of the Four UNEP GEF Medium Size Projects: GEF ID GFL/2328-2760-4A37/4A76/4A77/4AB0

Supporting the Implementation of the Global Monitoring Plan of POPs in the four Sub-Regions: Eastern Southern Africa, West Africa, Latin America and Caribbean, and Pacific Islands

- **is Highly Satisfactory**
- Highly Satisfactory for delivery of activities and outputs
- Highly Satisfactory for relevance
- Satisfactory for effectiveness
- Highly Satisfactory for efficiency
- Highly Satisfactory for attainment of results
- Highly Likely for Socio-political sustainability
- Likely for Financial sustainability
- Highly Satisfactory for Country ownership and drivenness
- High satisfactory for UNEP supervision and backstopping

Evaluation findings

- The projects were **highly relevant** with regards to the minimum requirements for the first effectiveness evaluation defined by the Conference of the Parties of the Stockholm Convention in decision SC-2/13;
- **Effectiveness** of the projects is considered **satisfactory.**
  - While **high quality data in the core media** (generated by the expert laboratories however) have been obtained for all the regions and sampling programs successfully established,
  - the capacity of the personnel of the **national laboratories** needs to be further enhanced to be able to generate high quality data as seen by the outcome of the intercalibration study during which **most laboratories did not perform satisfactorily**

Evaluation (cont´d)

- Project implementation was cost-effective owing to:
  - establishment of partnerships with key organisations, agencies (e.g. WHO), academic and research institutions (e.g., expert laboratories),
  - building on existing programmes (e.g., MONET or GAPS for passive air sampling or WHO for milk survey),
  - adoption of existing procedures (WHO guidelines for human milk sampling),
  - engaging local stakeholders (e.g., local health centres) for identification of mothers' milk donors, or
  - engaging only laboratories having minimum requirements for POPs analysis.
  - Also countries working with the Quick Start Programme funding under SAICM were included and coordinated with the GEF project (Bahamas, Barbados, Cuba, Haiti)

Evaluation drawbacks

- A number of factors reduced efficiency and hindered the progress of the projects in some countries including
  - delays in signing MOUs (most countries),
  - the movement of the project coordinator without proper handing over (Egypt),
  - delays in funds transfer (e.g., Senegal, Brazil), or
  - delay in getting ethics committee approval (e.g., Brazil and Zambia).
- As a result two no-cost extensions (corresponding to 15 months) were required to ensure that project activities were successfully completed.

Capacity building and training courses

Capacity building

- Assist laboratories in developing countries to improve the quality of their analysis;
- Components of the capacity building:
  - Provision of small parts and consumables to POPs laboratories;
  - Development of guidance and training materials;
  - Maintenance of a databank containing operational POPs laboratories;
  - Hands-on training courses;
  - Networking and remote assistance

Hands-on training courses (1-2 weeks)

In developing country laboratory by expert laboratory according to their local conditions:

- Pilot project (2006):
  - Pre-visit by UNEP and laboratory experts to seven developing countries: Six to be trained (FJI, KEN, MLI, MVD, URY, VNM);
    CHN found not necessary since well advanced
- GMP1 regional projects (2010/2011):
  - E+S Africa: 5 of 6 countries: EGY, KEN, MUS, UGA, ZMB; (ETH no lab)
  - Pacific: 1 of 8: FJI (KIR, NIU, WSM , PLW, SLB, TUV, MHL no POPs labs)
  - W-Africa: 3 of 6: GHA, MLI, SEN, (COD, TGO no POPs lab; NGA not ready)
  - GRULAC: 10 of 12: ATG, BRA, CHL, ECU, JAM, MEX, PER, URY, BRB, CUB
    (BHS no POPs lab; HTI lab not ready)

2. Hands-on training courses (3 days)

At expert laboratory according to needs and existing capacity:

- Pilot (2008): Final project workshop held at IVM VU Amsterdam
  - Training course for 5 countries at IVM VU for GC/ECD and GC/LRMS labs (FJI, KEN, MLI, MDA, URY)
  - Training course for 2 countries at MTM Örebro University for dioxin labs (CHN, VNM);
- GMP1 regional projects (2011): Three final workshops:
  - for E+S Africa and W-Africa held at IVM VU Amsterdam:
    11 countries trained on GC/ECD and GC/LRMS analysis (KEN, MUS, UGA, ZMB, GHA, MLI, NGA, SEN)
  - for GRULAC held at CSIC in Barcelona:
    11 countries trained on initial POPs on GC/ECD, GC/LRMS, and GC/HRMS analysis (ATG, BRB, BHS, CHL, CUB, ECU, HTI, JAM, MEX, PER, URY)
  - For Pacific Islands at USP/IAS, Suva, Fiji
- New POPs project (2014):
  - One centrally organised training workshop at CVUA Freiburg on new POPs (6 countries: BRA, CHN, MDA, RSA, URY, VNM)

Provision of equipment and lab consumables

The objective is to strengthen or enhance existing capacity:

- No provision of larger/essential (analysis) instruments;
- Provision of essential sampling equipment:
  - PAS sampler and cleaned PUFs for whole project
  - Glassware for collection of mothers´ milk
- Provision of spares and consumables according to needs and existing procedures. Typical packages include:
  - Analytical standards for identification and quantification of POPs (labelled, unlabeled);
  - Two capillary GC columns (50 m, 60 m)
  - Syringes, septa, liner, ferrules
  - Some glassware, clean-up materials
  - Reference materials

Monitoring of POPs in human milk

Human samples to indicate exposure

Human samples reflect bioaccumulation of POPs:

- Mothers´ milk
- Blood
- Adipose tissues

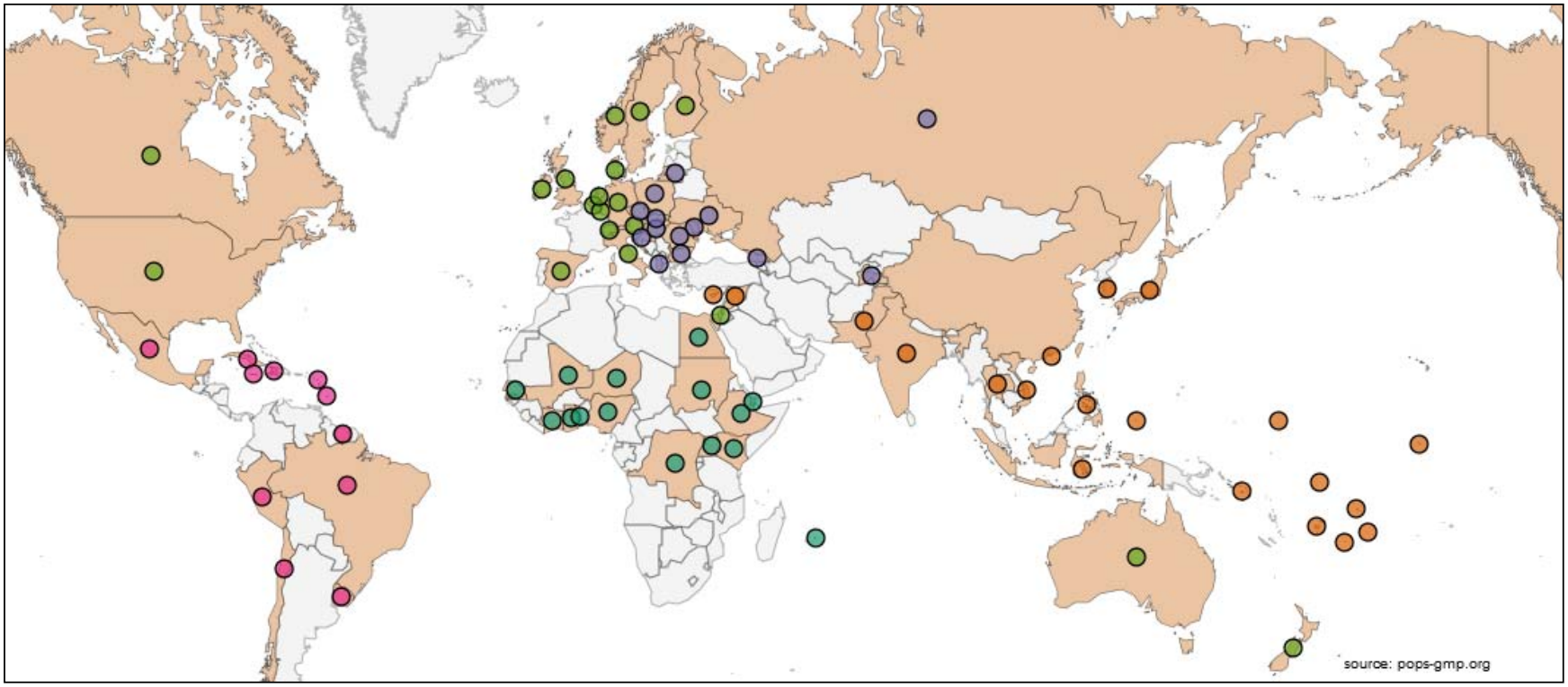
Human milk is preferred in UNEP GMP projects since:

- Results are comparable on lipid basis (caution: fat determination!)
- Sampling is by non-invasive method
- Less concern about infectious diseases at chemical analytical laboratory (hepatitis, HIV)

Limit: Not all population is reflected

Human milk surveys

- More than 9200 datapoints generated;
- Pooled samples: one country one datapoint *per* sampling round



Regional distribution by round

Round	**1st**	**2nd**	**3rd**	**4th**	**5th**	
Year Region	1987-1989	1992-1993	2000-2003	2004-2007	2008-2012	Total per region
Africa			**1**	**2**	**12**	**15**
Asia-Pacific	1		4	3	16	24
CEE			8	3	3	14
GRULAC			1	1	9	11
WEOG	11	10	12	5	5	43
Total per round	12	10	26	14	45	107

Human Milk – Basic POPs (5th round)

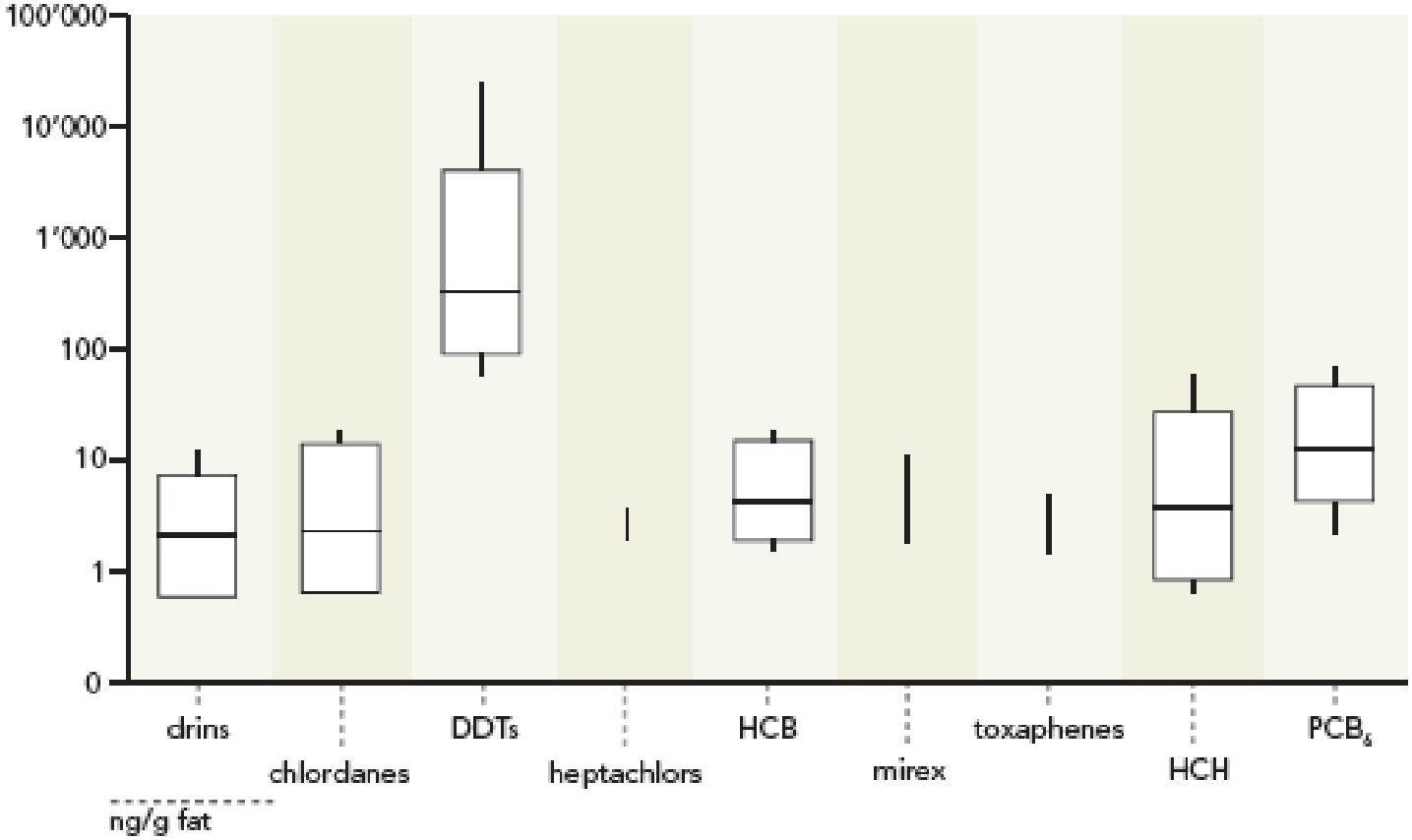
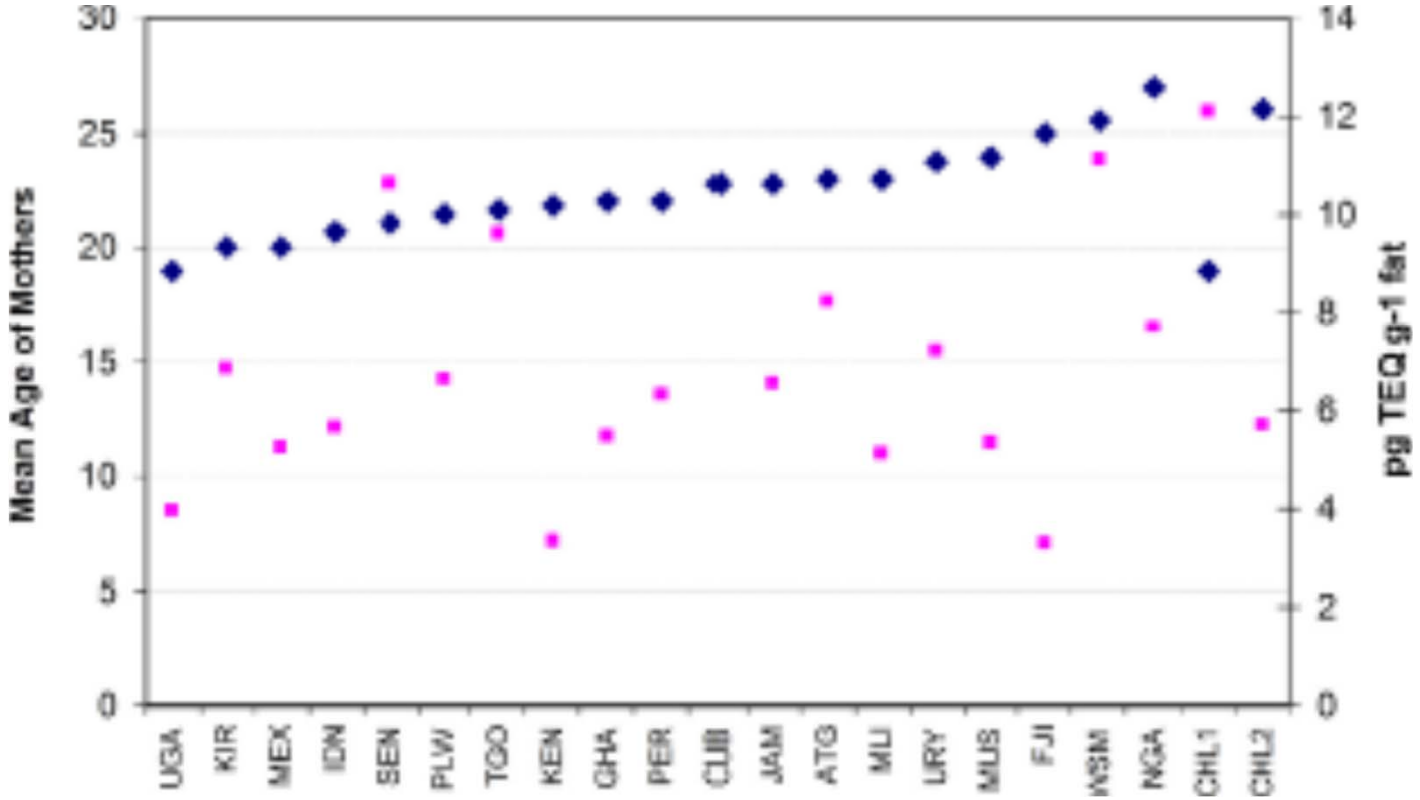


Figure 5 - Concentrations of Basic POPs

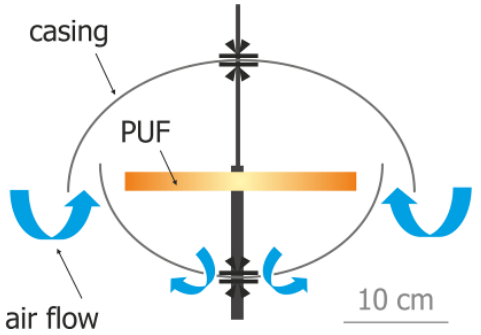
n = 30

Correlation: age of mother vs. PCDD/PCDF results



Monitoring of POPs in ambient air (PAS/PUF)

GMP1: Monitoring of POPs in air



GAPS sampler in Pacific Islands region ↑

Spanish sampler in GRULAC →

MONET sampler in Africa ↓

Basic POPs and dl-POPs in PUFs (results)

Global	n	n=0	min	max	mean
			ng PUF^{-1}	ng PUF^{-1}	ng PUF^{-1}
ΣDrins	129	6	0	747	14.8
Σchlordanes	129	31	0	21.3	1.70
ΣDDTs	129	2	0	710	71.1
Σheptachlors	129	55	0	3.30	0.28
HCB	129	9	0	6.60	1.26
Mirex	129	105	0	0.50	0.02
ΣHCHs	129	26	0	75.9	3.53
ΣPCB_6	129	22	0	1 765	42.0
$WHO_{1998}\text{-}TEQ_{PCDD/PCDF}$	33	1	0	0.21	0.04
$WHO_{1998}\text{-}TEQ_{PCB}$	33	5	0	0.64	0.03
$WHO_{1998}\text{-}TEQ_{total}$	33	0	0	0.73	0.07

HFiec

GMP1: Monitoring of POPs in air

Location of PAS in UNEP's GMP1 projects

Exposure for 4x3 consecutive months (2010-2011)

PCDD/PCDF: aggregated into 1 year

PUF PAS results (ng/PUF) per region

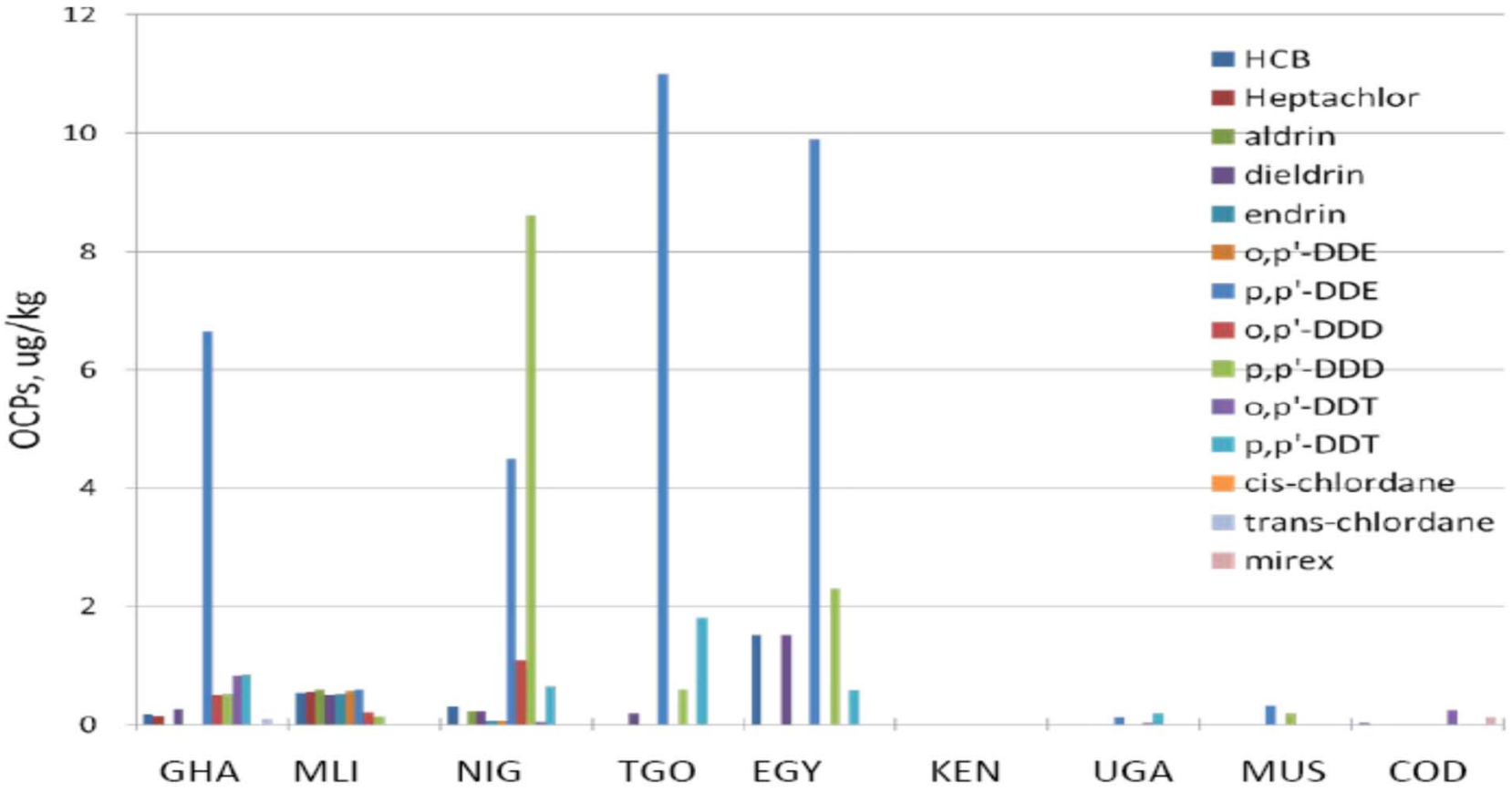
Region	Global			Africa			GRULAC			Pacific		
	min	max	mean	min	max	mean	min	max	mean	min	max	mean
Σdrins	0	747	15	**0**	**44**	**11**	0	2.3	0	0	747	62
Σchlordanes	0	21	1.7	**0**	**21**	**3.0**	0	1.0	0.1	0	20	3.6
ΣDDTs	0	710	71	**1.4**	**686**	**108**	0	1.5	0.2	1	710	192
Σheptachlors	0	3.3	0.28	**0**	**3.3**	**0.62**	0	1.4	0.12	0	0.9	0.05
HCB	0	6.6	1.3	**1.1**	**6.6**	**2.4**	0	1.4	0.2	0.6	3.5	1.9
Mirex	0	0.50	0.02	**0**	**0**	**0**	0	0.5	0.04	0	0.4	0.02
ΣHCHs	0	76	3.5	**0**	**76**	**7.0**	0	2.3	0.2	0	39	5.9
ΣPCB_7	0	2,294	53	**0**	**259**	**19**	0.3	**2,294**	93	0.5	34	8.7

Concentrations of PCDD, PCDF and dl-PCB in PUFs (pg TEQ/PUF)

Region	Global			Africa			GRULAC		
	min	max	mean	min	max	mean	min	max	mean
WHO_{1998}-$TEQ_{PCDD/PCDF}$	0.2	213	35.7	5.79	167	46.2	0.91	**213**	45.7
WHO_{1998}-TEQ_{PCB}	0.0	643	31.3	2.1	87.7	17.7	0.31	**643**	57.5
WHO_{1998}-$TEQ_{PCDD/PCDF/PCB}$	0.2	732	67.0	7.9	255	63.9	1.43	**732**	103

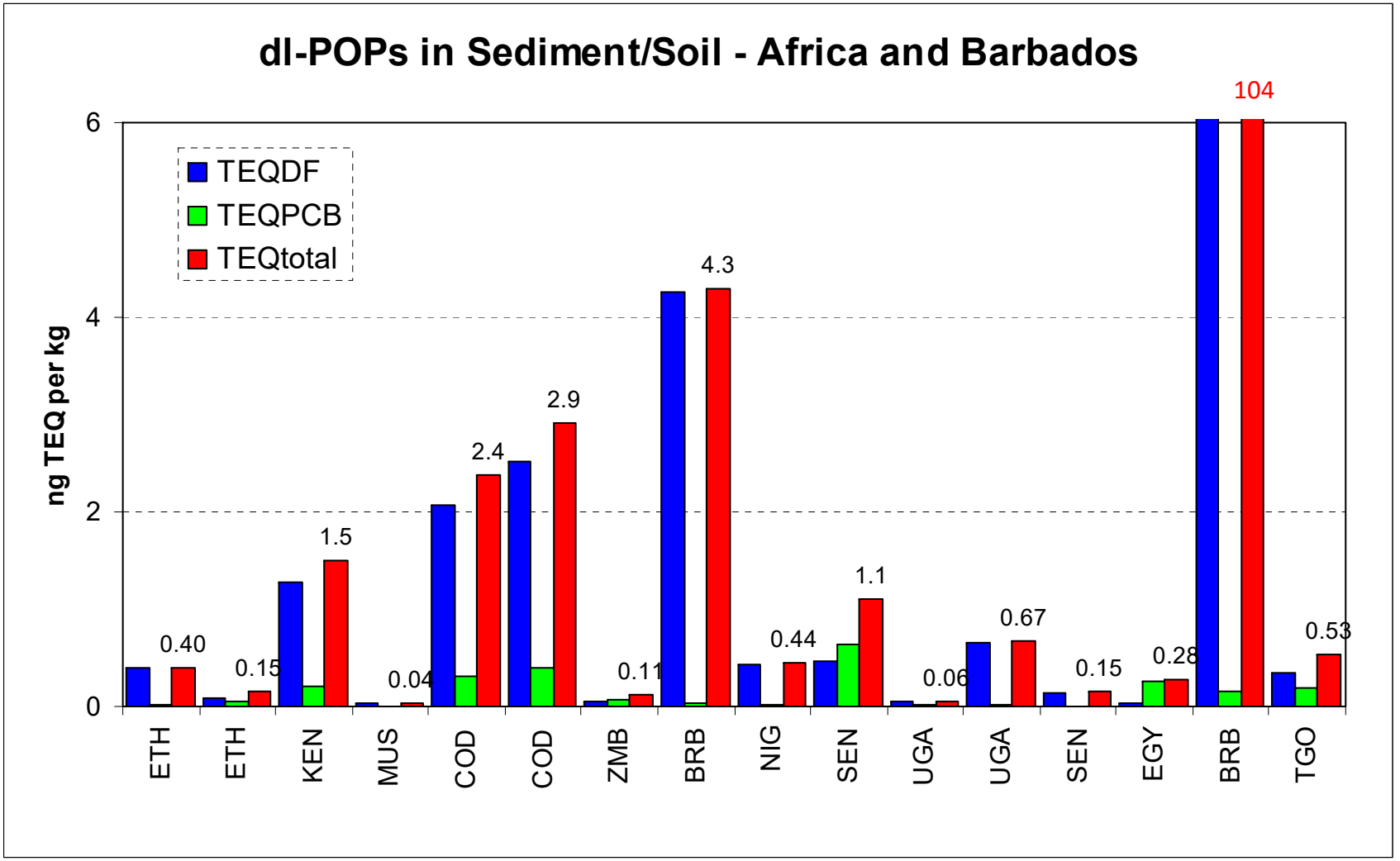
Analysis of POPs in samples other than the core matrices

Analysis of national samples: OCPs in fish in Africa



Courtesy Heather Leslie, IVM VU Amsterdam

PCDD/PCDF in soil



Jessica Hagberg, MTM Center, Oerebro University

Recommendations from countries

Participating countries commented positively on experiences and recommended as follows:

- Further needs on monitoring and analytical capacity for POPs, including the new POPs;
- regular courses to introduce new methods or refresher courses for more experienced laboratories;
- regular interlaboratory assessments studies and QA/QC programs; and,
- inclusion of more countries within regional projects.

All of the above are realized in the GMP2 project(s); approved Dec. 2014.

Thank you