# GMP implementation in four regions by UNEP/DTIE Chemicals Branch

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# General – Context - Identity

# Components of the GMP projects

- To build regional capacity for sampling and analysis of POPs in the core matrices of the Global Monitoring Plan = air and human milk;
- To paint a picture of POPs concentrations in UN regions;
- To identify changes in POPs concentrations over time;
- To contribute to the global report to be submitted to the Conference of the Parties of the Stockholm Convention;
- To evaluate the effectiveness of the Stockholm Convention implementation.

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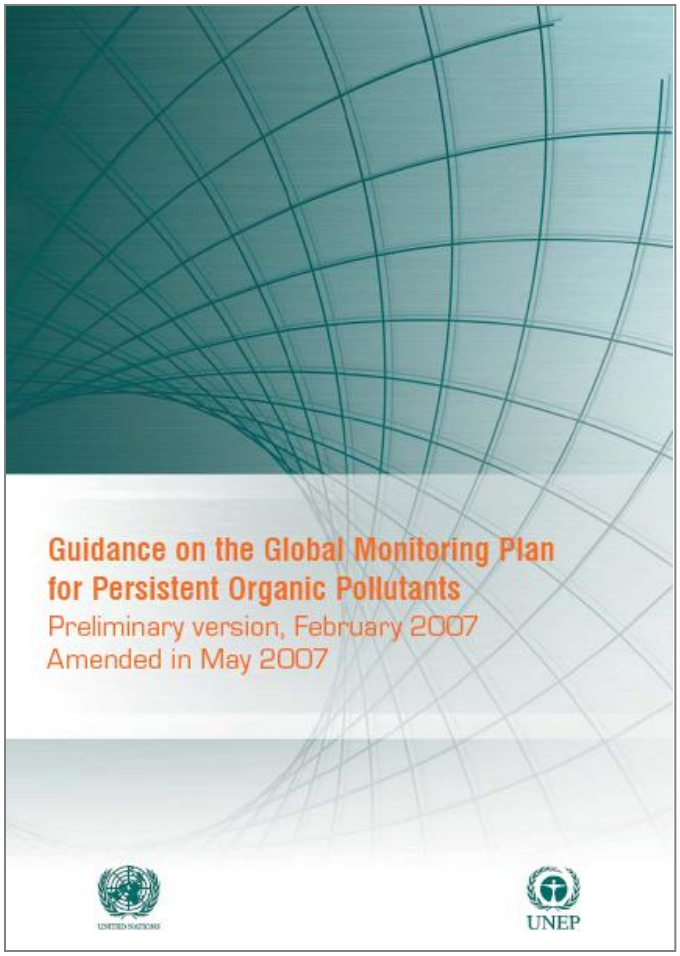
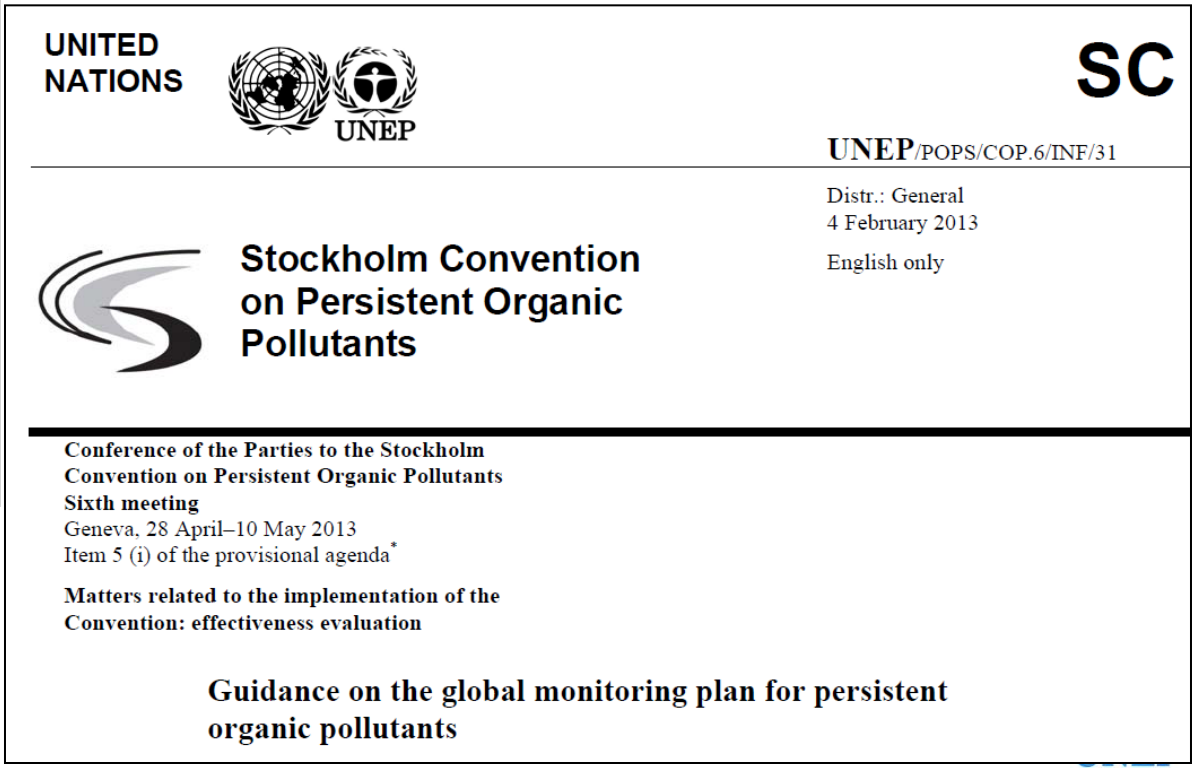
# Guidance for Global Monitoring Plan




Orientation and benchmark



UNITED NATIONS

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UNEP/POPS/COP.6/INF/31

Distr.: General
4 February 2013

English only

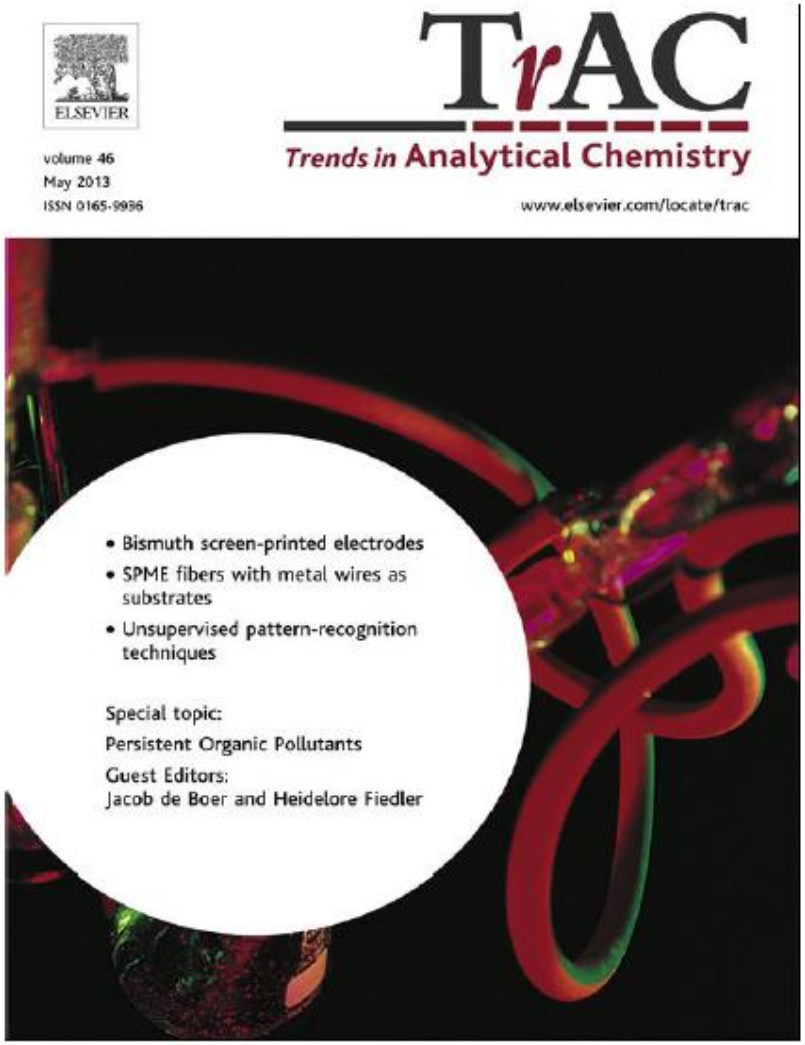
Stockholm Convention on Persistent Organic Pollutants

**Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants**
**Sixth meeting**
Geneva, 28 April–10 May 2013
Item 5 (i) of the provisional agenda*

**Matters related to the implementation of the Convention: effectiveness evaluation**

**Guidance on the global monitoring plan for persistent organic pollutants**

# Scientific Publications – Special Issue




Guest editors:
Jacob de Boer and
Heidi Fiedler

Trends Trends in Analytical Chemistry, Vol. 46, 2013

**The need for capacity building and first results for the Stockholm Convention Global Monitoring Plan**

H. Fiedler, E. Abad, B. van Bavel, J. de Boer, C. Bogdal, R. Malisch

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# TrAC Special Issue on POPs GMP


Jacob de Boer, Heidelore Fiedler (May 2013), Persistent organic pollutants, TrAC 46, 70-71, 10.1016/j.trac.2013.03.001. (http://www.sciencedirect.com/science/article/pii/S0165993613000575)

H.A. Leslie, B. van Bavel, E. Abad, J. de Boer (May 2013), Towards comparable POPs data worldwide with global monitoring data and analytical capacity building in Africa, Central and Latin America, and the South Pacific, TrAC 46, 85-97, 10.1016/j.trac.2013.01.009. (http://www.sciencedirect.com/science/article/pii/S0165993613000526)

Vincent Lal, William Aalbersberg, Heidelore Fiedler, Bert van Bavel, Jacob de Boer (May 2013), Capacity building for persistent organic pollutant (POP) analysis in the Pacific and POP trends in the Pacific Islands, TrAC 46, 173-177, 10.1016/j.trac.2012.12.018. (http://www.sciencedirect.com/science/article/pii/S016599361300040X)

Derek Muir, Rainer Lohmann (May 2013), Water as a new matrix for global assessment of hydrophilic POPs, TrAC 46, 162-172, 10.1016/j.trac.2012.12.019. (http://www.sciencedirect.com/science/article/pii/S0165993613000411)

S.P.J. Van Leeuwen, H.A. Leslie, J. De Boer, S.P.J. Van Leeuwen, B. Van Bavel, E. Abad, H. Fiedler (May 2013), POPs analysis reveals issues in bringing laboratories in developing countries to a higher quality level, TrAC 46, 198-206, 10.1016/j.trac.2013.01.008. (http://www.sciencedirect.com/science/article/pii/S0165993613000423)

S.P.J. Van Leeuwen, J. De Boer, S.P.J. Van Leeuwen, B. Van Bavel (May 2013), First worldwide UNEP interlaboratory study on persistent organic pollutants (POPs), with data on polychlorinated biphenyls and organochlorine pesticides, TrAC 46, 110-117, 10.1016/j.trac.2012.12.020. (http://www.sciencedirect.com/science/article/pii/S0165993613000514)

Samira Salihovic, Helena Nilsson, Jessika Hagberg, Gunilla Lindström (May 2013), Trends in the analysis of persistent organic pollutants (POPs) in human blood, TrAC 46, 129-138, 10.1016/j.trac.2012.06.009. (http://www.sciencedirect.com/science/article/pii/S0165993612003196)

Kärrman, G. Lindström (May 2013), Trends, analytical methods and precision in the determination of perfluoroalkyl acids in human milk, TrAC 46, 118-128, 10.1016/j.trac.2012.10.009. (http://www.sciencedirect.com/science/article/pii/S0165993612003202)

H. Fiedler, E. Abad, B. van Bavel, J. de Boer, C. Bogdal, R. Malisch (May 2013), The need for capacity building and first results for the Stockholm Convention Global Monitoring Plan, TrAC 46, 72-84, 10.1016/j.trac.2013.01.010. (http://www.sciencedirect.com/science/article/pii/S0165993613000538)

Jana Klánová, Tom Harner (May 2013), The challenge of producing reliable results under highly variable conditions and the role of passive air samplers in the Global Monitoring Plan, TrAC 46, 139-149, 10.1016/j.trac.2012.07.021. (http://www.sciencedirect.com/science/article/pii/S0165993612003755)

C. Bogdal, M. Scheringer, E. Abad, M. Abalos, B. van Bavel, J. Hagberg, H. Fiedler (May 2013), Worldwide distribution of persistent organic pollutants in air, including results of air monitoring by passive air sampling in five continents, TrAC 46, 150-161, 10.1016/j.trac.2012.05.011. (http://www.sciencedirect.com/science/article/pii/S0165993612003184)

Guorui Liu, Minghui Zheng, Guibin Jiang, Zongwei Cai, Yongning Wu (May 2013), Dioxin analysis in China, TrAC 46, 178-188,

10.1016/j.trac.2012.05.012. (http://www.sciencedirect.com/science/article/pii/S0165993613000198)

M. Abalos, E. Abad, S.P.J. van Leeuwen, J. de Boer, S.P.J. van Leeuwen, M. Abalos, G. Lindström, B. van Bavel, H. Fiedler (May 2013), Results for PCDD/PCDF and dl-PCBs in the First Round of UNEPs Biennial Global Interlaboratory Assessment on Persistent Organic Pollutants, TrAC 46, 98-109, 10.1016/j.trac.2012.11.003. (http://www.sciencedirect.com/science/article/pii/S0165993612003238)

Jayne de Vos, Laura Quinn, Laura Quinn, Claudine Roos, Rialet Pieters, Henk Bouwman, Peter Gorst-Allman, Egmont Rohwer, John P. Giesy (May 2013), Experience in South Africa of combining bioanalysis and instrumental analysis of PCDD/Fs, TrAC 46, 189-197, 10.1016/j.trac.2013.02.003. (http://www.sciencedirect.com/science/article/pii/S016599361300054X)


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# POPs to be monitored (12)

| | Compounds to be Monitored | | | |
|---|---|---|---|---|
| | **Air** | **Human Milk** | **Human Blood** | Water |
| **Initial POPs** | | | | |
| Aldrin | Aldrin | Aldrin | Aldrin | Water has not been recommended as a core matrix for the lipophilic and nonpolar initial twelve POPs; therefore, analysis of surface waters is not recommended |
| Chlordane | *cis*- and *trans*-chlordane; and *cis*- and *trans*-nonachlor, oxychlordane | *cis*- and *trans*-chlordane; and *cis*- and *trans*-nonachlor, oxychlordane | *cis*- and *trans*-chlordane; and *cis*- and *trans*-nonachlor, oxychlordane | |
| DDT | 4,4'-DDT, 2,4'-DDT and 4,4'-DDE, 2,4'-DDE, 4,4'-DDD, 2,4'-DDD | 4,4'-DDT, 2,4'-DDT and 4,4'-DDE, 2,4'-DDE, 4,4'-DDD, 2,4'-DDD | 4,4'-DDT, 2,4'-DDT and 4,4'-DDE, 2,4'-DDE, 4,4'-DDD, 2,4'-DDD | |
| Dieldrin | Dieldrin | Dieldrin | Dieldrin | |
| Endrin | Endrin | Endrin | Endrin | |
| HCB | HCB | HCB | HCB | |
| Heptachlor | Heptachlor and heptachlorepoxide | Heptachlor and heptachlorepoxide | Heptachlor and heptachlorepoxide | |
| Mirex | Mirex | Mirex | Mirex | |
| PCB | $\Sigma PCB_7$ (7 congeners): 28, 52, 101, 118, 138, 153, and 180 | $\Sigma PCB_7$ (7 congeners): 28, 52, 101, 118, 138, 153, and 180 | $\Sigma PCB_7$ (7 congeners): 28, 52, 101, 118, 138, 153, and 180 | |
| | PCB with TEFs* (12 congeners): 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, and 189 | PCB with TEFs* (12 congeners): 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, and 189 | PCB with TEFs* (12 congeners): 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, and 189 | |
| PCDD/PCDF | 2,3,7,8-substituted PCD/PCDF (17 congeners) | 2,3,7,8-substituted PCD/PCDF (17 congeners) | 2,3,7,8-substituted PCD/PCDF (17 congeners) | |
| Toxaphene | Congeners P26, P50, P62 | Congeners P26, P50, P62 | Congeners P26, P50, P62 | |

TEF = Toxicity equivalency factor assigned according to WHO(2005)

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# Issue of $\Sigma PCB_7$ *vs*. $\Sigma PCB_6$

| Congener | Detection |
|---|---|
| 1. PCB #28 | ECD, LRMS, (HRMS) |
| 2. PCB #52 | ECD, LRMS, (HRMS) |
| 3. PCB #101 | ECD, LRMS, (HRMS) |
| 4. PCB #118 | (LRMS) HRMS |
| 5. PCB #138 | ECD, LRMS, (HRMS) |
| 6. PCB #153 | ECD, LRMS, (HRMS) |
| 7. PCB #180 | ECD, LRMS, (HRMS) |
| Sum $PCB_7$ | |

→ Suggestion: reporting **$\Sigma PCB_6$** instead of **$\Sigma PCB_7$**

# New POPs to be monitored

| | Air | Human Milk | Human Blood | Water |
|---|---|---|---|---|
| **New POPs listed at COP-4** | | | | |
| Chlordecone | Chlordecone | Chlordecone | Chlordecone | |
| α-HCH | α-HCH | α-HCH | α-HCH | |
| β-HCH | β-HCH | β-HCH | β-HCH | |
| γ-HCH | γ-HCH | γ-HCH | γ-HCH | |
| Hexabromobiphenyl | PBB 153 | PBB 153 | PBB 153 | |
| Pentachlorobenzene | PeCBz | PeCBz | PeCBz | |
| c-penta BDE<br>c-octa BDE | BDE 47, 99, 153, 154, 175/183 (co-eluting)<br>Optional: BDE 17, 28, 100 | BDE 47, 99, 153, 154, 175/183 (co-eluting)<br>Optional: BDE 100 | BDE 47, 99, 153, 154, 175/183 (co-eluting)<br>Optional: BDE 100 | |
| PFOS[4] | PFOS, PFOSA, NMeFOSA, NEtFOSA, NMeFOSE, NEtFOSE | PFOS, PFOSA | PFOS, PFOSA | PFOS, PFOSA |
| **New POPs listed at COP-5** | | | | |
| Endosulfan | α-, β-endosulfan; and endosulfan sulfate | α-, β-endosulfan; and endosulfan sulfate | α-, β-endosulfan; and endosulfan sulfate | |

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# Cost for POPs analysis

| **Analysis to third parties** | Preferred method | **cost per sample** USD |
|---|---|---|
| PCDD/PCDF | HRGC-HRMS | 900 |
| dl-PCB (when in addition to PCDD/F) | HRGC-HRMS | 350 |
| TEQ (total) | HRGC-HRMS | 1,150 |
| POPs pesticides+indicator PCB | HRGC-HRMS<br>HRGC-LRMS<br>HRGC-ECD | 550 |
| PBDE | HRGC-LRMS | 300 |
| HBCD | HRGC-LRMS | 100 |
| HBCD isomers (LC) | LC-MS/MS | 200 |
| PFOS | LC-MS/MS | 220 |

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# Six projects in three regions

Pacific: 8 countries

- FJI, KIR, NIU, WSM , PLW, SLB, TUV, MHL

West Africa: 6 countries

- COD, GHA, MLI, NGA, SEN, TGO

East and Southern Africa: 6 countries

- EGY , ETH, KEN, MUS, UGA, ZMB

GRULAC: 8 + 4 countries

- ATG, BRA, CHL, ECU, JAM, MEX, PER, URY
  BHS, BRB, CUB, HTI

**Total: 32 countries**

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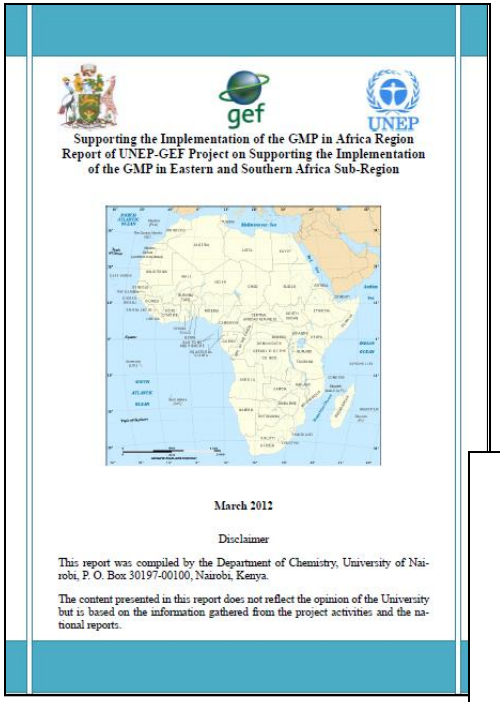
# Four UNEP/GEF GMP and Two SAICM QSP Projects



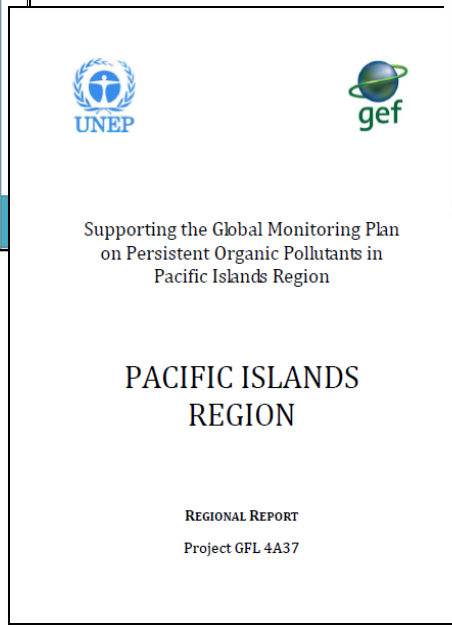
Supporting the Implementation of the GMP in Africa Region
Report of UNEP-GEF Project on Supporting the Implementation of the GMP in Eastern and Southern Africa Sub-Region

March 2012

Disclaimer

This report was compiled by the Department of Chemistry, University of Nairobi, P. O. Box 30197-00100, Nairobi, Kenya.

The content presented in this report does not reflect the opinion of the University but is based on the information gathered from the project activities and the national reports.

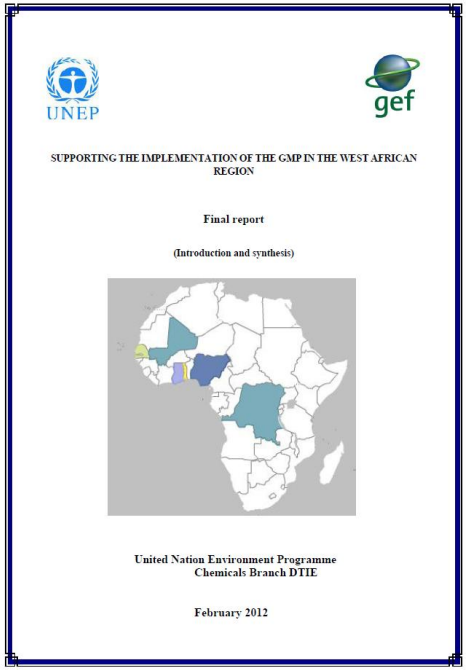


Supporting the Global Monitoring Plan on Persistent Organic Pollutants in Pacific Islands Region

PACIFIC ISLANDS REGION

REGIONAL REPORT

Project GFL 4A37



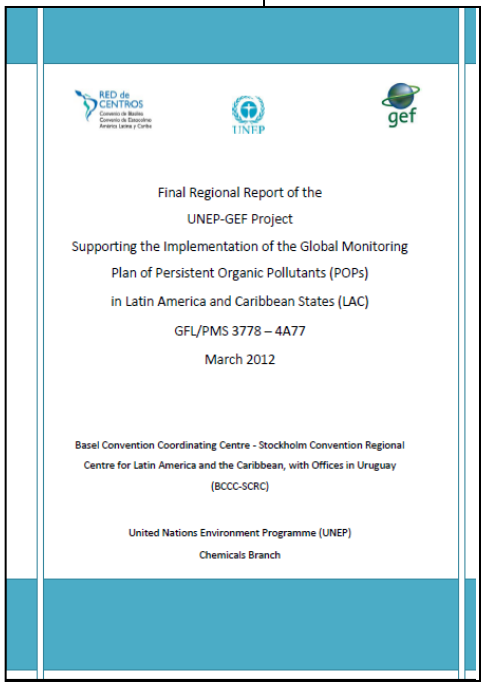
SUPPORTING THE IMPLEMENTATION OF THE GMP IN THE WEST AFRICAN REGION

Final report

(Introduction and synthesis)

United Nation Environment Programme
Chemicals Branch DTIE

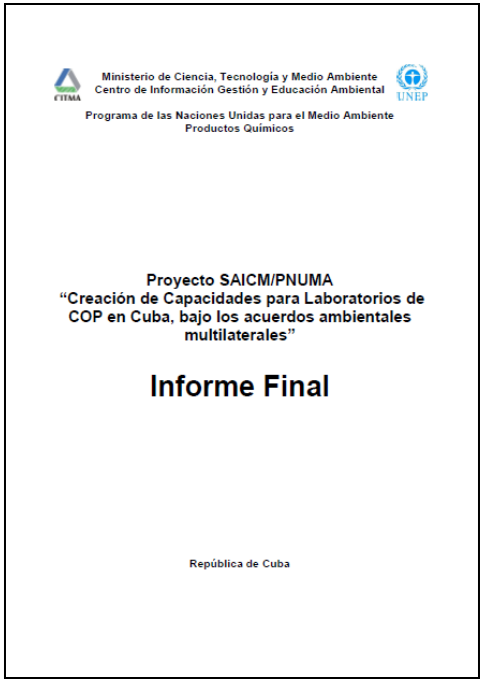
February 2012



Final Regional Report of the
UNEP-GEF Project
Supporting the Implementation of the Global Monitoring
Plan of Persistent Organic Pollutants (POPs)
in Latin America and Caribbean States (LAC)
GFL/PMS 3778 – 4A77
March 2012

Basel Convention Coordinating Centre - Stockholm Convention Regional Centre for Latin America and the Caribbean, with Offices in Uruguay (BCCC-SCRC)

United Nations Environment Programme (UNEP)
Chemicals Branch



Ministerio de Ciencia, Tecnología y Medio Ambiente
Centro de Información Gestión y Educación Ambiental

Programa de las Naciones Unidas para el Medio Ambiente
Productos Químicos

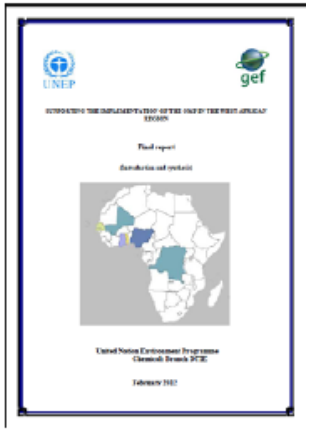
Proyecto SAICM/PNUMA
"Creación de Capacidades para Laboratorios de COP en Cuba, bajo los acuerdos ambientales multilaterales"

Informe Final

República de Cuba

# POPs Analysis and Monitoring

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




http://www.unep.org/hazardoussubstances/UNEPsWork/PersistentOrganicPollutantsPOPs/POPsAnalysisandMonitoring/tabid/105850/Default.aspx

# UNEP's Capacity Building (2010)

by CSIC, IVM VU Amsterdam, MTM Örebro

| Region (Funding) | Number of training courses for POPs Labs | Number of countries participating |
|---|---|---|
| Pacific project (GEF) | 1 | 8 |
| West Africa project (GEF) | 3 | 6 |
| South-East Africa project (GEF) | 5 | 6 |
| GRULAC Project (GEF) | 7 | 8 |
| GRULAC Project (SAICM) | 2 | 4 |
| Regional WS (AMS, BCN; 2011) | 2 | |
| **Total:** | **20** | **32** |

# Monitoring of POPs in air

# Sampling Locations in GRULAC

| Country (ISO code) | Site |
|---|---|
| Antigua and Barbuda (ATG) | St. Phillip's |
| Bahamas (BHS) | Coral Harbour |
| Barbados (BRB) | St. James, Christ Church |
| Brazil (BRA) | São Paulo |
| Chile (CHL) | Canal Melchor |
| Cuba (CUB) | Havana, Cienfuegos, Sancti Spiritus, Santiago de Cuba |
| Ecuador (ECU) | Quito |
| Jamaica (JAM) | Kingston |
| Mexico (MEX) | Monte Azules, Chiapas |
| Peru (PER) | Lima |
| Uruguay (URY) | Montevideo |

# Delivery of Passive Air Samplers


**Passive air samplers shipped to countries:**

**110**

**Pre-cleaned PUFs shipped to countries:**

**420**


# Passive Air Sampler

Delivered to the region by CSIC containing pre-cleaned PUFs

# Sample and analysis set-up; Mirror samples where feasible

| PAS Number | Sample Objective | Target Analytes | Analytical Laboratory | Countries Sampling these PUFs |
|---|---|---|---|---|
| 1 | Quarterly data-point (3 m) | Basic POPs OCPs | Expert Lab | All countries |
| 2 | Quarterly data-point (3 m) | Basic POPs PCB | Expert Lab | All countries |
| 3 | Quarterly data-point (3 m) | Basic POPs OCPs | National Lab | All countries that have national Lab for basic POPs |
| 4 | Quarterly data-point (3 m) | Basic POPs PCB | National Lab | All countries that have national Lab for basic POPs |
| 5 | Annual data-point (4x3 m) | dl-POPs | Expert Lab | All countries |
| 6 | Annual data-point (4x3 m) | dl-POPs | National Lab | All countries that have national Lab for dl-POPs |
| 7 | Quarterly data-point (3 m) | dl-POPs | Expert Lab | All countries that have national Lab for dl-POPs |
| 8 | Quarterly data-point (3 m) | dl-POPs | National Lab | All countries that have national Lab for dl-POPs |

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# Set-up of Passive Air Samplers

Bahamas


Barbados

# Set-up of Passive Air Samplers

Brazil

Peru

Ecuador

# Set-up of Passive Air Samplers

Barbados

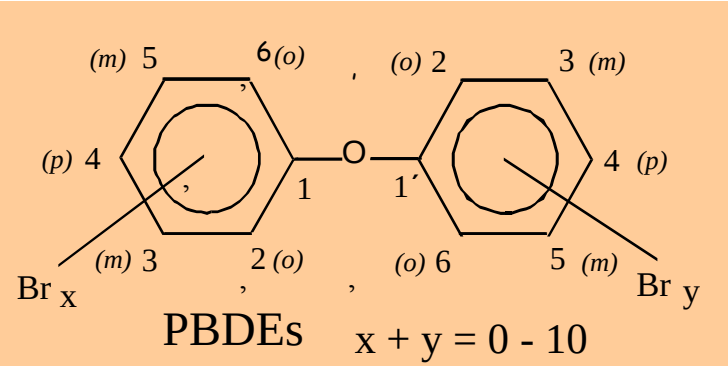
Mexico

Uruguay

Antigua and Barbuda

# Analytes (old and new POPs)

- Aldrin, dieldrin, endrin, *cis*-chlordane, *trans*-chlordane, *cis*-nonachlor, *trans*-nonachlor, oxychlordane, heptachlor, *cis*-heptachlor epoxide, trans-heptachlor epoxide, *p,p'*-DDT, *o,p'*-DDT, *p,p'*-DDE, *o,p'*-DDE, *p,p'*-DDD, *o,p'*-DDD, mirex, HCB;
- PCDD, PCDF, PCB;
- Polybrominated diphenyl ethers (PBDE)



# PBDE Results I

| SampleD | ATG | CHL | BRA | ECU | JAM | MEX | PER | URY |
|---|---|---|---|---|---|---|---|---|
| Unit | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ |
| BDE-17 | 0.10 | 0.004 | 0.84 | 0.65 | 2.23 | 0.03 | 3.28 | 1.52 |
| BDE-28 | 0.21 | 0.05 | 0.91 | 0.73 | 4.20 | 0.08 | 2.31 | 1.52 |
| BDE-47 | 1.29 | 0.62 | 6.45 | 2.49 | 22.2 | 2.05 | 9.01 | 3.98 |
| BDE-99 | 0.75 | 0.46 | 2.94 | 1.10 | 11.5 | 1.77 | 5.11 | 1.89 |
| BDE-100 | 0.21 | 0.09 | 0.67 | 0.27 | 2.72 | 0.47 | 1.27 | 0.51 |
| BDE-153 | 0.23 | 0.16 | 0.48 | 0.90 | 1.48 | 0.83 | 1.27 | 0.40 |
| BDE-154 | 0.09 | 0.05 | 0.29 | 0.45 | 1.11 | 0.29 | 0.73 | 0.30 |
| BDE-183 | 0.54 | 0.33 | 0.61 | 2.46 | 1.23 | 2.73 | 3.14 | 0.67 |
| $PBDE_8$ | 3.42 | 1.77 | 13.2 | 9.05 | 46.7 | 8.25 | 26.1 | 10.8 |
| BDE-66 | 0.09 | 0.04 | 0.44 | 0.13 | 2.14 | 0.07 | 1.43 | 0.07 |
| BDE-85 | 0.05 | 0.03 | 0.11 | 0.07 | 0.28 | 0.12 | 0.29 | 0.10 |
| PBDE 66+85 | 0.14 | 0.07 | 0.54 | 0.20 | 2.42 | 0.20 | 1.72 | 0.16 |
| $PBDE_{10}$ | 3.57 | 1.84 | 13.7 | 9.25 | 49.1 | 8.45 | 27.8 | 11.0 |

$PBDE_8$ are recommended for analysis in ambient air samples in the guidance document for the Global Monitoring Plan (GMP) by UNEP

GRULAC countries, GEF project

UNEP

# PBDE Results II

| SampleD | BHS | BRB | CUB-CF | CUB-SS | CUB-CH | CUB-SC |
|---|---|---|---|---|---|---|
| Unit | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ | ng $PUF^{-1}$ |
| BDE-17 | 0.78 | 0.47 | 0.15 | 0.10 | 0.30 | 0.06 |
| BDE-28 | 1.43 | 1.91 | 0.24 | 0.14 | 0.44 | 0.11 |
| BDE-47 | 9.13 | 7.04 | 0.65 | 0.61 | 2.17 | 1.49 |
| BDE-99 | 4.39 | 2.60 | 0.27 | 0.19 | 1.10 | 1.28 |
| BDE-100 | 1.20 | 1.11 | 0.12 | 0.06 | 0.29 | 0.27 |
| BDE-153 | 0.88 | 0.45 | 0.30 | 0.09 | 0.13 | 0.19 |
| BDE-154 | 0.61 | 0.65 | 0.11 | 0.06 | 0.14 | 0.11 |
| BDE-183 | 1.34 | 1.02 | 0.77 | 0.26 | 0.16 | 0.30 |
| $PBDE_8$ | 19.8 | 15.2 | 2.60 | 1.51 | 4.74 | 3.81 |
| BDE-66 | 0.39 | 0.35 | 0.11 | 0.02 | 0.21 | 0.02 |
| BDE-85 | 0.20 | 0.13 | 0.05 | 0.02 | 0.07 | 0.09 |
| PBDE 66+85 | 0.59 | 0.48 | 0.16 | 0.03 | 0.28 | 0.11 |
| $PBDE_{10}$ | 20.4 | 15.7 | 2.76 | 1.55 | 5.02 | 3.93 |

GRULAC countries, SAICM QSP projects

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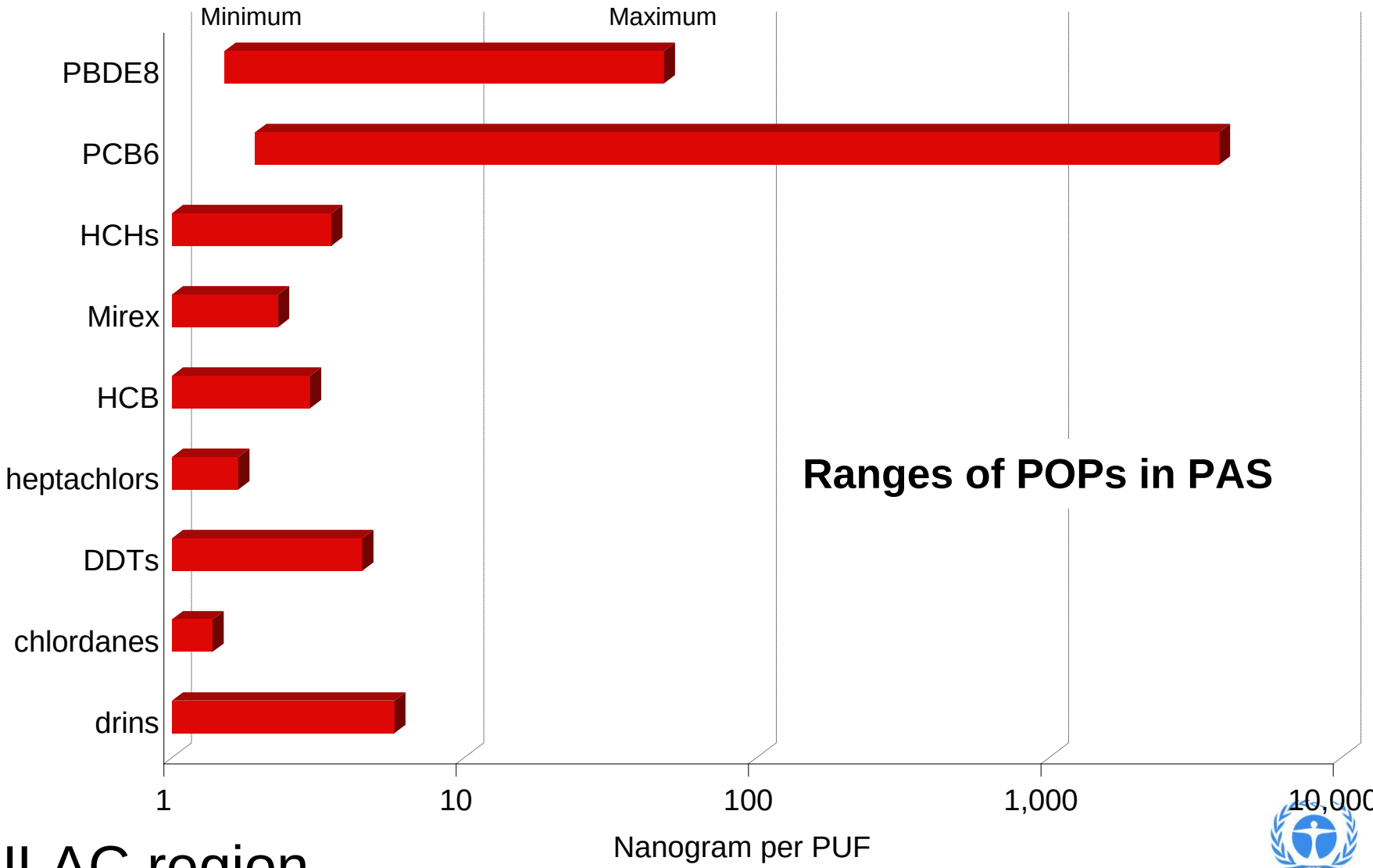
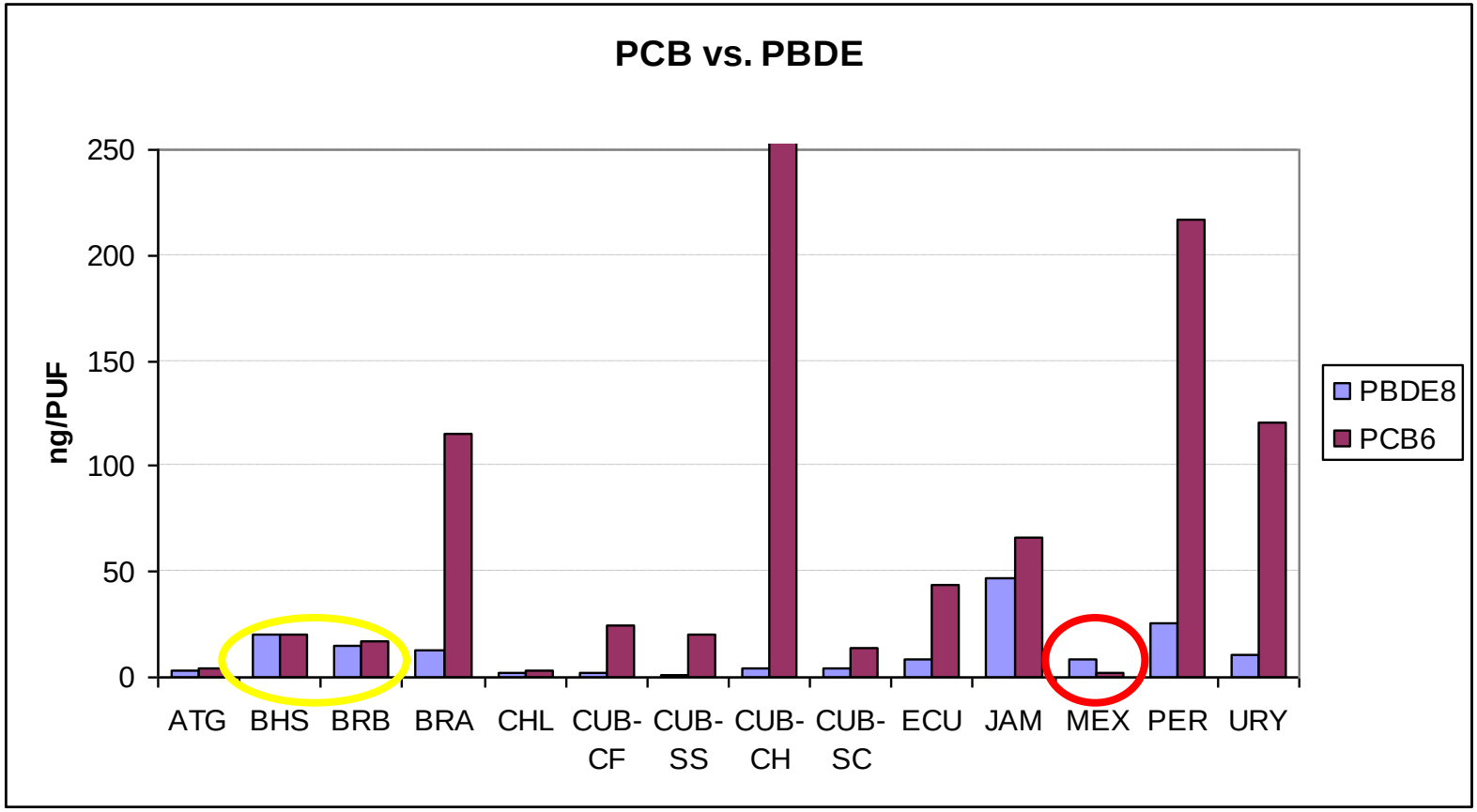
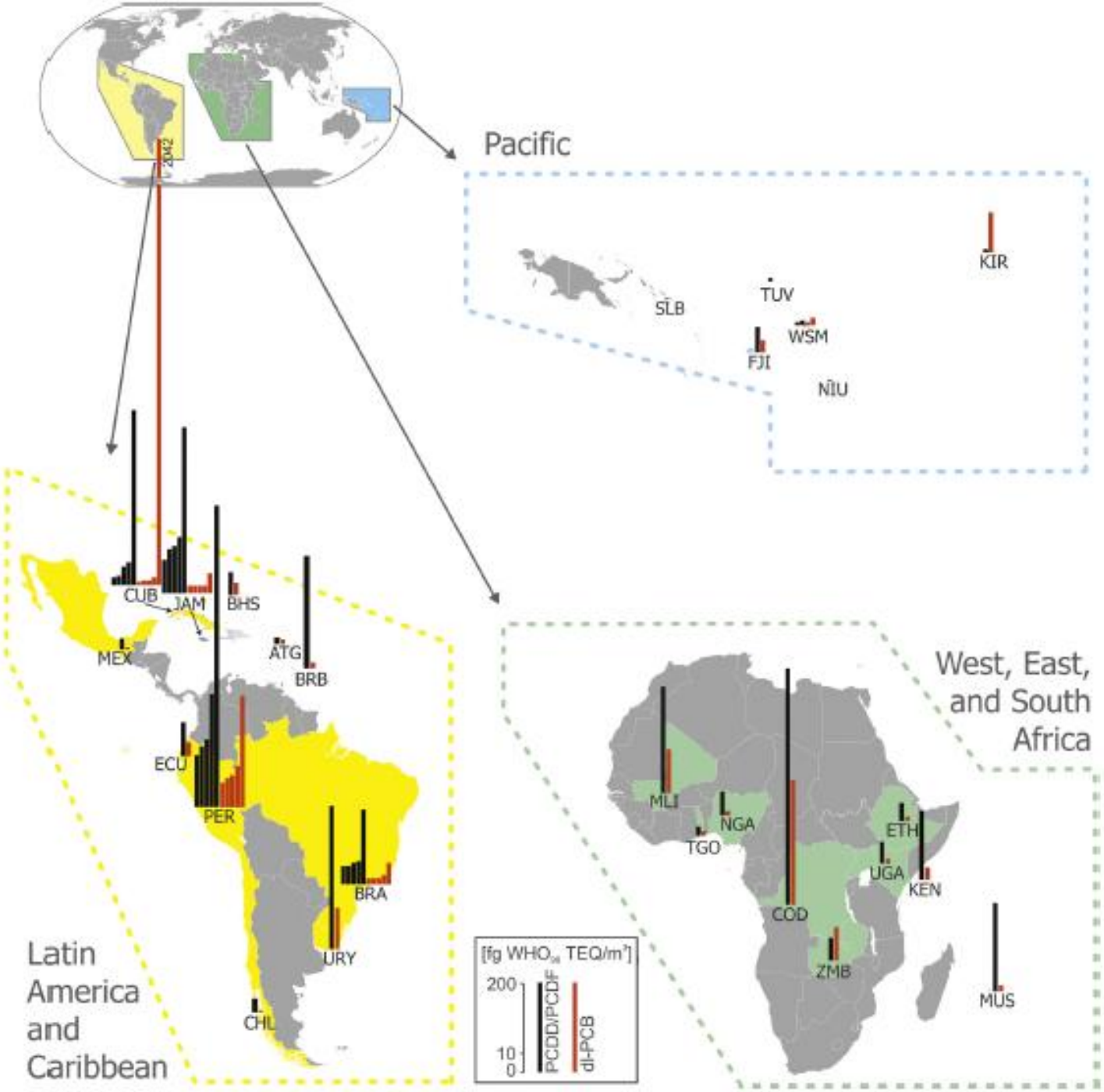
# Min-max concentrations (Annual aggregate)




GRULAC region

# Comparison PBDE *vs*. PCB






PCDD/PCDF and dl-PCB in air (UNEP GMP projects)

Bogdal *et al.* (2013), TrAC **46**, 150-161

# PCB and DDTs in air using PAS/PUF

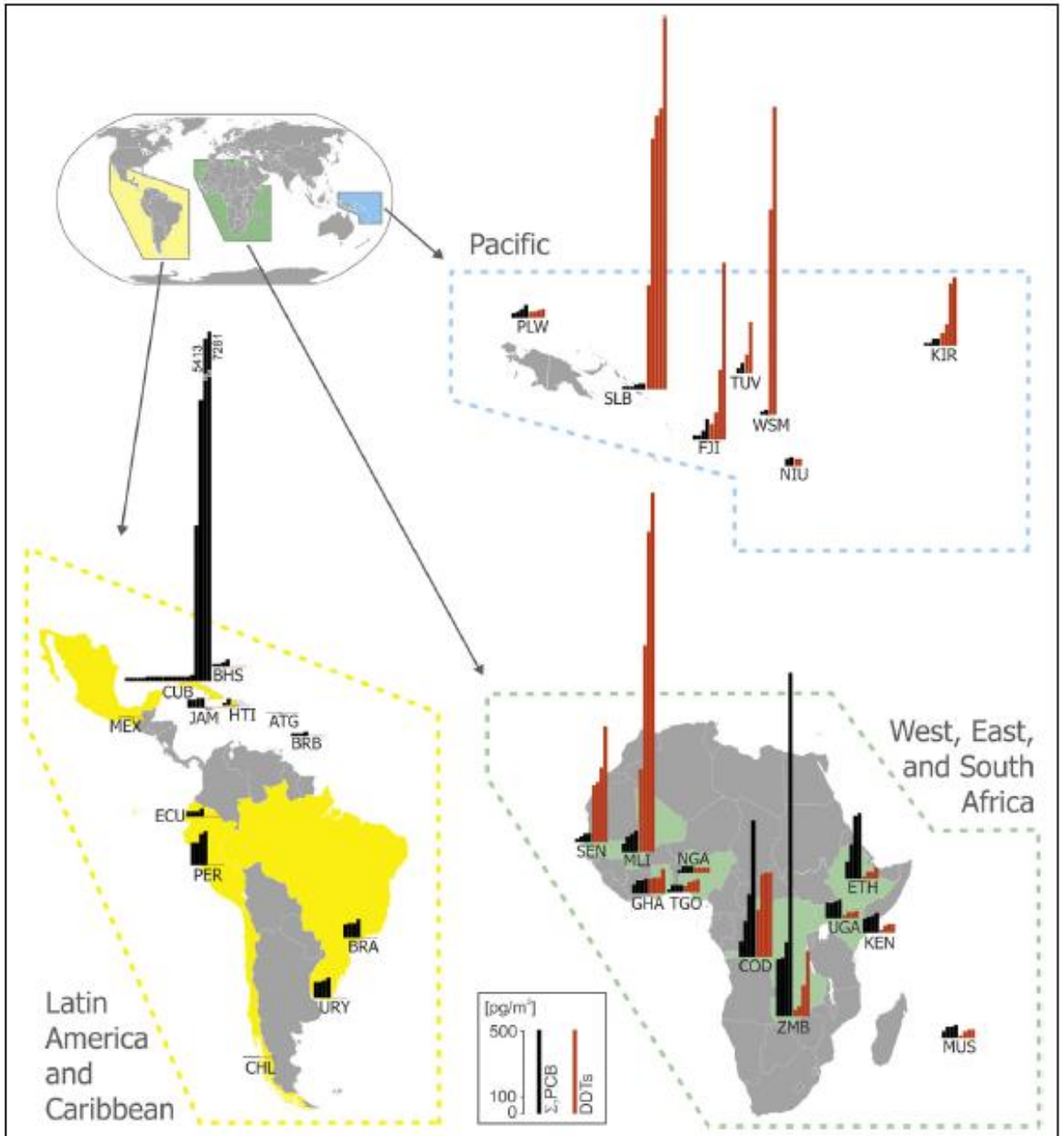
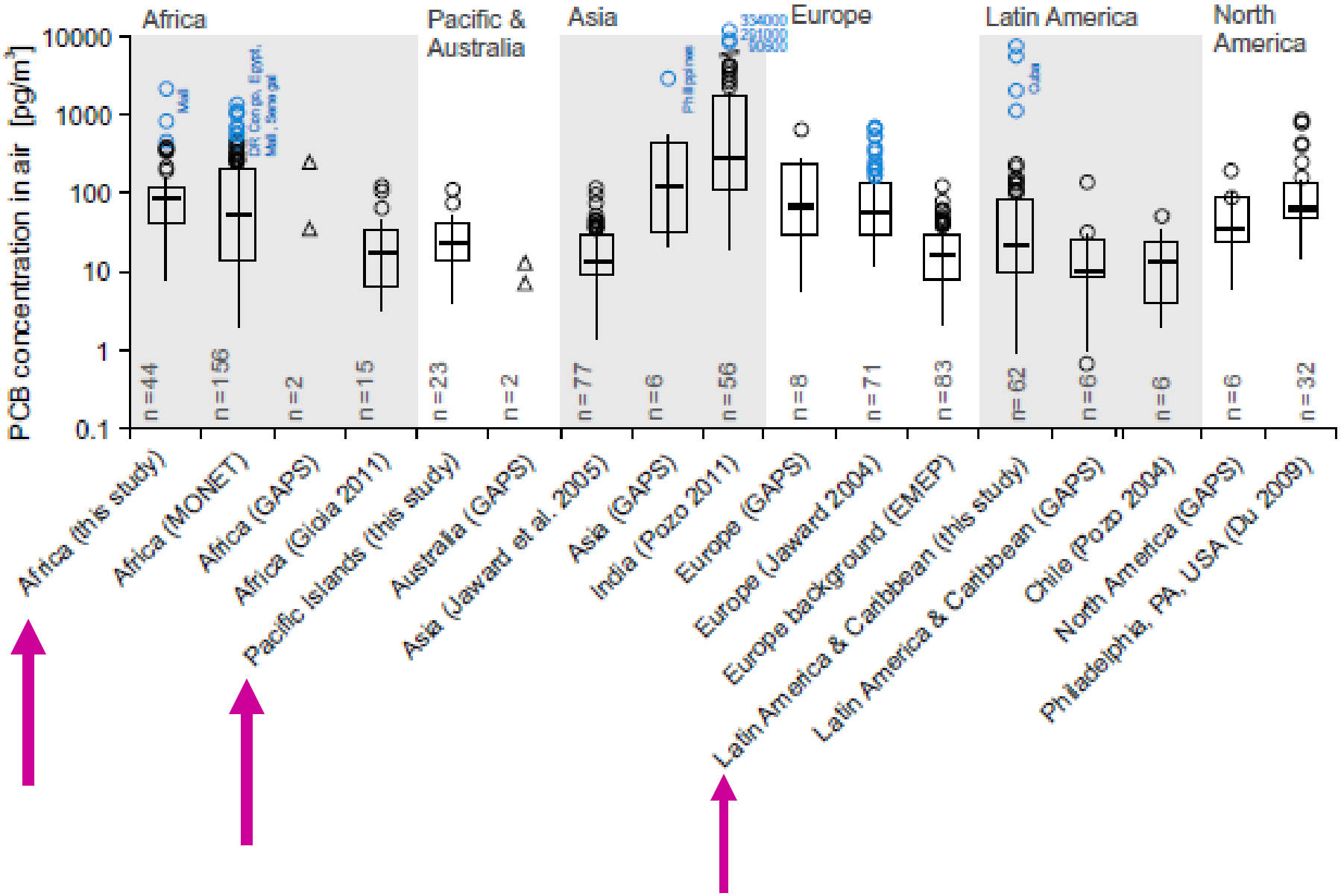



**Figure 3.** Distribution of $\Sigma_7$PCB and DDTs in Latin America and the Caribbean; West, East, and South Africa; and the Pacific region observed in this study. Countries are labeled by their ISO 3166-1 alpha-3 code, further defined in the text.

Bogdal *et al.* (2013), TrAC **46**, 150-161




# $PCB_7$ in ambient air, comparison with previous studies

Bogdal *et al.* (2013), TrAC **46**, 150-161

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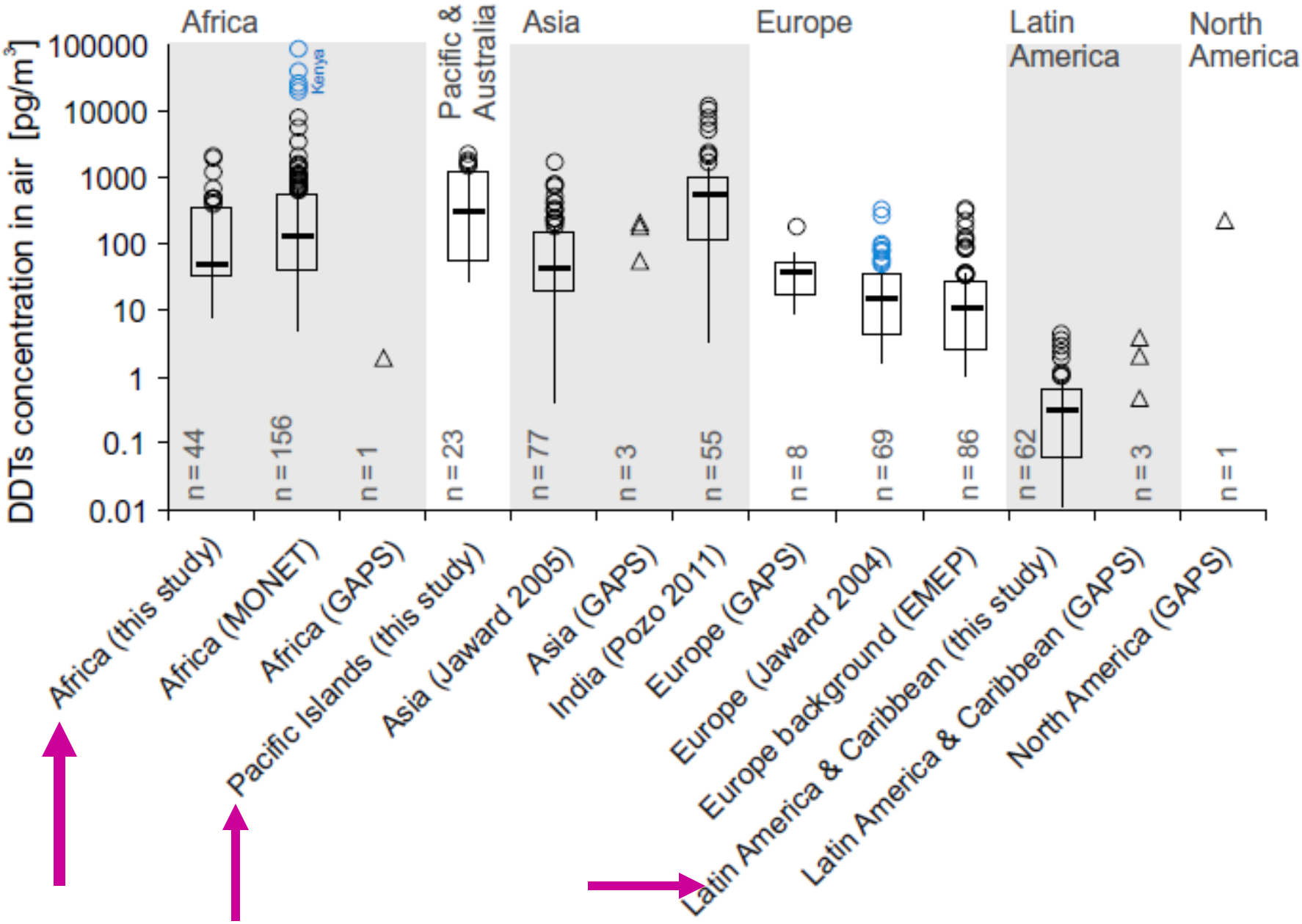


DDTs in ambient air, comparison with previous studies

Bogdal *et al.* (2013), TrAC **46**, 150-161

# POPs in PAS (2010-2011, summary)

| | Global | | | | |
|---|---|---|---|---|---|
| | n[1] | N of non detects | min (ng/ PUF) | max (ng/ PUF) | mean (ng/ PUF) |
| Σ Drins | 129 | 6 | 0 | 747 | 15 |
| Σ Chlordanes | 129 | 31 | 0 | 21 | 1.7 |
| Σ DDTs | 129 | 2 | 0 | 710 | 71 |
| Σ Heptachlors | 129 | 55 | 0 | 3.3 | 0.28 |
| HCB | 129 | 9 | 0 | 6.6 | 1.3 |
| Mirex | 129 | 105 | 0 | 0.50 | 0.02 |
| Σ HCHs | 129 | 26 | 0 | 76 | 3.5 |
| Σ $PCB_7$ | 129 | 22 | 0 | 2,294 | 53 |

| | Global (annual average) | | | | |
|---|---|---|---|---|---|
| | n | n=0 | min (pg/4 PUFs) | max (pg/4 PUFs) | mean (pg/4 PUFs) |
| $WHO_{1998}$-$TEQ_{PCDD/PCDF}$ | 31 | 0 | 0.2 | 213 | 35.7 |
| $WHO_{1998}$-$TEQ_{PCB}$ | 31 | 5 | 0.0 | 643 | 31.3 |
| $WHO_{1998}$-$TEQ_{PCDD/PCDF/PCB}$ | 31 | 0 | 0.2 | 732 | 67.0 |

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# Monitoring of POPs in human milk

# Human milk sampling

**UNEP-coordinated Survey of Mothers' Milk for Persistent Organic Pollutants**

**Guidelines for Organization, Sampling and Analysis**

**Chemicals Branch**
**United Nations Environment Programme (UNEP)**

**July 2012**


# Identification of a dioxin source of exposure to mothers

Chemosphere 90 (2013) 1678–1685

Contents lists available at SciVerse ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

Dioxins (polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-furans) in traditional clay products used during pregnancy

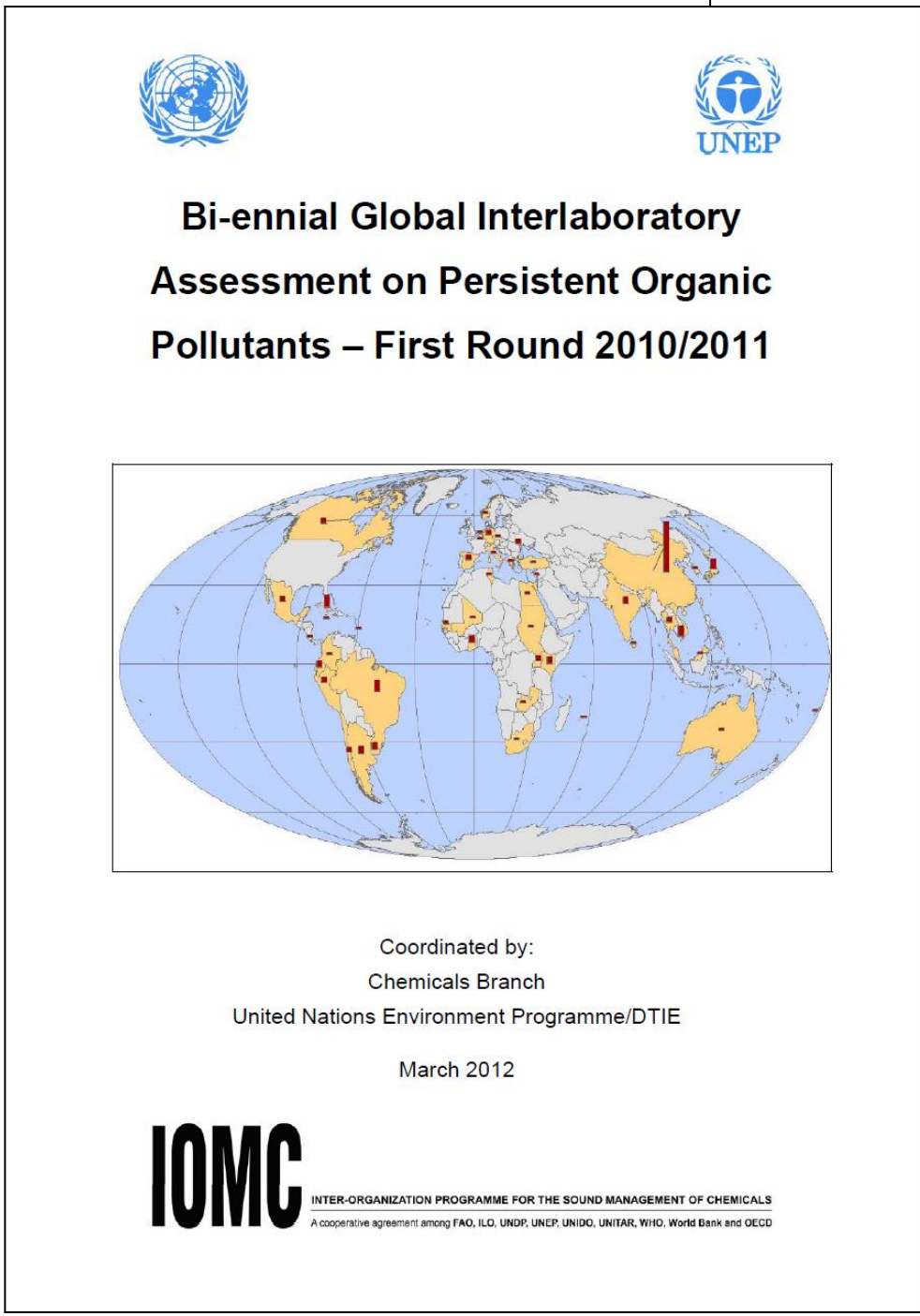
Noortje M. Reeuwijk [a,*], Antonia Talidda [b], Rainer Malisch [c,d], Alexander Kotz [c,d], Angelika Tritscher [e], Heidelore Fiedler [f], Marco J. Zeilmaker [g], Martin Kooijman [a], Koen J.H. Wienk [a], Wim A. Traag [b], Ron L.A.P. Hoogenboom [b]

# Interlaboratory Assessment

103 labs registered
83 from 47 countries delivered results for at least one POP and one matrix.

Two rounds planned to include all 22 POPs:
- 2012/2013 (underway*)
- 2014/2015

* ENRTP and GEF funding



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**Bi-ennial Global Interlaboratory Assessment on Persistent Organic Pollutants – First Round 2010/2011**

Coordinated by:
Chemicals Branch
United Nations Environment Programme/DTIE

March 2012

IOMC
INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS
A cooperative agreement among FAO, ILO, UNDP, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD

# Regional participation at Interlab

- Simple POPs (PCB and organochlorine pesticides)
  - 12 laboratories from WEOG region
  - 61 laboratories from the other four UN regions
    - 10 from Africa, 35 from Asia
    - 3 from CEE, and 23 from GRULAC;
- Complex POPs (PCDD/PCDF, dl-PCB)
  - 10 laboratories from WEOG region and
  - 40 came from the other four UN regions
    - 3 from Africa 32 from Asia
    - 1 from CEE, and 4 from GRULAC

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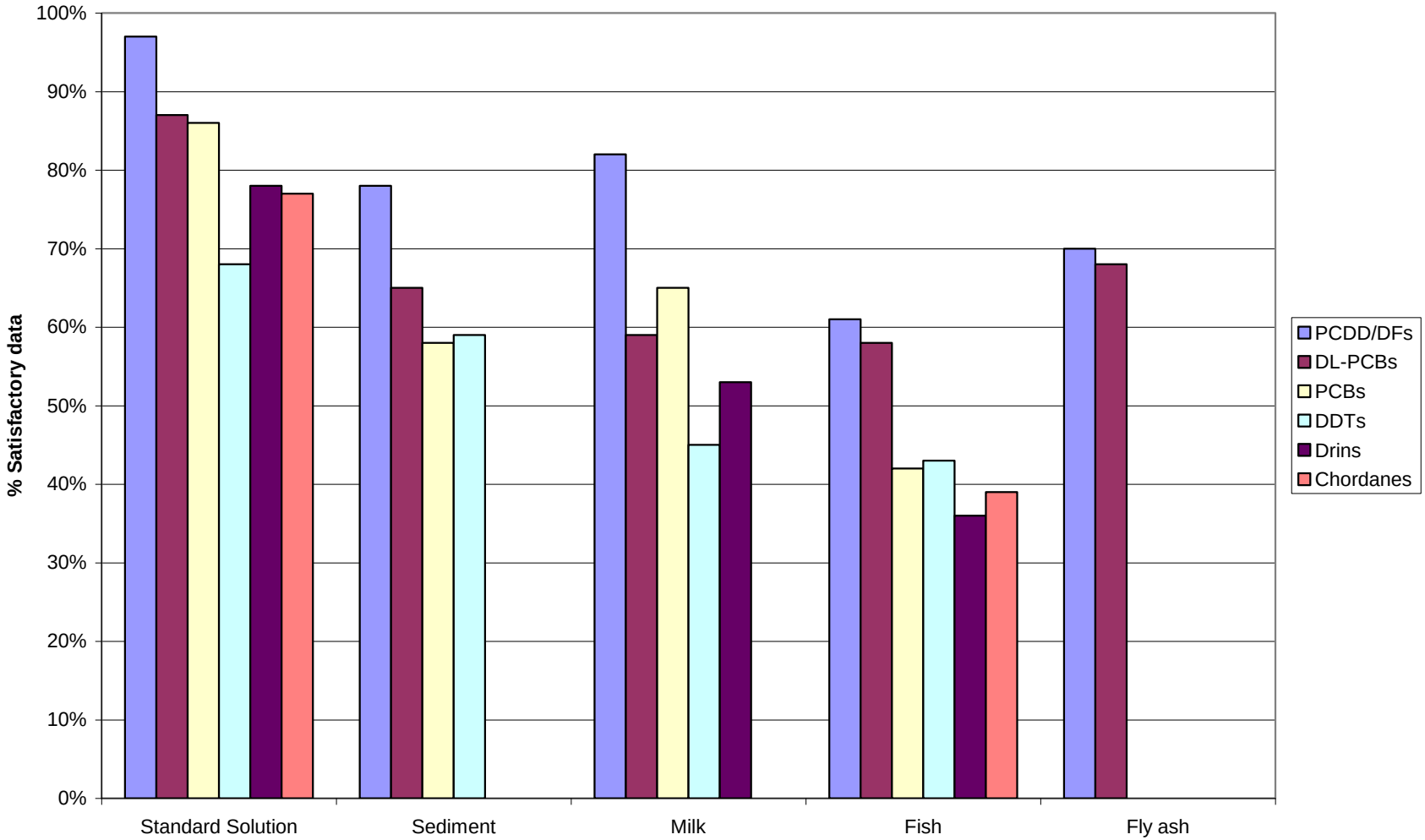
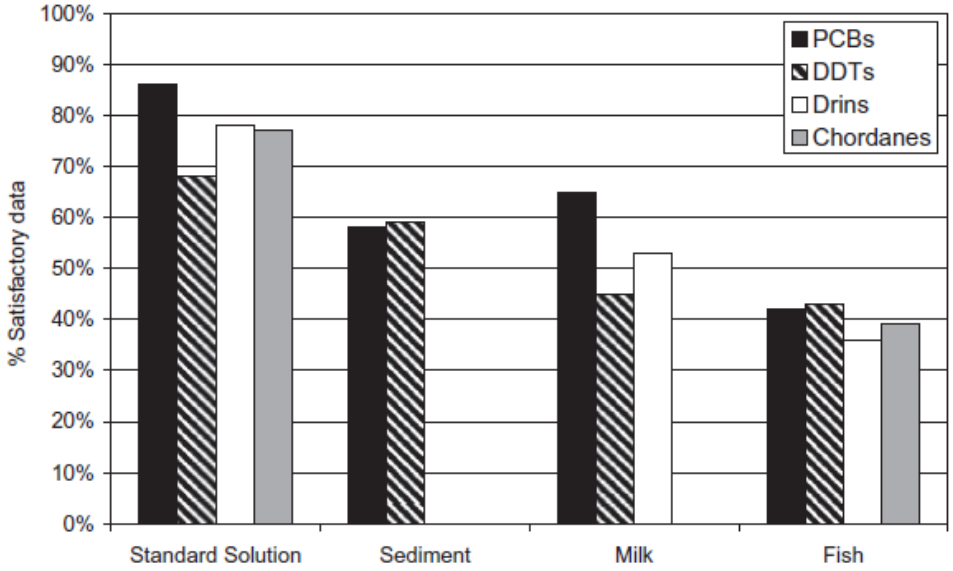
**Percentage of laboratories with satisfactory z-scores (i.e. z< ± 2) for OCP, PCB, PCDD/PCDF and dl-PCB in the test solution, sediment, milk, fish and fly ash**

# Successful 1st step



# Interlab – Percentage of Laboratories with satisfactory results

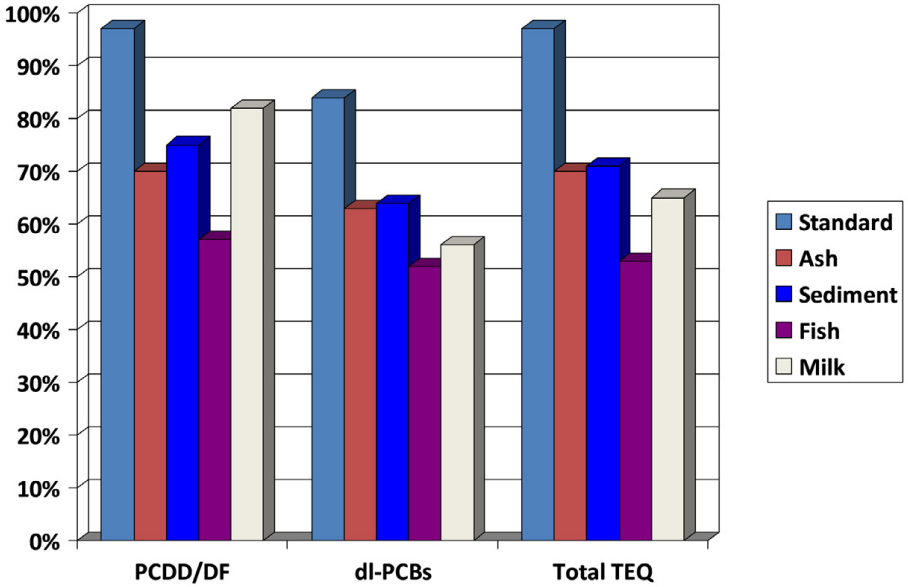



van Leeuwen *et al.* (2013), TrAC **46**

Approximately half of the data are not reliable;
Most probelms with fish matrix

Dioxin laboratories perform better than OCP laboratories

Abalos *et al.* (2013), TrAC **46**




Participation in interlaboratory studies helps laboratories to identify strengths and weakenesses

# POPs Global Monitoring Plan (GMP Phase II)

## GEF approved PIFs

### African Region

- DR Congo
- Egypt
- Ethiopia
- Ghana
- Kenya
- Mali
- Morocco
- Mauritius
- Nigeria
- Senegal ✓
- Tanzania
- Togo
- Tunisia
- Uganda
- Zambia

### Asian Region

- Cambodia
- Indonesia
- Lao PDR
- Mongolia
- Philippines
- Vietnam

### GRULAC Region

- Antigua and Barbuda
- Argentina ✓
- Barbados
- Brazil
- Chile ✓
- Colombia
- Cuba
- Ecuador
- Jamaica
- Mexico
- Peru
- Uruguay

### Pacific Region

- Fiji
- Kiribati
- Marshall Islands
- Niue
- Palau
- Samoa
- Solomon Islands
- Tuvalu
- Vanuatu

✓ **BRS Secretariat for 4 regions**

✓Cofinance letter received

# Conclusions

- External driver through Stockholm Convention on POPs;
- Harmonized approaches and protocols essential for comparative assessments;
- Intensive coordination and cooperation between UNEP, expert back-up laboratories, and national experts necessary $\Rightarrow$ networks and capacities successfully developed;
- Quantitative data: All groups of POPs quantifiable in air and mothers' milk; however at different scales;
- In the next step, new POPs and new water matrix has to be integrated and the established networks continued;
- Further training of local laboratories is essential.

UNEP

# Thank you very much

- Örebro University, MTM Center: Bert van Bavel
- IDAEA/CSIC Barcelona:  Esteban Abad
- IVM VU University Amsterdam: Jacob de Boer
- CVUA Freiburg: Rainer Malisch
- ETH Zürich: Christian Bogdal
- Environment Canada: Tom Harner
- Recetox: Jana Klanova
- Ministry of Environment Ontario: Eric Reiner
- Secretariat of the Stockholm Convention: Katarina Magulova
- World Health Organisation: Angelika Tritscher
- National coordinators for PAS and mothers' milk
- Private sector: Wellington Laboratories, CIL, Waters, ThermoScientific, SGE
- GEF and SAICM QSP for funding

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