GLOBAL MONITORING PLAN

FOR PERSISTENT ORGANIC POLLUTANTS

Pursuant to Article 16 on the Effectiveness Evaluation
of the Stockholm Convention

SECOND REGIONAL MONITORING REPORT

GRULAC REGION

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PREFACE

Persistent organic pollutants (POPs) are a group of chemicals that have toxic properties, resist degradation in the environment, bioaccumulate through food chains and are transported long distances through moving air masses, water currents and migratory species, within and across international boundaries. POPs belong to three main groups; however, some of the chemicals fit into more than one of these three general categories:

- pesticides used in agricultural applications[1];
- industrial chemicals used in various applications[2];
- chemicalsgenerated unintentionally as a result of incomplete combustion and/or chemical reactions[3].

Twelve POPs were initially listed in the Stockholm Convention (shown in bold font in footnotes 1-3). In general, these 'legacy' POPs were first produced and/or used several decades ago.Their persistence, bioaccumulative properties and potential for long-range transport are well studied, and they have been globally banned or restricted since 2004. In 2009, nine more substances were added to the Convention (chemicals with an asterisk in footnotes 1-3). Two additional chemicals were listed in 2011 and in 2013 (two and three asterisks in footnotes 1-3 respectively).

Article 16 of the Stockholm Convention requires the Conference of the Parties to evaluate periodically whether the Convention is an effective tool in achieving the objective of protecting human health and the environment from persistent organic pollutants. This evaluation is based on comparable and consistent monitoring data on the presence of POPs in the environment and in humans, as well as information from the national reports under Article 15 and non-compliance information under Article 17. The global monitoring plan for POPs, which has been implemented under the framework of the Convention, is a key component of the effectiveness evaluation and provides a harmonized framework to identify changes in concentrations of POPs over time, as well as information on their regional and global environmental transport.

This monitoring report synthesizesinformation from the first and second phases of the global monitoring plan and presents the current findings on POPs concentrations in the GRULAC Region. While the first monitoring report, presented at the fourth meeting of the Conference of the Parties, provided information on the baseline concentrations of the 12 legacy POPs, this second monitoring report, to be submitted to the Seventh Meeting of the Conference of the Parties in 2015, provides the first indications of changes in concentrations of the chemicals initially listed in the Convention, as well as baseline information on the newly listed POPs.

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1 aldrin, chlordane, chlordecone*, dichlorodiphenyltrichloroethane (DDT), dieldrin, endosulfan**, endrin, heptachlor, hexachlorobenzene (HCB), gamma-hexachlorocyclohexane (γ-HCH, lindane)* and byproducts of lindane [alpha-hexachlorocyclohexane (α -HCH)* and beta-hexachlorocyclohexane (β -HCH)*], mirex, toxaphene.

2 tetra- and pentabromodiphenylethers (PBDEs)*, hexa- and heptabromodiphenylethers (PBDEs)*, hexabromocyclododecane*** (HBCD), hexabromobiphenyl*, perfluorooctanesulfonicacid (PFOS), itssalts and perfluorooctanesulfonylfluoride (PFOS-F)*, pentachlorobenzene (PeCB)*, polychlorinatedbiphenyls (PCBs).

3 hexachlorobenzene (HCB), pentachlorobenzene (PeCB)*, polychlorinatedbiphenyls (PCBs) and polychlorinateddibenzo-*p*-dioxins (PCDDs) and dibenzofurans (PCDFs).

ABBREVIATIONS AND ACRONYMS

AMAP	Arctic Monitoring and Assessment Programme
ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variance
COP	Conference of the Parties
CTD	Characteristic Travel Distance
CV	Coefficient of Variation
DDD /DDE	Metabolites of DDT
DDT	Dichlorodiphenyltrichloroethane
DLPCBs	Dioxin-like PCBs
dlPOPS	Dioxin-like POPs
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range
FAO	Food and Agriculture Organization of the United Nations
GAPS	Global Atmospheric Passive Sampling Survey
GEF	Global Environment Facility
GMP	Global Monitoring Plan
HCB	Hexachlorobenzene
HCHs	Hexachlorocyclohexanes
HPLC	High Performance Liquid Chromatography
HRGC	High Resolution Gas Chromatography (capillary column)
HRMS	High Resolution Mass Spectrometer
HxBB	Hexabromobiphenyl
IADN	Integrated Atmospheric Deposition Network
I-TEQ	International Toxicity Equivalence
LAPAN	Latin American Passive Atmosphere Monitoring Network
LC50	Median Lethal Concentration
LD50	Median Lethal Dose
LOAEL	Lowest Observable Adverse Effect Level
LOD	Limit of Detection
LOQ	Limit of Quantification
LRT	Long-range Transport

LRTAP	Long-range Transport Air Pollutants
LRTP	Long-range Transport Potential
MDL	Minimum Detectable Level
MEA	Multilateral Environmental Agreements
MRL	Maximum Residue Limit
NAFTA	North American Free Trade Agreement
NARAPs	North American Regional Action Plans
ND	Not detected
NOAA	National Oceanic and Atmospheric Administration
OCs	Organochlorines
OCPs	Organochlorine Pesticides
OECD	Organization for Economic Cooperation and Development
OPs	Organophosphates
PAHs	Polycyclic aromatic hydrocarbons
PBDEs	Polybrominateddiphenyl ethers
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzo- p-dioxins
PCDFs	Polychlorinated dibenzofurans
PCP	Pentachlorophenol
PFOS	Perfluorooctane sulfonate
POPs	Persistent Organic Pollutants (group of twelve as defined in the Stockholm Convention 2001)
PUF	Polyurethane Foam
QA/QC	Quality Assurance and Quality Control
RECETOX	Research Centre for Environmental Chemistry and Ecotoxicology
ROGs	Regional Organization Groups for the Global Monitoring Plan
SAICM	Strategic Approach to International Chemicals Management
SOP	Standard operating procedure
SPM	Suspended particulate matter
SPREP	South Pacific Regional Environment Programme
TCDD	Tetrachlorodibenzo-*p*-dioxin
TEQ	Toxicity Equivalents
TPT	Triphenyltin

UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
WHO	World Health Organization
XAD	Styrene/divinylbenzene-co-polymer resin

GLOSSARY OF TERMS

[Please adjust as necessary]

Activity	Any programme or other activity or project that generates data or information on the levels of POPs in the environment or in humans that can contribute to the effectiveness evaluation under Article 16 of the Stockholm Convention Core matrices. These are the matrices identified by the Conference of the Parties to the Stockholm Convention at its second meeting as core for the first evaluation: A = ambient air; M = (human) mother's milk and / or B = human blood
CTD	The characteristic travel distance -defined as the "half-distance"- for a substance present in a mobile phase
I L-1	Instrumentation level 1 capable ofanalysing PCDD/PCDF and dioxin-like PCB at ultra-trace concentrations: must be a high-resolution mass spectrometer in combination with a capillary column
I L-2	Instrumentation level capable ofanalysing all POPs: (capillary column and a mass-selective detector)
I L-3	Instrumentation level capable of analysing all POPs without PCDD/PCDF and dioxin-like PCB (capillary column and an electron capture detector)
I L-4	Instrumentation level not capable of a congener-specific PCB analysis (no capillary column, no electron capture detector or mass selective detector)
Intercomparisons	Participation in national and international laboratory validation activities such as ring-tests, laboratory performance testing schemes, etc.
LOD	Limit of detection. Definition: The lowest concentration at which a compound can be detected; it is defined as that corresponding to a signal three times the noise.
<LOD	Result below the of limit detection
LOQ	Limit of quantification. Definition: The lowest concentration that can quantitatively be determined is three times higher than LOD.
<LOQ	Result below limit of quantification. Compounds found at levels between LOD and LOQ can be reported as present, or possibly as being present at an estimated concentration, but in the latter case the result has to be clearly marked as being below LOQ.
MDL	Method detection limit. The MDL considers the whole method including sampling, sample treatment and instrumental analysis. It is determined by the background amounts on field blanks.
Phase I	Activities to support the Article 16 effectiveness evaluation that will be conducted by the Conference of the Parties at its fourth meeting, information collected between 2000 and 2008.

Phase II	Activities to support the Article 16 effectiveness evaluation that will be conducted by the Conference of the Parties at its seventh meeting, information collected between 2009 and 2013.

EXECUTIVE SUMMARY

This second monitoring report synthesizes the information from the first and second phases of the Global Monitoring Plan and presents the current findings on POPs concentrations in the GRULAC Region. The second phase of the Global Monitoring Plan focuses on the inclusion of the newly listed POPs in ongoing monitoring activities. Furthermore, it addresses the need for harmonized data handling and ensuring support for the collection, processing, storing and presentation of monitoring data in regions with limited capacity through a Global Monitoring Plan data warehouse. Enhancing the comparability within and across monitoring programmes to evaluate changes in concentrations of POPs over time and their regional and global transport was also an important milestone in the second phase.

It is worth noting thattheGRULACRegionrequires expanding thecapabilitiesto implementin all countriesin the regionthe monitoringof POPs concentrations. To date, there are countries that havenot formallybegun withthe measurement process; similarly, there are still new POPsthat are not measuredinall matricesdefined to evaluateeffectiveness.

1 INTRODUCTION

This monitoring report synthesizes the information from the first and second phases of the Global Monitoring Plan and presents the current findings on POPs concentrations in the GRULAC Region. While the first monitoring report, presented at the fourth meeting of the Conference of the Parties in May 2009, provided information on the baseline concentrations of the 12 legacy POPs, this second monitoring report, to be submitted at the Seventh Meeting of the Conference of the Parties in May 2015, provides the first indications of changes in concentrations of the chemicals initially listed in the Convention, as well as baseline information on the newly listed POPs.

At its sixth meeting in May 2013, the Conference of the Parties, by decision SC-6/23 on the Global Monitoring Plan for Effectiveness Evaluation, adopted the amended Global Monitoring Plan for Persistent Organic Pollutants (UNEP/POPS/COP.6/INF/31/Add.1) and the amended Implementation Plan for the Global Monitoring Plan (UNEP/POPS/COP.6/INF/31/Add.2). It also adopted the Guidance on the Global Monitoring Plan for Persistent Organic Pollutants (UNEP/POPS/COP.6/INF/31), which has been updated to address the sampling and analysis of the newly listed POPs, providing a useful basis for monitoring these chemicals in the second phase of the global monitoring plan, as well as for harmonized data collection, storage and handling.

The global coordination group met four times over the period 2011-2014 in order to oversee and guide implementation of the second phase of the global monitoring plan, with particular emphasis on addressing the sampling and analysis of the newly listed POPs, harmonizing data collection, storage and handling, addressing the needs to ensure the sustainability of ongoing monitoring activities and for further capacity strengthening to fill the existing data gaps, as well as improving data comparability within and across monitoring programmes.

The long-term viability of existing monitoring programmes (air and human biomonitoring) is essential to ensure that changes in concentrations over time can be studied. National air monitoring activities that contributed data to the first monitoring reports continued to do so during the second phase, and new programmes have been identified to support the development of the second reports. Similarly, the continued operation of global and regional air monitoring programmes was a major pillar in the second phase.

For the new monitoring activities, collaboration with strategic partners has ensured cost-effective generation of data and the use of harmonized protocols for POPs monitoring. The implementation of the second phase of the UNEP/WHO human milk survey is another important pillar of the global monitoring plan, providing useful long-term results showing how human exposure to POPs has changed over time as measures are implemented to enforce the Convention.

Enhanced comparability within and across monitoring programmes to evaluate changes in levels over time and the regional and global transport of POPs was an equally important milestone in the second phase. Quality Control and Quality Assurance (QA/QC)practices have been and continue to be essential to ensure comparability, along with inter-laboratory exercises and inter-calibration studies. Efforts continue to be directed at ensuring comparability within and across programmes, providing for evaluation of changes in concentrations of POPs over time and enabling regional comparisons.

Considering the global dimension of the Monitoring Plan under the Stockholm Convention, air, human milk and/or blood have been established as core matrices as they provide information on the sources of POPs, environmental transport and the levels of exposure in human populations. The listing of new POPs in the Convention brought additional challenges to the implementation of the Global Monitoring Plan. Perfluorooctane sulfonic acid (PFOS) and its salts do not follow the "classic" pattern of partitioning into fatty tissue, but instead bind preferentially to proteins in the plasma and are hydrophilic. Water has thus been added to the list of core matrices for these particular substances. This report also provides first results regarding the concentrations of such chemicals in water.

During the second phase of the Global Monitoring Plan, harmonized data handling was enabled and appropriate support was given in the collection, processing, storing and presentation of monitoring data to the regions with limited capacity. A Global Monitoring Plan data warehouse supports data collection and assists the regional organization groups and the global coordination group to produce the regional and global monitoring reports and in the effectiveness evaluation. The Global Monitoring Plan data warehouse also constitutes a publicly available repository of valuable information that can serve as a useful resource for policymakers and researchers worldwide.

2 DESCRIPTION OF THE REGION

The Group of Latin American and Caribbean Countries (GRULAC), covers a land area greater than 20 x 10^6 km^2, and is comprised of 33 countries stretching from Mexico in the north to Argentina and Chile in the south. On the west it is bound by the Pacific Ocean and on the east by the Atlantic Ocean and the Caribbean Sea. The land area covers 15 percent of the earth's surface.

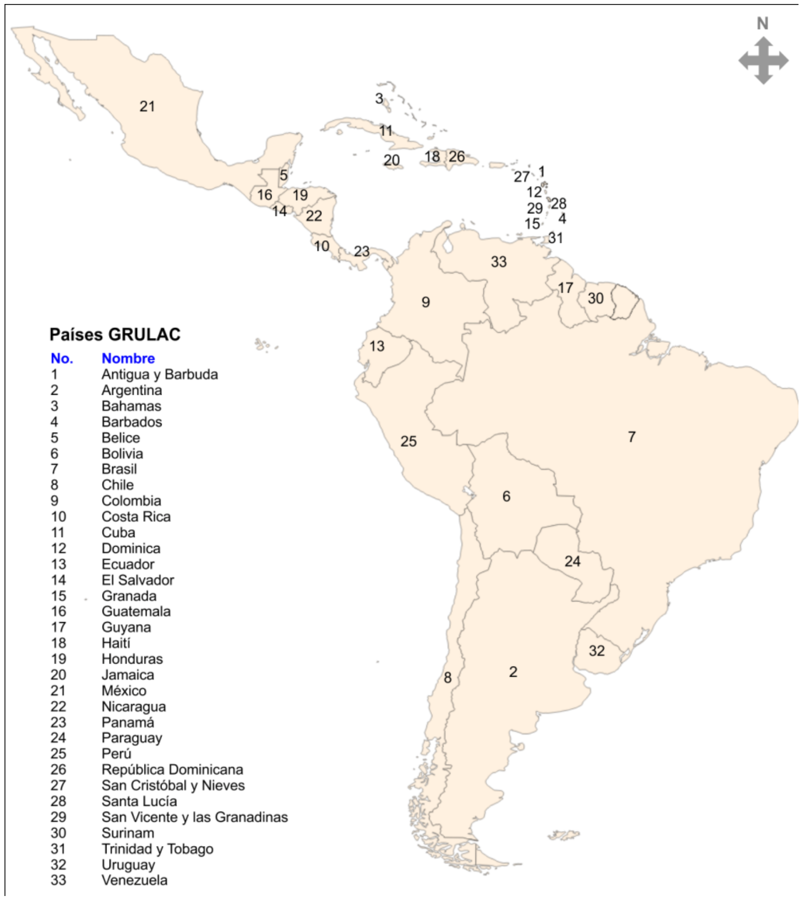

Figure 2.1. Group of Latin American and Caribbean Countries

The 33 countries of Latin America and the Caribbean vary significantly in size and economic development. The region includes both Brazil, the seventh largest economy in the world (The Economist 2011) and small island developing states, with their open and fragile economies (Rietbergen et al. 2007). Rich in natural resources, the region is home to approximately 23 percent of the world's forests, 31 percent of its freshwater resources and six of the world's 17 mega-diverse countries. Although these resources are not evenly distributed, the overall richness and economic importance of the region's ecosystems and its natural capital are undeniable (UNEP 2010b).

The region is rich in cultural, linguistic and biological diversity; more than 600 languages are spoken and it has the largest water and woody biomass stocks of the world, with 5 countries described as being biologically mega-diverse. Indigenous people represent a significant portion of its population. More than 650 indigenous groups have been identified, many of which are in Mexico, Bolivia and Guatemala, Ecuador, Peru, Colombia, Brazil, Chile and other countries in Central America and the Caribbean. The indigenous inhabitants of Bolivia and Guatemala represent demographic majorities, 66 percent and 40 percent of the total population respectively. The Afro-descendant population is very important in the region, for example, Brazil is the second most populous country with people of African ancestry in the world (UNFPA, 2011).

With this background, the countries in the region face many challenges in managing the wealth of natural resources. Population growth and unsustainable global and regional patterns of consumption and production are boosting the growing demand for and extraction of natural resources. This has led to the extensive transformation of natural environments into production systems with impacts on the region's biodiversity.

According to the report "*Population Aging: Is Latin America Ready?"* economic growth in the region will be more complicated in those nations with a large number of elderly people. Also, meeting the needs relating to healthcare, retirement pensions,among other, will be particularly difficult in low and middle income countries. The establishment of appropriate policies and institutions to adapt to powerful demographic changes will be essential to safeguard the social and economic future of the region (WB, 2011).

The region is one of the most urbanized in the world, with 79 percent of its population living in towns and cities, but bearing major inequity issues.The overall population in the GRULAC region was estimated at 576 million inhabitants in 2010 (ECLAC, Statistics and indicators, Web Portal[4]). During 2012 the population was approximately 601 million inhabitants, corresponding to 8.5 percent of the world's total. The annual population growth rate has fallen from 2.4 percent in 1972 to 1.11 percent in 2010. This variation wascausedby the accelerated downward trend in fertility, preceded by a sustained reduction in mortality. The latter began at the end of the first half of the twentieth century, and today it is reflected in the life expectancy, estimated in 74.7 years (2005-2010). The demographic transition has been fast.

Although there are still characteristics of heterogeneity among countries and within them, there have been two major changes at the regional level: the decline of demographic dependency and the aging of the population. There are seven cities with over 5 million inhabitants, three of them with over 10 million, while Mexico City and São Paulo have over 20 million each (ECLAC, 2011); 43.4 percent of the population live in poverty, 18.8 percent of which belongs to indigenous groups (ECLAC, 2003).

Overall adult literacy rates averaged 91.5 percentin 2011 (ECLAC, 2013), but income distribution inequalities adversely affect access to schooling, attendance and performance levels. Similarly, little access to land is an underlyingcause of social instability as well as continuous political and financial turmoil. Economic growth has been sluggish, after a period of steady growth throughout the 1990s. Nevertheless, during the last 6 years (from 2005 to 2010) the GDP varied between4.5 and 5.8, having its worst year in 2009 when it was below -1. According to ECLAC, this fluctuation will continue during the next years, leading to a growth cycle with a 3 percent annual rate. These results have helped reduce poverty and unemployment. In some countries the inequalities have decreased by 3.3 percent and extreme poverty rates have decreased by 2 percent.

Despite their heterogeneity, the countries in Latin America and the Caribbean share environmental challenges such as climate change, the loss of biodiversity, water and land management. The problems in coastal and marine areas, urbanization, poverty and inequality are also priority issues (GEO 5, 2012).

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4 Statistics and indicators, http://estadisticas.cepal.org/cepalstat/WEB_CEPALSTAT/estadisticasIndicadores.asp?idioma=e

Different studies have concluded that the policies in the region would only be effective if they are successful in bridging the gap between science and politics.

Robust policies are supported by evidence-based research; research designed to meet the needs of those responsible for policy formulation.

Such research should include, where appropriate, local and indigenous knowledge, which is an important feature of the region. Researchers and policy makers must work together to obtain the relevant information, develop knowledge and take advantage of innovation for environmental decision-making.

2.1. Subregions of the GRULAC Region

The Group of Latin American and Caribbean Countries region contains four subregions: Mesoamerica, the Caribbean, the Andes and the Southern Cone, each with its own special characteristics and rich biodiversity. The topography ranges from tropical islands to mountain ranges and high plateaus, rainforests, deserts and plains. The climate varies enormously; its diversity is reflected in the variety of ecosystems that include many of the world's biologically richest eco-regions, such as the tropical forest and several mega-biodiverse countries, as well as the urban environments, where 75 percent of GRULAC inhabitants live.

Figure 2.2. Subregions of the GRULAC Region

2.1.1. Andean Subregion

(Bolivia, Colombia, Ecuador, Peru and Venezuela)

The Andean Subregion characteristically comprises a 4.7 million km^2 surface area or 25 percent of Latin America. The population in 2010 was 123.2 million and the Subregional GNP reached US$ 255 billon, almost 14 percent of the Latin American total.

Nearly 20 percent of the GNP depends on the extraction and processing of natural resources. Forests cover 230 million hectares, or 35 percent of the GRULAC total forest area, were deforestation represents a major challenge (GEO-LAC, 2003).

As in some countries in Central America, Colombia developed the Regional Integrated Silvopastoral Ecosystem Management Project. This is a pilot test of payment for ecosystem services to promote the adoption of silvopastoral practices in degraded pastures in the country.

This project developed an index of environmental services and pays participants for net increases in their points (Pagiola et al. 2007).

2.1.2. The Caribbean Subregion

(Antigua and Barbuda, Bahamas, Barbados, Cuba, Dominica, Grenada, Guyana*, Haiti, Jamaica, Dominican Republic, Saint Kitts and Nevis, Saint Lucia, St. Vincent and Grenadines, Suriname*, Trinidad and Tobago* (*These countries were included in the Caribbean Subregion).

The Caribbean Subregionis comprised primarily of a chain of islands surrounded by the Caribbean Sea, organized into 27 territories, including independent states and colonies of European nations. The Caribbean islands of the region varywidely in size, namely, from 91km^2 (Anguila) to 110,860 km^2 (Cuba). Important variations in socio-economic conditions, cultures and political systems are found in this subregion, for instance, Cuba accounts for over one-third of the population (more than 11 million) and almost half of the land area. There is a wide diversity of habitats, including coral reefs, seagrass beds, mangroves, wetlands and rocky shores. Tourism contributes approximately 30- 50 percent of the GDP; the region receives over 6 percent of the world's tourism. Designing suitable environmental protection policies is a major challenge (GEO- LAC, 203).

While ensuring national food security under a trade embargo, Cuba's transition to organic agriculture has also had a positive impact on people's livelihoods by guaranteeing a steady income for a significant proportion of the population (GEO-5, 2012). Moreover, the lack of synthetic pesticides in agricultural production is likely to have a positive long-term impact on the people's well-being, since such chemicals are often associated with negative health implications including some forms of cancer (UNEP 2011d).

2.1.3. Mesoamerica Subregion

(Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama).

The Mesoamerican surface area is 2.5 million km^2, the land bridge between North and South America. Of this subregion, 30 percentiscovered by the Mesoamerican Biological Corridor, comprising the Central American System of Protected Areas (SICAP, from its acronym in Spanish), bordering buffer zones and multiple-use areas. Mesoamerica covers a wide geographical diversity: the 100 km-long Mesoamerican Barrier Reef System, extensive mountain chains, 8,000 km-long coastline, and extensive mangroves.

In 2013 the estimated population inhabiting this subregion was of 165 million, and over 20 percent of that population made a living from coastal marine activities. Deforestation is a major challenge here due to logging, agricultural and range expansion activities, and domestic fuel requirements for over 60 percent of the homes in rural areas.

Costa Rica, Nicaragua and Colombia are promoting sustainable agriculture production with the implementation of the Regional Integrated Silvopastoral Ecosystem Management Project. (GEO-5, 2012).

In Nicaragua, the area of degraded pasture decreased by two-thirds, while pastures with high tree-density increased substantially, as did fodder banks and hedges. The project developed an environmental services index and pays participants for net increases in points (Pagiola et al. 2007).

2.1.4. The Southern Cone

(Argentina, Brazil, Chile, Paraguay, Uruguay)

The Southern Cone subregion comprises a surface area of 12.6 million km^2, which was home to 270 million people in 2010. It contains a wide variety of landscapes: forest (629 million hectares), prairies, steppes, shrubs, wetlands and deserts. The aforementioned countries have the lowest population density and the highest urbanization rates in GRULAC. Large percentages of urban dwellers are present (over 89.3 percent in Argentina, 80 percent in Brazil, 87 percent in Chile and 93 percent in Uruguay). This is the fourth largest economic group in the world after the EU, NAFTA and Japan- with a total GDP of US1100 billon. Urban environment management and deforestation are the major challenges (GEO-LAC, 2003).

The adoption of conservation tillage and less aggressive pesticides caused, respectively, a dramatic decrease in soil erosion and contamination risk in Argentina throughout 1956–2005 (GEO-5, 2012). The risk of water and wind-related erosion dropped considerably in response to the expansion of zero-tillage agriculture in the last two decades (Viglizzo et al. 2011).

Various Brazilian organizations united to develop a project on integrated crop/livestock zero-tillage systems in the Brazilian Cerrado. Rotating annual crops such as maize, soy and rice with no tillage allowed the intensification of land use, increased productivity per hectare and reduced the need for clearing additional land for pasture or arable land. Estimates indicate that this resulted in a reduction in clearance of 0.25–2.5 hectares for every hectare involved in the project. Reported effects of integrating crops and livestock with zero tillage showed less use of leaching herbicides, lower fertilizer use and lower greenhouse gas emissions (Landers 2007).

2.2. Most relevant environmental problems

The GRULAC region has the world's largest reserves of arable land, but unplanned urban expansion, erosion, unsustainable land use, loss of nutrients, chemical pollution, overgrazing and deforestation have caused degradation of what once was productive agricultural land-over 300 million hectares, representing 16 percent of the whole world. Land degradation is a major environmental issue in this region. The problem is more severe in Mesoamerica, where 26 percent of the territory has been affected, whereas in the Southern Cone subregion only 14 percent has suffered such impact (UNEP, 2004).

An estimation shows that in the Southern Cone alone, 682,000 km^2have been affected by nutrient loss, with about 450,000 km^2 affected in a moderate to severe degree. Fertility is decreasing in north-eastern, Brazil and northern Argentina, while other critical areas are found in Mexico, Colombia, Bolivia and Paraguay.

Only 12.4 percent of the subregion's agricultural land has no fertility limitations. In 2002, the subregion consumed approximately 5 million tons of nitrogen fertilizers, equivalent to 5.9 percent of the global consumption of which 68 percent was consumed by Argentina, Brazil and Mexico alone. The impact of pesticide use on the environment is being addressed as a priority by the scientific community. Developing countries account for 30 percent of the global pesticide consumer market and among them, Brazil is the largest individual consumer market, accounting for half of all Latin American pesticide consumption (Peres et al. 2007).

Forty percent of the population lives in areas having only 10 percent of the region's water resources. The quality of the surface and ground water has been severely deteriorated. Pollution of aquifers is extensive and saline intrusion affects coastal areas. Freshwater availability in Latin America and the Caribbean is much higher than the world average. The region contains 30 percent of the world's renewable water resources and three hydrographic regions that cover 25 percent of the region.

Freshwater resources are unevenly distributed. Brazil alone has nearly 40 percent of this resource. On the other hand, almost 6 percent of the region's land is desert and, in some places, such as the Chihuahua or Atacama deserts, there is scarce precipitation. With 79 percent of its population living in towns and cities (UNEP 2010b), the region is one of the most urbanized in the world. It faces challenges in providing its flourishing towns and cities with safe water and sanitation, and in addressing air pollution and the contamination of its freshwater, oceans and seas. The associated competition for scarce resources and the inequitable distribution of benefits have led to emerging socio-environmental conflicts and risks to the traditional lifestyles and livelihoods of local and indigenous communities. (GEO-5, 2012).

Over the last 30 years, there has been a significant decrease in both surface and groundwater quality in the region due to increasing use in agricultural activities and domestic untreated wastewater (GEO-4 2007). The growing water demand and pollution, especially in and around the urban areas, has progressively diminished water availability and quality. For the first time in the last 30 years, water availability has become a limiting factor for socioeconomic development of some Latin America and the Caribbean areas, particularly in the Caribbean (ECLAC 2002).

Global climate change exacerbates many of the region's existing problems. Extreme weather patterns and climatic events are increasing in frequency and intensity, and sea levels are rising.

The impacts are already affecting the region's most vulnerable groups, including its small island developing states and many rural, indigenous and poor populations. Thus, it is even more important to use water resources efficiently and to conserve and sustain terrestrial, coastal and marine ecosystems. The challenge, however, is huge and the region is far from achieving some of the Millennium Development Goals (MDGs) (UN 2010a).

Given the current situation, including poverty throughout Latin America and the Caribbean, there is an urgent need to implement more effective measures to halt and reverse the region's negative environmental trends (UN 2010a).

The GRULAC countries cover 25 percent of the global forest area and account for 40 percent of the loss of natural forest in the past 30 years. Some of their forest habitats are in danger, with the highest rates of deforestation in the world. Notwithstanding, Latin America and the Caribbean's protected areas, including marine, cover more than 500 million hectares. They are considered one of the region's most important policy measures for conserving biological diversity (Bovarnick et al. 2010; UNEP 2010b).

There is documented evidence that protected areas not only play a role in conserving species and habitats, but also deliver a range of ecosystem services and are considered important in climate change adaptation and mitigation (CBD 2008). If properly managed, they can contribute both to national gross domestic product (GDP) and help to cover their own costs (Table 12.3a, b). Although not often perceived, protected areas have the potential to provide a range of social benefits: improving equity and alleviating poverty as well as empowering women, communities and indigenous people, all of which are important considerations in the region (Bovarnick et al. 2010).

New protection efforts have been made,including the creation of the Mesoamerican Biological Corridor from southern Mexico to Panama. The Brazilian Amazon's annual deforestation rates are decreasing and the strategies to diminish deforestation include containment through licensing procedures, monitoring, and fines. As a result of integrated prevention and control programmes, annual deforestation in the Amazon decreased from 26,100 km^2 in 2004, to 13,100 km^2 in 2006 (INPE, 2006). Brazil's Amazon Region Protected Areas (ARPA) Programme is the largest worldwide initiative in tropical forest conservation, aiming to protect 600,000 km^2 of biologically important areas between 2003 and 2018. (GEO-5, 2012). ARPA has the potential to avoid 5 billion tons of carbon emissions by 2050 (Simpson 2010; Azevedo-Ramos et al. 2006).

Political reforms are also needed to address the root causes of deforestation, including the role of clearing in establishing land claims (Fearnside, 2005). Paraguay, which until 2004 had one of the world's highest forest loss rates, has diminished this in its eastern regions. The so-called "Zero Deforestation Law" passed in 2004 by the Paraguayan Congress has helped to reduce the deforestation rate by 85 percent (WWF 2006).

The deforestation rate in the region is among the highest in the world. The transformation of forest soils into grazing land, farmland and more recently into areas for biofuel production (as well as for urban expansion, to a lesser extent) has compromised the ecological integrity of forest ecosystems, limited their ability to provide environmental services, fragmented them dramatically and in many cases eliminated them entirely (GEO-LAC-3-2010)

There are 227 designated Ramsar sites, 16 in LAC, covering a total area of approximately 35.9 million hectares. The conversion of mangroves for tourism and other types of land use has resulted in the destruction of these ecosystems, with direct effects on fishing and on the ability of the systems to provide required environmental services. (GEO-LAC-3-2010)

Coastal infrastructure, urbanization and tourism and land-based pollution are significant pressures on coastal and marine ecosystems. The rise in sea level due to climate change and the increasing frequency of El Niño/La Niña phenomena are also affecting coasts and changing coastline dynamics, ecosystem health, rainfall patterns and river flows, as well as damaging infrastructure (GEO-5, 2012).

Poor air quality has been a problem in the region, especially in larger urban areas such as Mexico City, Santiago de Chile, SãoPaulo, and Bogotá. The World Health Organization (WHO, 2014) reports that in 2012, around 7 million people died as a result of air pollution exposure, outdoors and indoors, of which 3.7 million are linked to outdoor air pollution. About 88 percent of these deaths occur in low and middle income countries, which represent 82 percent of the world's population. About 58,000 deaths occurred in Latin America in 2012. There were 4.3 million deaths attributable to household air pollution, 81,000 in Latin America.

Urban growth, population growth and rural-urban migration have caused an urban population explosion from 163.9 million in 1970 to 600 million in 2012 (ECLAC, Statistics and indicators. Web Portal). The problems of urban areas include inadequate water supply and sanitation, insufficient waste management, poor air quality, health problems, violence, and other social problems, environmental pollution, and the increasing vulnerability to natural hazards, particularly at the poorest sectors.

2.3. Health Issues

Infant mortality in the region has declined dramatically over the past decade, largely due to the success of proven low-cost technologies and approaches to improving child health. Mortality rates in children under 1 year declined from 47.2 per 1,000 live births in 1990 to 29.6 in 2008. Malnutrition continues to be a major concern, particularly in Central America, where growth deficiencies among children under age 5 is still very high (USAID, 2007).Growth deficiencies are a sign of nutritional deficiencies that result in irreversible physical and mental limitations, leaving these children with a burden they will carry into adult life.

Infectious diseases, including tuberculosis (TB) and malaria, are also important health concerns for the GRULAC region; some progress has been attained in the past decade by increasing case detection and improving treatment outcomes. Reported malaria cases in the GRULAC region exceeded 800,000 in 2003, with more than 75 percent occurring in the Amazon Basin countries of Brazil, Colombia, and Peru. Dengue and dengue haemorrhagic fever (DHF) pose another serious public health threat in the GRULAC region. Brazil, Colombia, and the Central America subregion account for the majority of cases. In 2002 and 2003, the reported cases of dengue and DHF in these countriesamounted to nearly 1.4 million (USAID, 2007).

Other infectious diseases with public health impact in the GRULAC region include Chagas disease and leishmaniasis. Chagas, a debilitating and fatal disease of smooth muscle tissue that is spread through the bite of the Chagas beetle, is endemic in 18 Latin American countries. Leishmaniasis occurs in South America, primarily in Brazil, Bolivia, and Peru. It is transmitted through the bite of the infected female phlebotomine sandfly.Leishmaniasis are a globally widespread group of parasitic diseases. The common form causes nonfatal, disfiguring lesions, but epidemics of a rarer form can cause thousands of deaths (USAID, 2007).

In spite of the existence of several studies related to chemical exposure and health effects, there is no complete diagnosis in the region oriented to evaluating these relationships in the population in general.

2.4. Governance

Latin America and the Caribbean are marked by the persistence of environmental problems partly associated with overpopulation in large cities and poverty. The1990's also saw a number of positive changes, including greater participation of citizens in decision-making, the development of public and private networks to defend the environment and the promotion of environmental education. In Latin America and the Caribbean environmental governance is a complicated issue, since the environment has not yet been granted the high-priority status it requires (Gabaldón and Rodríguez 2002). Regional participation in global multilateral environmental agreements (MEAs) is generally high and governmental institutions formally devoted to environmental matters have been created in most countries over the last 20 years. However, the profile and budgets of environmental institutions are often lower than those of other ministries or departments, and to date they continue to fail at placing environmental matters among the priorities.

Without strong governance frameworks to support environmental decision-making, efforts to ensure greater environmental sustainability are unlikely to be effective.Too often, policies tend to focus on the direct pressures affecting ecosystems and their services, because these are best understood or are the easiest to address. However, until policies begin to address some of the deeper, underlying causes of environmental degradation, countries are unlikely to meet the goals and targets established in international, regional and national agreements. Thus, there is a need to invest more in understanding these drivers and how they work together. A greater integration of environmental considerations into broader development processes is also necessary (GEO-5, 2012).

In recent decades, most Latin American and Caribbean countries have developed national environmental legal and institutional frameworks to formulate strategies and action plans for sustainable natural resource use and environmental protection (UNEP 2010b; Larson 2003). In addition, countries have begun to adopt a more cross-sectorial approach, with other agencies considering environmental issues in addition to those directly responsible for the environment.

Despite these achievements, a limited capacity to implement and enforce existing legislation and poor institutional arrangements constrain effectiveness (UNEP 2010b). The weak development of environmental policies whilst facing economic, financial, commercial and technological globalization has aggravated the situation (UNEP 2011c). Managing national environmental policies and balancing internal priorities among other sectorial needs, while engaging in multilateral efforts through multilateral environmental agreements, constitutes a major challenge for the region.

Despite these difficulties, governmental, academic and social institutions increasingly ensure that environmental issues are taken into account (Guimaraes and Bárcena, 2002). Over 90 percent of the countries in Latin America and the Caribbean have signed MEAs, such as, the Montreal and the Kyoto protocols and the Basel Convention. MEAs related to biological diversity and desertification have even higher levels of participation. The participation in multilateral environmental signatures, such as the Cartagena Protocol, and the Rotterdam and Stockholm conventions, have similar amount of involved parties, at 92, 79 and 93 percent, respectively (www.chm.pops.in).

Ensuring compliance with MEAs continues to be a major challenge, as enforcement depends on national (and sometimes subregional) action in which governmental capacities are critical (Geo- 4, 2007). The Wider Caribbean Programme (within the Cartagena Convention) and its protocols are important multilateral regional agreements and action plans for the future.

Several countries of the region also belong to the Antarctic Treaty (Argentina, Brazil, Chile, Peru, Ecuador, Uruguay), and many of them perform research activities within the Antarctic region, but there are no publications available related to POPs research. The countries of the GRULAC region have been working in many coordinated efforts, addressing regional problems during several years. However, even when these efforts have been very effective in the international forums, still these are not enough for building sustainable POPs programmes with a proper regional structure.

Under Article 15 of the Stockholm Convention countries must report total quantities of POPs listed in the annex A, B and C. Only 6 countries have submitted their national report pursuant to Article 15 of the said Convention, Antigua and Barbuda, Argentina, Colombia, Brazil, Chile and Mexico (available on the internet at www.pops.int. June 2014).

The GRULAC region has nominated 4 regional Centres of the Stockholm Convention (Brazil, Mexico, Panama and Uruguay), which may play an important role to support a regional monitoring programme.

2.5. POPs related issues in the region

Most of the GRULAC countries are parties to the Stockholm Convention (25 parties and 8 signatories). Some of them (Antigua and Barbuda, Argentina, Colombia, Barbados, Bolivia, Chile, Ecuador, Mexico, Panama, Peru, Saint Lucia, Uruguay) have concluded their National Implementation Plans. Information regarding sources and inventories of POPs are reported in these NIPs.

The predominant regional POPs sources in the Mesoamerica and the Caribbean regions are agriculture, public health, energy, industry and waste management. Many of the POPs pesticides have been applied in the region in agriculture or vector control. Also, PCBs have been used in many electrical devices including transformers and capacitors. Furthermore, inadequate incineration of domestic, industrial and agricultural waste and land-clearing fires are potential sources of PCDDs, PCDFs. In many countries in the region, incinerators are widely used for hospital waste. Disposal of obsolete stocks of banned pesticides and other POPs represents a problem.

In the countries of the Andean and Southern Cone Subregionsknowledge regarding the sources of POPs contamination is still scarce. POPs pesticides are forbidden, but the total amount of chlorinated pesticides used at thesubregional level before the banning of these products is not available. Some POPs pesticides were even produced within the region; consequently, the legacy of this industrial activity has been noted in several areas now considered as hot spots or as 'heavily contaminated'. The main source for polychlorinated biphenyls (PCBs) is contaminated oil in electrical equipment (in use or stored); however other uses cannot be dismissed. The existing dioxins and furans inventories in the region reveal that uncontrolled biomass combustion is one of their major release sources, and that it is responsible for up to 70 percent of the total releases. Incinerators for hospital waste are widely used in many countries in the region.

Independent estimations using both CO_2 emissions and the GDP, indicate a total release of dioxins into the air that reaches a 3000 – 5000 g TEQ/Year for the entire region (Barra et al. 2005, 2007).

Human exposure to POPs has been documented in many countries within the region, but the data are still incomplete to allow an in-depth regional evaluation. However it is expected that the general population could be exposed through different environmental means and food.

Regional evidence of POPs in air, marine, freshwater and terrestrial ecosystems, food, and human biological samples is scattered across time periods, locations, and methods, with scarce evaluation of temporal or spatial trends. Therefore, it is difficult to attempt creating an overall picture due to a lack of comparability between surveys and lack of monitoring and surveillance programmes. Chlorinated pesticides and PCBs have been detected in atmospheric, marine, freshwater, groundwater, sediment, soil, food and biota samples, including human blood and milk.

It is believed that pesticide banning and the enforcement of regulations during recent years have resulted in reduced levels of these products in humans. Dietary human exposure through the food chain has been little explored. Independently of the food habits for the people in this region, it is well known that dietary intake accounts for more than 90 percent of the total potential intake for dioxins and furans (Domingo and Bocio, 2007); the same situation is given for PCBs.

Latin America and the Caribbean's ecosystems and associated natural capital are important to both the region's countries and to the entire planet. However, persistent negative environmental and related socio-economic trends are a clear indication that the measures established thus far and implemented to protect them –at national, subnational or supranational levels– are insufficient to address either the rate or scale of conversion and consumption prevalent within the region. Consequently, Latin American and Caribbean countries continue to face such issues as poverty, inequity and social conflict related to environmental quality.

3. REGIONAL IMPLEMENTATION ORGANIZATION

This project has been possible thanks to the participation of several GRULAC countries and the support of the UNEP/GEF, the SAICM, the Spanish CISC and the University of Freiburg, Germany. Its goal is to strengthen national capacities for POPs monitoring in the air and in human milk, and to participate and contribute to the implementation of the Global Monitoring Plan for POPs.

It is important to mention the Global Passive Atmospheric Sampling (GAPS), which has the goal of demonstrating the feasibility of using passive samplers to evaluate the spatial and temporal distribution of POPs at a global level. The GAPS network includes more than 40 sites in 7 countries, most of them as background sites, with some of them at agricultural and urban areas. (Pozo et al, 2006).

On the other hand, the LAPAN Project was created with the support of the Brazilian Research Board and coordinated by Gilberto Fillman, which involves the participation of 10 countries (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Venezuela and Uruguay).

The following section of this document describes the different actions and organization mechanisms implemented during recent years with the aim of strengthening capacities and generating information that feeds the UNEP data warehouse on POPs.

3.1. Meetings and workshops that support the activities of the Global Monitoring Plan in Latin America and the Caribbean

Several meetings were held to define the objectives and strategies as well as to reinforce the capacities and the implementation of the Global Monitoring Plan of POPs in Latin America and the Caribbean.

The Regional Workshop to start the UNEP/GEF Project “Support to the Implementation of the POPs Global Monitoring Plan in the countries of Latin America and the Caribbean” took place in November 2009, where the objectives, activities and the outcomes expected were presented. They also presented the experiences of the countries participating in the PNUMA/GEF and SAICM projects in POPs monitoring in air and human milk, as well as the infrastructure status of the laboratories and their capacity to perform POPs analysis.

The Global Coordinating Groupheld sessions during April and October 2010 where they discussed the consequences of including new POPs, the current activities of perfluorate chemicals in human milk and serum, the PFOS sampling guidelines in seawater, big lakes, specimen banking, long distance transportation, and the climate effects on air samples.

During March 2011 the Coordinating group of the Global Monitoring Plan reviewed the guiding document of the Global POPs Monitoring Plan (GMP) and discussed the implementation of the second phase of the plan. They also reviewed the preliminary GMP guidelines including long distance transportation, the climate change effects, specimen banking, and the impact of including nine new chemical products. The strategy, process, structure and terms of the regional surveillance reports were also revised.

The final workshop of the PNUMA/GEF "Support to the Implementation of the POPs Global Monitoring Plan in the countries of Latin America and the Caribbean” was held in March 2011, in Barcelona, Spain, with the goals of discussing the results of the GMP for POPs in Latin America and the Caribbean; showing that the POPs national laboratories of this region have participated in the PNUMA interlaboratories,to demonstrate their capacity to analyse for POPs chemicals, and that they have received in situ training by The Laboratory of Dioxins, as well as the Laboratory for the Analysis of POPs in Water of the IDAEA- CSIC of Barcelona, Spain. The Amsterdam IVM provided training within the SAICM project in Barbados. The database resulting from this project will allow for a better understanding of the transportation and destination of these persistent pollutants in Latin America and the Caribbean region.

The Global Coordination Group and the Persistent Organic Pollutants Global Monitoring ProgrammeRegional Organization Groups worked together in October 2012 with the aim of finishing the review of the GMP guidelines document and discussing the implementation of the second phase of this plan.

The coordination group also reviewed the strategy, process and structure of the regional monitoring reports to adapt them to the requirements of the second and future effectiveness evaluations of the convention. They established terms for the activities to facilitate the preparation of the regional monitoring reports. They agreed on the substitution of the first reports with the second ones, so the second reports will be the reference documents for the GMP as they offer a full vision of the region.

Regarding data management, they will include those from the regional/global programmes of passive sampling. The regional reports will be sent to the coordinating group to facilitate the issue of a global report.

At the Sixth Meeting of the Conference of the Parties to the Stockholm Convention,held in Geneva, Switzerland, May 2013, it was agreed that the effectiveness evaluation was a vital issue to determine whether the Stockholm Convention is complying with its goal of protecting human health and the environment from persistent organic pollutants. The Meeting also emphasized the importance of the Secretariat continuing to provide support to the regional organization groups and the global coordination group, as well as reinforcing the technical and financial support for the countries that need assistance to perform the national monitoring activities. They also pointed out the importance of supporting the creation and consolidation of the laboratories' analytical capacities to ensure reliable sampling and analysis.

The members of the Regional Organization Groups (ROG) and the Global Coordination Group (GCG) for the POPs Global Monitoring Plan met on September 2013 in Brno, Czech Republic, where they discussed the second phase of the Global Monitoring Plan, which includes air monitoring, human matrix, water and activities to strengthen the capacities. They also examined the data management and storage in order to increase the data reliability and comparison.

3.2. Coordination of the regional activities

The implementation of the UNEP/GEF Project "Support to the Implementation of the POPs Global Monitoring Plan in the countries of Latin America and the Caribbean" is managed by the Basel Convention Coordinating Centre-Stockholm Convention Regional Centre for Latin America and the Caribbean, with offices in Uruguay (hereinafter called BCCC- SCRC) in cooperation with the laboratories designated by the countries participating in this project: Antigua and Barbuda, Brazil, Chile, Ecuador, Jamaica, Mexico, Peru and Uruguay.

The Laboratory for dioxins, the Institute of Environmental Assessment and Water Research- Spanish Council for Scientific Research (IDEAEA- CSIC) of Barcelona, Spain, participated in the project as reference laboratories for air samplers. The reference laboratory for the WHO and UNEP for human milk samples has been The State Institute for Chemical and Veterinary analysis of Food (CVUA) of Freiburg, Germany. (UNEP/GEF, 2012).

The BCCC- SCRC performed general coordination tasks at a regional level, both face to face and via e-mail or teleconference, in order to organize and manage the project activities. Videoconferences were also held with certain countries to exchange information and set up work plans. Prior to the startof the project, the focal points of the Stockholm Convention were contacted to appoint the people in charge and stakeholders involved. Once identified, invitations were sent to the project launching workshop. The drafting, review and signature of the memorandum of understanding (MOU) were carried out by the involved parties during the first semester, however these activities took almost one year in some countries.

The BCCC- SCRC developed guidelines for the management of passive air samplers according to the established timeline, both in Spanish and English. Guidelines for the assembly of passive air samplers were developed and documented by Esteban Abad from the CSIC, in cooperation with UNEP; these guidelines were translated into English and distributed to target countries. The BCCC-SCRC used said version as a basis, with prior authorization from Fundação Oswaldo Cruz (FIOCRUZ)and made some changes adapting it to the GMP-GRULAC project countries.

The project was disseminated through different media and in global and regional meetings. A brochure and a banner with information on the project were designed and presented at the 4th GEF Assembly (24-28 May 2010, Punta del Este, Uruguay) and in other meetings. The brochure is available on the BCCC-SCRC website.

In addition, the design, development and maintenance of the Geographic Information System, which includes data on the monitoring of POPs in air and human milk for the GMP project, were completed. Data was processed and different charts were developed per substance, country matrix, as well as comparative charts per group of substances in different countries. The site will remain open to incorporate information on future results of POPs monitoring in different matrices.

3.3. Organization and Development

3.3.1. Organization

The BCCC-SCRC as the Regional Project Coordinator was responsible, among other, for follow-up, generating guidelines, collaborating in organizing the workshops.

As national counterparts, each country appointed:

- a National Coordinator;
- staff in charge of air and human milk monitoring;
- laboratories to perform the analysis of POPs in different matrices.

3.3.2. Development

Mother's Milk

The World Health Organization (WHO) and the UNEP developed a generic protocol for studies of human exposure to POPs in 2007. Fundação Oswaldo Cruz (FIOCRUZ-Rio de Janeiro, Brazil) prepared a summarized version of the above mentioned protocol. Subsequently, the BCCC-SCRC used said version as a basis, with prior authorization from FIOCRUZ, and made some changes adapting it to the region. It was then translated into Spanish and English, before distributing it among the GMP- GRULAC project countries.

Each participating country, based on the Protocol provided by the BCCC- SCRC, designed the monitoring of POPs in mother's milk according to their national capacities. This protocol specifies everything related to the monitoring, such as the characteristics of mothers to be considered, sample storage conditions, etc. Each country was responsible for building a pool consisting of 50 individual samples and sending a fraction to the Reference Laboratory.

Antigua and Barbuda, Chile and Uruguay performed the sampling of mother's milk prior to this project, through co-financing from the Secretariat of the Stockholm Convention, and according to an agreement between UNEP and WHO, the results obtained were collected to be included in the GMP. On the other hand, the collection and analysis of samples from Barbados, Chile once again, Cuba, Haiti, Mexico and Peru were performed during the execution of the GMP. Ecuador and Brazil were not able to collect any samples (UNEP/GEF, 2012).

Air

The monitoring of POPs in air was conducted using Passive Air Samplers (PAS). These consist of replaceable polyurethane foam (PUF) placed on an aluminium structure, so that the foam is in contact with air. Both the aluminium structure and the polyurethane foam were provided to all GMP participating countries (countries with GEF or SAICM funds).

Esteban Abad, from CSIC, developed and documented the guidelines for the assembling of passive air samplers. Those guidelines were distributed by the BCCC- SCRC Which generated specific instructions for this type of passive air samplers.

Within the project, each country selected a monitoring point. Table 3.1 shows their location coordinates. Each monitoring point had five PAS. Four samples were taken from each point over a year. The sample was comprised of 5 polyurethane foams (PUFs) which were exposed for three months then they were removed, stored and sent according to the recommendations within the abovementioned documents prepared by the CSIC and the BCCC-SCRC. Two of the five PUFs were to be analysed in the country and the other three at the CSIC. For those countries with the capacity of analysing PCDD/ PCDF at a national level, the number of PUFs used was 8 (UNEP/GEF, 2012).

Global Atmospheric Passive Sampling

The GAPS project originated in Canada in 2004-2005. It included approximately 60 sites in its first phase. This is one of the programmes which report to the Global Monitoring Plan of the Stockholm Convention for Persistent Organic Chemicals.

The organic chemicals included in this project are the ones considered within the Stockholm Convention, among which we can mention the organochlorine pesticides, PCDD&PCDF, PCBs, PFBs, PBDEs, endosulfan.

Some of the main objectives of the GAPS project were as follows:

- demonstrate the feasibility of using passive samplers for the identification and quantification of POPs;
- determine temporal and spatial tendencies of POPs in air;
- contribute useful data for the regional and global evaluation of the long distance atmospheric transportation of POPs.

Some of the criteria established for selecting the sites for the project are:

- Site identification
    - the existence of weather stations operated by the Global Weather Organization, or other similar systems or programmes in the participating countries;
    - participation of academics or researchers.
- Site location
    - the sampling sites must be located 2 metres above ground level in open spaces without any obstacles for the wind;
    - awayfrom the influence area of any potential sources of contamination (chimneys, human activities, combustion processes).
- The selection and number of sites considers a balance of:
    - capacity of the laboratories;
    - how representative the sites are and their utility in the validation of models;
    - availability and disposition of the participating countries;
    - regions whose data enable a spatial span at a global level;
    - availabilityof funds to operate the Environmental Agency of Canada and the participating countries' contribution.

Latin American Passive Atmospheric Monitoring Network (LAPAN)

The **Latin American Passive Atmospheric Monitoring Network** was created with the support of the Brazilian Research Council, with the goal of:

- creating a permanent regional research network in South America;
- producing seasonal long term studies of POPs (and other organic persistent pollutants);
- extending the GAPS network, improving the temporal and spatial resolution in South America;
- evaluating the local and global POPs sources to be installed in rural, industrial, urban and remote areas;
- fulfilling the needs of South American countries for them to comply with the POPs monitoring commitments within the Stockholm Convention;
- comparing different passive atmospheric sampling methods (PAS-XAD-2 and pine needles);
- improving the QA/QC procedures (e.g. interlaboratory studies);
- improving/consolidating research exchange programmes;
- improving the local capacities and professional qualifications. (Flimman, Gilberto, 2011)

POPs Global Interlaboratory Evaluation - Biennial

The first PNUMA interlaboratory evaluation at a global level of POPs was organized within the GMP project, considering the development level of POPs analytical capacities of the countries involved. For the organochlorinepesticides mix analysis, dl-POPs mix, PCBs mix, five matrices were given: solution, sediments, fish, chimney ashes (only for PCDD/PCDF) and human milk.

The main findings of the first interlaboratory evaluation included:

For the dlPOPS:

- 37 laboratories sent data for PCDD/PCDF in standard solution, 29m laboratories for di-PCB;
- 26 laboratories sent results for PCDD/PCDF in flying ashes and sediments; 20 and 22 for dl-PCB;
- 19 and 15 sent information for PCDD/PCDF in fish and human milk; 15 for di-PCB;
- good results were obtained unexpectedly for dl-POPs;
- the best results were obtained for standard solutions: RDS (TEQ PCDD/PCDF) =8%;
- theworst results were obtained in flying ashes: RSD (TEQ total) = 20%.

Basic POPs

- the good results obtained show a satisfactory instrument calibration;

- the PCB>OCPs performance;
- ΣPCB: the performance for Africa and GRULAC was slightly lower than in other regions. (Fiedler, 2014)

For the second interlaboratory evaluation the following criteria were considered:

For standard solutions:

- OCPs: aldrin, dieldrin, endrin, chlordanes, heptachlors, DDT,hexachlorobenzene, mirex, HCHs, endosulfan, chlordecone, pentachlorobenzenein the concentration range of 1 µg/kg-1,000 µg/kg
- PCB: six indicators of PCB in the concentration range of 1 µg/kg-10 µg/kg
- PCDD/PCDF: 2,3,7,8-substituted congeners in the concentration range of 35 µg/kg-180 µg/kg
- dl-PCB: 12 dl-PCB in the concentration range of 170 µg/kg-300 µg/kg
- PBDE/PBB: PBDE and PBB-153 in the concentration range of 70 µg/kg -570 µg/kg
- PFOS: polyfluoralkyl substances (PFCAs, PFSAs, FOSA) including PFOS and FOSA in the concentration range of 125 µg/kg -320 µg/kg.
- PFAS: mixture of perfluoralkyl substances (Me-FOSA, Et- ME-FOSE, Et-FOSE) in the concentration range of 630 µg/kg -1,260 µg/kg (Fiedler, 2014)

Table 3.1 shows the number of GRULAC laboratories and the matrix in which they participated in this second round of interlaboratory assessment.

Table 3.1. Number of GRULAC laboratories and matrix used in the laboratory assessment

Persistent organic chemicals	Standard solution	Sediments	Fish	Human Milk	Air	Transformer oil
Organochlorine pesticides	9	7	7	5	4	
PCB	9	8	6	5	3	2
PCDD/PCDF	2	0	2	0	1	
dl-PCB	2	0	2	0	1	
PBDE	1	1	1	1	1	
PFOs	0	0	0	0	0	

Source: Fiedler, Heidelore, 2014. Summary of key results from the second round of interlaboratory assessment of POPs laboratories

The results of the second evaluation show that the GRULAC laboratories participating in the trial present a wide spread in their results, as in the case of dihedron with 9 participating laboratories where four complied with the UNEP criteria and five were out of range.

Regarding the PCBs standard solutions results, the variation range in GRULAC was of 2 to 32 percent, lower than the WEOG and Asia regions, but in fish and sediments the behaviour was worse than in those regions. In the case of fish GRULAC had a greater deviation and higher individual variations.

The global result of the participating laboratories was satisfactory for over 60 percent of the data sent for OCP PCB and PCDD/PCDF. Nevertheless,in relation to the prior study, the result for all other types of pollutants was lower. For PCDD/PCDF 97 percent satisfactory in the first study versus 74 percent in this study; PCB 86 percent in the first study against 66 percent in the second; OCP 68-77 percent and 61 in the current one. The PBDE showed figures comparable just below 60 percent which is an acceptable value, since it is the first trial with such chemical. Only 15 percent of PFAS present acceptable results. (UNEP 2014)

4 METHODS FOR SAMPLING, ANALYSIS AND HANDLING OF DATA

4.1 Strategy for gathering new information

For collecting new information, which should allow comparing results and identifying tendencies, the following studies or projects were considered:

- a survey requesting information (shown on annex 1) was sent to the GRULAC region countries;
- the execution of the UNEP/GEF project in GRULAC called "Support to the Implementation of the POPs Global Monitoring Plan in the countries of Latin America and the Caribbean";
- the results of the SAICM project in Caribbean countries;
- results from the Global Atmospheric Passive Sampling (GAPS) supported by the Canadian Environmental Agency;
- resultsfrom the operation of the Atmospheric Passive Sampling network in Latin America.

4.2 Programmes/activities related to air monitoring

The Global Monitoring Plan (GMP) in ambient air established by the United Nations Environment Programme aims to provide representative information on the long-term presence of POPs in the environment, their time trends and regional and global transport.

GEF financed the implementation of the GMP for Latin America and the Caribbean, involving 8 countries in the first stage: Antigua and Barbuda, Brazil, Chile, Ecuador Jamaica, Mexico, Peru and Uruguay. Furthermore SAICM supported capacity-building efforts to Barbados Bahamas and Haiti to participate in the draft GMP, while Cuba received support on strengthening laboratory capabilities.

The biggest challenge in the implementation and operation of a monitoring network with these characteristics is the selection of the number and location of sampling stations, in order to obtain representative data on the long-term trend of POPs. Therefore, the sites selected for the installation of PAS were chosen very carefully so that they met the requirements of representativeness and lack of direct influence of POPs emitters. The projects were carried out from mid-2009 to early 2012, installing passive samplers in four exposure periods of three months from July 2010 to June 2011.

On the other hand, the Global Atmospheric Passive Monitoring Programme (GAPS), which operates sites measuring POPs strategically placed around the world, including the GRULAC region, generates datafor these substances since 2004. The countries participating in this programme in the region are: Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Mexico and Ecuador.

Similarly, the Latin Passive Air Monitoring Network (LAPAN), funded by the Research Council of Brazil, aims for the region to have a permanent research system for persistent organic compounds through passive methods that include the following countries; Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay and Venezuela, among other goals.

4.2.1 Project UNEP/GEF/SAICM. Passive air samplers (PAS)

Methods and materials

Passive air samplers (PAS) have been developed as simple and cost-effective alternatives to active air samplers and are increasingly used to monitor ambient air concentrations of POPs (Shoeib and Harner, 2002).

The core part of PAS consists of an adsorbent that is exposed to a passive air flow. Polyurethane foam (PUF) disks have proven to be adequate adsorbents in PAS, due to their capacity for retention of POPs, as well as their low costs and simple handling. PAS used are identical to the devices used in several previous studies (Klánováet *al.*, 2008; Pozoet *al.*, 2006; 2009; Shoeib and Harner, 2002) and consist of a PUF disk protected from dry and wet deposition by a stainless steel casing (Figure 3-1).

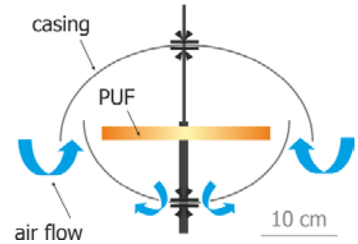

Figure 4.1. Cross-section of a passive air sampler (PAS) equipped with a polyurethane foam (PUF) disk as adsorbent for airborne persistent organic pollutants (POPs)

Deployment of PAS and collection of PUF

In LAC the CSIC (Consejo Superior de InvestigacionesCientíficas) from Spain was responsible for providing the GAPs samplers. They provided clean PUFs, wrapped in aluminium foil; each PAS was delivered with five PUFs; four for the four seasons and one in reserve or as a lab blank. The CSIC was the authorized laboratory that provided the GAPs samplers and analysed the samples collected from the LAC countries.

Figure 4.2. Sampler used in GRULAC

A document with a standard operating procedure was prepared and provided to the project participants. To the extent possible, the instructions provided in the standard operating procedure were followed by the operators on site. The regional representation of the sampling site was one of the most important criteria that had to be considered. Sampling locations should not be heavily influenced by POPs emissions from very close local sources; rather, they should sample air representative of a wide region around the site.

A description of all selected sites was provided. PAS were located in urban and industrial regions, as well as in rural and remote sites (Table 4.2). PAS were installed vertically at about 1.5 m to 2.0 m above ground or above the roof of a building. PAS were installed for one year in each country (except for Pacific Island: six or three months) and PUFs were changed every three months.

Analyses of PUFs

Details on the laboratories and the national results, where available, can be found in the regional reports from the three GEF and two SAICM projects. We report herein the results generated by the expert laboratories, *i.e.,* IVM VU University Amsterdam for basic POPs in Africa and Pacific Islands, MTM Örebro University for dl-POPs in Africa and Pacific Islands, and CSIC/IDAEA Barcelona for basic POPs and dl-POPs in Latin America.

All expert laboratories participated in the First Worldwide UNEP Inter-laboratory Study on POPs. For the analysis of basic POPs, IVM VU University Amsterdam and CSIC applied capillary gas chromatography with two columns of different polarity coupled to electron capture detector (ECD). For the analysis of dl-POPs, MTM Örebro University and CSIC/IDEA applied capillary gas chromatography coupled to high-resolution mass spectrometer (HRMS) following EPA Method 1613 or EN 1948 for PCDD/PCDF and EPA Method 1668 for PCB

Results were reported in the UNEP reporting scheme as developed for the Global Monitoring Plan (UNEP GMP). The results were reported as upper-bound (UB) and lower-bound (LB).

Chemical Analysis

PUF disk extracts were analysed for a suite of target compounds that included OCPs, PCBs, and PBDEs. Samples were screened for 48 PCB congeners, 17 PBDEs, and 19 OCPs: R-,*γ*-, *δ*-HCHs, aldrin, heptachlor, heptachlor epoxide, *cis*-chlordane, *trans*-chlordane, *trans*nonachlor, endosulfan 1, endosulfan 2, endosulfansulfate, *o,p′*-DDE, *p,p′*-DDE, *o,p′*-DDD, *p,p′*-DDD, *o,p′*-DDT, *p,p′*- DDT(Ultra Scientific, North Kingstown, RI).

Results are only reported for OCPs that were detected consistently. PCB concentrations are reported as the sum of the 48 congeners (Σ48). Analysis of PUF disk extracts was carried out by gas chromatography-mass spectrometry (GC-MS)ona Hewlett- Packard 6890 GC-5973 MS for PCBs, using electron impact (EI), and for OCPs and PBDEs by negative chemical ionization (NCI).

Limit of detection (LOD) was defined as the average field blank (*n* =30) plus three standard deviations (SD). When target compounds were not detected in blanks, the ½ instrumental detection limit (IDL) value was substituted for LOD. For data values that fell below the LOD, 1/2 LOD was used for calculating means. All qualified data (i.e., those exceeding the LOD) were blank corrected.

Target POPs

Target POPs are classified in two categories, namely basic POPs and dioxin-like-POPs (dl-POPs), as listed in Table 4.5.

Table 4.1. Compound classes (including isomers and congeners) considered in this project

ABBREVIATION FOR CHEMICAL CLASS	CHEMICAL CLASS	COMPOUNDS INCLUDED IN CHEMICAL CLASS
	Basic POPs	
ΣDrins	Aldrin Dieldrin Eldrin	Single compound Single compound Single compound
ΣChlordanes	Chlordanes	isomers α-chlordane, γ-chlordane, oxychlordane, *cis*-nonachlor, and *trans*-nonachlor
Σ DDTs	Σ DDTs	parent compound dichlorodiphenyltrichloroethane DDT, and transformation products dichlorodiphenyldichloroethene DDE and

		dichlorodiphenyldichloroethane DDD
Σ Heptachlors	Heptachlor	parent compound heptachlor and transformation products *cis*-heptachlorepoxide and *trans*heptachlorepoxide
HCB	Hexachlorobenzene	(HCB) single compound
Mirex	Mirex	Single compound
Σ HCHs	Hexachloroclyclohexane	(HCHs) isomers α-HCH, β-HCH, and HCH[1]
Σ PCB7	polychlorinated biphenyls	*(di-ortho-PCB) congeners numbered PCB 28, 52, 101, 118, 138, 153, and 180*[2]
Σ Toxaphenes	Toxaphenes	Congeners Parlar 26, 50, and 62
dioxin-like-POPs (dl-POPs)		
Σ dl-PCB	polychlorinated biphenyls	(non-*ortho*- and *monoortho*- PCB congeners numbered PCB 77, 81, 105, 114, 118,123, 126, 156, 157, 167, 169, and 189
Σ PCDD/PCDF	Polychlorinated dibenzo-*p*dioxins (PCDD) and polychlorinated dibenzofurans (PCDF)	all 2,3,7,8-chloro- substituted congeners

1 HCHs were included in the list of target analytes, although it is not part of the initial twelve POPs.

2 2,4,4',trichlorobiphenyl (PCB 28), 2,2',5,5'-tetrachlorobiphenyl (PCB 52), 3,3',4,4'-tetrachlorobiphenyl (PCB 77), 3,4,4',5-tetrachlorobiphenyl (PCB 81), 2,2',4,5,5'-pentachlorobiphenyl (PCB 101), 2,3,3',4,4'-pentachlorobiphenyl (PCB 105), 2,3,4,4',5-pentachlorobiphenyl (PCB 114), 2,3',4,4',5-pentachlorobiphenyl (PCB 118), 2,3',4,4',5'-pentachlorobiphenyl (PCB 123), 3,3',4,4',5-pentachlorobiphenyl (PCB 126), 2,2',3,4,4',5'-hexachlorobiphenyl (PCB 138), 2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153), 2,3',4,4',5,5'-hexachlorobiphenyl (PCB 167), 2,3,3',4,4',5-hexachlorobiphenyl (PCB 156), 2,3,3',4,4',5'-hexachlorobiphenyl (PCB 157), 3,3',4,4',5,5'-hexachlorobiphenyl (PCB 169), 2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180), 2,3,3',4,4',5,5'-heptachlorobiphenyl (PCB 189).

In Latin America and the Caribbean, concentrations of basic POPs are generally much lower than in the other regions. Concentrations are, however, above LOD (<0.1 ng/PUF for all basic POPs) for all samples and all compound class. Concentrations are all below 2.5 ng/PUF for all compound class (apart Σ PCB7) and all sites. The site from Havana (Cuba) has extremely high concentrations, which might be explained by its location close to an industrial site; these groups of for Σdrins, Σ DDTs, and in particular Σ PCB7. For all other sites, concentrations of basic POPs lie within a small range.

In Latin America and the Caribbean, concentrations are comparable to Africa. Only the site from La Habana in Cuba has clearly higher concentrations of dl-PCB (643 pg WHO1998- TEQ/PUF). Concentrations of PCDD/PCDF (124 pg WHO1998-TEQ/PUF) are not unusually high on this site. On sites where quarterly samples were analysed (BRA, JAM, and PER), the samples with a three month exposure period compare well to the annual samples. In BRA, the sum of the three quarterly samples accumulated together 69 pg WHO1998-TEQ/PUF PCDD/PCDF and dl-PCB, whereas the annual sample accumulated 67 pg WHO1998-TEQ/PUF.

Also in JAM the sum of the quarterly samples (142 pg WHO1998-TEQ/PUF) is close to the annual sample (130 pg WHO1998-TEQ/PUF). Similarly, in PER the sum of the quarterly samples (289 pg WHO1998-TEQ/PUF) is close to the annual sample (292 pg WHO1998- TEQ/PUF).

4.2.2. The Global Atmospheric Passive Monitoring Programme (GAPS)

Description of the sampling equipment.

The PUF disk of the passive sampler is installed in a stainless steel chamber with two domes of the same material (“flying saucer” design) which protect the foam from direct precipitation, sunlight and deposition of large particles (see fig.4.1). Air enters the chamber through a 2.5 cm space between the two domes and flows over the surface of the disc. Depuration or performance reference chemicals are added to the PUF before installing them to determine the specific sampling rates.

Sampler preparation

The PUFS are pre-cleaned by Soxhlet extraction with acetone for 24 hours, afterwards they are placed in diethyl ether for a further 24 hours. Before being sent to the sampling sites, the PUFS are fortified with 7 depurative chemicals (d6, ç-HCH and the congeners of PCB 3, 9, 15, 30, 107 and 198). Before and after collecting the sample, as well as during shipping, the PUFS are stored in one litter amber flasks, rinsed with solvent, with lids covered with Teflon. Field blanks were deployed once at each site. The field blank is placed in the chamber for a minute, and is immediately returned to the glass flask which has to be air-proof sealed with Teflon tape to avoid pressure changes and contamination.

Extraction and Analysis

Prior to extraction, thePUFS' discs are spiked with a recovery standard consisting of 13C-PCB-105 (260 ng), d6-R-HCH (220 ng), and d8-p, p ¢ -DDT (240 ng). The analytical recoveries of PCB and organic chlorinated pesticides (OCP) are spiking with 6 clean PUF enriched with 2 ng of each congener of PCB and 1.5 ng of each POC. Mirex (100 ng) is added as an internal standard to correct the volume deficiencies.

The PCHs, organic chlorinated pesticides and the PBDE were analysed in a Hewlett-Packard 6890 gas chromatograph with a mass spectrometer-5973 (GC-MS) with electrons impact detector (EI) for the PCB and negative chemical ionization (NCI) for the OCP and the PBDE ions monitoring mode or sampling ions mode (SIM).

The detection limits in the samples are defined as the average of the field blanks plus three standard deviations. When the target or goal chemicals are detected in the targets, half of the instrumental detection limit is used instead of the LD. (Pozo, et al, 2006)

4.2.3. Project LAPAN

Sampler design.

The network employs a stainless steel mesh cylinder filled with XAD-2 (styrene/ divinylbenzene - co-polymer resin) which is housed in protective stainless steel chambers. Such shelters protect the sorbent from direct deposition of large particles, sunlight, and precipitation and help to diminish the wind speed effect on the sampling rate.

Preparation of PAS

The XAD-2 resin (20/60 mesh, 350 m^2 g^{-1} surface area, 9 nm pore diameter, Supelco) was rinsed with Milli-Q water and Soxhlet extracted three times for 4 days each using in turn methanol, acetonitrile, and dichloromethane. After being washed with sodium hydroxide to remove potential acidic interferents, dichloromethane, and methanol, the XAD-2 was stored in methanol. Twenty (20) mL of wet resin (XAD-2 in methanol) was added to a pre-cleaned stainless steel mesh container plugged with a small amount of clean glass wool at the bottom and covered with glass wool on the top. The column was then transferred to stainless steel jar, dried by nitrogen, and sealed in the shipping containers until its use.

Extraction and Analysis

Before extraction, surrogate standards (PCB103 and PCB198) were added to each of the samples. POPs adsorbed in the XAD-2 were Soxhlet extracted with hexane:dichloromethane (1:1 v/v) for 12 hr. The sample extract was concentrated down using a BÜCHI Syncore® Polyvap R-24 system parallel evaporator. The extracts were then injected in a GC/MS system to analysePBDEs and PAHs. Afterwards, the extracts were cleaned-up in a 5 g silica gel column (pre-cleaned at 450°C for 8h). Silica was activated at 200 °C for 24h before use. PCBs were eluted with 50 mL of hexane followed by 100 mL of hexane:dichloromethane (1:1 v/v) for OCPs and current used pesticides.

The PBDEs were identified and quantified using a Perkin Elmer Clarus 680 SQ-8T gas chromatograph equipped with a mass spectrometer (GC/MS) fitted with an ELITE 5MS capillary column (30 m x 0.25 mm i.d. x 0.25 µm film thickness fused with silica). The data acquisition was done in SIFI mode (Selected Ion and Full Ion Scanning).

Two microlitreswere injected in a split mode. The injector temperature was kept at 130°C for 0.01 min and, then, increased to 295°C at 100°C min^{-1}. Helium was used as carrier gas, with an initial flow of 1.3 mL min^{-1} and after 30 min increased to 3.0 mL min^{-1}. The oven temperature was kept at 130°C for 1 min, followed by an increase of 15°C min^{-1} up to 180°C and, then, 4°C min^{-1} up to 295°C (held for 3 min). Source and interface temperature were kept at 200°C and 280°C, respectively. The mass spectrometer operated in the electron impact mode (EI) at 70 eV. Compound identification was based on individual mass spectra and GC retention times in comparison to literature, library data, and authentic standards. Standards were injected and analysed under the same conditions as the samples. Compound quantification was made by internal standards such as (2,4,5,6-tetrachloro-*m*-xylene (TCMX). Blank analyses were carried out, and all values have been corrected for these blank concentrations.

Quality Control & Quality Assurance

QC&QA procedures are routine in the laboratory and were followed in this study. Procedural blanks, field blanks and resin blanks were run together with the exposed samples by performing the entire extraction, clean-up, and analytical procedures to estimate the background contamination originally present in the XAD-2 resin and potentially introduced during manipulation and/or analytical procedures. In addition, a couple of resins were taken to the sites without ever opening the containers, and returned to the laboratory for analysis. These so-called transportation blanks served to assess possible contamination caused by shipping, handling, and storage.

For most POPs of interest, the resin blanks and field blanks were higher than the procedural blanks. All results were blank corrected using the averages of 13 resin blanks and 8 field blanks. These resin blanks and field blanks were also used to calculate the method detection limits (MDLs) defined as the average blank value plus three times the standard deviation. Recoveries for PCB-103 and PCB-198 were above 80 percent. Data shown in this study were not corrected for recovery.

Derivation of passive air sampling rates

The analysis yields sequestered amounts (pg), which can be converted to volumetric air concentrations (pg m^3) by dividing by the product of deployment period (365 days for example) and sampling rate R (m^3 day^{-1}). Recent studies have shown that R is different for different chemicals and for different sampling sites. (Fillmann, Gilberto. 2006)

4.3. Location of sampling sites

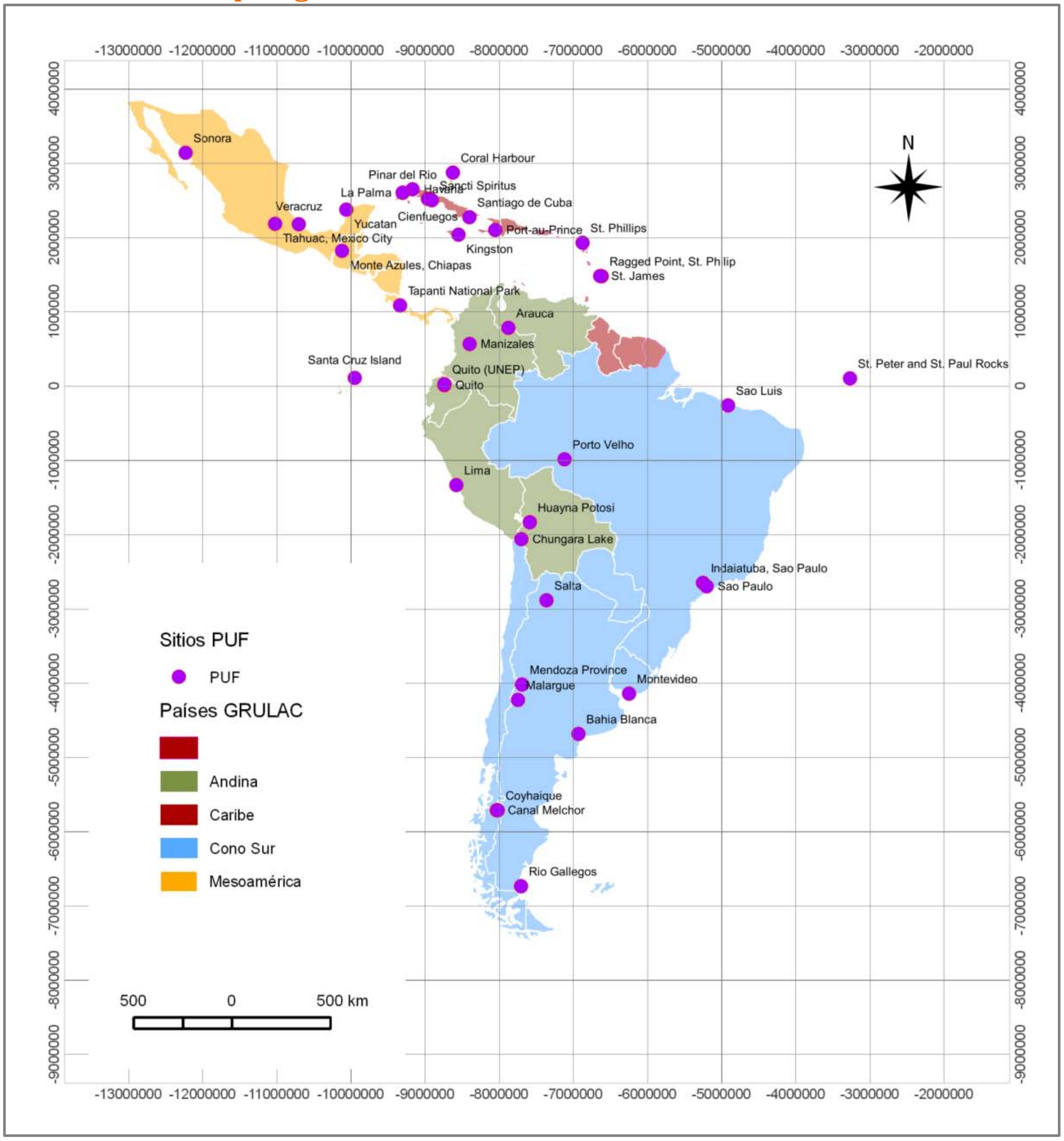

Figure 4.3. Sampling Sites UNEP/GEF/SAICM and GAPS

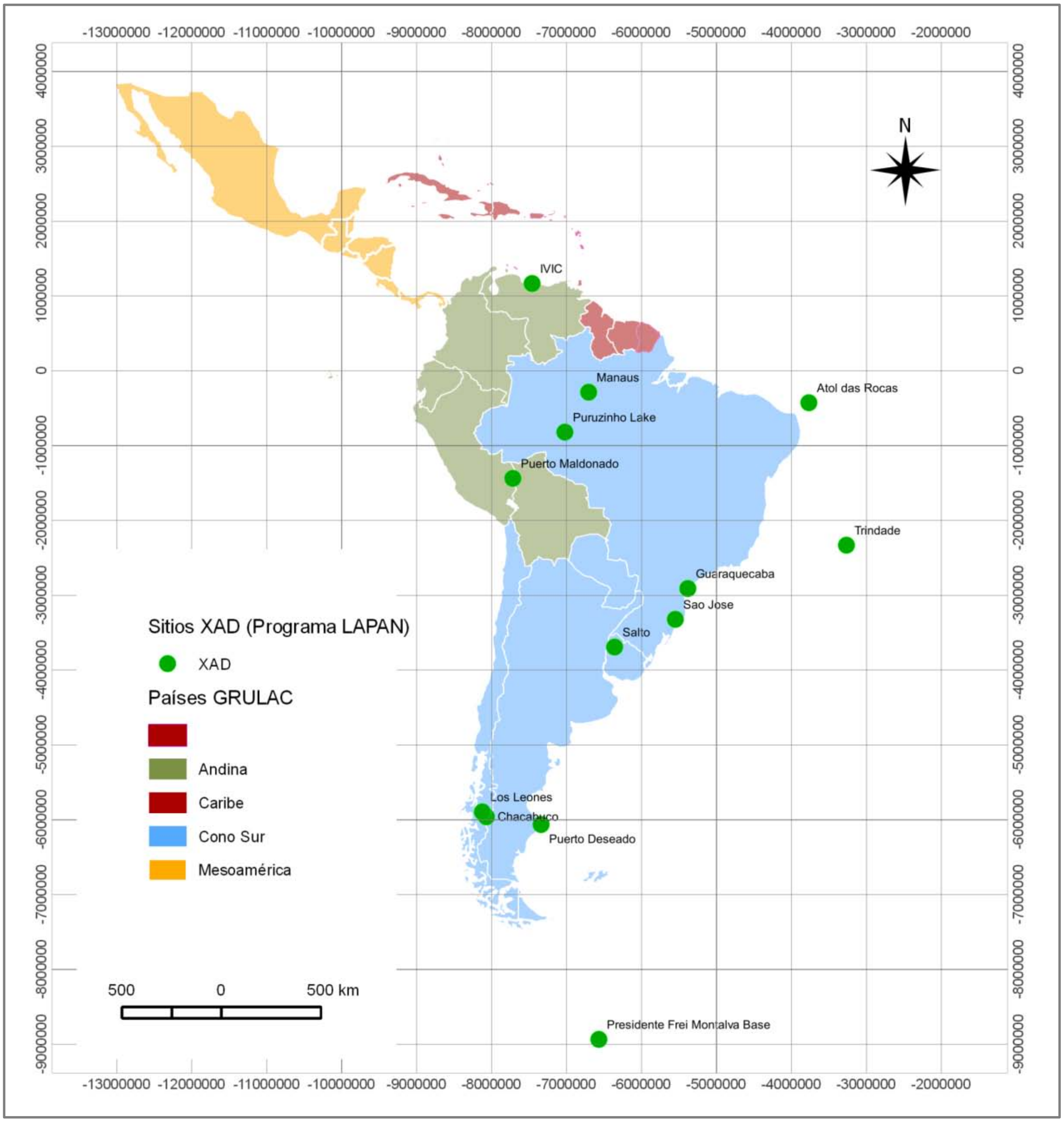

Figure 4.4. LAPAN Sites (XAD)

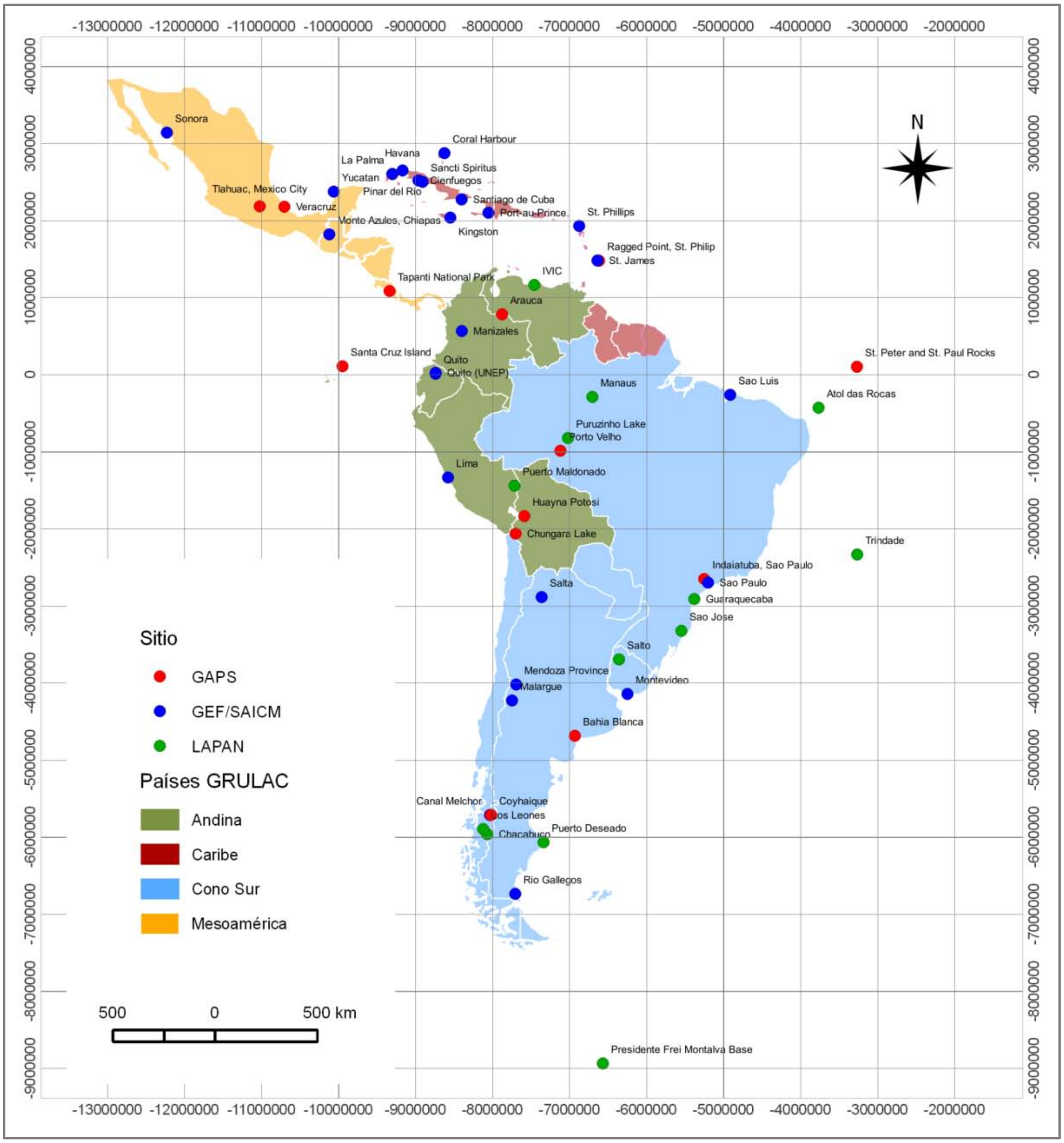

Figure 4.5. Sites (GAPS, GEF/SAICM and LAPAN)

Table 4.2. Sampling sites GRULAC

Country	Site	Site Type	Latitude	Longitude	Type of Passive Sampling	Monitoring Programme
Colombia	Arauca	Rural	7.01	-70.74	PUF	GAPS
Argentina	Bahia Blanca	Suburban	-38.75	-62.25	PUF	GAPS
Chile	Chungara Lake	Remote	-18.22	-69.17	PUF	GAPS
Chile	Coyhaique	Rural	-45.58	-72.03	PUF	GAPS
Bolivia	Huayna Potosi	Remote	-16.27	-68.14	PUF	GAPS
Brazil	Indaiatuba, Sao Paulo	Rural	-23.16	-47.17	PUF	GAPS
Cuba	La Palma	Remote	22.75	-83.53	PUF	GAPS
Brazil	Porto Velho	Urban	-8.84	-63.94	PUF	GAPS
Barbados	Ragged Point, St. Philip	Rural	13.17	-59.43	PUF	GAPS
Ecuador	Santa Cruz Island	Remote	0.98	-89.36	PUF	GAPS
Brazil	St. Peter and St. Paul Rocks	Remote	0.92	-29.35	PUF	GAPS
Costa Rica	Tapanti National Park	Remote	9.70	-83.87	PUF	GAPS
Mexico	Tlahuac, Mexico City	Urban	19.25	-99.01	PUF	GAPS
Mexico	Veracruz	Rural	19.20	-96.13	PUF	GAPS
Chile	Canal Melchor	Rural	-45.58	-72.15	PUF	GEF/SAICM
Cuba	Cienfuegos	Suburban	22.07	-80.50	PUF	GEF/SAICM
Bahamas	Coral Harbour	Urban	24.98	-77.47	PUF	GEF/SAICM
Cuba	Habana	Urban	23.14	-82.36	PUF	GEF/SAICM
Jamaica	Kingston	Urban	18.00	-76.78	PUF	GEF/SAICM
Peru	Lima	Urban	-11.90	-77.05	PUF	GEF/SAICM
Argentina	Malargue	Rural	-35.47	-69.58	PUF	GEF/SAICM
Colombia	Manizales	Remote	5.08	-75.44	PUF	GEF/SAICM
Argentina	Mendoza Province	Rural	-33.94	-69.10	PUF	GEF/SAICM
México	Monte Azules, Chiapas	Remote	16.13	-90.90	PUF	GEF/SAICM
Uruguay	Montevideo	Urban	-34.85	-56.12	PUF	GEF/SAICM
Cuba	Pinar del Rio	Urban	22.77	-83.55	PUF	GEF/SAICM
Haiti	Port-au-Prince	Urban	18.53	-72.33	PUF	GEF/SAICM
Ecuador	Quito	Urban	0.10	-78.50	PUF	GEF/SAICM
Ecuador	Quito (UNEP)	Urban	0.22	-78.50	PUF	GEF/SAICM
Argentina	Rio Gallegos	Rural	-51.65	-69.21	PUF	GEF/SAICM
Argentina	Salta	Remote	-25.09	-66.13	PUF	GEF/SAICM
Cuba	Sancti Spiritus	Rural	21.92	-80.02	PUF	GEF/SAICM
Cuba	Santiago de Cuba	Urban	20.00	-75.47	PUF	GEF/SAICM
Brazil	Sao Luis	Urban	-2.35	-44.12	PUF	GEF/SAICM
Brazil	Sao Paulo	Urban	-23.55	-46.72	PUF	GEF/SAICM
Mexico	Sonora	Rural	27.13	-109.85	PUF	GEF/SAICM
Barbados	St. James	Urban	13.18	-59.62	PUF	GEF/SAICM
Antigua and Barbuda	St. Phillips	Rural	17.07	-61.75	PUF	GEF/SAICM
México	Yucatán	Remote	20.86	-90.38	PUF	GEF/SAICM
Brazil	Atol das Rocas	Remote	-3.86	-33.82	XAD	LAPAN
Chile	Chacabuco	Remote	-47.12	-72.46	XAD	LAPAN

Country	Site	Site Type	Latitude	Longitude	Type of Passive Sampling	Monitoring Programme
Brazil	Guaraquecaba	Remote	-25.29	-48.32	XAD	LAPAN
Venezuela	IVIC	Urban	10.40	-66.99	XAD	LAPAN
Chile	Los Leones	Remote	-46.72	-72.95	XAD	LAPAN
Brazil	Manaus	Remote	-2.59	-60.21	XAD	LAPAN
Chile	PresidenteFreiMontalva Base	Remote	-62.33	-58.99	XAD	LAPAN
Argentina	Puerto Deseado	Remote	-47.75	-65.91	XAD	LAPAN
Peru	Puerto Maldonado	Rural	-12.83	-69.29	XAD	LAPAN
Brazil	Puruzinho Lake	Remote	-7.37	-63.06	XAD	LAPAN
Uruguay	Salto	Rural	-31.47	-57.10	XAD	LAPAN
Brazil	Sao Jose	Remote	-28.59	-49.82	XAD	LAPAN
Brazil	Trindade	Remote	-20.51	-29.31	XAD	LAPAN

4.4 PFOS in Air

Only Uruguay reports data on PFOS in air within the UNE/GEF “Establishing the tools and methods to include nine new POPS in the Global Monitoring Plan”. It also includes PFOS in water, though the results are not yet available.

We can mention the following about the sampling and analysis of these compounds in air:

Any air monitoring strategy investigating the occurrence and/or long range transport of PFOS to remote regions should include PFOS derivatives and precursor compounds. The gas-phase transport of PFOS is limited because it is an ionizable chemical that partitions strongly to water and in the atmosphere, will partition to aerosols. The occurrence of PFOS at background and remote sites occurs through an atmospheric pathway that is mediated through the long-range transport of more volatile precursor chemicals that ultimately degrade to PFOS. Therefore in order to understand the occurrence of PFOS at background sites, it is necessary that these derivatives/precursors are monitored in air. (Guidance, 2013)

PFOS includes all molecules having the following molecular formula: $C_8F_{17}SO_2Y$, where Y = OH, metal, or other salt, halide, amide and other derivatives including polymers (European Union, 2006).

For air the target PFOS related analytes are the perfluorosulfonamidealcohols, acrylates and PFOSA. These compounds are neutral and semi-volatile and thus more similar to conventional POPs. Most studies extracted them by passing air through a cartridge containing XAD resin sandwiched between polyurethane (PUF) plugs. PFOS and related anionic PFCs, as well as the perfluorosulfonamidealcohols may also be on air particles and can be determined by analysing a filter placed in front of the PUF-XAD sandwich. These neutral PFCs are eluted from the PUF/XAD by a combination of medium polar organic solvents such as methanol, petroleum ether and ethyl acetate. The filter can be analysed for PFOS following methods used for other solid samples e.g. by extraction with methanol (Guidance, 2013).

4.5 Programmes/activities related to human tissue (milk and blood)

4.5.1 Programmes/activities related to human milk

WHO survey of Human Milk for Persistent Organic Pollutants

Background

In 2005, at the Second Meeting of the Conference of the Parties to the Stockholm Convention, it was recognized that human biomonitoring is essential to evaluate whether human exposure to POPs is indeed decreasing over time. The monitoring of human milk allows countries and regions to identify contamination problems and formulate measures to reduce and prevent human and environmental exposure to these chemicals.

Building on the previous WHO human milk monitoring studies, the United Nations Environment Programme (UNEP) and the World Health Organization (WHO) jointly implemented a global study to monitor changes in human exposure over time. The survey measures POPs concentrations in human milk and is implemented in a wide range of countries with large differences in food consumption patterns and environmental levels of POPs.

Concentrations of POPs in human milk are considered good indicators of the actual body burden. In addition, human milk is considered to be one of the best sampling matrices for biomonitoring due to its availability and non-invasive approach when collecting individual samples. Its high lipid content makes the extraction method for POPs easier and the precision of the measurements higher. Over the last decades, human milk has generally been used as a medium to measure contamination in humans, and analytical techniques have been well established for most POPs included in the Stockholm Convention.

Furthermore, the uptake of these chemicals by the infant via human milk is of high toxicological relevance. The risk-benefit assessment of breastfed infants represents one of the most challenging aspects of human toxicology, as possible adverse health effects associated with exposure to POPs concur with significant health benefits of breastfeeding. In this perspective, the results of the human milk survey are not meant to derive a “ranking” of countries with respect to risks for the breastfed infant. The surveys are primarily aimed at identifying worldwide quantitative differences of human milk contamination with these POPs, and provide a baseline for those countries for which such information was previously not available. The quantitative differences observed in these surveys may provide a suitable basis for possible source-directed measures to further reduce levels of specific POPs on a country-by-country basis. Therefore it is useful to interpret the results in a national and regional context, and to introduce targeted measures to further decrease human exposure.

Early WHO surveys performed mainly in Europe and North America in 1987-1989 and 1992-1993 exclusively focused on PCB, PCDD and PCDF. In 2001-2003, a larger global survey was implemented, covering the twelve POP compounds initially listed in the Stockholm Convention. Following the ratification of the Stockholm Convention, WHO and UNEP started their collaboration, and two additional global surveys were completed in 2005-2007 and 2008-2012. These significantly enlarged the geographical scope of the study to provide representative results for all regions of the globe. The results of these surveys have been compiled in document UNEP/POPS/COP.6/INF/33.

The second phase of the human milk survey (2013-2014) aimed at detecting changes in the levels of legacy POPs measured in human populations and building a consistent baseline for human exposure to the newly listed POPs.

Sampling

In order to promote reliability and comparability, participating countries are encouraged to adhere as closely as possible to the WHO protocol. However, it is also recognized that the situations in countries vary considerably so that some flexibility is required. Guidance is provided to assist countries in developing their national protocols, including:

Number of donors: a minimum of 50 individual donors should each provide 50 ml of human milk for preparing the pooled sample. Note that one additional participant per million population over 50 million is recommended for large countries and in some cases, more than one pooled sample may need to be prepared. On the other hand, a lower number of samples may be necessary for small countries.

Strategies for selecting donors: The following criteria for selection of donating mothers shall be applied: a) they should be primiparae, b) healthy, c) exclusively breastfeeding one child (i.e. no twins), and d) residing in the area for about five years. Interviewing of potential donors can take place pre- or post-natal or in wellbaby clinics. The stratification of donors should represent the presumed national exposure profile of each country. This would include consideration of diet, occupational exposure, rural and urban residence and proximity to potential POPs releasing sources such as industries and waste sites.

Biosafety: in general, the handling of any milk sample should comply with biosafety rules to protect workers who will handle samples. The National Coordinators should decide whether HIV-positive donors can participate in the survey.

Consequently, the sampling protocol will vary among countries and therefore, comparison of results between countries should be approached with caution. However, once the national protocol is established, it should be applied in subsequent rounds so that changes and trends can be followed. In these cases, observation of temporal trends should be scientifically valid provided information on the distribution of levels in individual samples is available.

4.5.2 Analytical procedures

Procedure for PCDDs, PCDFs and PCBs

After freeze-drying of the whole sample, fat and contaminants of interest are extracted in a hot extraction device (”Twisselmann extractor”) with cyclohexane/toluene (50/50) for 8 hrs. After evaporation of the solvent, an aliquot of fat is spiked with ^{13}C-labeled internal standards (17 PCDD/Fs, 5 non-ortho PCBs [37, 77, 81, 126, 169], 6 mono-ortho PCBs [28, 60, 105, 118, 156,189] and 7 di-ortho PCBs [52, 101, 153, 138, 180, 194 and 209]). Gel permeation chromatography on Bio Beads S-X3 removes fat. A silica column impregnated with sulphuric acid removes remaining oxidizable substances. A florisil column separates PCDD/F from PCBs. The PCDD/F-fraction is purified on a Carbopack C-column. After addition of 1,2,3,4-13C12-TCDD, determination is performed by HRGC/HRMS (FisonsAutospec; resolution 10,000; DB5-MS). The PCBs are separated on a Carbopack B-column into three fractions of first di-ortho PCBs (elution with hexane), then mono-ortho PCBs (elution with hexane/toluene; 92.5/7.5) and finally non-ortho PCBs (reversed elution with toluene). After addition of 13C12-PCB 80, the different PCB groups are determined by HRGC/HRMS (FisonsAutospec; resolution 10,000; DB5-MS) in three separate runs. Marker PCBs are PCB 28, 52, 101, 138, 153 and 180.

Procedure for analytically simple POPs

The milk samples were analysed for POP pesticides. Fats and POPs of interest were extracted from freeze-dried human milk as described above for PCDDs, PCDFs and PCBs. Up to 0.5 g of the fat extract was re-dissolved in cyclohexane/ethyl acetate and the internal standards (2,4,5-Trichlorobiphenly and Mirex), dissolved in cyclohexane, were added. The applied clean up-parts of the analytical method followed the principles of the European standardized methods for pesticide residue analysis for fatty food - Determination of pesticides and PCBs, EN 1528 part 1-4, 1996-10 (confirmed 2001). To remove fat, gel permeation chromatography was performed on a chromatography column using Bio-Beads S-X3 with cyclohexane/ethyl acetate as eluting solvent. After concentration and transfer into iso-octane, chromatography on a small column of partially deactivated silica gel was used as final clean up steps with toluene as eluent. Determination was performed with GC/ECD using a GC (Fisons Mega 2) with two parallel columns of different polarity (fused silica no. 1:30 m PS-088 [97.5 percent Dimethyl -2.5 percentdiphenylsiloxane copolymer] 0.32 mm id., 0.32 µm film thickness, fused silica no. 2:30 m OV-1701-OH, 0.32 mm id., 0.25 µm film thickness, both columns customs column made). Results were confirmed by GC-LRMS (GC: HP 6890 / MS: HP 5973; 30 m HP5-MS, 0.25 mm id., 0.25 µm film thickness + 2.5 m pre-column; detection mode: MSD –EI). The limit of quantification (LOQ) was 0.5 ngg^{-1} fat.

Procedure for PBDEs

No information was identified in the region on the analysis of PBDEs.

Procedure for PFOS

Milk samples were extracted using weak anion exchange, solid-phase extraction (Waters Oasis® WAX, Waters Corporation, Milford, USA) using a previously reported method (Kärrman et al. 2007). Internal standard ($^{13}C_4$-PFOS) and 2 mL formic acid/water (1:1) were added to 1 mL milk. The solution was sonicated for 15 min and centrifuged at 9000 x g for 30 minutes. The supernatant was extracted on Oasis WAX and PFOS was eluted with 1 mL 2 percent ammonium hydroxide in methanol, after washing the column with 2 mL sodium acetate buffer solution (pH 4) and 2 mL 40 percent methanol in water. After evaporation the final extract volume was 20 µL, then 30 µL 2mM ammonium acetate in water and performance standard ($^{13}C_8$-PFOS) were added. Milk extracts were injected (10 µL) on an Acquity UPLC Xevo TQ-S tandem mass spectrometer (Waters Corporation, Milford, USA) with an atmospheric electrospray interface operating in negative ion mode. The analytes were separated on an Acquity BEH C18 column (2.1 x 100 mm, 1.7 µm) and analysed on a MS/MS system run in electrospray ionization mode (ESI). Multiple reaction monitoring (MRM) was used and three product ions were monitored for PFOS. Milk samples were quantified using external standards in solvent and the internal standard method. The performance standard was used to assess the recovery of the internal standard.

Data comparability

To ensure reliability of exposure data and to improve comparability of analytical results from different laboratories, WHO has coordinated a number of inter-laboratory quality assessment studies. The State Institute for Chemical and Veterinary Analysis of Food Freiburg met all the pre-set criteria for analyses of PCDDs, PCDFs, dioxin-like PCBs, marker PCBs and fat in human milk and were thus selected as the WHO

Reference Laboratory for the WHO human milk studies. Perfluorinated chemicals are likewise analysed in a single laboratory at the MTM Research Centre, Örebro University, Sweden.

It should also be noted that the sampling concept for the mothers' milk exposure studies changed between 2000 and 2012. Whereas in 2000-2003 countries were encouraged to prepare two or more pooled samples to address differences within a country, the guidance document for the Global Monitoring Plan under the Stockholm Convention asks for one representative sample for up to 50 million citizens. In order to obtain comparable results, the median concentration from all national pools that were submitted is commonly used.

Correlation study on PFOS between milk and blood

Among the newly listed POPs, PFOS and its salts do not follow the "classical" pattern of partitioning into fatty tissues, but instead bind preferentially to proteins in the plasma, such as albumin and gamma-lipoproteins, and in the liver, such as liver fatty acid binding protein. Due to higher albumin content, blood is considered the preferable and recommended medium to determine fluorinated compounds, but analysing PFOS in milk samples is also a viable option with today's technology. The levels in human milk are generally much lower than those in blood, but a strong association between serum and milk concentrations of PFOS has been reported.

Kärrman and Davies (2013) collected milk and serum samples from primiparae women in Uppsala, Sweden in the period from 2004 to 2011; 48 serum samples and 48 milk samples were collected and analysed on a MS/MS system run in electrospray ionization mode. PFOS (linear isomer) was quantified in all samples and concentrations ranged from 1.3 to 20 ng/mL in serum and 0.028 to 0.354 ng/mL in milk. The limit of detection was 0.05 ng/mL for serum and 0.012 ng/mL for milk. Serum levels of PFOS were compared with levels of PFOS in human milk from the same mother. The regression analysis showed that levels of PFOS measured in milk and serum were highly correlated, with a Pearson's correlation coefficient of 0.9171. Milk levels in this study are on average 1.55 percent of the corresponding serum levels. This value is in agreement with previous studies on similar serum to milk relationships, that have reported 1.09 percent (Kim et al. 2011), 1 percent (Kärrman et al. 2007), and 1.4 percent (Thomsen et al. 2010).

Concentrations of POPs in human milk. Brazil 2012.

Brazil performed a study to determine the concentrations of POPs in human milk, considering as a reference guide for developing protocols of the World Health Organization (WHO). The samples were collected in human milk banks of the Brazilian National Network of Human Milk. The sampling was carried out in the capital cities of 15 states of Brazil, collecting 10 individual samples in each one. Three groups of samples (GR1, GR2. GR3) were prepared with 50 individual samples.

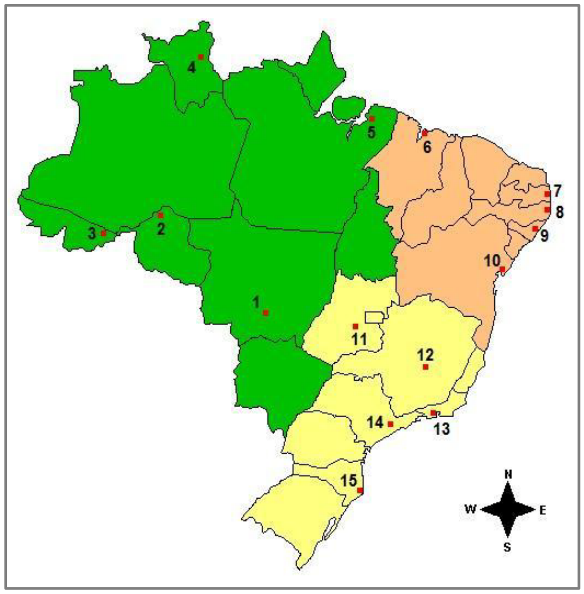

Figure 4.6. Human milk sampling locations in Brazil 2012.

The locations were divided in three regions: **Big Region 1 (GR1)** - Cuiabá/MT (1), Porto Velho/RO (2), Rio Branco/AC (3), Boa Vista/RR (4), Belém/PA (5); **Big Region 2 (GR2)** - São Luís/MA (6), João Pessoa/PB (7), Recife/PE (8), Maceió/AL (9), Salvador/BA (10); **Big Region 3 (GR3)** - Goiás/GO (11), Belo Horizonte/MG (12), Rio de Janeiro/RJ (13), São Paulo/SP (14), Florianópolis/SC (15).

The analyses were performed in theWHO reference laboratory in Freigburg, Germany (CVUA/FR), except for the PFOS and other PFCs that were analysed in the Man-Technology-Environment Research Centre in the University of Örebro, Sweden, PNUMA reference laboratory.

The results for this study are presented in chapter five.

4.6 Programmes/activities related to water

There are isolated studies on PFOS in water, but no formal monitoring Programme in LAC for the determination of PFOS and other POPs which on average travel significant distances, was identified. However,it is importantdescribe methodologies of extraction and analysis of PFOS in water.

PFOS and other PFCs are extracted from water with weak anion exchange (WAX) solid phase cartridges (ISO 2008; Taniyasu et al. 2008). The cartridges are preconditioned by elution with 0.1 percent NH_4OH in methanol, and then methanol and (pre-cleaned) water. Sample cartridges are eluted with 25mM ammonium acetate buffer (pH 4) and the target analytes then eluted with 0.1 percent NH_4OH in methanol (ISO 2008; Taniyasu et al. 2008). Water volumes of 0.5-1L are sufficient for pg/L measurements of PFOS. In general no further clean-up of extracts for PFOS is required and samples can be submitted for LC-tandem

A critical feature of all methods for PFCs that employ LC-MS/MS is the use of ^{13}C- and/or $^{18}O_2$-labelled PFOS and PFOSA substances from the extraction step. The isotope-dilution technique, which uses isotope-labelled internal standards chemically identical to the analytes of interest, corrects for the matrix effects on the analytes recovery during the extraction procedure and in their extent of ionization, thus resulting in greater accuracy and precision.

4.7 Data storage

Data are stored at the GMP data warehouse, available at www.pops-gmp.org.

4.8 Data handling and preparation for the regional monitoring report

Statistical considerations

The correct definition of data is a prerequisite for the subsequent statistical analysis. Only reliably reported concentration values can be accepted for any spatial or temporal comparison. Therefore, a multilevel evaluation procedure based on the annually aggregated concentration values is implemented in order to maintain a high predictive value of the GMP records while avoiding bias in the concentration values.

The data evaluation procedure in place in the second phase GMP guarantees comparability of the different samples, especially from the point of view of the type of site, matrix, sampling method, time span and sampling frequency. Heterogeneity in these factors might dramatically increase the uncertainty in the final outcomes. The processing procedures in place also limit the impact of uncontrolled covariates and thus reduce the risk of false trend detection or neglecting truly significant changes.

Details on statistical considerations and their implementation in the second phase GMP are available in the guidance document (UNEP/POPS/COP.6/INF/31).

The information warehouse;

Harmonized data handling and appropriate support given to the collection, processing, storing and presentation of monitoring data in regions with limited capacity was a major focus of the work in the second phase GMP. A global monitoring plan data warehouse supports data collection and assists the regional organization groups and the global coordination group in producing the regional and global monitoring reports, and the effectiveness evaluation. It includes an interactive online data capture system, handling, and presentation module.

The global monitoring plan data warehouse also constitutes a publicly available repository of valuable information that can serve as a useful resource for policy makers and researchers worldwide. The tool is available at www.pops-gmp.org.

Data from existing programmes.

Data from existing programmes as described in 4.1.1-4.1.4 have been incorporated in the GMP data warehouse and made available to the regional organization groups for validation and analysis. Access to information from 78going existing monitoring programmes and activities is provided to the regional organization groups in an efficient and user friendly manner for the development of monitoring reports, and ensures harmonized data analysis and presentation across the regions.

5. RESULTS

This chapter provides the results of the GRULAC countries which are available in the global monitoring plan data warehouse (GMP-DWH) as of 15 September 2014.This instrument is the outcome of the Meeting of the Regional Organization Groups and the Coordination Group of the Global Monitoring Plan that were held in Brno, Czech Republic in June 2012 and in Geneva, Switzerland in October 2012. The establishment of data warehouse was recommended in the updated Global Monitoring Plan Guidance for Persistent Organic Pollutants during the Sixth Meeting of the Conference of the Parties to the Stockholm Convention that was held in May 2013 in Geneva (http://www.pops-gmp.org/index.php). Also, other results of the monitoring, conducted before 2012, are shown in the study. This information is focused in fundamental matrices of GMP: air, human milk and/or blood samples.

In order to achieve a better comparison, the data were grouped according to the following four regions: Mesoamerica, the Caribbean region, the Andean region and the Southern Cone, as in the following figure (5.1) shows with different colours:

Figure 5.1. Subregions of GRULAC

Regarding the air matrix, available data presented by the First Regional Monitoring Report were taken from the GAPSProgramme.

It has been a challenge to incorporate new air monitoring sites with a further coverage in the region. This Second Monitoring Report contains air monitoring data obtained from the following programmes: GAPS, GEF/SAICM Programme and LAPAN. There was an increase of sites with available data, from 11 to 52, but there is discontinuity in previous sampling sites

Considering the complexity of the region in ecological, geographical and social terms, there continue to be gaps in the process of obtaining and analysing the information. For example in Central America there is only one remote site, in Costa Rica, which prevents from obtaining conclusions on that area.

The classification of air sampling sites (Table 5.2) does not meet the criteria established in the Guidance on the Global Monitoring Plan for Persistent Organic Pollutants (4.1.1). The lack of information on the sites is a restriction for the interpretation of GMP data warehouse.

On the other hand, the region does not have active samplers to contrast and validate the data acquired in the passives ones. Although the active air sampling requires more infrastructure and resources for its development, this method represents the standard methodology for analysing air pollution. Therefore, it is important to have at least one active sampler for each subregion.

The First Monitoring Report only presented one datum for human milk and blood samples that was published by the WHO in its milk study in Brazil. This time, there is information from 10 countries,which means further coverage of the region. It is the same case for air monitoring, but Central America is not covered yet. None of the countries in this area participate in the milk or blood programmeeven though they have an intensive use of agrochemicals.

5.1 Ambient Air

In this section, the results of the atmospheric passive sampling programmes (GAPS, GEF/SAICM Programme and LAPAN) are presented. For a better representation of data variability, the median was used to show parameter trends in every site.

The minimum, maximum, 5th and 95th percentiles, standard deviation and median are presented in the Annex 7- electronic document.

Data for 2005 and 2006, the baseline in ambient air concentrations, are mainly obtained from GAPS (GMP-DWH, 2014). As in previous years, data reported in 2009 was also obtained from the GAPS Programme. However, data for 2010, 2011 and 2012 were generated under the GEF/SAICM and LAPAN Programmes.

The results of the sampling were gathered by type of site such as background, rural, suburban and urban. Table 5.1 shows the number by type of site. In Figure 5.2 the distribution of the sites in the GRULAC region is presented.

Table 5.1. Type and number of sites

Type of site	Number
Background	20
Rural	14
Sub-urban	2
Urban	16

Source: GMP-DWH, 2014.

Figure 5.2. Distribution and classification of air monitoring sites

Table 5.2. Classification of sampling sites

Country	Site	Background	Rural	Suburban	Urban
Antigua and Barbuda	St. Phillips		X		
Argentina	Bahía Blanca			X	
	Malargue		X		
	Provincia de Mendoza		X		
	Puerto Deseado	X			
	Rio Gallegos		X		
	Salta	X			
Bahamas	Coral Harbour				X
Barbados	Ragged Point, St. Philip		X		
	St. James				X
Bolivia	Huayna Potosi	X			
Brazil	Atol das Rocas	X			
	Guaraquecaba	X			
	Indaiatuba, Sao Paulo		X		
	Manaus	X			
	Porto Velho				X
	Puruzinho Lake	X			
	Sao Jose	X			
	Sao Luis				X
	Sao Paulo				X
	St. Peter and St. Paul Rocks	X			
	Trindade	X			
Chile	Canal Melchor		X		
	Chacabuco	X			
	Lago Chungara	X			
	Coyhaique		X		
	Los Leones	X			
	PresidenteFreiMontalva Base	X			
Colombia	Arauca		X		
	Manizales	X			
Costa Rica	Parque Nacional de Tapanti	X			
Cuba	Cienfuegos			X	
	Habana				X
	La Palma	X			
	Pinar del Río				X
	Sancti Spiritus		X		
	Santiago de Cuba				X
Ecuador	Quito				X
	Quito (UNEP)				X
	Santa Cruz Island	X			
Haiti	Port-au-Prince				X

Jamaica	Kingston				X
Mexico	Monte Azules, Chiapas	X			
	Valle de Yaqui, Sonora		X		
	Tlahuac, Ciudad de México				X
	Cordoba, Veracruz		X		
	Celestum, Yucatán	X			
Peru	Lima				X
	Puerto Maldonado		X		
Uruguay	Montevideo				X
	Salto		X		
Venezuela	IVIC				X

Source: Table prepared with information from the GMP-DWH 2014.

In the graphic analysis of the results, records were separated when all the sampling values were below the limit of quantification (LOQ). In total, there were 1,506 records that were separated from the analysis (Annex 8, electronic document). This does not indicate that the results are incorrect; it shows that when a parameter is not detected on the site it was reported as half of the limit of quantification (LOQ/2).

The results of the parameters reported in data warehouse can be found in Annex 9- electronic document.

Below there are graphs of the median by type of site.

5.1.1 Background sites

The graphs of the sum of the DDT at background sites show values between 4 and 10 pg/m^3 (70 percent of the information) with a maximum of 19.33 pg/m^3 in St Peter during 2009 and 236.7 pg/m^3 in 2010.

Explanation for this value is difficult to establish; it could be due to long range transport,given the fact that the site is located in the Atlantic Ocean. It is noteworthy that the detected isomer is p’p’DDE, reporting p’p’DDTis below the limit of quantification, whichsuggests that the isomer originated from a non-recent use.

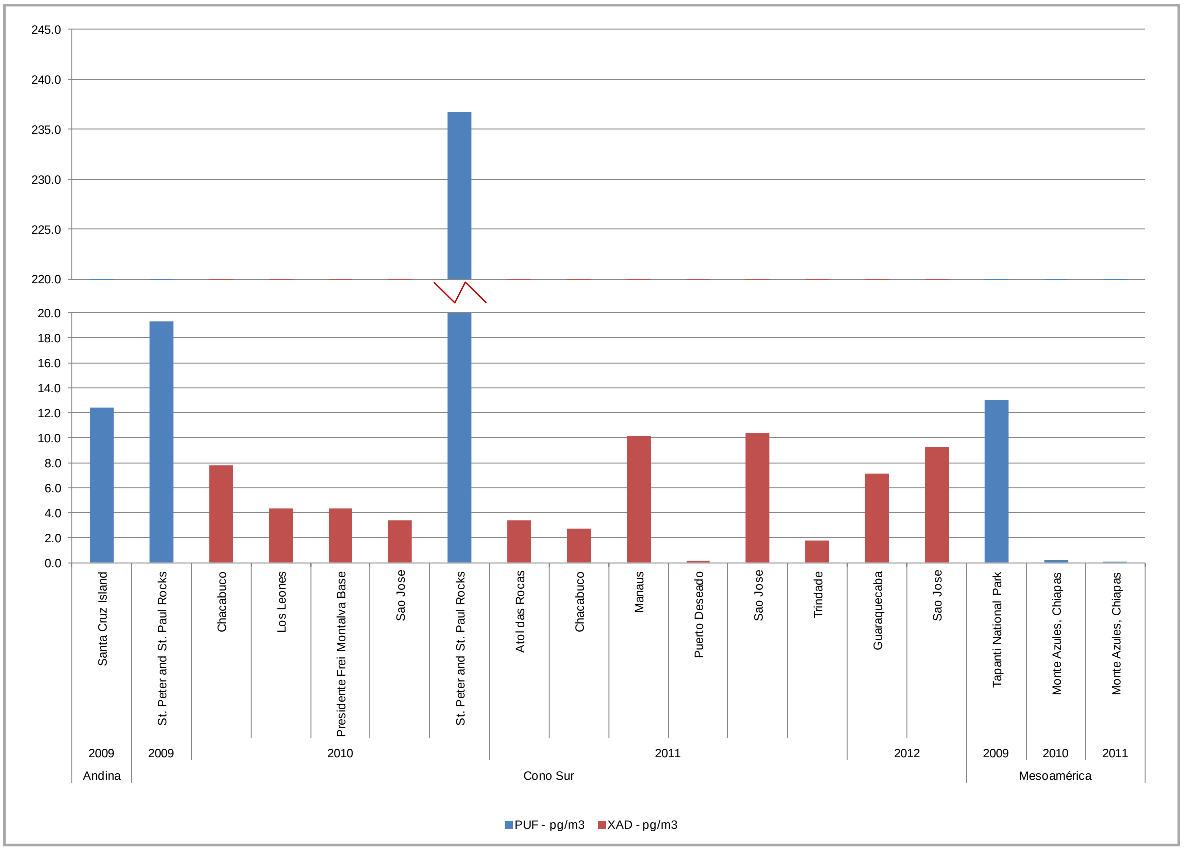

Figure 5.3. Sum 6 DDTs (air sampling in background sites)

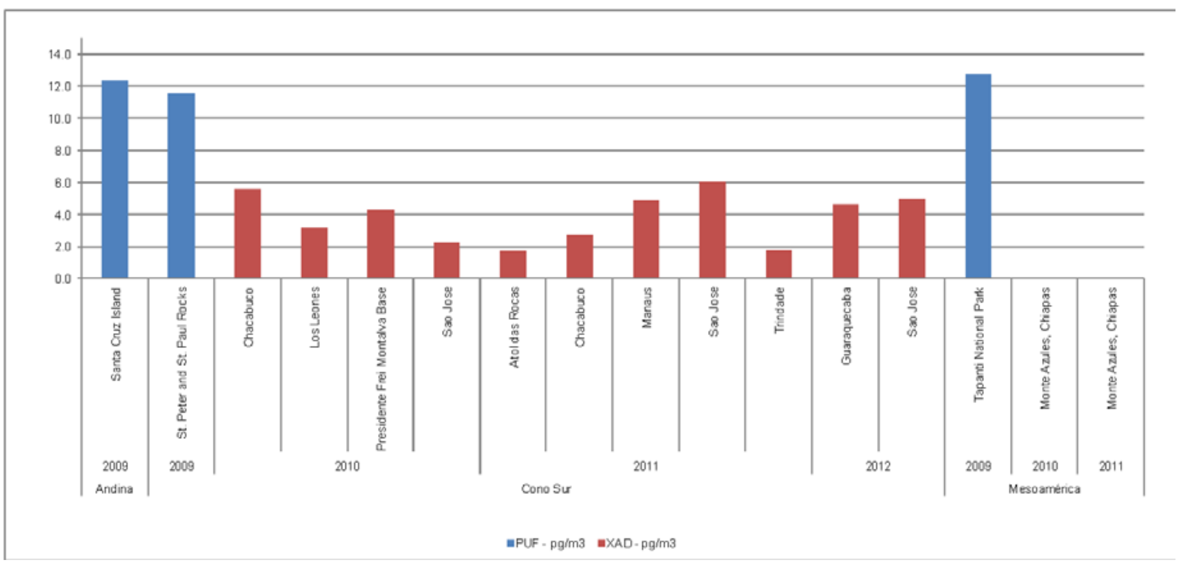

Figure 5.4. p'p'DDT (air sampling in background sites)

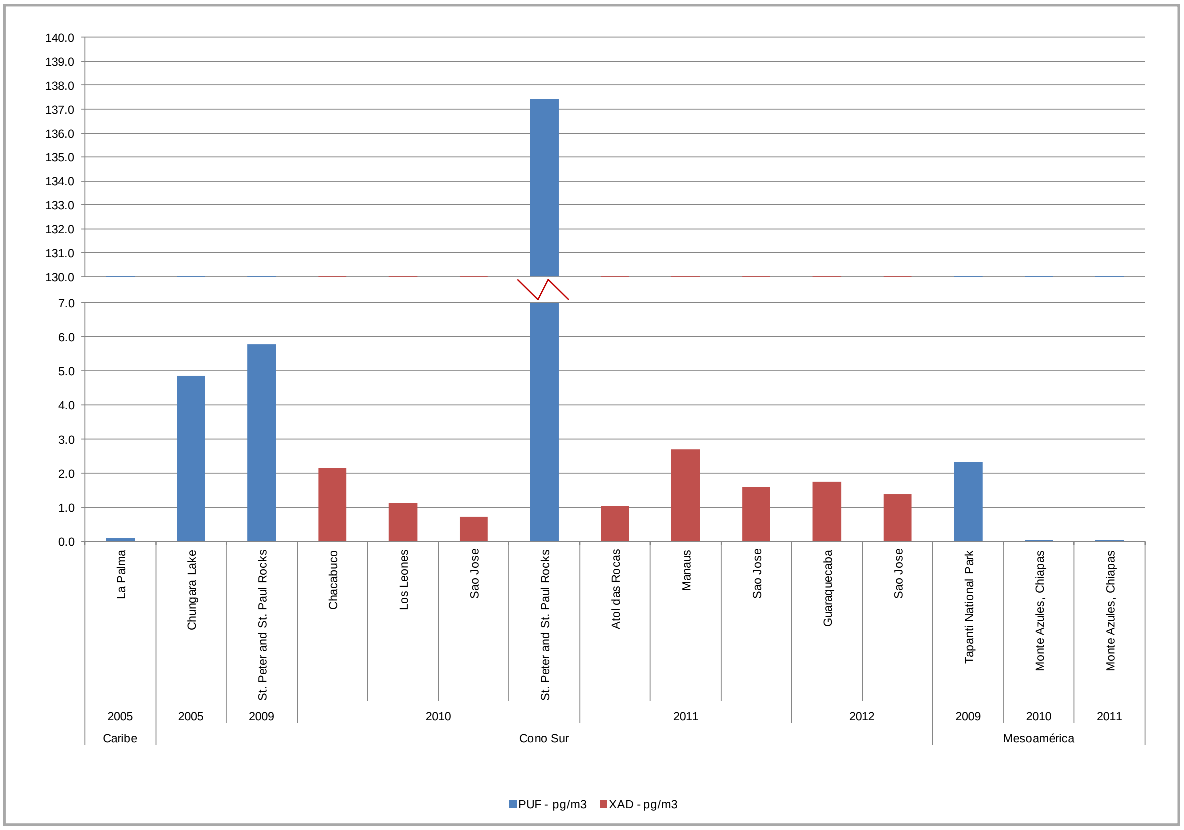

Figure 5.5. p’p’DDE (air sampling in background sites)

In the graphs of the sum of the 6PCBs, the indicators show values between 1 and 7 pg/m^3 with a maximum of 35.4 pg/m^3 at the site of St. Peter in 2010. It is worth notingthat there are PCB values in all background sites, as expected.

There are more than one available data about Montes Azules, Chiapas and St. Jose, Brazil. There was no variation in the values during 2010 and 2011 in Montes Azules. In the case of St. Jose there are three data showing a decrease between 2010 and 2011 and remaining unchanged in 2012. The maximum value is found in St. Peter in 2010.

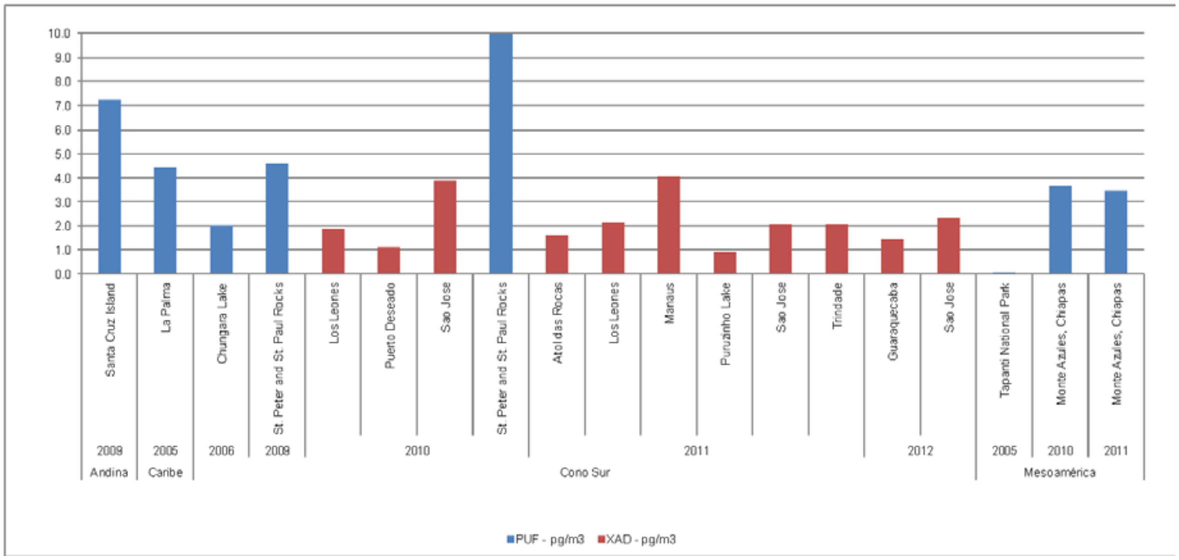

Figure 5.6. Sum 6 PCBs (air sampling in background sites)

The values found for dioxins and furans in the background sites are: 1.7 and 90 fg/m^3. A decrease in the values of 2010 and 2011was observed in Manizales and Salta, while there was an increase from 2010 to 2011, in Yucatan.

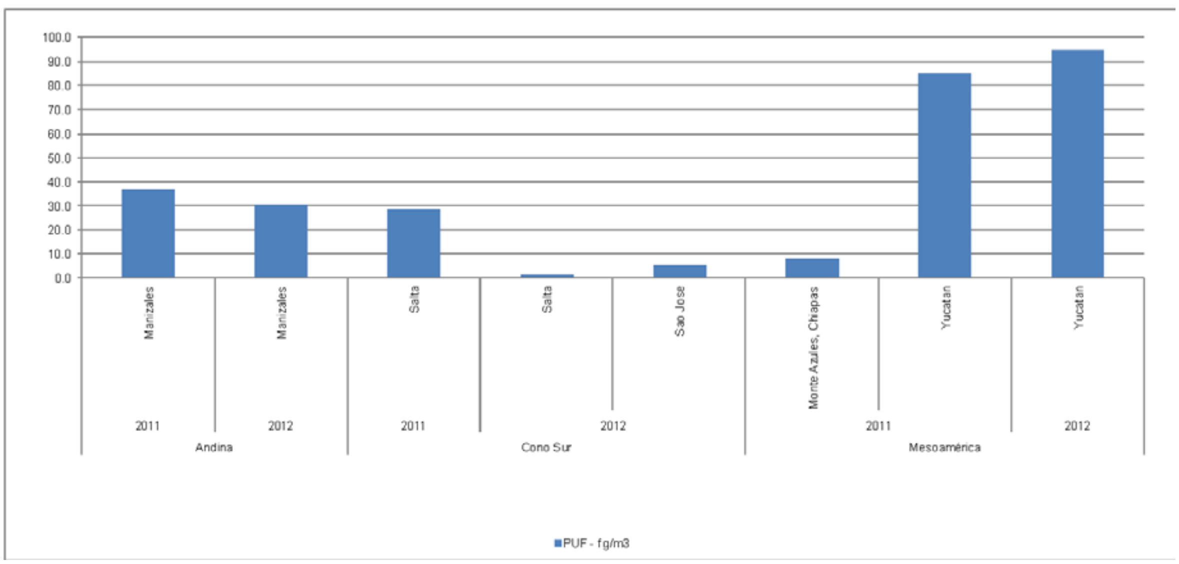

Figure 5.7. Sum 17 PCDDs/Fs (air sampling in background sites)

The lindane graphs for the background sites show values ranging from 0.2 -22 pg/m^3. This compound was detected in almost all sites and presented highest values due to the fact its use was allowed up until recently, prior to it been considered a POP.

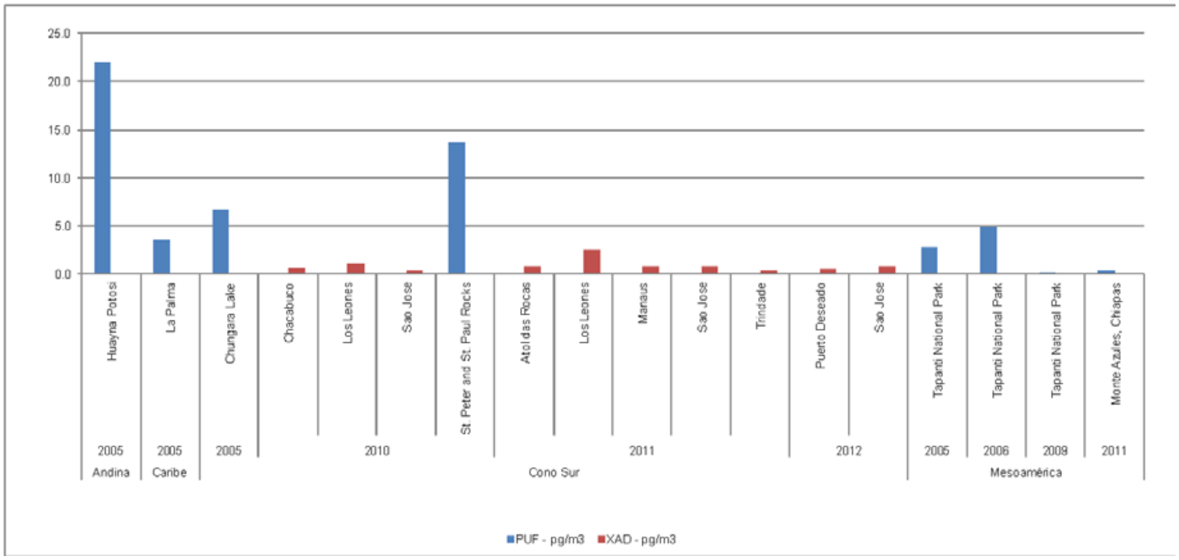

Figure 5.8. Gamma-HCH (air sampling in background sites)

5.1.2 Urban sites

The Sum of DDT in urban sites ranged from 0.1-9 pg/m^3 in almost all of the sites,as indicated by data from two consecutive years, with a decrease in values from 2010 to 2011.

Porto Velho has a maximum value, 350 pg/m^3;this relatively high value can be attributed to the fact that it is a site with a high degree of anthropogenic influence as it is located approximately 15 km from urban centres and it is also a malaria endemic area. In the past, DDT was used in significant amounts in that location. Also, biomass burning during the dry season (from July to October) is intense.

Other sites with relatively high results are Havana, Cuba, and Tlahuac, Mexico. The main isomer was p'p'DDE which would explain the non-recent use.

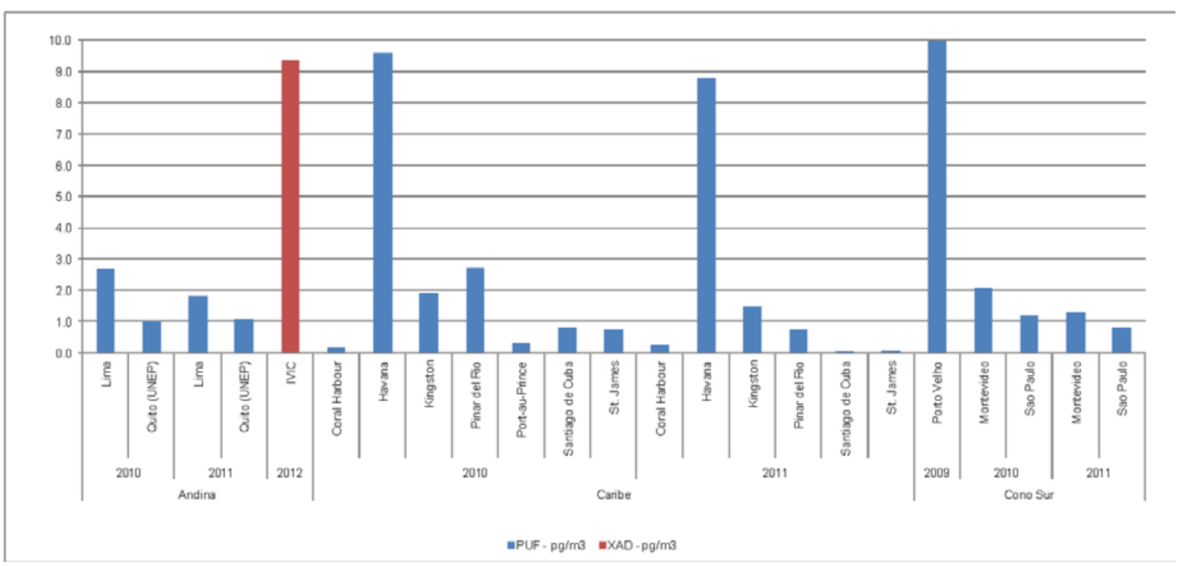

Figure 5.9. Sum 6 DDTs (air sampling in urban sites)

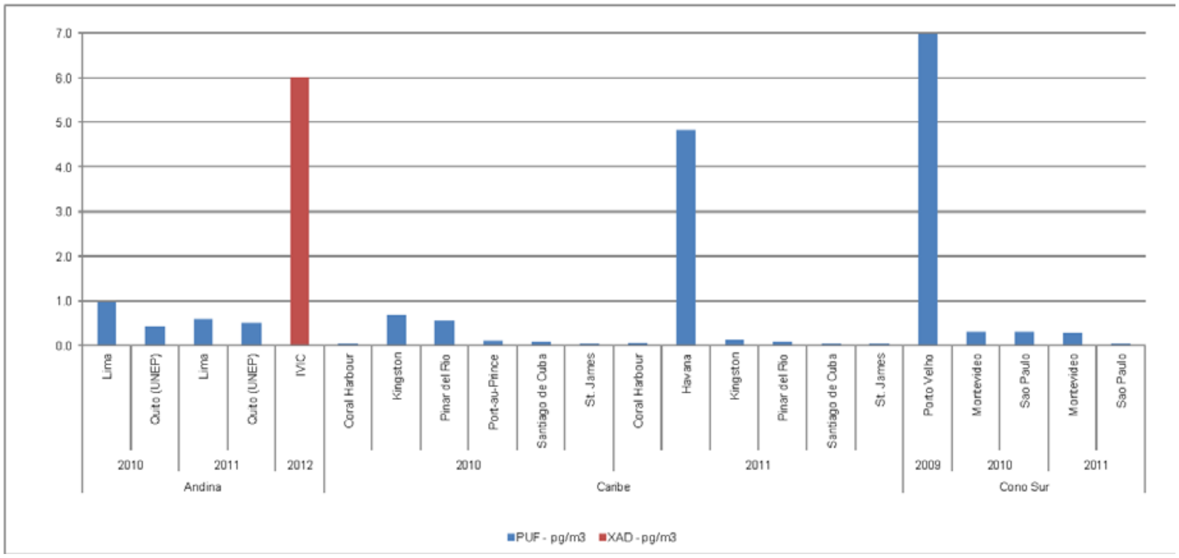

Figure 5.10. p'p'DDT (air sampling in urban sites)

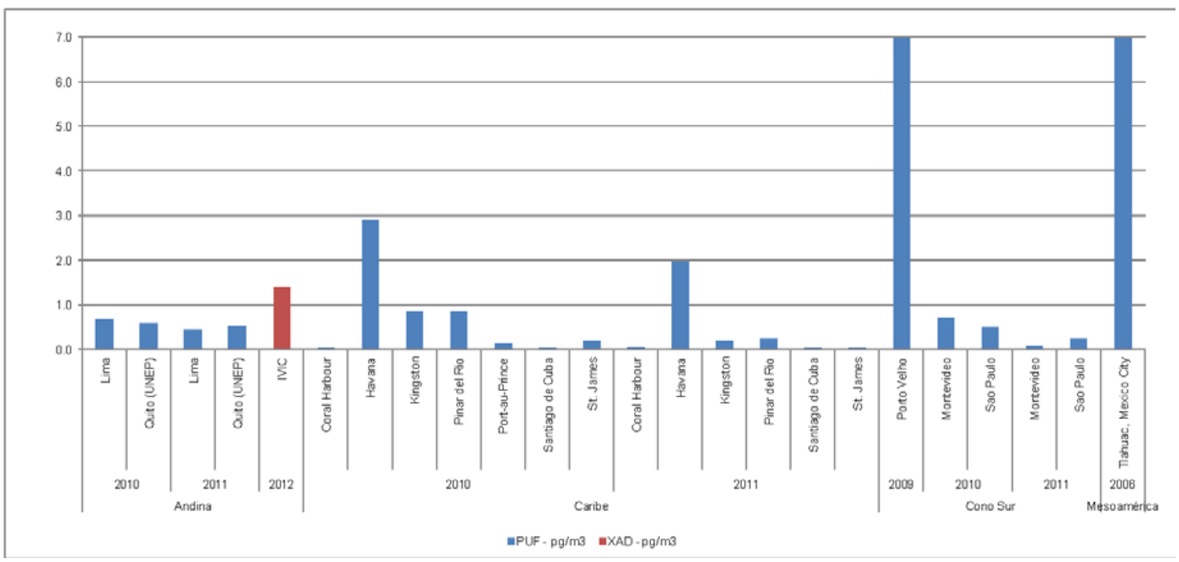

Figure 5.11. p'p'DDE (air sampling in urban sites)

The sum of the 6 PCBs in urban sites shows values ranging from 1.5 -447 pg/m^3, with no significant changes between 2010 and 2011. Havana returned a maximum value of 13,6ng/m^3. It is important to highlight the fact that urban sites have higher values when compared with background ones. This can be attributed primarily to the influence of anthropogenic sources.

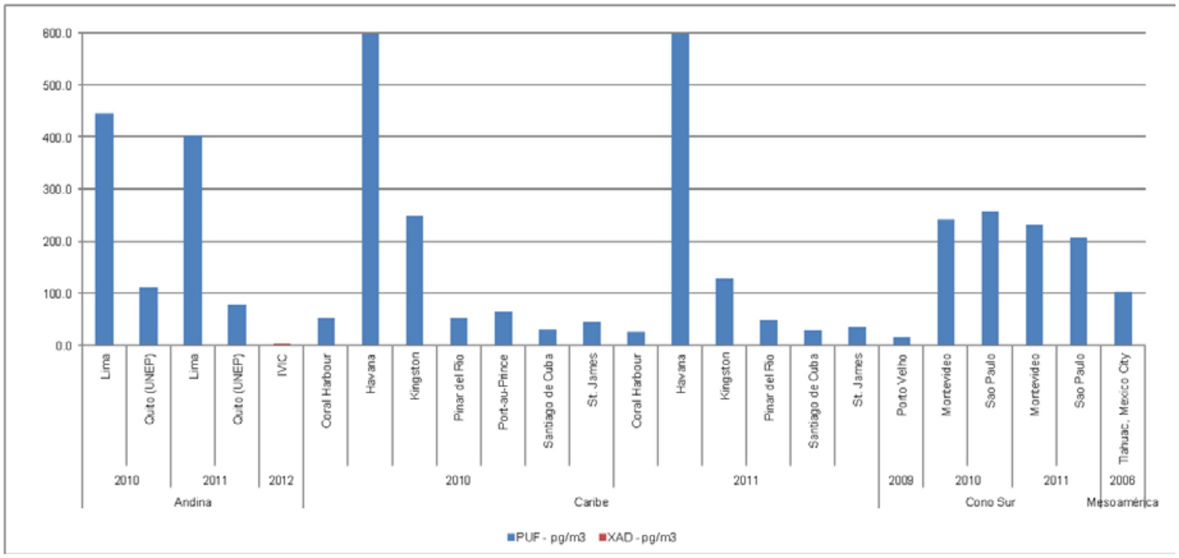

Figure 5.12. Sum 6 PCBs (air sampling in urban sites)

The sum of the 12 PCBs in urban sites show the majority of values ranging between 0,68 and 73 pg/m^3 without any significant changes between 2010 and 2011. The maximum was found in Havana with a value of 430pg/m^3. A small decrease between two consecutive years was observed in Lima, Kingston and Sao Paulo.

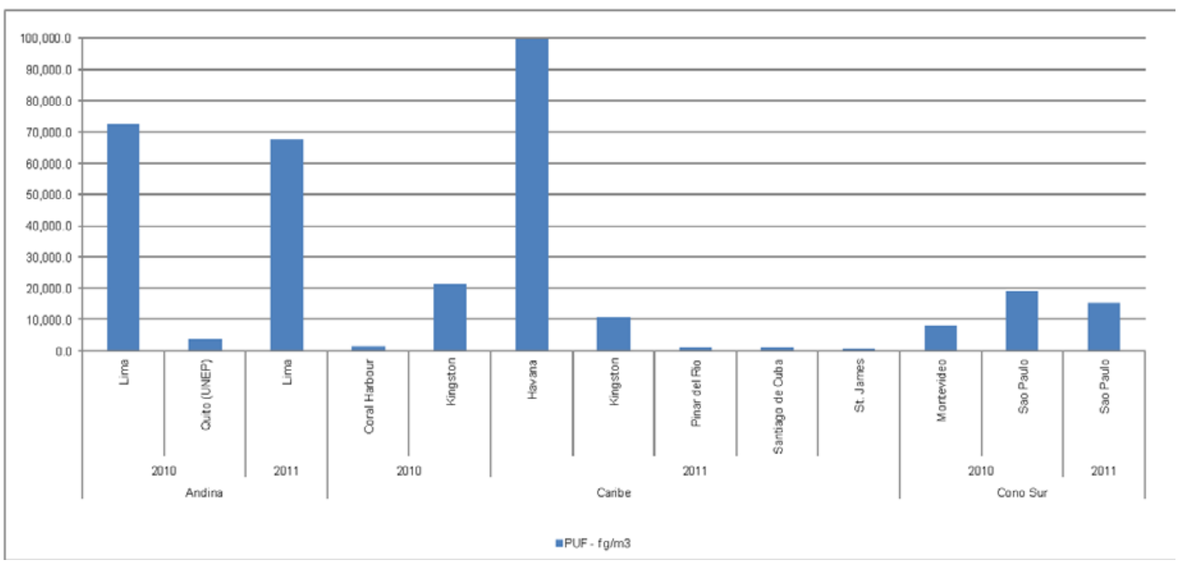

Figure 5.13. Sum12 PCBs (air sampling in urban sites)

Regarding dioxins and furans, the values range between 0,037 and 9,6pg/m^3, with a decrease of 30 percent in the case of Kingston.

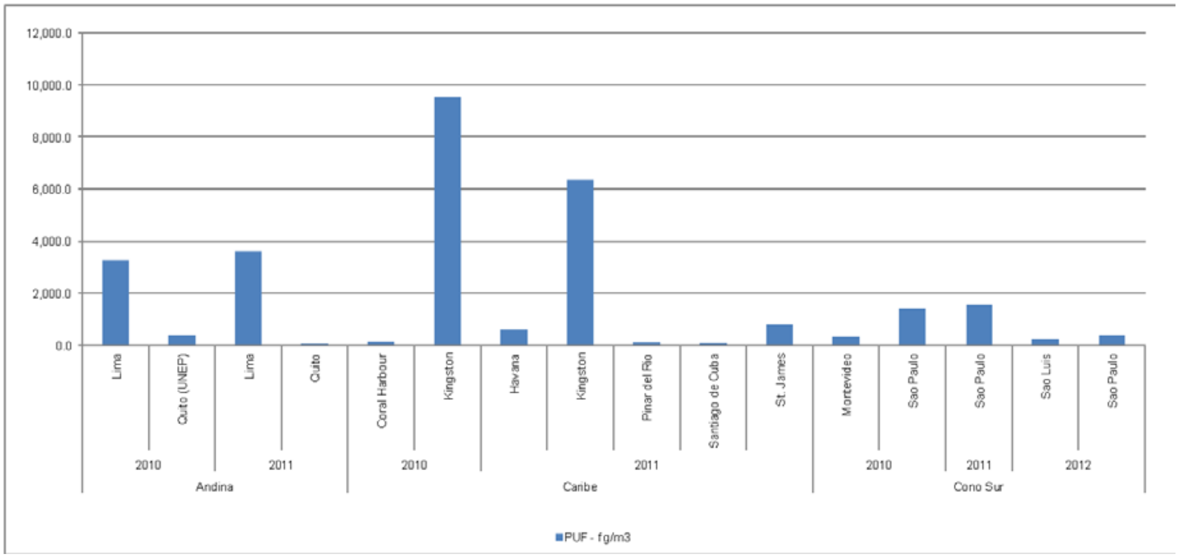

Figure 5.14. Sum 17 PCDDs/Fs (air sampling in urban sites)

In most of the sites the values of lindane are below 2 pg/m^3 in recent years.

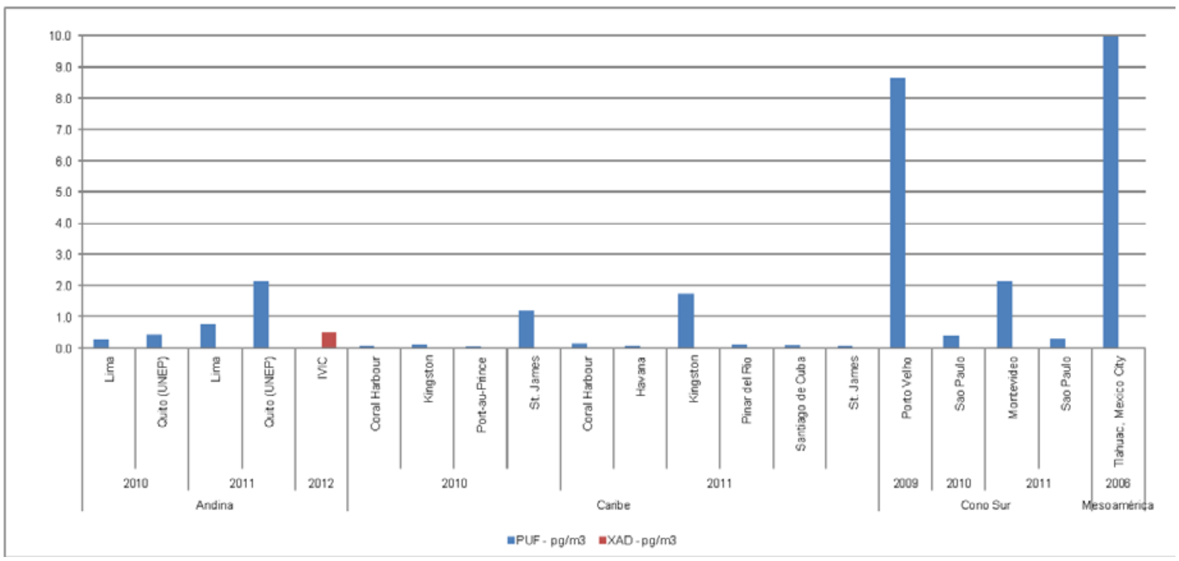

Figure 5.15. Gamma-HCH (air sampling in urban sites)

5.1.3 Rural sites

In rural sites, DDT values are between 1 and 13 pg/m^3. Puerto Maldonado has a significant increase of this compound because of the incidence of malaria in this place. The information about p'p'DDE shows expected results of the previous application of p'p'DDT. The range of values is 0.5-5 pg/m^3.

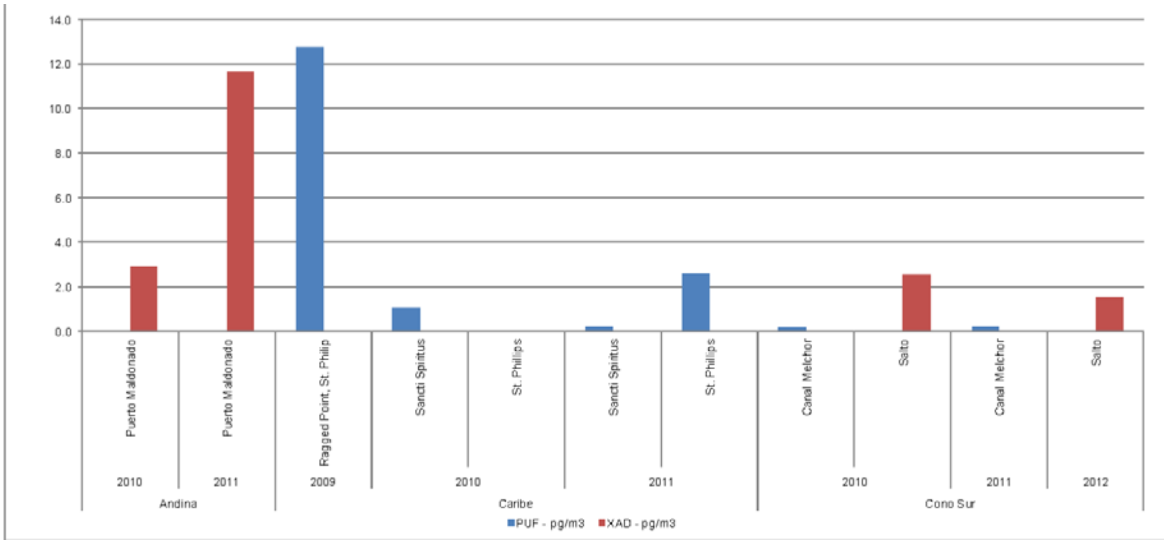

Figure 5.16. Sum 6 DDTs (air sampling in urban sites)

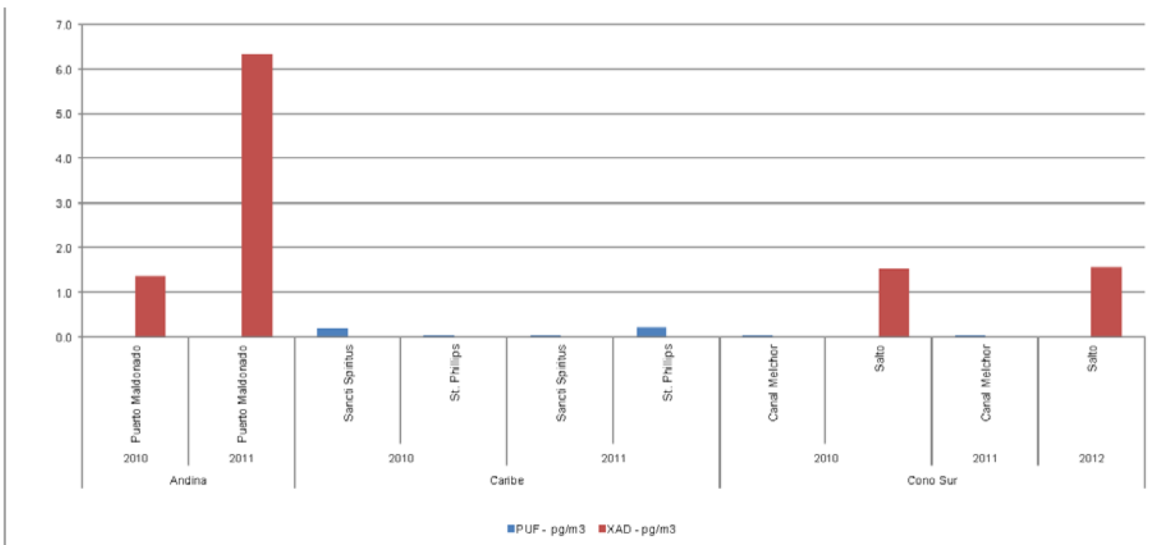

Figure 5.17. p'p'DDT (air sampling in urban sites)

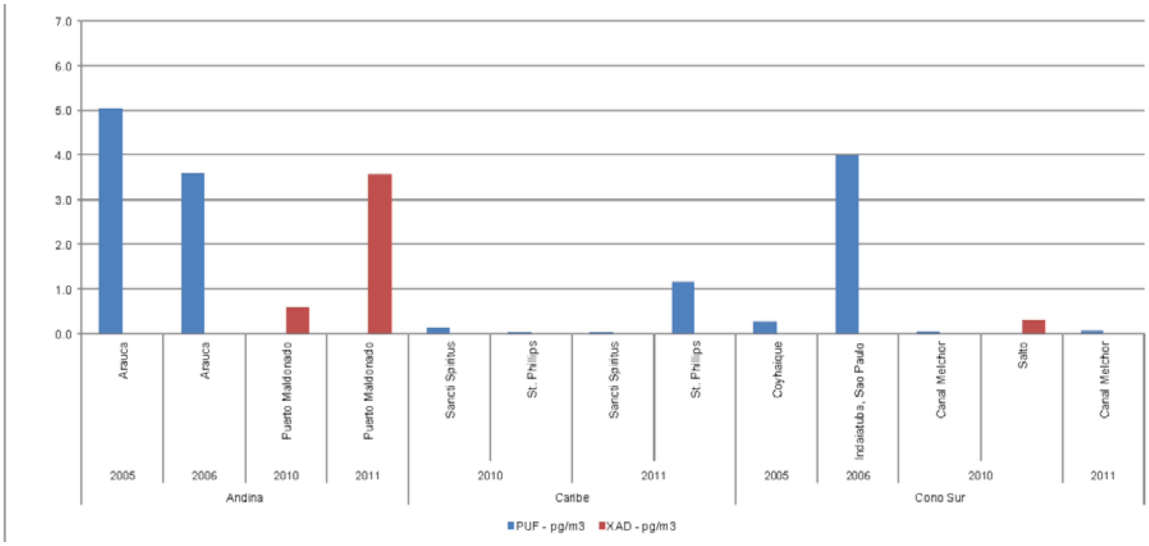

Figure 5.18. p’p’DDE (air sampling in urban sites)

Values for 6PCB indicators indicate that the highest values were returned by Cordoba, Veracruz. This can be attributed to the fact that these area form part of the industrial corridor with food and chemical industries. The observed values have a range from 1-35 pg/m^3, Veracruz with a value of 154 pg/m^3. Unfortunately there is a gap of information after 2005.

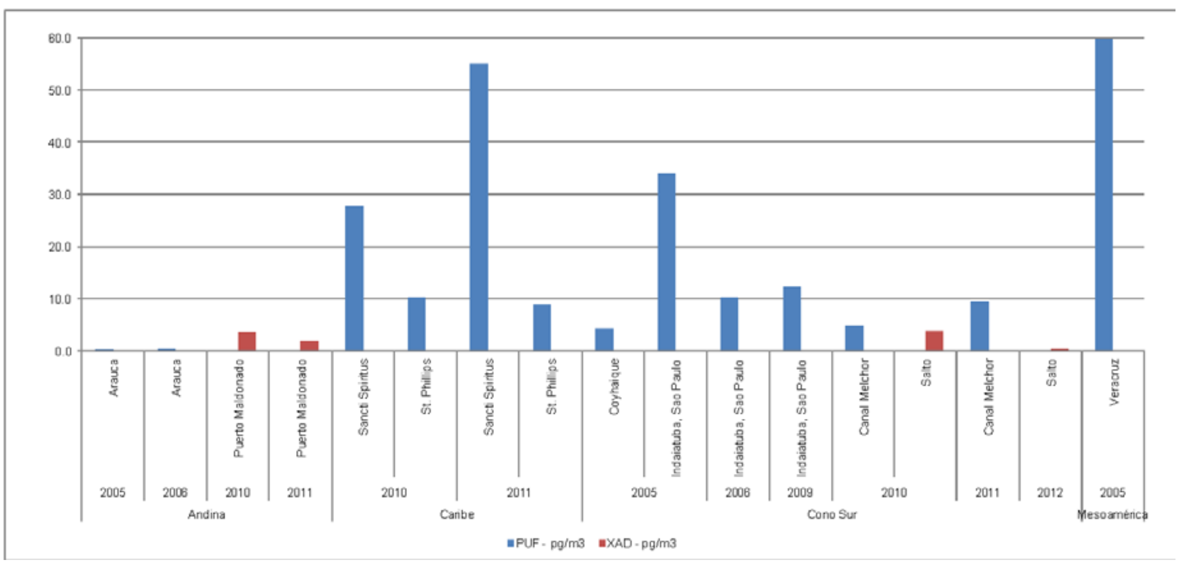

Figure 5.19. Sum 6 PCBs (air sampling in urban sites)

Sum of 12 PCB demonstrate values from 0,26-1,08 pg/m^3.

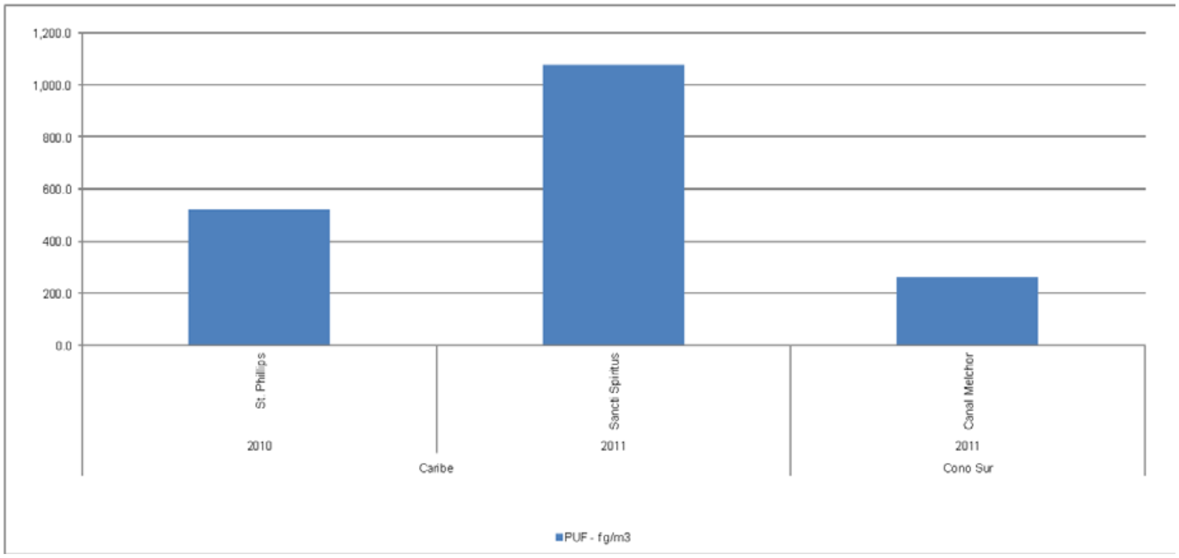

Figure 5.20. Sum of 12 PCBs (air sampling in urban sites)

The values of dioxins and furans in rural sites range between 9 and 370 fg/m^3, with maximum values in the Yaqui Valley, Sonora, with a decrease between 2011 and 2012. A feature of this site is the high agricultural use with biomass burning.

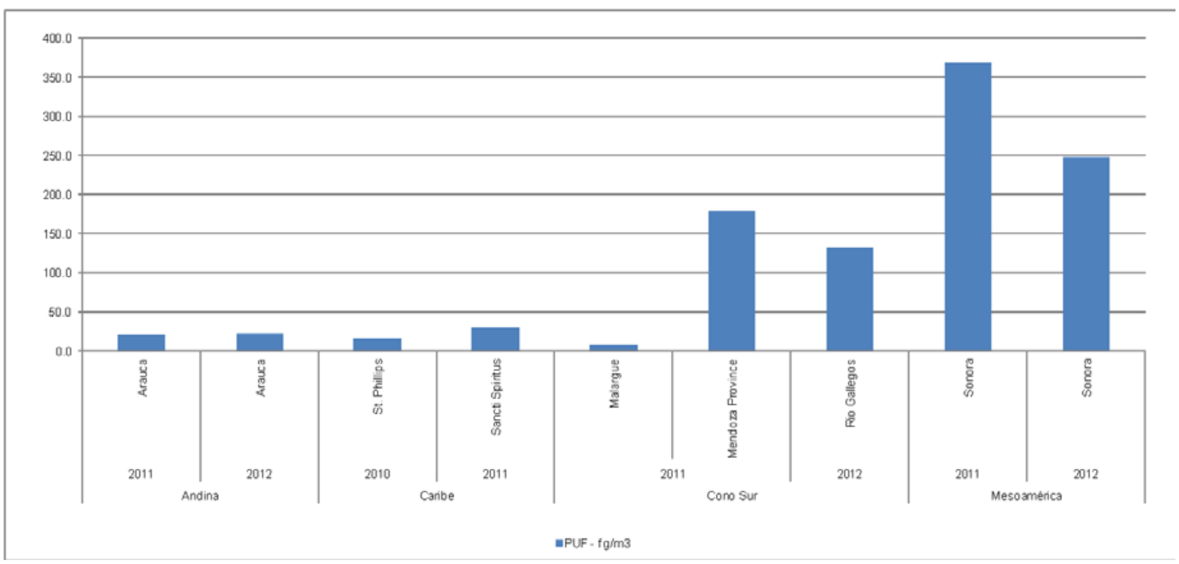

Figure 5.21. Sum 17 PCDDs/Fs (air sampling in urban sites)

Lindane is the most common compound in rural sites, due to its high agricultural use in the past. Its range of concentration is from 0.4-26 pg/m^3. It is clear that the values are reducing over time in locations like Sao Paulo.

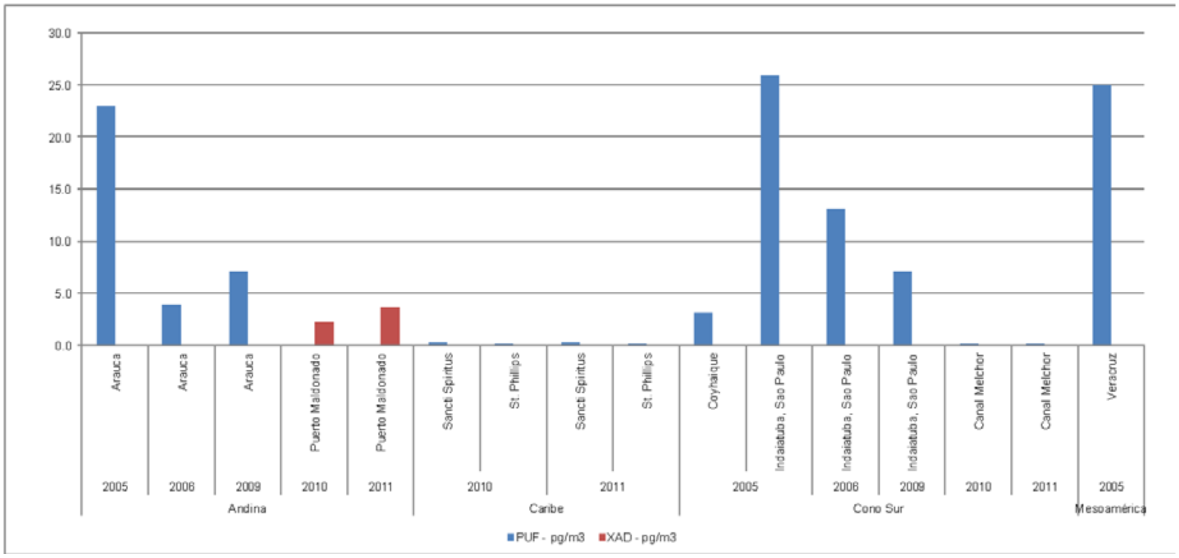

Figure 5.22. Gamma-HCH (air sampling in urban sites)

5.2. Human Milk

The results of the data warehouse GMP-DWH 2014 are reported in this section. Table 5.3 shows the countries that sent their data on human milk samples. Annex 10- electronic document lists 1260 resultsthat were obtained from data warehouse GMP-DWH 2014.

Table 5.3. Countries that provided information on human milk to data warehouse GMP-DWH 2014

Subregion/country	2001	2002	2004	2008	2009	2010	2011
AndeanSubregion							
Peru							X
Caribe							
Antigua and Barbuda				X			
Barbados						X	
Cuba							X
Haiti			X				X
Jamaica							X
SouthernCone							
Brazil	X	X					
Chile				X			X
Uruguay					X		
Mesoamerica							
Mexico							X

The sum of DDT for all samples that were analysedranged between 120 and 2500 ng/g fat. Haiti has a decrease in values from 2004 to 2011.For Chile, the two data are closer in time and are comparable.P'p'DDE is the main isomer that was found in the study.

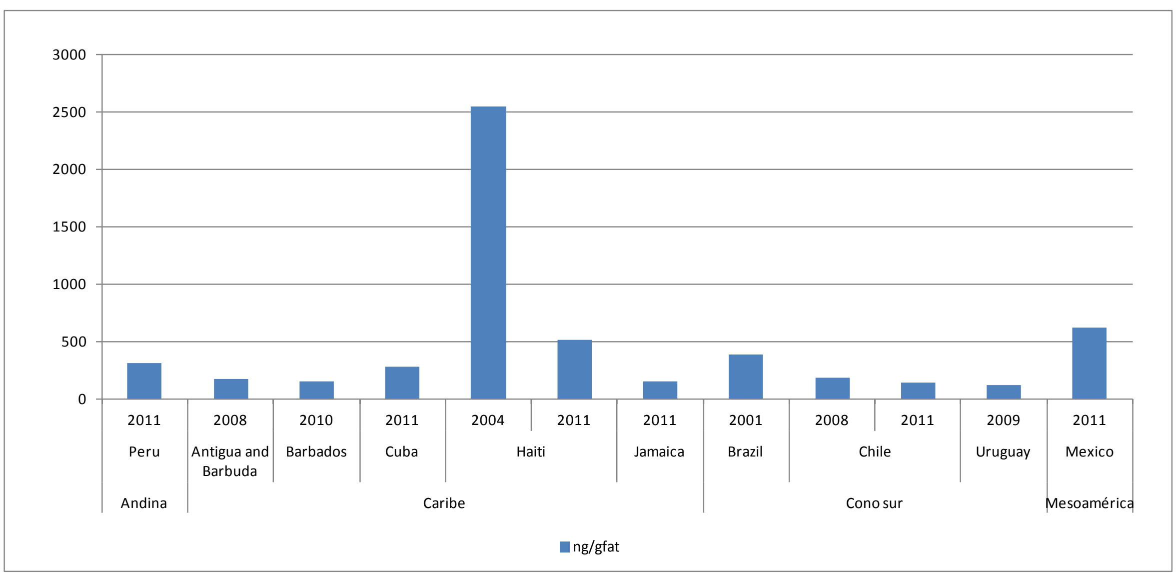

Figure 5.23. Sum 6 DDTs (Human Milk)

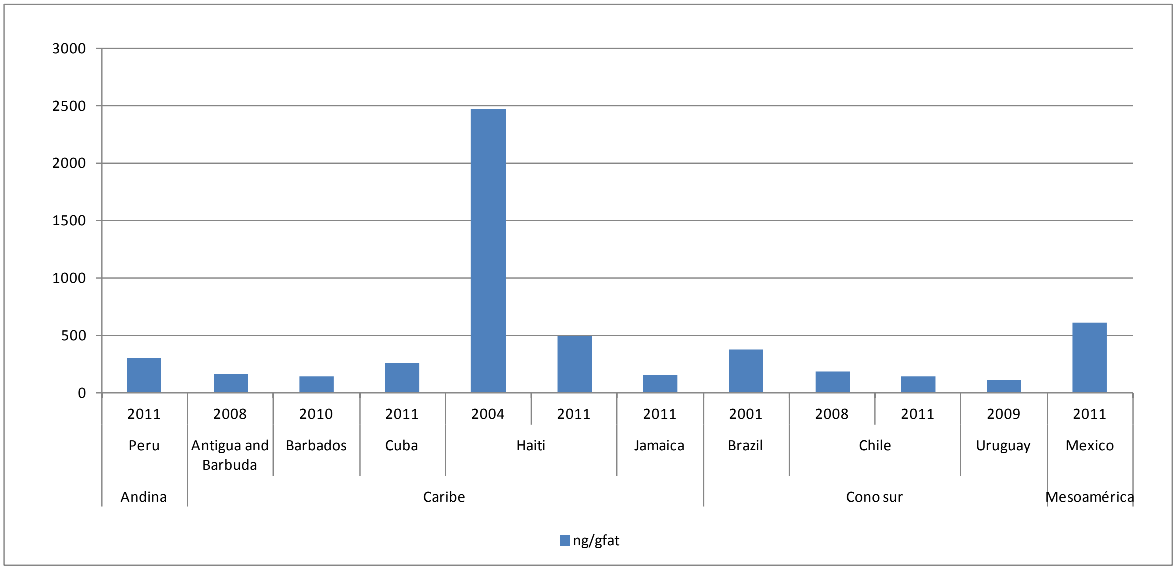

Figure 5.24. p'p'DDE (Human milk)

The Sum of 6PCB indicators appear in all samples in a range from 4-50 ng/g of fat, which is consistent with the air data in almost all sites. The different countries in the region have very similar information.

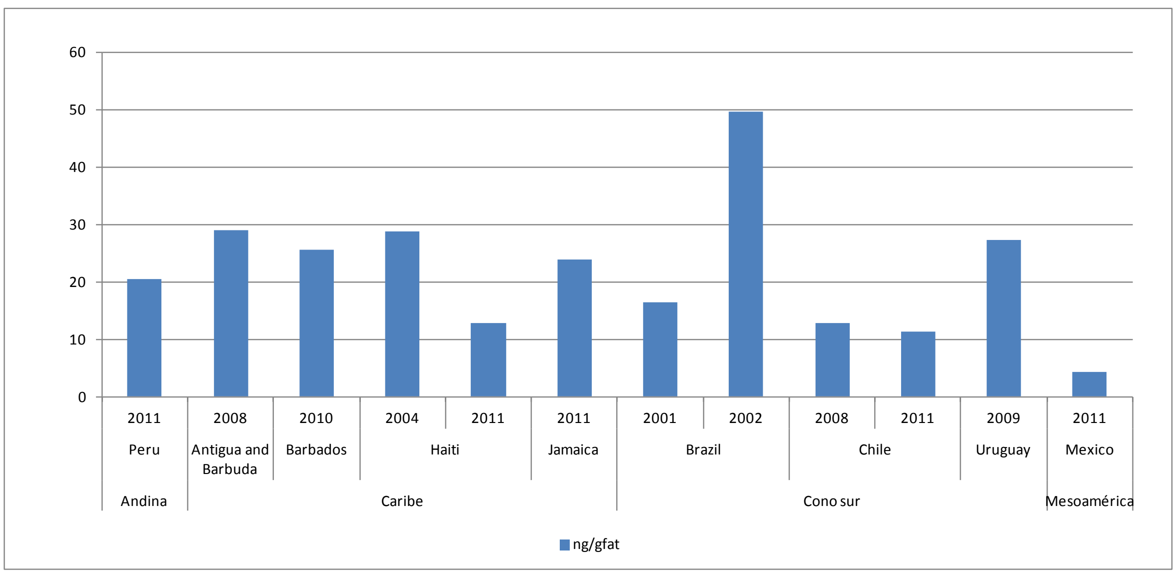

Figure 5.25. Sum 6 PCBs (Human milk)

The sum of 12PCBs are in a range from 1,3- 22,5 ng/g fat. This result is consistent with data in ambient air.

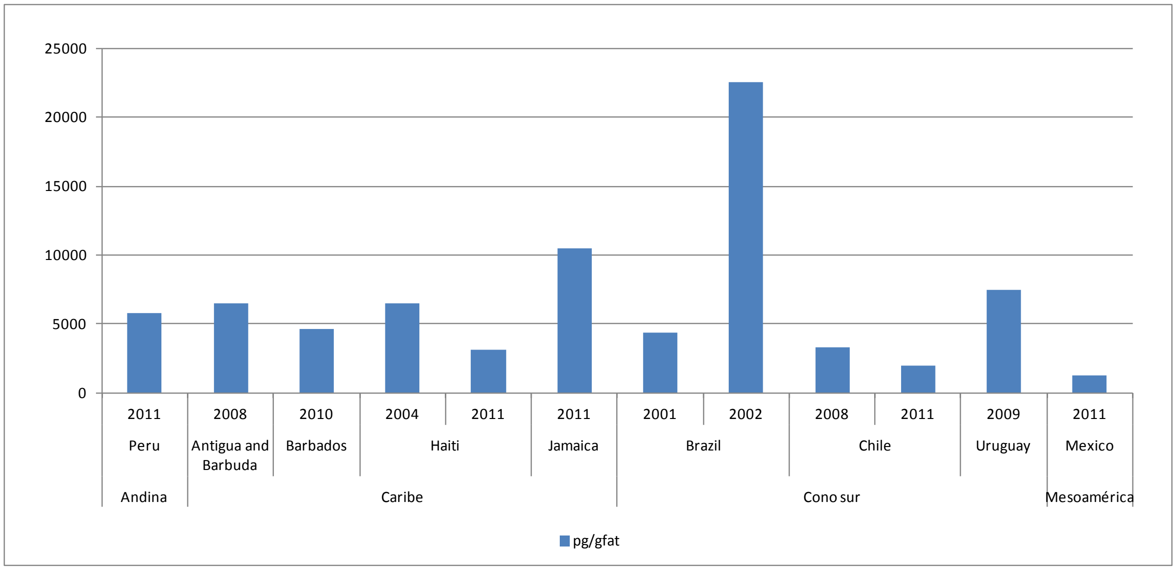

Figure 5.26. Sum 12 PCBs (Human milk)

Dioxins and furanshave beenfoundin breastmilkwith values ranging from 35-90 pg/g fat, respectively. This information is similar in all of the countries.

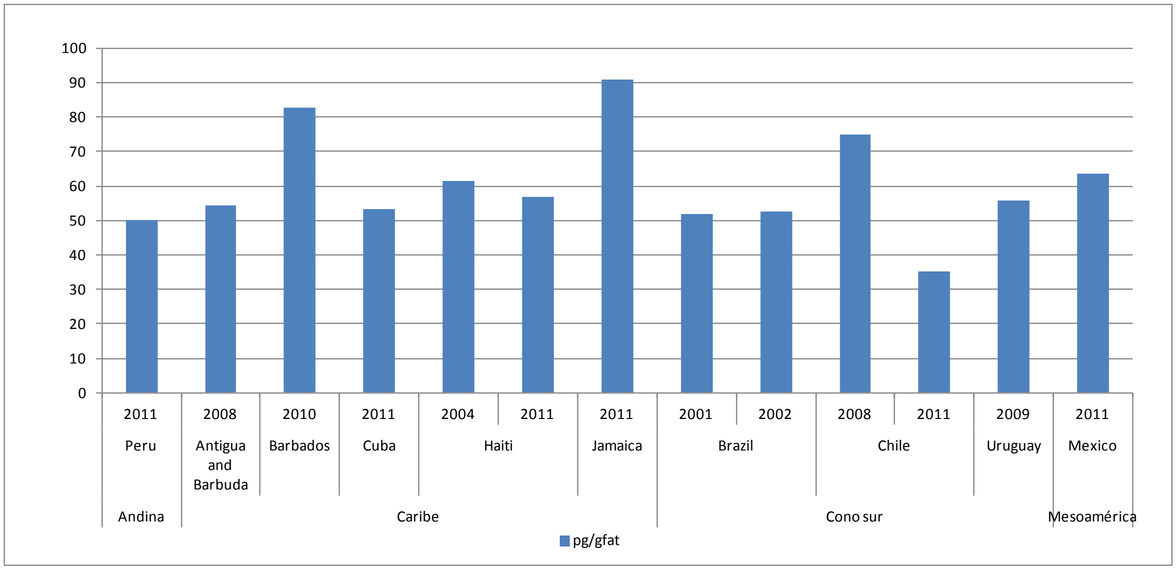

Figure 5.27. Sum 17 PCDDs/Fs (Human milk)

Dieldrin is in all samples with data between 0.25-7.6 ng/g fat. In countries with more than one datum the decrease over time is evident, such asin the case of Haiti and Chile.

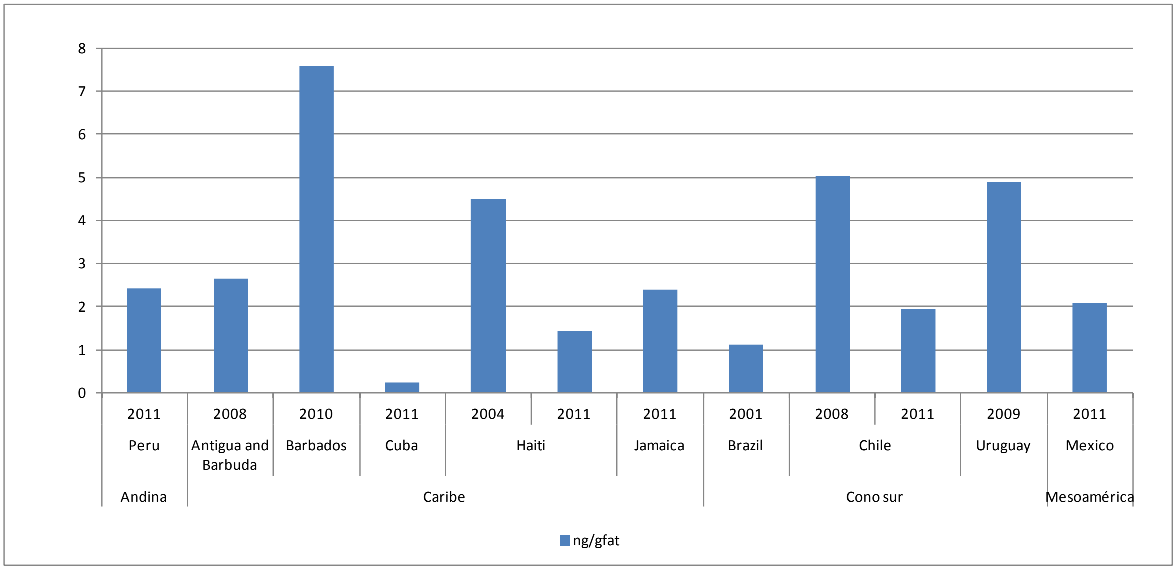

Figure 5.28. Dieldrin (Human milk)

Levels of POPs in breast milk in Brazil - 2012

In this section we present the results of "Levels of POPs in breast milk in Brazil- 2012".

The results indicate that the sum of the 6 PCBs indicators in the region 1 (GR1) is 18 ng / g fat, three times the values of other two regions, and almost one third of the amount registered in Brazil 2002 (50 ng/g fat) (See Figure 5.25).

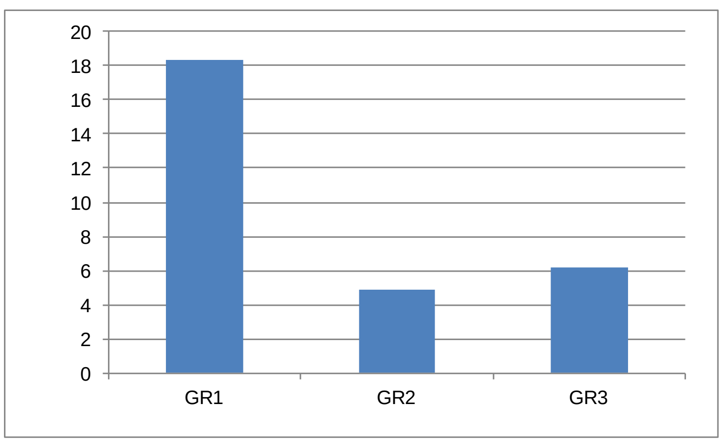

Figure 5.29. Sum 6 PCBs (ng/gfat), (Human milk) Brazil 2012

Concerning the sum of the 12 PCBs, there is a higher value in the Region 1 (GR1), but six times lower than Brazil in 2002 (22,5ng/g fat).

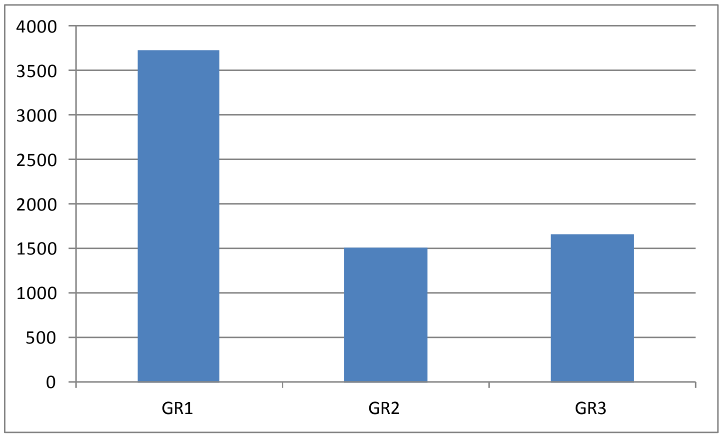

Figure 5.30. Sum 12 PCBs (pg/gfat), (Human milk) Brazil 2012

The following figure shows that the level of pp-DDE is above the pp-DDT, which is to be expected since DDT is banned in Brazil.

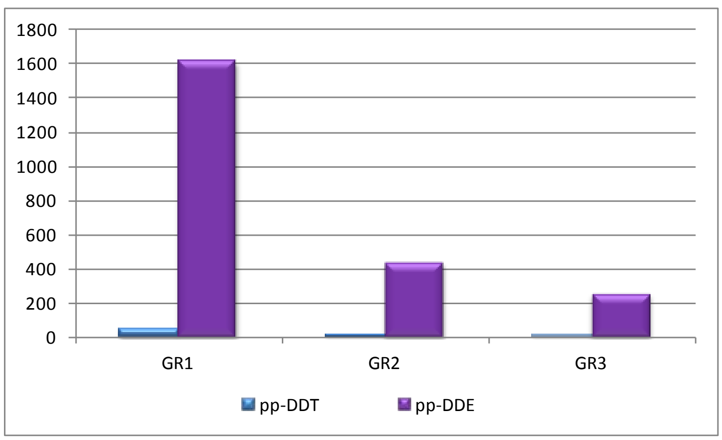

Figure 5.31. pp-DDT and pp-DDE (ng/gfat), (Human milk) Brazil 2012

6. CONCLUSIONS AND RECOMMENDATIONS

In the First Regional Monitoring Report few countries were involved in specific environmental monitoring programmes, so there were insufficient data to provide a regional pictureof persistent organic pollutants. However, for this second report there was a significant increase in participating countries, which is commendable andmust be maintained and even increased for future reports.

6.1 Conclusions

There has been some degree of progress in the area of technical capacity-building as it pertains to sampling and analysis of persistent organic pollutants in Latin America and Caribbean countries. Despite this,however, the region still has a long way to go to have a reliable and sustainable regional monitoring system that canprovide timely and reliable data for the GMP and useful tools to support national and regional decision-making on this important subject.

Capacity-building activities are important steps forward in the process of establishing a regional monitoring system. However, governments must be involved in implementing programmes and fulfilling its international commitments. The Secretariat will need to reaffirm the knowledge through training programmes and with technology transfer mechanisms, with the participation of experts and government officials.

There were efforts to harmonize analytical methodologies to reach comparable data through in situ training. The participation in intercalibrationprogrammes was very important and useful. It not only provided tools for comparing the quality of our regional data with those of the other regions,but also allowed for identifying strengths and weaknesses in laboratories.

Bearing this in mind, we must work to improve the quality of the processes and the information. According to the report of the second round of Interlaboratory Assessment of POPs, there was an important spread of results in the region. Our participation in future intercalibrationprogrammes will allow us to improve our data and will include the participation of new laboratories and new POPs.

It is important to note that the Latin America and Caribbean region is comprised of 33 countries, but there is ambient air or human milk information from only 18. Only 12 countries have participated in supporting activities under the GMP through training in specialized laboratories. The message is clear: our countries need wide and solid monitoring plans in order to be technically independent and to be able to contribute more meaningfully to the GMP.

Considering the foregoing, it will be necessary for national governments to assume their responsibility and commitment to the Stockholm Convention by providing the financial and material resources required to fulfil the required activities under the Global Monitoring Plan. Supporting the training of specialized technical staff with adequate wages to reduce the mobility of staff and taking into account which specialized laboratories are elements to be considered. It would be relevant to set up regional equipment for dioxins and furans analysis in order to strengthen the national capacities. All countries could share the costs of their operation and maintenance.

6.1.1 Baseline concentrations

Air

The First Regional Report took into account the air information from the GAPs Programme. It was a challenge to incorporate new monitoring sites around the region.The Second Report contains air monitoring data from the following programmes: GAPs, GEF/SAICM and LAPAN.

Despite the increase in passive monitoring sites from 11 to 52, there was no progress in establishing active monitoring sites, as required by the Guidance on the Global Monitoring Plan (4.1.1).

The classification of air sampling sites (Table 5.2) does not meet the criteria established in the Guidance on the Global Monitoring Plan for Persistent Organic Pollutants (4.1.1). The lack of information on the sites is a restriction for the interpretation of the GMP data warehouse.

In addition, the region does not have active samplers to contrast and validate the data acquired in the passives ones. It must be noted though that active air sampling requires more infrastructure and resources for its development. This method represents the standard methodology for analysing air pollution. Therefore, it is important to establish at least one active sampler per subregion.

This study was made with quantifiable data (above the limit of quantification, LOQ), 64 percent of whichcame from the GMP data warehouse.

Human milk and blood

The First Monitoring Report only presented one set of data for human milk and blood samples, which were published by the WHO from its milk study in Brazil. For this report, there is information from 10 countries, representing a significant increase in thecoverage of the region.

Evidence for temporal trends

It is not possible to analyse series with evidence and trends because there is no data from the same site over a long period of time.

Regarding human milk, Haiti was the sole country with data from two different rounds. The data presented indicated a fivefold decrease in DDTover a 7-year period.

Evidence for long range transport

It is mandatory to perform an analysis of atmospheric currents circulation in order to have information on long range transport because the current samples did not provide that information. For instance, in the case of St. Peter and St. Paul Rocks there are data that could indicate longrange transport; notwithstanding, a lot of options could explain this situation.

6.2 Recommendations

There are relevant progresses on technical capacity-building for sampling and analysis of persistent organic pollutants in Latin America and Caribbean countries.However, the region has still a long way to go in order to have a solid monitoring regional system that provides data and useful tools to support the decision-making on this important subject.

Capacity-building activities are important steps forward in the process of establishing a regional monitoring system, including the establishment or regular interlaboratory programmes.

This is needed to reaffirm the acquired knowledge through training programmes and technology transfer mechanisms, in which experts and governmental officials should participate.

Current results point out the need to continue with permanent monitoring programmes in all of the GRULAC countries.

It is important to highlight that the region still lacks a systematic monitoring of traditional POPs, and now it faces the challenge of the new POPs.

Central American countries should be included in a next mother's milk survey, since there is currently no information.

It is necessary to create incentives for the countries that do not participate in this network, in order to have a solid database.

Continue with air monitoring at the same existing sites in order to have evidence of temporal trends for reporting in the future.

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ANNEXES

Annex 1. Request for information

Mr. / Mrs.

Focal point

Stockholm Convention

Uruguay

Subject: Request for information on the implementation of the second phase of the Global Monitoring Plan for Persistent Organic Pollutants in Latin America and the Caribbean

Dear Sir or Madam,

In the letter circulated by the Deputy Executive Secretary on 9 October, attached herein for reference, the countries in Latin America and the Caribbean were invited to actively participate so as to contribute to the second phase of the global monitoring plan for effectiveness evaluation under the Stockholm Convention.

To develop the second regional monitoring report, the regional organization group for the global monitoring plan kindly requests your cooperation to collect the information necessary for the preparation thereof, which will be presented at the Seventh Meeting of the Conference of the Parties to be held in 2015.

Of particular interest are the results of research and monitoring programmes and/or measures relating to the identification and quantification of persistent organic pollutants in air, human milk and blood, water and other matrices. All input and support to the process of implementation of the second phase global monitoring plan will be welcome and of major service in evaluating the effectiveness of the Stockholm Convention.

The information regarding your country is included below as contained in the first monitoring report, for further update and completion in view of the second phase global monitoring plan. The inclusion of information on the new POPs is of particular importance, where such information is readily available.

Thank you in advance for your cooperation on this matter.

Sincerely,

Rigoberto Blanco

GRULAC Coordinator

Country		
Information provided in First Report	Current status 2014	Comments
Existing capacity for ambient air sampling (indicate if high-volume and/or passive)		
Existing capacity for sampling/analysis of other media (list which media)		
Existing capacity for sample treatment and POPs analysis (indicate which POPs: organochlorine pesticides, PCBs, dioxins/furans)		
System for quality management, QA/QC (indicate the most relevant: availability of SOPs, participation in national interlaboratory tests, accreditation) note: SOPs = standard operating procedures		
Requirements for capacity-building (indicate what capacity strengthening would be necessary)		
Does your country have the capacity to provide capacity building to other countries? (indicate what capacity-building your country could provide)		
Does the country have a NIP? If the answer is yes, list the main actions related to the effectivenessevaluation: monitoring actions, media, parameters, POPs, and time period.		
State whether such actions as monitoring are being carried out; when are they going to beimplemented?		

Compilation of national surveillance programme activities and existing data sets (updated January 2014)

Existing national monitoring programme/activity/dataset	Purpose	Matrix	Laboratories and Institutions involved	Laboratories and Institutions involved	Involvement of intl. & reg. Programmes/ data accessibility	Time frame	Country's view on the potential of the activity to contribute to GMP	General Description on Country's Monitoring Capacity/ Capability

Annex 2. Ecuador

MINISTRY OF ENVIRONMENT OF ECUADOR
VICE-MINISTRY FOR ENVIRONMENTAL QUALITY
NATIONAL DEPARTMENT OF ENVIRONMENTAL CONTROL
INFORMATION ON THE GLOBAL MONITORING PLAN FOR PERSISTENT ORGANIC POLLUTANTS IN LATIN AMERICA AND THE CARIBBEAN

1. BACKGROUND

Ecuador is committed to submitting a National Implementation Plan to the Convention two years after its ratification. Consequently, a process to develop its National Plan began on September 2003. This National Plan was sent to the Secretariat of the Stockholm Convention on September 2006.

This National Plan was reviewed and updated given the country's new constitution, changes in the national circumstances, priorities and emerging needs, and it was sent to the Convention in 2009.

Article 16 of the Stockholm Convention requires the Conference of the Parties to evaluate the effectiveness of the Convention four years after the date of entry into force and periodically thereafter.

The Global Monitoring Plan aims to create a harmonized organizational framework for the collection of comparable monitoring data on the presence of Persistent Organic Pollutants (POPs hereafter) listed in annexes A, B and C to the Convention, and identify trends in levels over time, and provide information on their regional and global transport in the environment.

The Guidance on the Global Monitoring Plan is a useful technical basis on all the implementation issues of the Global Monitoring Plan, especially on statistics, sampling, sample preparation, analytical methods, and data management.

During 2006 Ecuador participated in the UNEP/GEF POPs Laboratory Project,in which the following laboratories participated:

- SESA/MAGAP, Pesticide Laboratories of the Agricultural Health Service of the Ministry of Agriculture, Aquaculture and Fisheries (AGROCALIDAD)
- CEEA- Ecotoxicology Laboratory, Ecuadorian Atomic Energy Commission
- Laboratory of ESPOL

2. REPORT

Regarding to request for information on the implementation of the second phase of the Global Monitoring Plan for Persistent Organic Pollutants in Latin America and the Caribbean, we declare the following:

In 2010, a Memorandum of Understanding between the Regional Centre of the Stockholm Convention for Latin America and the Caribbean and the Ministry of Environment of Ecuador was signed within the framework of the UNEP-GEF project "Supporting the implementation of the Global Monitoring Plan of POPs in Latin America and the Caribbean States". With this project we achieved:

- Strengthening the capacity of national monitoring and contributing to the generation of data for the global monitoring plan.
- Building capacities for analytical assessment and data generation of POPs in air and human milk matrices

Several studies of residual chlorinated pesticides have been developed in various regions and watersheds, proving the presence of POPs from pesticides in water, sediment, soil organisms, and human milk as well as in certain foods from the basic food basket in the eighties. There has been a reduction of these chemicals since its ban for agricultural use in 1992. However, there is no monitoring plan for priority matrices such as air, human milk and/or blood.

The following laboratories have been involved in the development of activities of this project as follows:

AGROCALIDAD Laboratory developed the human milk analysis (2012- 2013) and the Ecotoxicology Laboratory of the Electricity and Renewable Energy Ministry performed the air ones (2012-2013).

The Ecotoxicology Laboratory of the Vice-Ministry of Control, Research and Nuclear application of the Ministry of Electricity and Renewable Energy worked on the analysis of polyurethane foams.

In order to maintain air monitoring in the longterm we have established an interinstitutional cooperation agreement between the Ministry of the Environment and the Vice-Ministry of Control, Research, and Nuclear Applications of the Ministry of Electricity and Renewable Energies. In this framework, different analysis on the POPs from the passive samplers will be developed and the inclusion of samples of new monitoring sites is also considered. The Ministry of the Environment has delivered to the laboratory two kits for water and reagents purification.

Ecuador participated in the Global Atmospheric Passive Sampling (GAPS), which is sponsored by ENVIRONMENT CANADA and is based on data collection of POPs at the global level. This programme began on December 2004 as a pilot study for 2 years. Subsequently it became a global network comprised of about 60 monitoring sites on five continents. In 2008 Ecuador was included as monitoring site in Santa Cruz, Galapagos. The main goals of this programme are:

- to determine the application of air passive samplers for POPs;
- to determine routes of spatial and temporal transfer for POPs in the air;
- to contribute information for the assessment of atmospheric transport of POPs at the regional and global levels.

However, the coordination with Canada has indicated that there is no report since 2011.

Recently we have established communication with the centre in order to coordinate various activities for sampling in Galapagos and other sites. Additionally, PROSUL has been launched to send samplers in the coastal region of the country in the Machalilla National Park and the Ecological Reserve of Churute Mangrove.

3. RESULTS

We share the information on the analysis of the polyurethane foams PUF during 2012 and 2013 in the four monitoring sites in Ecuador: Sucumbios (Puerto Libre), Provincia El Oro (El Guabo), Provinciadel Guayas (Milagro), Provincia de Carchi (San Gabriel):

Table A2-1. Analysis on the polyurethane foams (PUFs)

City			Puerto Libre		El Guabo		Milagro		San Gabriel	
Date			Nov 2012	Feb 2013	Nov 2012	Feb 2013	Nov 2012	Feb 2013	Nov 2012	Feb 2013
Compounds	LD* ng/PUF	LC** ng/PUF	ng/PUF	ng/PUF	ng/PUF	ng/PUF	ng/PUF	ng/PUF	ng/PUF	ng/PUF
HCB	0,2	0,6	2,75	< LD	2	< LD	2,3	< LD	4,15	< LD
Lindane	0,2	0,6	1,25	< LD	1	< LD	0	< LD	1,9	< LD
ppDDE	0,4	1	1,05	1,885	3,05	1,835	7,55	12,15	1,4	1,8
ppDDT	0,5	1,5	4,05	15,25	14,05	12,75	17,35	26,5	3,1	7,05
ppDDD	0,5	1,5	1,8	16,15	0	3,65	1,45	25,35	< LD	3,6
Dieldrin	0,4	1	< LD	< LD	2,95	< LD	< LD	< LD	< LD	< LD
Alpha HCH	0,2	0,6	1,8	27,9	< LD	27,55	< LD	6,7	0,95	37,15
Alpha Endosulfan	0,4	1	6,45	9,95	23	5,6	175,55	113,1	17,1	16,75
Beta Endosulfan	0,5	1,5	0,85	6,55	3,9	1,85	< LD	24,2	< LD	3

LOD* Limit of detection, expressed as nanograms of compound per PUF
LOQ** Limit of quantification, expressed as nanograms of compound per PUF
PUF polyurethane foam 6g

Also, we report data on the analysis of human milk samples that were collected during 2012 and the first quarter of 2013. Unfortunately, Ecuador could not continue with the collection of samples in this type of matrix. We expected to re-establish human milk monitoring as one of the priority matrices in the near future.

Analysis of human milk

Compound	LOD in matrix (ppb)	LOQ in matrix (ppb)	Province
			Carchi
pp-DDE	6,3	20,8	350,1
	8,3	27,8	425
	10,7	35,7	795

Compound	LOD in matrix (ppb)	LOQ in matrix (ppb)	Province	
			Pichincha	Los Ríos
pp-DDE	0,0751	0,25	0,4773	21,42
pp-DDD	0,0058	0,0192	1,6762	<LD
Lindane	0,0125	0,0417	<LD	1,1522
Alfa-endosulfan	0,0031	0,0104	0,0321	<LD

4. Conclusions and recommendations

- The determination of POPs in the air is in a primary stage in the GRULAC states.
- The information from the analysis provided by laboratories in the country is still basic.
- ESPOL Laboratory has begun a novel action for the carbonization of the rice bran in order to reduce the generation of dioxins and furans from the combustion of agricultural waste.
- Inter-institutional commitments have been established to maintain the long-term monitoring programmes/activities (laboratory analysis).
- Data on the project and the risks associated with POPs have been disseminated to several institutions of government and civil society. Notwithstanding, it is mandatory to develop sectorial capacities to create commitments and coordinated actions on this issue.
- Sampling and analysis of human milk has not been completed due to coordination difficulties with the Public Health Ministry and inconveniences to meet the criteria for the selection of donors.
- Ecuador has to strengthen its national analytical capacity.
- It is necessary to incorporate in the Instructions for the use of passive samplers (PAS) the use of Lab blanks
- It is desirable to expand the latitudinal and longitudinal sampling point in agricultural, rural, urban and remote zones such as: Carchi, Loja and in the frontier Morona Santiago.
- There is a need to establish a national network of laboratories and incorporate other laboratories.
- It is important to increase the outreach and publish the information on risks associated with POPs and the results of the project to all the stakeholders.
- In order to improve the initiated process and take advantages of each of the experiences of all of the participating countries, there is an opportunity to promote initiatives to strengthen the analytical capabilities and data generation on POPs.
- It is important to define a process that allows the exchange of information on actions amongst the GRULAC countries on issues such as the generation of POPs and the coordination of activities at the regional level.

ECUADOR

Information provided to the First Report	Current status (2014)	Comments
Existing capacity for ambient air sampling (indicate if high-volume and /or passive)		
	There are four sites for the air passive monitoring.	
Existing capacities for the analysis/ sampling in other matrices		
7 laboratories (3 private laboratories, 4 governmental ones)	3 accredited laboratories for the POPs monitoring.	
Existing capacity for sample treatment and POPs analysis (indicate which POPs: organochlorine pesticides, PCBs, dioxins / furans)		
An analysis of PCBs and Organochlorine Pesticides is developed.	Currently, Ecuador is working with new laboratories to increase its analytical capacity on PBCs.	
System for quality management, QA/QC (indicate the most relevant: availability of SOPs, participation in national inter-laboratory tests, accreditation note: SOPs= standard operating procedures.		
2 laboratories (GRUNTEC E INSPECTORATE) are accredited under the ISO 17025	The situation continues in the present.	
Requirements for capacity building (Indicate needed conditions to strengthen the capacity)		
The laboratory has a competent infrastructure, but special staff for sampling is required.	According to the laboratories, the following are required:Appropriated standards, chromatography equipment accessories, training to analyse main matrices	
Reference materials		
Certificates		
Chromatography equipment accessories		
Laboratory safety system		
Training in methods to analyse maternal milk and blood		
Bibliography		
Does your country have capacity to provide capacity building to other countries?		
(Indicate what capacity building your country could provide).		
AGROCALIDAD could support other countries with their employees.	The analytical capacity has been extended with the participation of new university laboratories through POPs projects.	
Does your country have an NIP? If positive, list the main actions related to the effectiveness evaluation: monitoring actions, media, parameters, POPs and time period.		
Ecuador has developed a National Implementation Plan for the Management of POPs.	The following projects has been development to address the POPs: Integrated and environmentally appropriated PBCs management, update of the PNI, a proposal for an e-waste management system at the regional level.	
State whether such actions as monitoring are being carried out; when are they going to be implemented?		
The country is outlining control systems in order to have inputs for the creation of monitoring programmes. Nevertheless, there is no financing for the implementation of such systems. Electric companies are committed to monitoring PCBs in dielectric oils used by them and establishing a management programme. In the framework of a FAO project, AGROCALIDAD will study food products to find the level of organochlorine	Ecuador has implemented monitoring actions in the air during 2013 and with the cooperation of the Ecotoxicology Laboratory these actions will continue in 2014. Electric companies are designing their action plans with inventories and actions to manage PBCs.	

pesticides.		

Compilation of national monitoring programmes, activities and information warehouse (Updated as of January 2014)

Purpose	Matrix	Laboratories and institutions involved	Methodologies to collect sampling and analysis	Involvement of intl. & reg. Programmes/ data accessibility	Period	Country's view on the potential of the activity to contribute to GMP	Existing National Monitoring: Programme/ activities/ source	General Description of the countries capacities/ skills
Monitoring of Organochlorine Pesticides in polyurethane foams	Air	Ecotoxicology Laboratory of the Electricity and Renewable Energy Ministry	Passive air samplers by Polyurethane Foams (PUFs).Analysis using Gas Chromatography	During 2011 and 2012 the Project for the implementation of the Global Monitoring for POPs in Latin America and the Caribbean and the Regional Centre of Uruguay provide support to the country.	2 years	The national analytical capacity was strengthened with this project through interlaboratory testing of different countries. Also, it was established the development of the PUF analysis during 2013 and probably in 2014 too.	There is not allocation of resources during 2014	Different national laboratories are interested in this work.

Annex 3. Antigua and Barbuda

ANTIGUA AND BARBUDA		
Information provided to First Report	Current status 2014	Comments
Existing capacity for ambient air sampling (indicate if high-volume and/or passive)		
No		
Existing capacity for sampling/analysis of other media (list which media)		
Limited monitoring Breast milk and mammalian meat – Antigua and Barbuda. (2006). Monitoring in water and Soil (2003-2005)		
Existing capacity for sample treatment and POPs analysis (indicate which POPs: organochlorine pesticides, PCBs, dioxins/furans)		
No		
System for quality management, QA/QC (indicate the most relevant: availability of SOPs, participation in national interlaboratory tests, accreditation) note: SOPs = standard operating procedures		
No accreditation		
Requirements for capacity building (indicate what capacity strengthening would be necessary)		
Training: POPs sampling, Data management (analysis, interpretation andcommunication). Acquisition of analytical equipment		
Does your country have the capacity to provide capacity building to other countries? (indicate what capacity building your country could provide)		
Capacity does not exist.		
Does the country have a NIP? If positive, list the main actions related to the effectivenessevaluation: monitoring actions, media, parameters, POPs, and time period.		
No		
State whether such actions as monitoring are being carried out; when are they going to beimplemented?		
No information available.		

Compilation of national surveillance programmes, activities and existing data sets (updated January 2014)

Existing national monitoring programme/ activity/ dataset	Purpose	Matrix	Laboratories and Institutions involved	Laboratories and Institutions involved	Involvement of intl. & reg. Programmes/ data accessibility	Time frame	Country's view on the potential of the activity to contribute to GMP	General Description on Country's Monitoring Capacity/ Capability
			Government Chemist					Limited capacity to carry out

			Laboratory without POPs analysis					monitoring

Annex 4. Chile

INFORMATION PROVIDED TO THE FIRST REPORT	CURRENT SITUATION 2014	COMMENTS
Existing capacity for ambient air sampling (indicate if high- volume and/ or passive		
No data available onpermanent monitoringover time,only on isolated campaignsrelatedPBCs. 1998: PBCs associated with fine matters (PM 2.5) in Santiago and Temuco. 2001: PBCs in urban air in Santiago. 2001: Air monitoring of PBCs in Santiago	There are continuousmonitoringcampaignsover timeinPBCsandother POPs, undertaken bythe Ministryof Environmentand academic institutions: 2005- 06: Passive air samplers in the Aysen Region for the Global Atmospheric Passive Sampling (GAPS) 2006- 07: Passive air samplers in Concepcion to elaborate the document: Spatial variability of atmospheric semivolatile organic compounds in Chile, Shunthirasingham, et al. (2011). 2010: Passive air and POPs samplers in the Aysen Region in the framework of the project: Supporting the Implementation of the Global Monitoring. Plan of Persistent Organic Pollutants (POPs) in Latin America and Caribbean States (Air and human milk).	
Existing capacity for sampling/ analysis of other media (list which media)		
18 laboratories to analyse POPs, soil, sediments, biota, food, milk, water, particulate matter, dielectric oil, etc.	2010: Monitoring of levels of PBCs and pesticides with passive samplers in the Aysen Region, as part of the project: Supporting the Implementation of the Global Monitoring. Plan of Persistent Organic Pollutants (POPs) in Latin America and Caribbean States (Air, human milk, sediments, fish muscle tissue). 2012: DexilL2000was acquiredfor measuringPBCsinsoilandoil as part of the Project: ***Best Practices*** for ***Management*** of PBC in the ***Mining Sector*** in South America (Chile- Peru) Analysis ofOrganochlorine Pesticidesin differentmatricessuch asmilk, water, among others (Instituteof Public Health)	
Existing capacity for simple treatment and POPs analysis (indicate which POPs: organochlorine, pesticides, PCBs, dioxins/ furans		
PBCs and Pesticides	PBCs and Pesticides	
System for quality management, QA/ QC (indicate the most relevant: availability of SOPs, participation in national interlaboratory tests, accreditation. Note: SOPs= standard operating procedures		
Based on the ***information*** gathered during ***2004***, there are ***18 laboratories*** that can ***perform some POPs analyses***, but ***only 3*** have been ***accredited*** (***ISO17025***) a given technique to anywise POPs in water and 4 in PCBs in water or dielectric oils.	Based on the ***information*** gathered during ***2004***, there are ***18 laboratories*** that can ***perform some POPs analyses***, but ***only 3*** have been ***accredited*** (***ISO17025***) a given technique to anywise POPs in water and 4 in PCBs in water or dielectric oils	
Requirement for capacity building (indicate what capacity strengthening would be necessary)		
The country does not have analytic capacities for dioxins and furans, as it does nothave adequate infrastructure and equipment. Only 24 percent of the analytic equipment is more modern than 2001. Aging equipment is a worrying factor, because of their obsolescence and theirincreasing operating	2011: the firstlaboratory of confirmatory analysisof dioxinsin meat, dairy products, fish, eggs, honey and other was inaugurated by the***Laboratory*** of ***Veterinary Pharmacology***, ***University of Chile***. 2012: training onsampling and analysis ofPBCs, and strengthening of the analytical capabilitieswere provided by the project on ***Best Practices***for ***Management*** of PBC in the ***Mining***	

costs.	***Sector*** in South America	
Does your country have capacity to provide capacity building to other countries? (indicate what capacity building your country could provide)		
There is the experience to carry out POPs in public and private laboratories that couldbe transferred to other countries. Triangular collaborations and bilateral agreements may be efficient when it comes totransfer the experience gained by scientists and technicians.	• There is the ***experience*** to carry out ***POPs*** in ***public*** and ***private laboratories*** that ***could be shared to other countries.*** • Triangular collaborations and bilateral agreements may be efficient when it comes totransfer the experience gained by scientists and technicians.	
Does the country have a NIP? If positive, list the main actions related to the effectiveness evaluation: monitoring actions, media, parameters, POPs and time period		
• There is the experience to carry out POPs in public and private laboratories that couldbe transferred to other countries. • Triangular collaborations and bilateral agreements may be efficient when it comes totransfer the experience gained by scientists and technicians.	Chilehas a NationalImplementation Plan (NIP) which is currentlybeing updated. Theactions are focused onthe managementof POPs, a regulatory perspective, the developmentof newPOPsinventories, disposal of PCBs andpesticides, andthe analysis ofthe analytical capacityof the country.	
State whether such actions as monitoring are being carried out; when are they going to be implemented?		
Theactions of the National Implementation Plan began in 2007 andwill be completedduring2008.	During this year we plan to implement actionsto update theNational Implementation Plan(NIP). Main actionsconsiderupdatingPOPsinventories, regulations to the holders ofcertainPOPs, analysis ofthe analytical capacityof the country tothenew POPs.	

There is not allocation of resources during 2014	Monitoring of Organochlorine Pesticides in polyurethane foams	Air	Ecotoxicology Laboratory of the Electricity and Renewable Energy Ministry	Passive air samplers by Polyurethane Foams (PUFs).Analysis using Gas Chromatography	During 2011 and 2012 the Project for the implementation of the Global Monitoring for POPs in Latin America and the Caribbean and the Regional Centre of Uruguay provide support to the country.	2 years	The national analytical capacity was strengthened with this project through interlaboratory testing of different countries. Also, it was established the development of the PUF analysis during 2013 and probably in 2014 too.	Different national laboratories are interested in this work.

Annex 5 Colombia

COLOMBIA		
Information provided for the first report	Current status 2014	Comments
Existing capabilities for ambient air sampling (indicate if high-volume and /or passive)		
No data available	No data available	
Existing capacity for analysis / sampling of other media?		
Available information on POPs, particularly data on concentrations of organochlorine pesticides in marine and coastal areas, coastal marine sediments and marine organisms (fish and bivalves). Organochlorine pesticides in water and soil samples analysed in the years 2005-2007. In water and milk for human consumption, corresponding to monitoring performed since 2005.	Available information on POPs pesticides concentration in soil and groundwater contaminated of three sites with buried pesticides. They have monitored PBCs in equipment of the national electricity system and the ground of an electrical installation. Waste incinerators, companies that perform metal smelting, coke production and roasting ovens husks plants or plant material make annual measurements of dioxins and furans.	
Existing capacity for sample treatment and POPs analysis (indicate which POPs: organochlorine pesticides, PCBs, dioxins / furans)		
The country has the capacity to determine POPs pesticides in soil water food and body fluids.	The country has analytical capability for determining organochlorine pesticides.The country has analytical capacity for determination of PBCs in oils, soil, water and solid surfaces. In the case of dioxins and furans, sampling is performed by national laboratories and the determination is made in laboratories located abroad.	
System for quality management, QA/QC (indicate the most relevant: availability of SOPs, participation in national inter-laboratory tests, accreditation note: SOPs= standard operating procedures.		
In Colombia laboratories performing the identification of COP must follow internationally recognized protocols and should be credited under the criteria of ISO 17 25.	Annually laboratories performing tests on POPs pesticides and PCB participate in an interlaboratory exercise to evaluate its analytical performance.	The entity that organizes and evaluates the interlaboratory tests regarding environmental determinations is the Meteorology, Hydrology and Environmental Studies Institute (IDEAM in Spanish).
Requirements for capacity building (indicate what capacity strengthening would be necessary).		
Not specified	Currently a programmefor strengthening national laboratories to carry out the determination of PCB exists in the country; laboratory personnelhas been trained for this purpose, a process of validation of analytical methods and an interlaboratory exercise are developed.	The National Institute of Health -NIH, under the Ministry of Health, in collaboration with the Ministry of Environment and Sustainable Development are structuring a series of activities to build capacity for analytical determination of PCBs in breast milk in the laboratories of the NIH.
Does your country have capacity to provide capacity building to other countries? (Indicate what capacity building your country could provide).		
Not specified	The country can provide training for the sampling and analysis of POPs pesticides and PCBs	Training would be provided by laboratories that are linked to some universities
Does the country have a NIP? If positive, list the main actions related to the effectiveness evaluation: monitoring actions, media, parameters, POPs and time period		
No	National Implementation Plan notes that the country should establish protocols for sampling and analysis techniques developed of POPs in environmental matrices such as water, soil, air and sediment, and biological samples such as food,	Regarding the analysis of dioxins and furans and brominated flame retardants it is not contemplated in the short term to develop activities to generate that capacity; and where

	blood and human breast milk. For this purpose the country has the analytical capacity to determine COP pesticides and is conducting a programme to strengthen the laboratories for the determination of PCB.	necessary, the samples would be sent to laboratories abroad that have the capacity to provide this service
State whether such actions as monitoring are being carried out; when are they going to be implemented?		
Regional project GEF/PNUMA/UCR/PAC "Reducing pesticide in the Caribbean Sea." This project is starting this year and includes the study and monitoring of organochlorine pesticides, among others. The Institute of Marine Research (INVEMAR) participates in the network monitoring of marine environmental quality in the Caribbean and Pacific Colombians, including 30 monitoring variables in marine waters of Colombia, about 350 stations; this activity has 8 years in development.	Under the project of PBCs disposal of Colombia, it has planned monitoring of PCBs in soil, food (fish) and milk in 2014 and 2015. Colombia plans to participate in a regional project coordinated by the Basel Regional Centre of Uruguay to monitor different COPscompounds.	

Existing national monitoring Programme/ activity/dataset	Purpose	Matrix	laboratories and institutions involved	methodologies for sample collection and analysis	Participation of regional and international Programmes and data accessibility	Time frame	Country's view on the potential of the activity to contribute to GMP	General Description on Country's Monitoring Capacity / Capability
PCB	Establish the presence of PBCs in different matrices	Oils, soils, breast milk and fish products	National Institute of Food and Drugs, National Institute of Health, Electricity companies, Institute of Meteorology, Hydrology and Environmental Studies	ASTM, EPA, IEC and IDEAM methods	Data shall be public	2014-2015	General Description on Country's Monitoring Capacity / Capability	The country has the analytical capacity to analyse samples collected during surveys

Annex 6 Peru

Information provided for the first report	Current status 2014	Comments
Existing capabilities for ambient air sampling (indicate if high-volume and /or passive)		
Not specified.	Currently we have capacity for ambient air sampling, through the use of high-volume samplers with filters.	We monitor the following parameters: Particulate matter < 10 (PM 10) and < 2.5 (PM 2.5), nitrogen dioxide and sulphur dioxide.

Existing capacity for analysis/sampling in other matrices		
12 laboratories that determine POPs and/or PCB, of which four (4) belong to the public sector, six (6) to the private sector and two (2) are laboratories of public universities, all located in metropolitan Lima. Other matrices: fish meal and fish oil, plankton and fresh fish.	11 laboratories perform POPs analysis: (3) belong to the public sector, (6) belong to the private sector and (2) belong to a public university. Laboratories have the capacity to perform the determination of PCBs, pesticides, DDT, organochlorines and organophosphates in dielectric oils, soils and sediments and water.	The determination is subject to the availability of specific laboratory materials.

Existing capacity for sample treatment and POPs analysis (indicate which POPs: organochlorine pesticides, PCBs, dioxins / furans, other)		
PCBs and pesticides.	Analysis of POPs in air, water and sediments; PCBs in oil, solid waste, soils, sediments, food and water; organochlorine pesticides in soils, food, water, fish, mammals, aldrin, dieldrin, endrin, heptachlor, DDT, toxaphene, mirex, chlordane and hexachlorobenzene.	Some laboratories have environments designed specifically for the treatment and analysis of samples of PCBs and pesticides. For other types of samples it would be necessary to enable specific physical environments in order to prevent cross-contamination. Furthermore, specific material is required by type of sample to be analysed, but there is chromatography equipment.

System for quality management, QA/QC (indicate the most relevant: availability of SOPs, participation in national inter-laboratory tests, accreditation note: SOPs= standard operating procedures. Note: SOPs= standard operating procedures.		
In Peru there is no reference integrated laboratory system, with protocols and standard procedures to validate results. Accreditation systems for POPs are not performed in the country yet.	In some cases the laboratories have developed quality management systems based on ISO standard 17025; where the test method is validated and its uncertainty is estimated. Currently, some laboratories have a Quality Manual, Management and technical procedures (POEs) approved and accredited before INDECOPI, normalizing entity of Peru. Some laboratories also participate in inter-laboratory trials, both national and international, with satisfactory results.	

Requirements for capacity-building (indicate what capacity strengthening would be necessary).

Strengthening of the analytical capacity for the determination of persistent organic pollutants (POPs) that allows: Strengthening capacities for the development of standards on POPs. Strengthen capacities to identify new POPs chemicals to be included in the Stockholm Convention. Capacity-building to establish bilateral and multilateral assistance programmes with industrialized countries, to support the activities and strategies for the management of POPs. Strengthening and capacity building in chemical safety.	Requirement of traceable standards for quality assurance of the tests performed. Enabling of physical environments to test in other matrices different from those currently tested. Laboratory materials to implement trials in other matrices. Assessment of conditions to monitor and test POPs in a decentralized manner, enhancing the capabilities of other laboratories at the national level. Strengthening of capacities to organize inter-laboratory trials for the determination of PCBs and pesticides. Methods of analysis for the new POPs, in different matrices, including the products that contain them.	

Does your country have capacity to provide capacity building to other countries? (Indicate what capacity building your country could provide).		
Yes, we could provide technical support for the preparation of National Implementation Plans, in countries that are in the process of developing it or who have not begun.	We could provide training or internships for professionals or technical analysts for performing PCBs and pesticides tests.	

Does the country have a NIP? If yes, list the main actions related to the effectiveness evaluation: monitoring actions, media, parameters, POPs and time period

Yes, Peru has its National Implementation Plan.	We had a national implementation Plan for the period from 2007 to 2012. It is currently being reviewed and updated.	The Plan included objectives to develop the communication skills and strengthen the national system of control and surveillance and improve its performance to prevent the illegal trade of POPs pesticides and others; as well as monitoring the presence of POPs in the environment. The progress of the activities set out in the Plan is currently being assessed.

State whether such actions as monitoring are being carried out; when are they going to be implemented?		
Currently we are not performing monitoring actions regarding air quality, contaminated soils, food and other environmental matrices. The projects and action plans that involve monitoring will be implemented according to the established schedule, once the National Implementation Plan is approved with a regulatory range.	With the support of international cooperation, we are currently implementing enabling activities for the monitoring of POPs in air, water, soil and breast milk. Also, progress is being made in the monitoring of the presence of PCBs in dielectric oils for the electricity and mining sectors, mostly in transformer oils and to evaluate contaminants in biota and marine sediments, both with the support of international cooperation. On the other hand, monitoring of pesticide residues is also performed.	

Annex 7 Guatemala

Information provided for the first report	Current status 2014	Comments
Existing capabilities for ambient air sampling (indicate if high-volume and /or passive)		
No		
Existing capacity for analysis/sampling in other matrices		
YES	Soil and biota (fish)	
Existing capacity for sample treatment and POPs analysis (indicate which POPs: organochlorine pesticides, PCBs, dioxins / furans, other)		
YES	Organochlorine pesticides, PCBs	In the first quarter of 2015 a study will be performed to identify POPs pesticides in an agricultural area
System for quality management, QA/QC (indicate the most relevant: availability of SOPs, participation in national inter-laboratory tests, accreditation note: SOPs= standard operating procedures.		
National Laboratory of Health of the Ministry of Public Health and Social Assistance	Accredited laboratory under ISO standard 17025. Accredited test “Determination of nitrate in samples of water packaged for human consumption through method 4500-NO3 of the Standard Methods For the Examination of Water and Wastewater 21st. Edition 2005”	
Requirements for capacity building (indicate what capacity strengthening would be necessary).		
	Training of laboratory personnel, acquisition of supplies, reagents, equipment and standards to set up methodologies for the analysis of POPs.	
Does your country have capacity to provide capacity building to other countries? (Indicate what capacity building your country could provide).		
NO		
Does the country have a NIP? If yes, list the main actions related to the effectiveness evaluation: monitoring actions, media, parameters, POPs and time period		
Yes,	Guatemala has a PNI which included only the first 12 POPs. During the implementation the inventory of PCBs has been updated twice, with a total of 440 tons of contaminated oil and the equipment containing it. We have also updated the inventory of dioxin and furans, using the last version of the toolkit provided by the Secretariat with a total of 208 g. EQT/a. We performed an inventory of obsolete pesticides with a total of 61.10 tons and 36,122.71 litres. For POPs pesticides there are still 15 tons of DDT, conveniently stored in a warehouse of the Ministry of Health. Progress has been made on the issues of inter-institutional coordination, creating a National Commission for the Coordination of Persistent Organic Pollutants. As of 2014 A total of 2,605 people were trained on the subject of the Stockholm Convention and progress of the National Implementation Plan, aimed at different sectors of the population. Posters, brochures and a video summary of the 22 POPs have also been developed. We already began activities on the issue of contaminated sites (manual identification and classification of contaminated sites). Management of new projects funded by the GEF and the European Union: (GEF: update of the PNI, already authorized, and environmentally sound management and elimination of PCBs and DDT, already authorized, management of the RAE at national and regional level). With the European Union: (PCB training, study on the identification of POPs pesticide in Laguna Retana (to be implemented in 2015), chemical emergencies and handling of chemical substances). Currently there are no actions on POPs monitoring.	
State whether such actions as monitoring are being carried out; when are they going to be implemented?		
No	As of 2014 no POPs monitoring programme has been implemented.	

Compilation of national monitoring programmes, activities and existing datasets (updated as of January 2014)

Existing national monitoring Programme /activity/dataset	Purpose	Matrix	Laboratories and institutions involved	Methodologies for sample collection and analysis	Participation of regional and international Programmes and data accessibility	Existing national monitoring programme /activity/dataset	Purpose	Matrix