PERSISTENT ORGANIC POLLUTANTS IN THE LATINAMERICAN REGION: RESEARCH NEEDS AND STRATEGIES FOR SUPPORTING POLICY MAKERS

Barra R[1], Mendoza R[1], Bezama A[1], Malm O[2], Castillo L[3], Aguayo M[1], Ibañez R[1].

[1] EULA-Chile Environmental Sciences Center, University of Concepción, Concepción, Chile
[2] Institute of Biophysics, Health Sciences Center, Federal University of Rio de Janeiro, Brazil
[3]Regional Institute for Toxic Substances, IRET, University of Heredia; Costa Rica

Abstract
The study of the persistent toxic substances (PTS) has attracted the interest of many scientists around the world. In previous years we have participated in a global effort to collect available information about persistent toxic substances in the Latin-American region. The products of such investigations come up as Regional Reports. More recently, there is more available information mainly about POPs that the different countries are producing as part of the national implementation plans (NIPs) of the Stockholm Convention referred to as POPs. The available information lacks of comparability since no harmonized structure have been used for releasing the NIPs, the exception is dioxins and furans where UNEP Chemicals have developed a toolkit. In the cases of PCBs and Chlorinated pesticides the information is obtained using different approaches and the comparability and confidence in the information is lower since the uncertainties are higher. More recently, we have been working in a project to support policy makers by creating a data base of PTS and a web page where it is expected people will access to get information available about the PTS in the Latin-American region. The need of international cooperation and the role of the proposed IPCP are also discussed.

Introduction

It is clear that the chemical pollution with persistent pollutants is a global issue; however the availability of information in developing countries such in Latin-American region is really poor[1,2]. That fact makes the management and the implementation of the Stockholm Convention more difficult. So a major problem that scientist faces within the region is how to make a better contribution from the science to the sustainable management of chemicals and in particular those belonging to the POPs types.
The opportunities to bring together scientist interested in PTS in the region have been historically due to external funding, agencies such UNEP, OAS (Organization of American States), and other are strengthening the opportunities of both scientific and technical cooperation. In this paper we describe the major problems for addressing the information relative to sources, environmental levels, toxicological and ecotoxicological effects, and finally how to handle situations regarding the storage and elimination of obsolete stocks of toxic compounds, by giving an example of methodological approach to address such issues by constructing a data base and a way for disseminating information.
Few attention has been paid to Latin-American sources, environmental levels effects and the contribution of the region to the global budgets of PTS, this fact could be explained by two reasons: the lack of information and the lack of human resources formed in the field.

Materials and Methods

Different sources to build up a data base have been used so far, existing information in regional reports, scientific papers and other governmental sources have been collected, and expressed as graphs, and data tables. The focus of the research has been directed to POPs compounds, where availability of information is larger, but also data is included regarding the PAHs situation in some South American countries.

Results and Discussion

A particular focus on pesticide information-mainly during the 1980s and early 1990s was recorded for many

Latin-American countries; the concern of pesticides however is more relevant in Central American countries, while some focus on industrial pollution is being observed in the last years. In general, both scientific and technical reports reveal few information regarding sources, considering that the regulatory status of most POPs pesticides correspond to banned products, besides the available information regarding the releases of dioxins and furans described in the National Action Plans. Table 1 summarizes the per capita release of dioxins in 5 Southamerican countries using information from the NIPs. Most of dioxins releases are attributed to uncontrolled combustion process and incineration sources.

Table 1. Dioxin estimated emissions in some Southamerican countries. (Data from UNEP: www.chem.unep.ch)

Country	Inhabitants (millions)	TEQ g/year Air	TEQ g/year total	µgTEQ/Inh/yr Air	µg TEQ/Inh/yr Total	Year
Argentina	37,4	874	2111	23	56.4	2001
Chile	15,7	51,9	85,6	3,3	5.4	2003
Ecuador	13,7	65,5	98,5	4,8	7.2	2002
Paraguay	5,2	70,7	156	14	30	2002
Perú*	26,1	193	424,3	7,4	16,2	2003
Uruguay	3,3	17,1	28	5	8	2000

*Provisory data

Dioxins and furans measurements are quite scarce and the data is generally not available to the public. Regarding PCBs, they were never synthesized within the region but only imported. The major uses of PCBs have been related to electric transformers and condensers, and other uses have not been explored. The estimated consumption made by NILU[3] make a total amount of 22,114 tons for 10 countries in the region; up today few PCBs inventories have been released. These figures agree well with the national inventories in some of the countries within the region. Unfortunately the inventories of PCBs have been conducted by using different strategies that make their comparison difficult.

In previous work we have described that probably combustion sources are a major contributor to PTS (Dioxins/furans and PAHs) to the environment in the region. A recent review of PAHs in the South American environment reported that only few studies have addressed the relationship between exposure and health. In addition, PAHs have been measured in urban settings being observed high concentrations in high populated areas, but there is few data regarding to rural areas, where fires are a common practice. The figure 1 shows some published data regarding PAHs in some high populated areas in South America reflecting the influence of both petrogenic and pyrogenic sources in particular matter (PM10)[5]

From these data it transpires that the human population in such high populated areas is exposed to high concentrations of airborne pollutants, but that the effects derived from such high exposure have not been evaluated yet.

The process of capacity building within the region should be improved, the efforts of the international agencies have been focused towards environmental officers usually linked to governmental agencies; because this approach has proven very useful, we believe that a capacity building towards the improvements of the human resources from the scientific side should also be promoted under the form of training courses, exchanges and postgraduate programs supported internationally, in our opinion an International Panel on Chemical Pollution (IPCP)[6] could play also an important role on these activities.

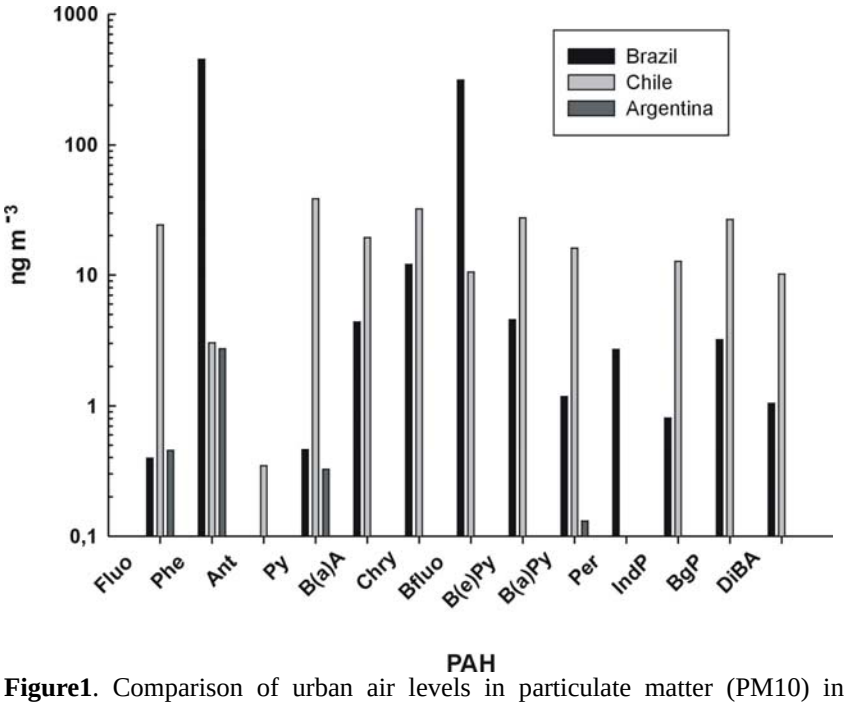

Figure1. Comparison of urban air levels in particulate matter (PM10) in three cities from SouthAmerica (Santiago-Chile, La Plata Argentina and Sao Paulo Brazil)

There are several problems that we found in Latin-America that international actions, such as the International Panel on Chemical Pollution IPCP[6], should address and that are shown below, and obviously could drive future research.

- The understanding of transport pathways (biotic and abiotic) are very poor
- The knowledge about sources is still incomplete
- Regarding the environmental levels and temporal trends about PTS there is practically no information in countries such as Bolivia, Ecuador and Paraguay, and some Caribbean and central American countries.
- Relationships about PTS exposure and effects on human health
- Absence of toxicological and ecotoxicological research

Some of the issues that should be addressed within the region are the identification and quantification of sources of releasing POPs within the region, this includes the amount of pesticides type legacy POPs that were used in the past. This could be done by using harmonized procedures in order to gain the opportunity to release comparative figures that will allow the allocation of resources to strength the process of sources identification and quantification; this could be considered a short term need. A second issue that we identify as prioritary is the evaluation of environmental levels and trends within the region; this could be perfectly addressed as a regional or subregional activity since analytical capabilities are available in several countries that may be used as regional centers for helping such countries where the capabilities have not been developed yet, this could be considered also a short term need. A third issue is related to the toxicological and ecotoxicological evaluation of the identified hot spots, this is particularly serious since the lack of relevant epidemiological information in the case of human health, even some recent reports from Brazil shows a good relationship between exposure and some endocrine effects in human populations[4], this could be considered on a long term need. Other issue of concern relates with the identification and treatment of contaminated sites that are associated to areas where pesticides were synthesized and some heavily industrialized areas, as well as former waste and dumping sites, this also could be considered a short term need. There are many papers that describe high concentrations in urban areas (most of the population is living in densely populated areas in both Central America and South America).

However, there is also concern about the levels of POPs found in remote areas[1]. We identified several areas of concern, where the data are lacking and represent important ecosystems for the region. (Andes mountains, Pacific Ocean, Caribbean Ocean, Atlantic Ocean, Amazon and La Plata River basins)

During the last year we have been working developing a database for toxic substances aimed to help decision makers towards a better chemicals management, the concept behind the database in use and production of PTS, using categories of information available at the toolkit for estimating the dioxins and furans emissions as a basis for building the life cycle of some PTS (POPs/POPs candidates, some pesticides, and other industrial related compounds that may be released in the area). The first problem was to choose the chemicals that should be part of the database, since no criteria exist for selecting chemicals. A second problem was to establish a comprehensive use and production structure for the database. A third problem was to get the information for filling up the data base. Currently, the Organization of American States (OAS) is organizing the collection of the data from each country belonging to the region that will be used for filling the data gaps, the aim of this project is to provide decision makers with a tool of information that could be use in the process of prioritizing actions for a sound management of chemicals within the region.

The proposed IPCP[6] could play a key role in helping developing countries in Latin America to improve the scientific understanding of the process releasing PTS to the environment. Activities that can be envisaged with the help of IPCP (and their implementation timing) include: classification of PTS for priority listing (short term), the analysis of fate and behaviour of PTS under different climatic circumstances (short-long term), the health and environmental risks due to the exposure to PTS (long term). Contribute with sound technical support for contaminated site remediation and waste management (short term). Capacity building in areas such as PTS inventories and sources analysis, quality assurance /quality control in analytical laboratories, the design of cost-effective monitoring programs and the application and use of environmental fate models (short-long term). In summary, in our view the IPCP contribution could be envisaged as follows:

a) Scientific support for setting priorities (physicochemical properties, fate models)
b) Capacity building in instrumental methods of analysis and the design of monitoring programmes
c) Contaminated sites management
d) Human health and environmental effects assessment
e) Training of human resources through exchange of PhD students, visiting professors, establishing postgraduate multidisciplinary programs related to PTS

Pollution by PTS are a global issue and should be addressed in a multidisciplinary strategy, developing countries need the international cooperation, but it should be emphasized that the cooperation should be based not only on a technological basis, but also in the perspective of preparing highly qualified human resources in the field of chemical management.

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