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CHEMICALS AND WASTE MANAGEMENT FOR SUSTAINABLE DEVELOPMENT
Results from UNDP work to protect human health and environment from Persistent Organic Pollutants

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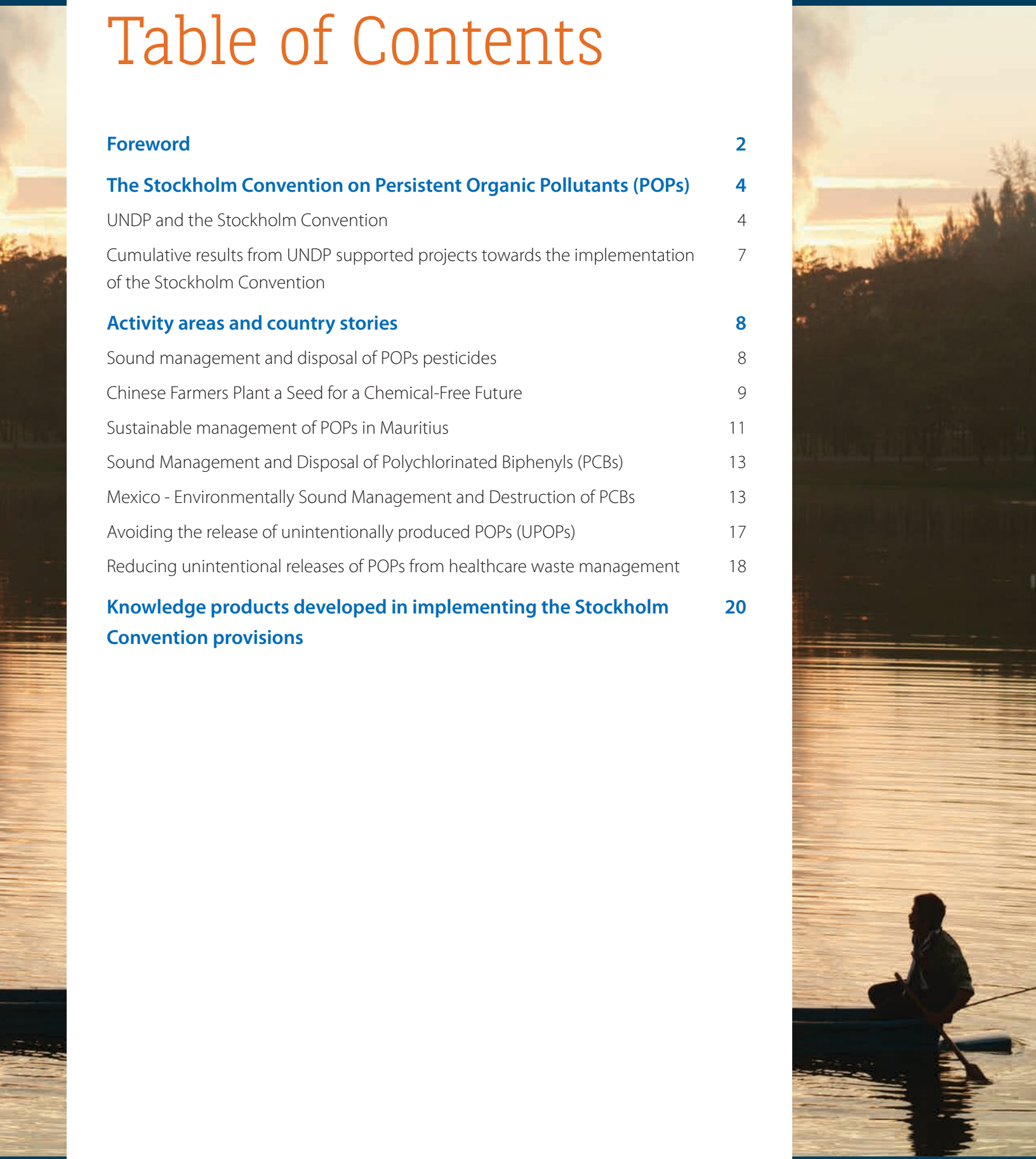

Foreword

The use of chemicals permeates modern life. Chemicals play an important role in development, including through the production and use of life-saving medicines, purification agents for treating drinking water supplies, and agricultural chemicals that boost on-farm productivity. However, in the absence of proper management practices the use of chemicals can pose significant risks to human health and the environment, particularly to the poorest and most vulnerable population groups.

At the United Nations Conference on Sustainable Development (Rio+20) countries reaffirmed the aim to achieve, by 2020, the sound management of chemicals and hazardous waste throughout their life cycle and in ways that lead to minimization of significant adverse effects on human health and the environment.

The United Nations Development Programme (UNDP) thus promotes the sound management and disposal of chemicals as an important aspect of our work to reduce global poverty and promote human health under the framework of the Strategic Approach to International Chemicals Management (SAICM).

Persistent Organic Pollutants (POPs) are chemicals that adversely affect human health and environmental quality when released into the air, water or soil. Even in small quantities, POPs can wreak havoc in human and animal tissue, causing nervous system damage, immune system diseases, reproductive or developmental disorders, and cancers. These pollutants have been given special regulatory attention because they persist in ecosystems for extended periods of time, are capable of travelling long distances on wind and water currents, and increase in concentration within food chains.

Assisting developing countries and countries with economies in transition in their efforts to sustainably manage the use, disposal, and destruction of POPs is an important element of UNDP's work in promoting the achievement of the Millennium Development Goals (MDGs). UNDP supports the development and introduction of alternatives to POPs, and increased access to the best available and affordable alternative technologies. With financial support from the Global Environment Facility (GEF) and partners in co-finance, UNDP helps countries meet the objectives of the Stockholm Convention on Persistent Organic Pollutants, with the aim of reducing the vulnerability of the poor to the health and environmental stresses originating from the improper management of POPs. UNDP supports countries to address chemicals and waste management in a holistic way, utilizing the lifecycle management approaches. UNDP believes that efforts to meet the goals of chemicals-related Multilateral Environmental Agreements, including the Stockholm Convention, will be enhanced by more effectively integrating sound management of chemicals into national development policies and processes. UNDP activities in the area of POPs and hazardous waste management are therefore undertaken within the overall context of a country's framework for sound management of chemicals. I hope this publication will be useful for chemicals and waste management practitioners in implementing the Stockholm Convention provisions.

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The Stockholm Convention on Persistent Organic Pollutants (POPs)

The Stockholm Convention on Persistent Organic Pollutants is a global treaty designed to protect human health and the environment from chemicals that do not degrade in the environment for long periods of time, are widely distributed geographically, and accumulate in the fatty tissues of humans and wildlife. Exposure to POPs can lead to serious health effects, including certain types of cancer, birth defects, developmental problems, dysfunctional immune and reproductive systems, and generally greater susceptibility to disease.

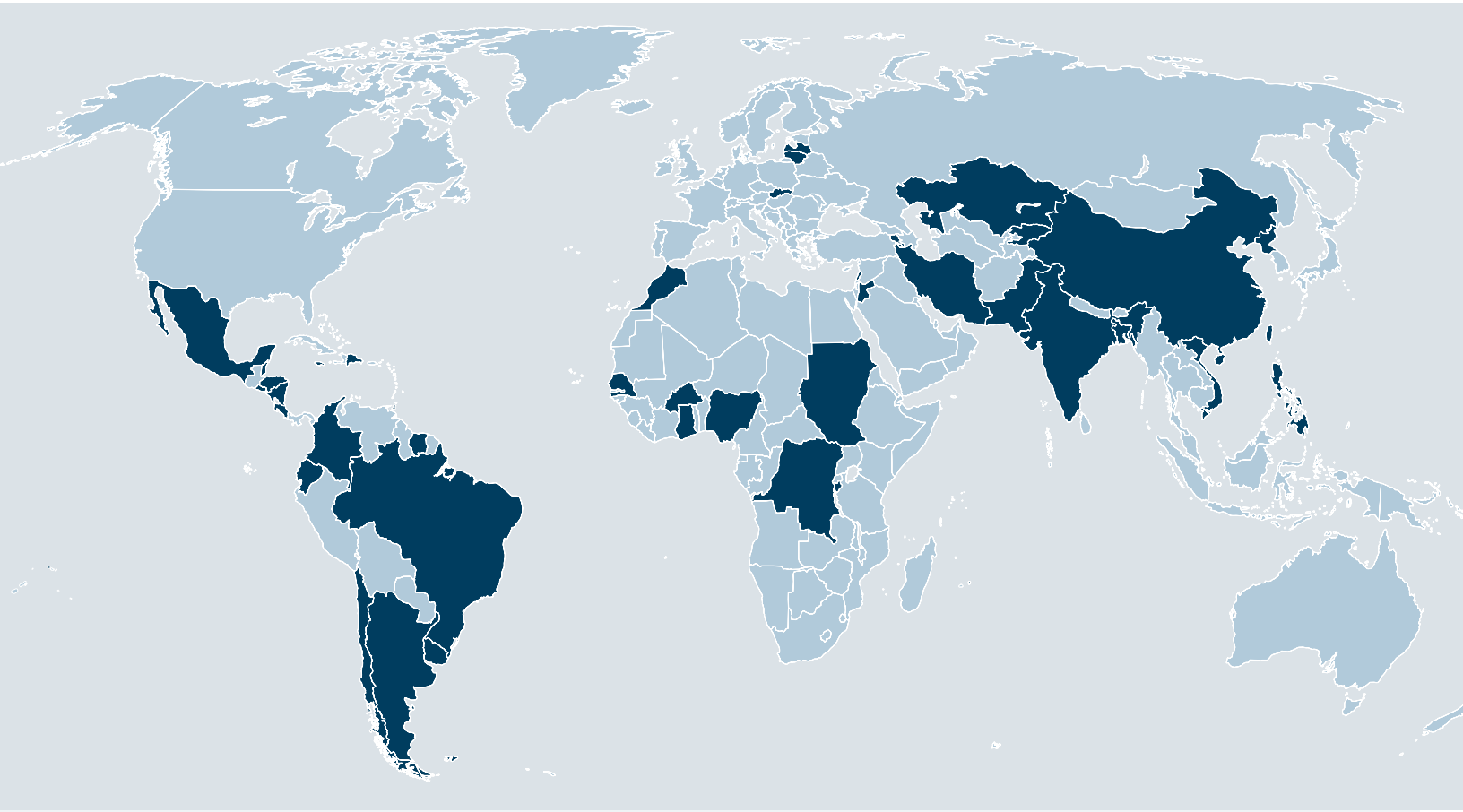
Given the long-range dispersion of POPs on wind and water currents, no single government acting alone can protect its citizens or environment from exposure to POPs. The Stockholm Convention, which was adopted in 2001 and entered into force in 2004, requires countries that are parties to it to take measures to eliminate or restrict the production and use of all POPs that are intentionally produced. The Convention also encourages countries to undertake continuous reductions in the amounts of POPs that are unintentionally produced, and to adopt the use of environmentally sound alternative processes and chemicals while promoting sound management of wastes and contaminated products.

UNDP and the Stockholm Convention

UNDP has actively been supporting developing countries, and countries with economies in transition, in their efforts to reduce and eliminate POPs and meet the objectives of the Stockholm Convention.

UNDP activities in chemicals and waste management are undertaken under the framework of the Strategic Approach to International Chemicals Management (SAICM). Wherever possible and appropriate, UNDP POPs activities are undertaken within a country's framework for sound management of chemicals, to ensure national coordination among chemicals-related activities in support of regional or global conventions and agreements on chemicals. UNDP's key approaches to helping countries advance the sound management of chemicals include:

- Campaigning and mobilization - Advocacy and awareness building among stakeholders about POPs management and sound management of chemicals.
- Analysis and capacity building - Identification of innovative practices, policies and institutional reforms to help countries put in place effective POPs and chemicals management structures that are informed by strategic needs assessments and financial evaluations.
- Technical Assistance - Specific impact-driven technical assistance for addressing national challenges and constraints affecting the management of POPs and other chemicals.
- Monitoring and integration - Assistance to countries in tracking progress on mainstreaming of POPs priorities and sound chemicals management into broader national development strategies.



Many of the challenges and priorities relating to the reduction and elimination of POPs require enhancement of national capacities with respect to human resources development and institutional strengthening, as well as increased availability of technical knowledge and training opportunities. As the United Nations' global development network, with an on-the-ground presence in 166 countries, UNDP is well placed to assist countries in gaining the knowledge, experience and resources required to tackle POPs management and elimination issues.

UNDP assists countries in meeting their commitments under the Stockholm Convention, including:

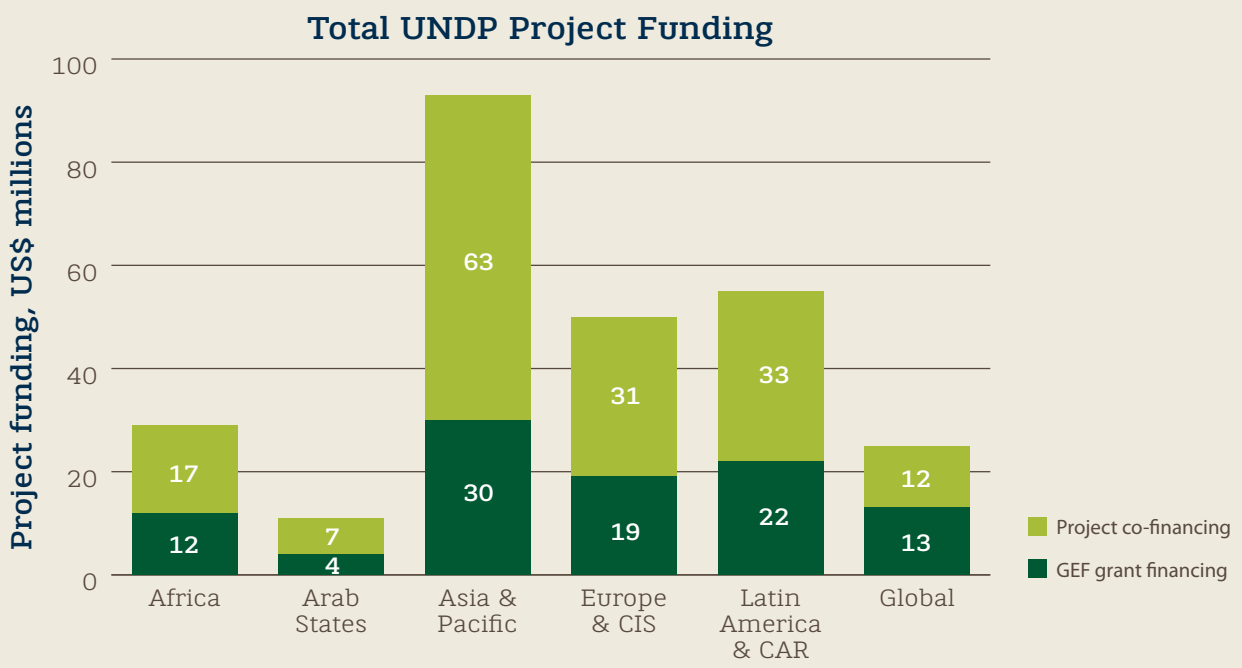
- Meeting reporting obligations, sharing lessons learned and adopting global best practices.
- Building necessary capacity to implement POPs risk reduction measures, including the disposal of POPs and POPs waste.
- Reducing the exposure and release of POPs to protect human health and the environment.
- Demonstrating effective alternative technologies and practices that avoid POPs releases.

During the early years of the Convention's implementation, much of the focus was on national planning as well as building necessary national capacity, meeting countries' reporting obligations, and compiling the first National Implementation Plans (NIPs).

This initial national POPs planning phase covering the original 12 POPs has now been completed. Hence UNDP's country level action has shifted towards implementing the activities to address POPs priorities that were included in the NIPs.

The map above shows countries where UNDP has been present from October 2005 till February 2013, as a GEF-Implementing Agency for Persistent Organic Pollutants (POPs) projects.

Figure 1: Geographical distribution of UNDP implemented projects on POPs.

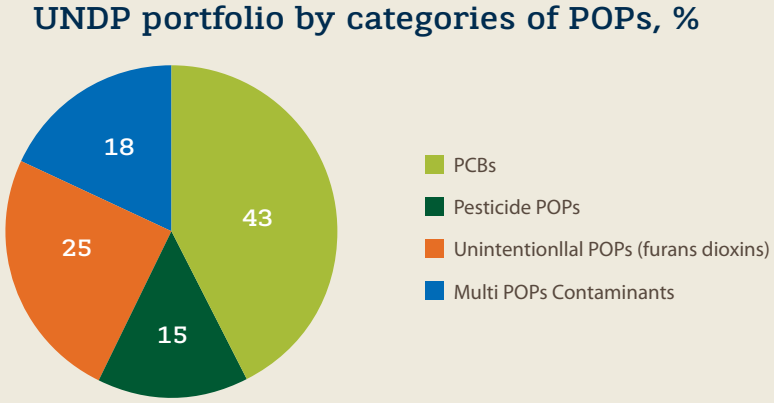


UNDP is supporting 44 countries (as of February 2013) to implement POPs related projects , as well as implementing three global and one regional programme with a combined portfolio of projects amounting to US $100 million of grants (programmed through the GEF) and co-financing of US $163 million. Figure 1 depicts the total project funding by region.

UNDP-supported country projects and global programmes address a variety of national and Stockholm Convention priorities, as well as GEF Strategic Objectives. Through the implementation of projects, UNDP supports the reduction and elimination of all types of POPs contaminants included under the Stockholm Convention (see Figure 2), covering a multitude of sectors and activities. A project may address the management of multiple POPs contaminants. This approach is particularly effective in smaller countries while bigger countries tend to benefit more from sector-wide approaches.

These sectors and activities range from POPs-free agricultural practices to reduction of unintentional POPs releases related to medical waste disposal, and from sound management of PCBs contained in equipment to minimization of the exposure levels of communities living close to contaminated areas.

Figure 2: Distribution of UNDP's projects by categories of POPs addressed.



Cumulative results from UNDP supported projects towards the implementation of the Stockholm Convention

Because UNDP POPs projects encompass a wide variety of POPs substances and approaches, reporting on the portfolio requires aggregating the results across groups of contaminants. In order to demonstrate the results achieved by the POPs portfolio, four indicators have been selected in the following three areas: strengthening of national regulations, capacity building at the national level, and global and local health and environmental impact.

The selected ***four indicators*** include: i) number of national overarching POPs or sector regulations adopted; ii) number of people receiving training in POPs management or POPs alternatives (more than 3 days of training); iii) POPs chemicals disposed; and iv) POPs chemicals safeguarded.

As most projects are still under implementation, the results shown below do not reflect the aggregated final results from the ongoing programs. Therefore, the compilation of the aggregated results on the POPs projects implemented by UNDP was done in a way to reflect the numerous successes made on the national level to address POPs issues, as well as the emphasis on regulatory strengthening and capacity building in the projects under implementation. Important and valuable experiences have been gained in the safe guarding and disposing of POPs and how to effectively eliminate them from the environment. The cumulative amounts of POPs disposed have been accelerating in recent years as the focus is shifting from capacity building to direct POPs handling and release-avoiding activities.

Table 1: Cumulative results based on selected indicators of UNDP POPs portfolio

INDICATOR	CUMULATIVE RESULT
Number of national POPs regulative instruments adopted	23
Number of people trained in POPs management/alternatives	193, 103
POPs disposed (metric tonnes)	3,014
POPs safeguarded (metric tonnes)	1,948

Activity areas and country stories

Sound management and disposal of POPs pesticides

UNDP assists countries in the implementation of POPs pesticides projects, building countries' capacity to soundly manage and dispose of POPs pesticides. UNDP is currently assisting four countries with the implementation of five POPs pesticide projects. There are also POPs multi-contaminant projects implemented by UNDP that include important POPs pesticide components.

With respect to the sound management and disposal of POPs pesticides, UNDP supports countries in:

- *Developing national capacity to safely manage and dispose of obsolete POPs pesticide stockpiles.* This involves training in how to identify, label, remove and transport obsolete POPs pesticides, improvement of national storage facilities and infrastructure to allow for the temporary safe storage of obsolete POPs pesticides, and identification of environmentally sound solutions for final disposal.
- *Promoting sustainable alternatives to POPs pesticides.* This involves testing of POPs-free alternatives, awareness building about POPs-free alternatives, support for the conversion of POPs production technologies into POPs-free production opportunities, and application of Integrated Pest Management practices where possible.

In China, UNDP supports the implementation of two POPs pesticide management projects. The first project supports testing of alternatives to promote production of POPs-free pesticides instead of DDT-based ones. The project also promotes Integrated Pest Management practices as an alternative to POPs and to reduce the country's reliance on pesticides (see box for details). The second project supports the phase-out of DDT used as an anti-fouling ingredient in marine paints.

Dang Jiuru smiles as he collects an apple from his orchard in Luochuan County, Shaanxi Province.

Chinese Farmers Plant a Seed for a Chemical-Free Future[1]

Seventy year-old Dang Jiuru dreamed of sending his grandson to university, but until recently his lifelong ambition seemed destined to remain unfulfilled. His apple orchard in Luochuan County, Shaanxi Province, simple did not make enough money. But just two years since he took the bold step of abandoning toxic dicofol pesticides produced from DDT, his grandson's university fund is now growing almost as fast as his apples.

This part of China's Loess Plateau features average altitudes of 1,100 meters and deep mineral-rich soil thus making the area perfect for growing nutritious fruit. Like most farmers he knew however, Dang felt he had to rely on chemicals to protect his fruit from the leaf mites that thrive in the region's semi-arid monsoon climate.

"If you had asked me to stop using chemicals a few years ago, I would have just smiled and carried on spraying my trees," explains Dang. "I thought I couldn't afford to stop using pesticides and that they were the only way to safeguard my income, but it turns out they were actually limiting it."

With the ability to destroy entire mite colonies, DDT-based dicofol pesticides offered farmers a cheap, effective and quick solution to the problem. What Dang didn't know, was that those same pesticides that he thought were protecting his family's income were the very reason his apples had never sold for more than 2 yuan (US$0.30) per kilogram.

[1] The story of the project was written by Adam Pitt and was among the winners of UNDP annual storytelling competition and was featured in Volume 2 of 'The Development Advocate' published in 28 January 2013

International treaties like the Stockholm Convention that aim to control the use of DDT and its production for use as chemical ingredients, and strict health and safety standards in other countries, meant more profitable overseas markets were not an option for Dang as long as he continued using DDT-based pesticides.

Training in Farming Techniques

Now, with the establishment of three demonstration projects and regular training provided by local and international experts, Dang is one of 100,000 farmers in three provinces being trained each year to adapt their farming techniques to international conventions and trading standards. This joint four-year project was initiated by UNDP and China's Ministry of Environmental Protection, and with US$6 million funding from the Global Environment Facility, it is also helping farmers to remove their dependence on so-called 'persistent organic pollutants' altogether. These pollutants include DDT-based pesticides and have been linked to serious health complications in people who come into contact with them.

Many of the new pest management techniques are simple, such as cultivating grass around the base of trees to provide a habitat for natural mite predators. Others involve more complex scientific technologies, with UNDP project experts providing scientific and biological guidance on the safe introduction of new predatory mite species into local ecosystems. And despite the larger investment in time and management that is required, interest has spread quickly and many farmers have already graduated and become trainers themselves in Luochuan County, where Dang has his farm.

Similar success in Hubei and Shandong provinces has seen thousands of citrus and cotton producers turn their backs on dicofol-based pesticides in favor of healthier, more sustainable farming practices.

Monitoring Progress

Over time farmers have learnt to record the effectiveness of their new cultivation methods in personal log-books, allowing communities to monitor the quality of their produce and take measures to avoid potential problems before they emerge. These efforts have been further enhanced by pest monitoring and forecasting centers, and a pesticide residue testing station set up under the project has provided regular guidance in compliance with international agricultural production standards.

In line with China's compliance with the Stockholm Convention, the project has helped minimize the amount of DDT released at a factory in Jiangsu Province and shut down production lines at two other factories in Hubei and Shandong. Annual reductions of 180 metric tonnes in DDT emissions and 350 metric tonnes of DDT contaminated waste released during production have also been achieved.

Together with the new skills being used on most of Luochuan's 300 square kilometers of apple orchards, reduced pesticide use has seen annual apple production reach 700,000 tonnes – equivalent to an average of 3.5 tonnes for each of the 200,000 people living in the county. Better quality apples now sell for 6 yuan ($0.90) per kilogram and plans are underway to diversify their use.

As for Dang, now a trainer himself, he is busy making preparations to join the growing number of farmers who are selling their apples to markets in Europe. And with a good harvest offering his family the chance to pocket 12 percent more per hectare than they did last year and invest in his grandson's education, who could blame him? One thing he is sure about though is that he won't be going back chemicals, even if it at one point he did consider them to be an easier option.

UNDP-GEF project at SSR National hospital, Mauritius, repacking stored DDT for transportation to final disposal.

Sustainable management of POPs in Mauritius

The use of POPs in the Republic of Mauritius has largely been restricted to PCBs in transformers and DDT as a malaria vector control agent. Small amounts of other pesticides have been used in the past, but were never applied in significant amounts. Imports, exports and use of all POPs except DDT are already forbidden in Mauritius. The inventory of POPs, undertaken during the preparation of the National Implementation Plan, identified that there are 116 tonnes of DDT, 5 tonnes of PCB containing oil, and 0.1 tonnes of other pesticides. The application of PCBs in transformers was halted in the 1980's; however there were still some transformers in use that contained PCBs. DDT was still being applied for vector control until end 2011, albeit in moderate amounts (around 600 kg/yr.). As can be seen, the DDT inventory was large and in no relation to modest annual use.

The owners of remaining obsolete POPs inventories have handed these over for final disposal. However, as often is the case in Small Island Developing States (SIDS), there are no disposal facilities for liquid and very limited capacity for solid hazardous waste available in country. Therefore, owners have not been able to dispose of these quantities in a responsible way. Continued storage, as well as incorrect disposal, will increase the potential for release to the environment; it is for this reason that a one-time POPs disposal program was essential.

The use of DDT has already led to soil contamination around past and current storage sites. The improper handling during the transfer of DDT into spraying equipment as well as deteriorated packaging keeps adding to this contamination. Remediation of these storage sites is possible, but better management will be mandatory to avoid future contamination. This would entail repackaging, a loss-free transfer system and, to reduce the extent of the problem, disposal of the surplus DDT inventory.

Therefore, UNDP has been assisting the Government of Mauritius in developing and implementing a project co-funded by the Global Environment Facility (GEF). The overall objective of the project is to address the first two national priorities related to the reduction and elimination of POPs as identified by the Republic of Mauritius in its 2005 National Implementation Plan (NIP): i) disposal of obsolete POPs chemicals and clean-up of POPs-contaminated areas; and ii) development of alternative strategies for malaria vector management with reduced or eliminated reliance on DDT.

Safe disposal and safeguarding of POPs

The project has, so far, assisted to re-package and ship abroad 138 tonnes of DDT and 5 tonnes of PCBs and PCB contaminated transformers. It means that virtually all POPs waste in Mauritius are safely disposed of and only 5 tonnes of DDT will be safeguarded in Pamplemousses storage site, as a precautionary measure in case of Malaria outbreak. Soil remediation of three sites (Mahebourg hospital, Fort George, and Pamplemousses) has been carried out. Disposal and remediation at such level demonstrate the increased awareness and will of the governmental and all interested stakeholders to address the issue of hazardous waste management. This work wouldn't have been possible without increased co-financing from the Government of the Mauritius.

Development of alternatives without use of POPs

The project facilitated identification, testing and selection, of effective and safe alternatives to DDT such as pyrethroids. All DDT spraying in sea and airport areas have been discontinued since the end of 2011 (600 kg used annually before the project start) and replaced with tested alternatives.

As part of efforts to reduce the dependence on DDT for controlling the spread of malaria, the project is helping Mauritius to develop an Integrated Vector Management (IVM) strategy. IVM is being piloted at village level to cross-check the effectiveness of the implementation of IVM strategy and efficacy of the identified IVM elements, such as the local surveillance of mosquito breeding places, safe use of chosen pyrethroids alternative. The work on piloting the new IVM strategy is being properly documented with evidence and recommendations on decentralization approaches, and will be submitted to the Government. A Central Database Management System is being developed by the project team to establish a progress monitoring system to cross-check the effectiveness of the implementation of IVM strategy and efficacy of the identified IVM elements, such as the local surveillance of mosquito breeding places, safe use of pyrethroids instead of DDT (which will be more suitable for in-door spraying), and protection with bed nets.

Capacity building

Several project activities and the development of guidance documents have been important contributing factors in further developing the capacity of project stakeholders in safeguarding the existing obsolete stockpiles. First and foremost, the backstopping of project activities by a Project Steering Committee involving several line Ministries, private and non-governmental stakeholders provides for a continuous platform for inter-disciplinary discussion, information exchange and project improvement. In addition, the development of guidance documents on the safe management of POPs stockpiles "Safeguarding of the POPs wastes", "Identification of POPs chemicals and certified containers", "Legal Review of regulations and laws governing the storage, handling, and disposal of POPs, and the potential remediation of highly contaminated POPs sites on Mauritius" have led towards adoption of good practices.

Sound Management and Disposal of Polychlorinated Biphenyls (PCBs)

The largest part of UNDP's POPs project portfolio focuses on the sound management and final disposal of PCBs. To date, GEF funding has been approved for UNDP-supported PCB management activities in the following 16 countries: Argentina, Brazil, Colombia, Costa Rica, Ecuador, Ghana, Jordan, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Mexico, Morocco, Rwanda, Slovak Republic and Uruguay.

With respect to the management and disposal of PCBs, UNDP supports these countries in:

- *Strengthening legal frameworks and improving enforcement capacity pertaining to PCB management* by addressing gaps in national PCB management regulations and creating an enabling environment for the environmentally sound management and destruction of PCBs.
- *Undertaking additional PCB inventories to identify remaining geographically dispersed PCBs and sensitive sites,* for example by identifying small and medium-sized enterprises possessing a portion of the remaining inventory.
- *Improving PCB management practices (such as handling, storage, transport, and destruction)* by providing technical guidance on management and safe disposal of PCBs and training for government officials, handlers of PCB-containing equipment, and other private sector entities, to ensure the sound management of PCBs throughout their life cycle.
- *Ensuring safe disposal of PCBs in collaboration with PCB-containing equipment holders,* by developing safe domestic disposal facilities, facilitating export of PCB waste to safe disposal facilities abroad, and improving coordination among PCB holders to lower the cost of transport and destruction of PCBs.
- *Implementing public awareness campaigns and communication strategies* to support all of the above activities.

Mexico - Environmentally Sound Management and Destruction of PCBs[2]

Mexico signed the Stockholm Convention on 23 May 2001 and ratified it on 10 February 2003, becoming the first Latin American nation to ratify the Stockholm Convention. Environmentally sound management of PCBs and their safe phase out are national priorities as outlined in Mexico's National Implementation Plan (NIP) for the Stockholm Convention, which was submitted on 12 February 2008.

[2] The case study was published in "Success Stories of Stockholm Convention 2001-2011"

UNDP-GEF project removing recycled PCB-containing materials used as building material in a community in San Felipe Nuevo Mercurio, Mexico.

The Federal Ministry of Environment of Mexico (SEMARNAT), with support from GEF, UNDP and the Ministry of Energy (SENER), is working towards eliminating the threat from PCBs to human health by instituting a necessary legal framework, building capacity, raising awareness and piloting innovative schemes to cost-effectively manage and destroy PCBs. These efforts aim to implement activities to ensure Mexico's compliance with Stockholm Convention requirements for PCB management and destruction through the follow-up to the NIP, thereby minimizing risks of exposure from PCBs to Mexicans, including vulnerable populations, and to the environment.

In Mexico, the national inventory originally estimated about 31,000 tonnes of PCB-containing materials above the norms, indicating that the whole country is affected by PCBs. As some of the sources of PCBs are located in populated areas and sensitive sites such as hospitals, water supply wells, education establishments, etc., the PCBs have a potential to adversely affect society, especially children and workers, if left unchecked and unmanaged. Considering the extent of the PCB issue and the potential risks to human health and the environment, the Government of Mexico and UNDP initiated in 2009 a project, co-funded by GEF, to address the situation.

The project, executed in partnership with SEMARNAT, aims at strengthening the capacity for a sound management of PCBs, materials and equipment which may contain or may be contaminated by PCBs. To achieve these goals, the project is implementing various activities, ranging from a legal review and an inventory of PCBs to piloting innovative schemes for PCB management and destruction as well as raising awareness on the health and environmental consequences of poor PCB management. The project is also expected to destroy 3,215 tonnes of PCBs, which constitute about 10.6% of the total estimated remaining national inventory.

PCB inventory verification

The national PCB inventory verification undertaken by the project has found PCB containing oils (over 50 ppm and most of it under 600 ppm) in approximately 6.3% of the transformers when sampling and analyzing oils in 1,998 transformers in 713 sites located in 19 (out of the 32) states in the country. Inventory verification shows that there are more than 37,000 tonnes of PCB containing materials over the 50 ppm limit in the country. Moreover, half of the samples with PCBs come from sensitive sites: hospitals, water supply wells for agriculture and cities, food processing facilities and education centers. Out of 105 transformers sampled in 39 hospitals, PCBs have been determined in 9; 8 out of 109 transformers sampled in water wells had traces of PCBs. Additionally, transformers at airports and railroad installations were sampled. Transformers in water wells and hospitals in rural communities have yet to be sampled in detail.

Policy strengthening for PCB management

Based on the analysis of the current management practices and a regulatory gap assessment, the project has proposed a revised technical Standard for PCB management. The proposed Standard, as a federal regulation, will emphasize the control of electrical maintenance workshops at municipal and provincial levels, in order to assure proper management of PCBs-containing oils by avoiding poor management practices resulting in further PCB cross-contamination of transformers in Mexico. This revised Standard is already in the process of review for adoption.

Project activities in pilot areas allowed determining that the cross-contamination caused by bad practices of electrical maintenance workshops is the main source of PCB-containing materials. The project has developed a general recommendations document for small and medium-size enterprises (SME) on how to manage their electrical transformers, particularly urging them to select for servicing those maintenance workshops which assume responsibility and undertake necessary correction measures in case PCB contamination is detected.

Since concentration of PCBs in oils is mostly below 600 ppm and 14% of samples in the inventory contain PCB between 5 and 50 ppm, which indicate cross-contamination related to electrical maintenance workshops, the project analyzed the hazardous waste management practices at 7 maintenance facilities. Based on the findings, the project put forward recommendations to lower exposure risks for employees handling PCB-containing materials and to ensure overall environmentally sound management of PCBs and other hazardous waste at these facilities. These recommendations were further refined on the basis of the experience during the training of over 40 workers of these facilities and a "Best practices technical guide for electrical maintenance workshops" has been developed. In anticipation of the eventual approval of standards of best practices, the project is undertaking a "crusade" to work with electrical maintenance workshops from the identification of the workshops in the whole country through training and up to a "good practices certification" of at least 50 workshops.

Capacity-building and awareness-raising

The project is supporting the strengthening of government and private entities capacities regarding inspection and chemical analytical techniques. For example, targeted two-day training sessions for over 350 participants from authorities at federal, state and municipal levels, SMEs, chemical laboratories and even fire and civil protection services have been organized; a Guide on best practices for PCBs inspection for local level authorities has been prepared. In order to stimulate the responsible PCB waste management and increase awareness among SMEs, the project has handed the acknowledgements of non-existence of PCBs to about 900 enterprises and sensitive sites operators during public events with representation of local authorities and press coverage for awareness-raising.

Community-level benefits

SEMARNAT's earlier study in the community of San Felipe Nuevo Mercurio (300 inhabitants) in the state of Zacatecas found above-limits PCBs content in the blood level of the population. As a particular case, during the inventory of PCBs in the country, the project confirmed SEMARNAT's information that people in a poor community used barrels, which formerly stored illegally imported PCB contaminated oils, as building materials and water containers. As part of the awareness and outreach efforts, the project has disposed and replaced 252 tonnes of PCB-contaminated materials in this small community.

Integrated Services Management System (ISMS) for PCB disposal

The high cost of destroying small quantities of PCBs is a barrier for small and medium-sized enterprises and operators of sensitive sites, since they cannot take advantage of the economies of scale with respect to costs of transport, interim storage and decontamination and/or destruction. Therefore, the project has devised a PCB management system that envisages different actions, from identification of PCBs, their safe storage and transport through to their destruction and appropriate reporting to government. The Integrated Services Management System also includes capacity-building of inspection authorities and analytical laboratories as well as an awareness-raising and communication strategy.

Among the benefits, this will allow a large number of PCB possessors to pool their waste and achieve environmentally sound disposal of PCBs at a reasonable cost. The ISMS was developed and tested as a pilot in a State of Guanajuato (5.5 million inhabitants) and in Cuautitlán Izcalli (a municipality with 600,000 inhabitants). The ISMS is being further tested and refined in 3 other states of the country: Nuevo Leon, Chiapas and Distrito Federal (Mexico City). The ISMS will be later expanded to the whole country. Through the ISMS, 81 tonnes of contaminated transformers and oils have been destroyed with project funds and 45 tonnes were destroyed by enterprises; 252 tonnes of contaminated materials in the small community and 337 tonnes were incorporated at the official register for eventual destruction. Results so far demonstrate that the unit cost of destruction for pooled PCB waste (where companies can bring as little as one piece of equipment) is already 25% lower than before the project and starting to approach the cost for large possessors of PCB-containing equipment like Mexico's Federal Electricity Commission (CFE). In 2012, CFE has destroyed 4,200 tonnes of contaminated material. In 2012, CFE has destroyed 4,200 tonnes of contaminated material. These results demonstrate the achievement of project objectives with regard to the destruction of contaminated materials and also the project co-financing from the Government of Mexico.

UNDP-GEF project installed autoclave technology at a biomedical waste treatment plant in Chennai, India GJ Multiclave plant, Chennai, Tamil Nadu, India; 2012

Avoiding the release of unintentionally produced POPs (UPOPs)

Certain POPs, such as dioxins, furans, HCBs and PCBs, are unintentionally formed and released during industrial processes, and from combustion, including uncontrolled waste burning, power plants, and waste incinerators.

UNDP supports countries in their efforts to reduce and eliminate such unintentional releases by:

- *Gradual implementation of best available techniques (BAT) and best environmental practices (BEP) for existing sources.*
- *Use of best available techniques and best environmental practices for new sources.*

UNDP is currently working on reduction of UPOPs releases through the implementation of projects at global, regional and country levels. Individual country projects are being implemented in Kazakhstan, Nigeria and Viet Nam. A 'global' project is being implemented in seven countries (Argentina, India, Latvia, Lebanon, Philippines, Senegal and Viet Nam) and a regional project is being implemented in Africa (Ghana, Madagascar, Tanzania and Zambia).

In Viet Nam, the UPOPs activities focus on minimizing human exposure from highly dioxin-contaminated areas. The project is designed to remediate these contaminated areas, which are threatening the health of large communities by causing birth defects, and also diminishing livelihoods and economic development prospects.

In Nigeria, the project aims to reduce UPOPs releases caused by uncontrolled burning of wastes through the introduction of sustainable waste management practices at community level. UNDP will also support Nigeria in taking UPOPs reducing approaches in designing waste management strategies, and reducing emissions of UPOPs emitted by open burning agricultural practices.

The 'global' project is a partnership between UNDP, the World Health Organization (WHO), the international NGO Health Care Without Harm (HCWH) and other major donors and partners. The project aims to minimize emissions of dioxins and mercury from medical waste by demonstrating and promoting best techniques and practices for reducing healthcare waste in seven countries.

Reducing unintentional releases of POPs from healthcare waste management

The health sector is a major source of dioxin and mercury releases to the global environment, primarily as a result of low technology medical waste incineration and the breakage and improper disposal of mercury-containing devices such as thermometers and blood-pressure meters.

The Stockholm Convention gives priority to the promotion of waste treatment technologies and practices that are as effective as medical waste incineration and avoid the unintentional formation and release of POPs. However, healthcare sectors in many countries lack essential equipment and knowledge for proper waste treatment, as well as resources for training, technical assistance and policy development.

A partnership between UNDP, the World Health Organization (WHO) and the international NGO Health Care Without Harm, as well as the private sector and other stakeholders, is assisting seven countries – Argentina, India, Latvia, Lebanon, Philippines, Senegal and Viet Nam – in developing and sustaining best healthcare waste management practices in ways that are both locally appropriate and globally replicable.

Demonstration of best practices

In each participating country, the project has developed model hospitals to demonstrate best practices in healthcare waste management (HCWM). The project promotes the use of commercially available non-burn waste treatment technologies, waste minimization and segregation as well as safe mercury storage and alternatives to mercury-containing devices. Some hospitals have seen as much as an 80% reduction in the amounts on infectious waste as a result of proper classification, segregation and waste minimization. Model hospitals in Argentina, India and Lebanon have demonstrated the re-melting and recycling of sterilized plastic and glass materials, thereby reducing the quantities of waste discarded in landfills. Most of the model hospitals are now mercury free.

Non-incineration technologies have been demonstrated in India, Latvia, Senegal, Tanzania and Viet Nam. Procurement of non-incineration technologies is ongoing for two hospitals in the Philippines and a region in Argentina, while final testing of a large 5 tonnes per day autoclave to treat all health-care waste in Hanoi is being completed at a central treatment facility in Viet Nam. The project has supported facilities in Latvia and Lebanon to improve operations of already existing non-incineration technologies, while at the same time improving storage facilities and waste flows. Through the project, a range of non-incineration technologies are being demonstrated, including waste treatment autoclaves, rotating autoclaves, hybrid autoclaves, microwave units, and alkaline digestion specifically designed to replace incineration of body parts.

Development of affordable and appropriate technologies

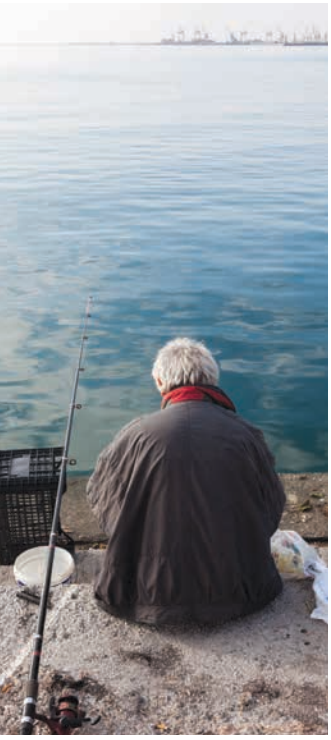
An additional project in Tanzania with the University of Dar es Salaam has developed affordable and locally made healthcare waste treatment technologies appropriate to conditions in much of sub-Saharan Africa. The new non-incineration technologies do not produce any dioxins and/or furans and have low operating and maintenance costs. Test of prototypes have shown a very efficient sterilization process. The system consists of pedal-operated autoclavable containers, an autoclave-based treatment system, compactors or optional shredders, and sharps waste destroyers. The system eliminates the need for plastic bags and has the potential to recycle a considerable amount of the materials after sterilization. The autoclave can make use of different electricity sources, depending on the energy source available at the medical facility. The process of demonstrating the fabrication of these new technologies has started at four manufacturing facilities (3 in Tanzania and 1 in Senegal). The technologies continue to be field tested at healthcare facilities in Tanzania.

The project in Argentina has also developed a new technology. Designed by the National Technical University of Argentina and the Global Project Team, the technology treats a difficult waste stream that until now could only be incinerated. The novel reactor uses the Fenton reaction to destroy chemotherapy waste from hospitals in an environmentally friendly manner.

Policy development and capacity building

The project supported the strengthening of national policies and regulations pertaining to HCWM and the management and phase-out of mercury containing devices in Argentina, India, Latvia, Lebanon, Philippines and Viet Nam. The Global project team, in close collaboration with the University of Illinois in Chicago - School of Public Health, has completed about a dozen training modules and a trainers guide to provide comprehensive Health Care Waste Management training that can be adapted to local circumstances in project and non-project countries. The modules are being translated in different languages. Another important outcome of this project is a set of guidance documents and tools that were used by health-care facilities to assess their health-care waste management (HCWM) situation, identify problems, and subsequently adopt best practices and techniques with respect to HCWM and phase-out mercury-containing devices. The project also compiled information about non-incineration technologies commercially available around the world. All these documents are found on a project website www.gefmedwaste.org.

The project's ultimate goal is protection of public health and the global environment from the impacts of dioxins/furans and mercury releases. Preliminary estimates indicate that best practices and techniques initiated during the project are expected to substantially reduce annual releases of dioxins (by 187 g I-TEQ) and mercury (by 2,910 kg) to the environment from the participating countries' healthcare sectors.



Knowledge products developed in implementing the Stockholm Convention provisions

Most UNDP implemented projects are introducing new approaches and practices that often result in various technical guidelines with varying regulative status at national level. These guidelines typically draw upon international guidelines developed under the Stockholm and Basel Conventions, while adapting to local conditions and languages.

In addition to national technical guidelines and awareness materials, general knowledge products have also been developed in areas where traditionally, less attention has been given to POPs and other hazardous substances of global concern. UNDP implemented projects have been particularly active in developing innovative guidance materials on POPs and mercury releases from health care waste facilities and operations.

The table below contains links to selected technical guidelines and information materials developed by UNDP supported projects.

The map above shows countries where UNDP has been present from October 2005 till February 2013, as a GEF-Implementing Agency for Persistent Organic Pollutants (POPs) projects.

Table 2: Website Links to Technical Guidelines and Information Materials

PROJECT TITLE	WEBSITE LINK
Demonstrating and Promoting Best Techniques and Practices for Reducing Health-Care Waste to Avoid Environmental Releases of Dioxins and Mercury	http://www.gefmedwaste.org/article.php?list=type&type=80
Design and Execution of a Comprehensive PCB Management Plan for Kazakhstan	http://www.undp.kz/projects/start.html?type=internet&lang=1
Environmentally sound disposal of PCBs containing equipment and waste in Latvia	http://www.lvif.gov.lv/?object_id=18776
Safe PCB Management Programme in Morocco	http://www.popmaroc.gov.ma/index.php?option=com_content&view=article&id=103&Itemid=18
Environmental Remediation of Dioxin Contaminated Hotspots in Vietnam	http://www.undp.org.vn/detail/what-we-do/project-details/?contentId=3610&languageId=1

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