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CHEMICALS AND WASTE MANAGEMENT FOR SUSTAINABLE DEVELOPMENT

Results from UNDP's work to protect human health and the environment from POPs



FOREWORD



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Persistent Organic Pollutants (POPs) are chemicals that negatively affect health and the environment when released into the air, water and soil. POPs can cause nervous system damage, immune system breakdowns, reproductive and development disorders, and cancers. They are a constant threat to sustainable human development, with the poorest among us most susceptible to their impacts. As an implementing agency under the Global Environment Facility (GEF), UNDP has - since 2004 - been expanding its work on these hazardous chemicals and promoting environmentally friendly alternatives that can promote achievement of the existing Millennium Development Goals (MDGs) and the new Sustainable Development Goals (SDGs).

In addition to eliminating PCBs, DDT and other hazardous chemicals, UNDP played a key role in introducing to West Africa a South African state-of-the-art autoclave technology that uses pressurized steam to sterilize infectious Ebola healthcare wastes; by not incinerating these wastes, environmental pollution is reduced. The GEF is one of UNDP's flagship programmes, and Chemicals is one of its key components.

PREFACE



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We are delighted to share with you the results of UNDP's work in protecting human health and environment from Persistent Organic Pollutants (POPs). The "*Chemicals and Waste Management for Sustainable Development*" publication showcases lessons from 11 case studies around the world, funded by the Global Environment Facility (GEF) as the main funding mechanism for the Stockholm Convention on POPs.

Tackling hazardous chemicals pollution is an important area of GEF's programming and UNDP actively supports developing countries and economies in transition fulfill their obligations under the Convention, taking measures to eliminate or restrict the production and use of POPs that are intentionally produced and reduce the amounts of POPs that are unintentionally produced. UNDP's expertise and experience built up over two dozen years of work in eliminating ozone depleting chemicals is successfully utilized in helping solve the POPs issue. This will also significantly contribute to achieving the target of the sixth GEF funding cycle of eliminating 80,000 tonnes of POPs including PCBs, obsolete pesticides and DDT in an environmentally sound manner.

INTRODUCTION

Many have often considered the earth an inexhaustible source of food, water and natural resources, while they mindlessly continue to pollute its atmosphere, waters and soil. However – as a wise person once said – we humans cannot live without the earth's resources, while the earth can get along quite nicely without us. Helping rid the world of hazardous chemicals is therefore a key step to helping maintain earth's atmosphere and its ecosystems.

All projects implemented by UNDP in POPs and covered in this report are funded by the GEF under its Strategic Plan for Chemicals and Waste. We also have a few activities in chemicals mainstreaming funded by SAICM QSP and some bilateral programmes. All reflect the objectives of the Stockholm Convention and its Secretariat. UNDP supports 84 countries implement POPs-related projects amounting to US\$156 million in GEF grants and US\$392 million in co-financing.

The 11 Case Studies included cover a wide range of experiences including PCBs, pesticides, e-waste, open burning of wastes, the fight against Ebola and South-South cooperation. We hope these case studies – presented in this Brochure to be launched at COP-7 in Geneva in May 2015 – will inspire better chemicals use and disposal practices.



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Application of GEF-UNDP's global medical waste project in Ebola-affected countries



OPERATOR JEFFREY AT JFK MEMORIAL HOSPITAL IN MONROVIA, LIBERIA, TESTING THE NEWLY INSTALLED STATE-OF-THE-ART AUTOCLAVE WHICH WILL BE USED FOR ENVIRONMENTALLY SAFER TREATMENT OF EBOLA HEALTHCARE WASTE. THIS IS DISCUSSED IN MORE DETAIL IN CASE STUDY #10. PHOTO BY BABACAR NDOYE.

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EXCAVATION OF POPs PESTICIDES AT THE LAGLUJA PESTICIDE BURIAL SITE IN GEORGIA. PHOTO BY VLADIMIR VALISHVILI.

THE STOCKHOLM CONVENTION ON POPs

The Stockholm Convention on Persistent Organic Pollutants (POPs) is a global treaty designed to protect human health and the environment from chemicals that do not degrade naturally 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 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, adopted in 2001, entered into force in 2004 and

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 POPs unintentionally produced (UPOPs), and to adopt the use of environmentally sound alternative processes and chemicals while promoting sound management of wastes and contaminated products. Initially, the Convention targeted 12 priority POPs, referred to as "*The Dirty Dozen*"¹ – most were pesticides and the others were industrial chemicals and by-products. Over the years, 11 additional POPs have been added after extensive review, and more are likely to be added in future.

¹ The "Dirty Dozen" are (1) Aldrin, (2) Chlordane, (3) Dieldrin, (4) Endrin, (5) Heptachlor, (6) Hexachlorobenzene (HCB), (7) Mirex, (8) Toxaphene, (9) Polychlorinated biphenyls (PCBs), (10) Dichlorodiphenyltrichloroethane or DDT, (11) Dioxins and (12) Furans.

Combating POPs – China's Action Towards a POPs-free Future



China is celebrating 10 years of successful POPs project implementation. To commemorate this milestone, China's Ministry of Environmental Protection/FECO, together with UNDP/China,

will roll out a month-long international campaign (May-June 2015) to raise public awareness on the danger that POPs present and highlight successful efforts to deal with this problem in China and around the world. This campaign will introduce POPs – a technical term – to the public in a simple cartoon video and smartphone games so as to generate an enabling environment for POPs reduction. A Side Event titled "A Song for You: Combating POPs – China's Action Towards a POPs-free Future" will be hosted by China on Friday 8 May 2015 from 1:15pm to 2:45pm in Conf. Room 4 during the Stockholm Convention COP-7 in Geneva (4-15 May 2015).

UNDP AND THE STOCKHOLM CONVENTION ON POPs

Since 2004, UNDP has 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 POPs projects are designed to ensure national coordination among chemicals-related activities in support of global conventions on chemicals.

Many of the challenges in reducing and eliminating POPs require enhanced national capacities, and increased availability of technical knowledge and training. Through its presence at the local level, UNDP helps countries:

- Meet reporting obligations, share lessons learned and adopt best practices.
- Build necessary capacity to implement POPs risk reduction measures, including the disposal of POPs and POPs waste.

- Reduce the exposure and release of POPs to protect human health and the environment.
- Demonstrate effective alternative technologies and practices that avoid POPs releases.

UNDP initially supported 29 countries in national planning, building capacity, meeting Convention reporting obligations and compiling the first National Implementation Plans (NIPs), covering the original 12 POPs. UNDP then helped implement activities prioritized in the NIPs.

Since 2004, UNDP has supported 84 countries implement POPs-related projects through national, regional and global programmes. In total, UNDP's portfolio of POPs projects amounts to US\$156 million of grants (through GEF) and US\$392 million in co-financing (see Table 1).



Table 1: UNDP/GEF POPs MSP/FSP (2004–2015)

| Country | POPs Area | GEF Grant (US\$'000) | Target |
|-----------------------|--|----------------------|--------------------------|
| Argentina | PCB Management | 3,400 | 1,000 T (D); 1,000 T (S) |
| Armenia | POPs Pesticides | 4,700 | 1,050 T (D) |
| Belize | UPOPs from HCWM | 990 | 6.4 g-TEQ |
| Brazil | PCB Management | 4,700 | 1,000 T (D) |
| China | Pesticides – Dicophol | 6,000 | 100 T (D); 100 T (S) |
| China | DDT – Antifouling Paint | 10,365 | 100 T (D); 100 T (S) |
| China | UPOPs/PBDEs from e-waste | 11,650 | 655 g-TEQ; 8.3t/yr PBDE |
| China | UPOPs: secondary copper | PPG Phase | NA |
| Colombia | PCB Management | 3,400 | 500 T (D) |
| Colombia | NIP update | 250 | NA |
| Costa Rica | PCB Management | 1,930 | 1,350 T (D) |
| Ecuador | PCB Management | 2,000 | 750 T (D) |
| Egypt | UPOPs and PBDEs from HCWM & e-waste | 4,100 | 41 g-TEQ |
| Georgia | POPs Pesticides | 1,000 | 250 T (D) |
| Ghana | PCB Management | 2,945 | 150 T (D) |
| Honduras | Multi-POPs | 2,650 | 89 (D); 40 (S); 80 g-TEQ |
| Indonesia | PBDEs from plastics prod., recycling and e-waste | 3,990 | 10 g-TEQ |
| Jordan | PCB Management | 950 | 40 T (D) |
| Kazakhstan | PCB Management | 3,300 | 1050 T (D); 200 T (S) |
| Kazakhstan | NIP + UPOPs from HCW | 3,400 | 103 g-TEQ |
| Kenya | UPOPs from MSW and HCW | PPG phase | NA |
| Kyrgyzstan | PCB Management | 950 | 25 T (D) |
| Kyrgyzstan | UPOPs from HCWM | 1,425 | 3 g-TEQ |
| Latvia | PCB Management | 999.6 | 280 T (D) |
| Mauritius | Multi-POPs | 902.25 | 21 T (S) |
| Mexico | PCB Management | 4,630 | 1,979 T (D); 818 T (S) |
| Mexico | UPOPs from e-waste and pesticide management | PPG phase | NA |
| Morocco | PCB Management | 2,198 | 685 T (D) |
| Nicaragua | POPs Pesticides | 900 | 1,288 m3 (S) |
| Nigeria | UPOPs from open burning | 4,150 | 5.6 g-TEQ |
| Pakistan | PCBs and POPs pesticides | 5,150 | 1,600 T (D), 1,600 T (S) |
| Rwanda | PCB Management | 886.7 | 150 T (D) |
| Trin. & Tobago | NIP Update | 425.5 | NA |
| Turkey | Multi-POPs: Industry UPOPs, PCBs, POPs pesticides, NIP | 6,931.4 | 4,032 T (D); 250 g-TEQ |
| Uruguay | PCB Management | 954.55 | 124 T (D); 20 g-TEQ |
| Viet Nam | Pesticides, contaminated sites | 3,957.58 | 1,140 T (D) |
| Viet Nam | Dioxin Hotspot remediation | 4,977.27 | 1,736 g-TEQ |
| Viet Nam | SMC, POPs contaminated sites and MIA | 2,550 | 6,350 T (S) |
| Viet Nam | NIP Update | 225 | NA |
| Africa (4) | UPOPs in HCWM | 6,453.2 | 32 g-TEQ |
| Global | UPOPs in HCWM | 10,326.46 | 226 g-TEQ |
| Indonesia/Philippines | Lead | 838 | |
| 15 countries | Skills building for NIP devl. | 700 | NA |
| 25 countries | Skills building for NIP devl. | 1,000 | NA |
| TOTAL | | 133,250.51 | |

T: tonnes; S = safeguarded; D: disposed; NA: Not Applicable; Africa 4 countries: Ghana, Madagascar, Tanzania, Zambia; Global countries: Argentina, India, Latvia, Lebanon, Senegal, Tanzania, Philippines, Viet Nam

Figure 1: Geographical distribution of UNDP implemented projects on POPs

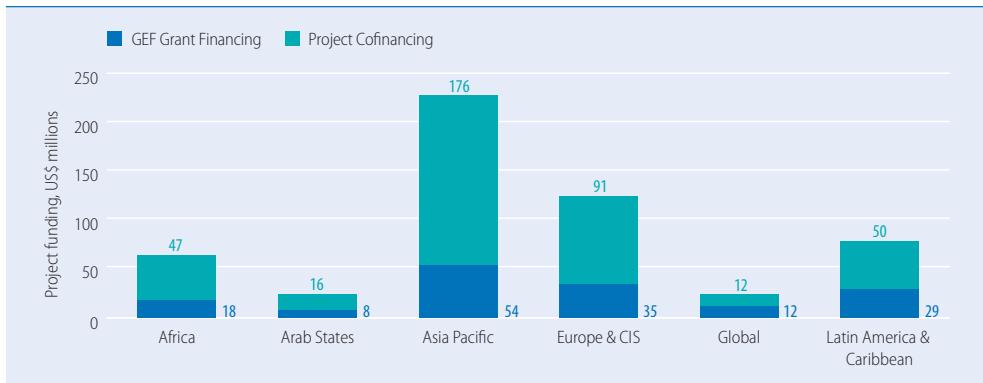


Figure 1 above shows the geographical distribution of UNDP implemented projects on POPs.

UNDP-supported country projects and global programmes address a variety of national and Stockholm Convention priorities, as well as GEF Strategic Objectives. Sectors that are supported through UNDP projects include:

- **Update and revision of National Implementation Plans (NIPs)**
- **PCB management**
- **POPs pesticide management**

- **Reduction and elimination of UPOPs from:**
 - Healthcare Waste Management
 - E-waste Management
 - Municipal Waste Management
 - Agricultural Waste Management
 - Metallurgical Production Processes and Recycling
- **Reduced use and releases of POPs flame retardants from:**
 - Manufacturing and production processes
 - Plastics waste management and recycling



TRAINING ON THE LABELING OF PCB CONTAINING CAPACITORS IN KAZAKHSTAN. PHOTO BY ALMAT ABENOV.

Figure 2: UNDP Chemicals & Waste Portfolio by categories of POPs addressed

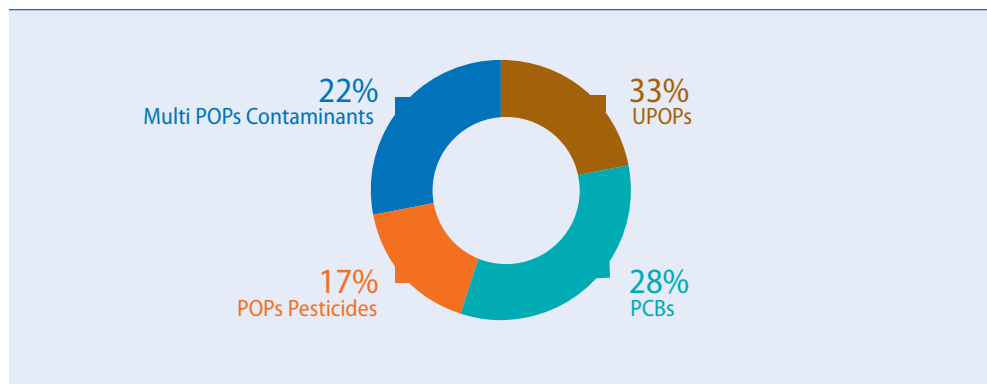


Figure 2 shows the distribution of projects by category of POPs addressed. UNDP’s key approaches to helping countries advance the sound management of POPs include:

- **Advocacy and awareness raising on the importance of POPs management** – campaigning among stakeholders, decision makers and population groups at risk.
- **Capacity building** – identification of innovative practices, policies and institutional reforms, to help countries put in place POPs management structures based on needs, financial assessments, and

lessons-learned and experiences from other countries.

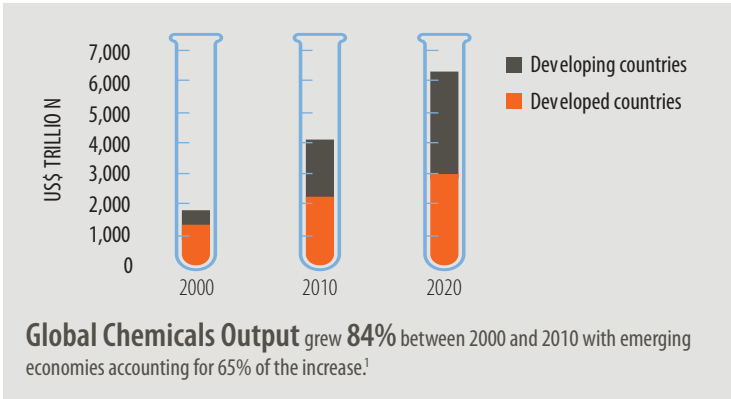
- **Technical assistance** – specifically designed to address national challenges and constraints that affect the management of POPs.
- **Monitoring** – assisting countries track their progress on addressing POPs phase-out.

For additional information on GEF Chemicals and Waste projects that are not POPs – such as Mercury, ODS, and other heavy metals – please refer to the other booklets in this publication series.



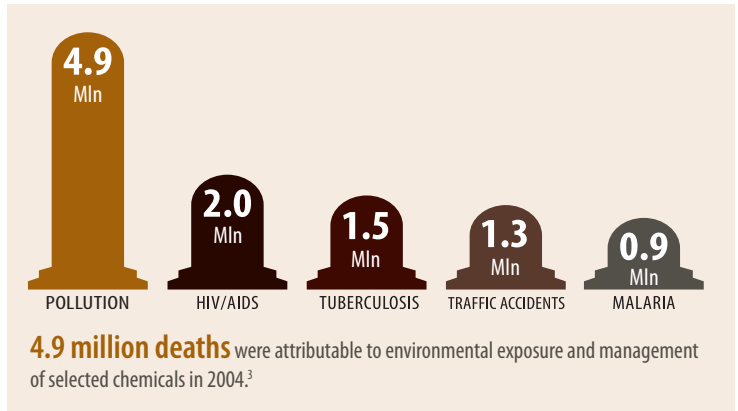
RECOVERED AND REPACKAGED POPs PESTICIDES FROM THE LAGLUJA PESTICIDE BURIAL SITE IN GEORGIA. PHOTO BY VLADIMIR VALISHVILI.

THE REALITY of Chemicals and Waste Management



A mother can pass as much as **33%** of her chemical body burden to her child.

232 toxic chemicals were found in umbilical cord blood from U.S. newborns.²



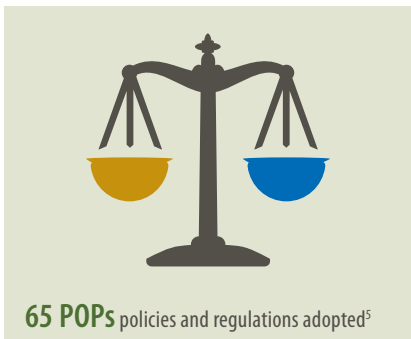
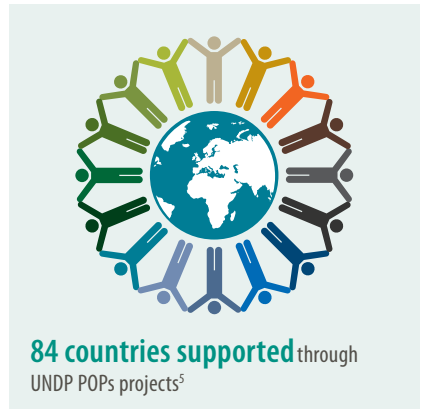
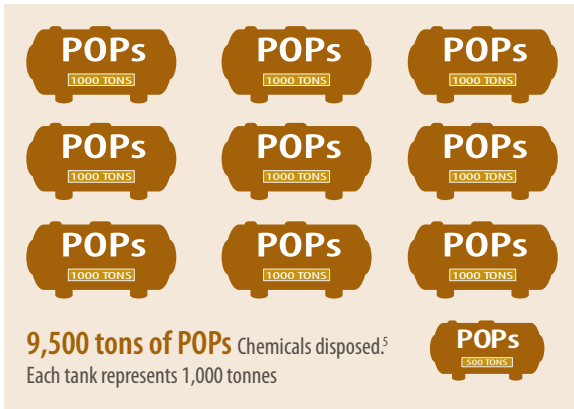
54% percent of the global burden of disease due to the chemicals is borne by children under the age of 15.³

Plastics weighing 191 times as much as the Titanic are dumped in the oceans every year.⁴

The costs of injury to pesticide users on smallholdings in 37 sub-Saharan African countries was **USD 4.4 billion** in 2005.³

Sources: 1. UNEP "Global Chemicals Outlook", 2013; 2. Environmental Working Group (2009); 3. UNEP – Costs of Inaction on the Sound Management of Chemicals (2013); 4. UCSB NCEAS/Ocean Conservancy (2015).

UNDP'S ROLE in Protecting Environment and Health from POPs



Sources: 5. UNDP Annual Portfolio Indicators (2012, 2013 and 2014)

SOUND MANAGEMENT OF CHEMICALS & WASTES AND THE SDGs

At Rio+20 (UN Conference on Sustainable Development) in 2012, countries established an intergovernmental process to develop a set of action-oriented, concise and easy to communicate Sustainable Development Goals (SDGs) to spur sustainable development. These SDGs² are expected to be adopted by the UN General Assembly at its 68th Session (Sept. 2015). Chemicals play an important role in development, and so the Sound Management of Chemicals and Wastes (SMCW) is an important component of UNDP's efforts to achieve sustainable, inclusive and resilient human development and the SDGs. Some of the most obvious linkages between SMCW and the SDGs are mentioned below:



Chemicals play a part in almost all human activities (medicines, water purifiers, agricultural chemicals) and the chemicals industry makes major contributions to national economies in terms of GDP and job creation. However, when chemicals are mismanaged, poorest communities face the highest risk due to their occupations, living conditions and limited access to uncontaminated food and water. SMCW can protect them from environmental and occupational exposure.



The sound use and application of fertilizers and pesticides can boost the productivity of agricultural lands on which poor communities depend. However, when poorly managed, agricultural chemicals can pose significant risks to human health, cause pollution and land degradation, impacting livelihoods in sectors such as agriculture and fisheries. SMCW can maintain a healthy agricultural base while maximizing the benefits of agricultural chemicals.

² Photos are from the United Nations Department of Economic and Social Affairs, <https://sustainabledevelopment.un.org/sdgsproposal>



Chemical products such as medicines, insecticides, repellants and larvicides help prevent millions of deaths each year. At the same time, 4.9 million deaths (8.3% of the global total) and 86 million Disability-Adjusted Life Years (5.7% of the global total) are attributable to pollution (WHO, 2004). We need to ensure that chemicals use and wastes do not cause environmental pollution, do not contaminate water, soil and air, protect human health and prevent death and illnesses.



When hazardous chemicals are applied in products and in productive sectors, their use as well as the dumping of products that contain them, can result in the release of hazardous chemicals, cause pollution that severely impacts water quality. SMCW can help prevent pollution of water sources, improve treatment of wastewater and drinking supplies and thus increase the availability of clean water.



SMCW is an integral part of sustainable industrialization. It plays a critical role in greening/retrofitting industry through holistic cleaner production approaches that introduce environmentally sound technologies/processes and the use of less or non-harmful chemicals (Green Chemistry). This is often tied to improving energy efficiency, reducing water and resource usage and decreasing waste production. Sustainable industrialization and SMCW can boost innovation, open up opportunities to new markets and value chains, and increase employment opportunities.



Cities occupy only 3% of the earth's land surface, yet house half the human population and use 75% of earth's resources. Cities are the largest consumers of natural resources and the biggest sources of pollution and greenhouse gas emissions. SMCW is key to helping cities become more sustainable, through the use of less harmful products and construction materials, improved waste management practices and services, and greening industry to reduce emissions that impact air and water quality.



Services and products required to meet basic human needs and improve the quality of life consume natural resources and often contain toxic materials. At several points during their life-cycle they generate waste and release pollutants. SMCW plays a key role in enabling countries to decouple growth from resource use and pollution, by redesigning products and production processes, phasing out toxic materials, minimizing waste generation and optimizing resource use through recycling and reuse.



SMCW is key to combatting climate change. The phaseout to date of most ozone depleting substances (ODS) has not only led to regeneration of the ozone layer but also significant reductions in greenhouse gas (GHG) emissions as most ODS are also powerful GHGs. SMCW presents several opportunities for GHG emission reductions, through resource recovery and recycling, waste to energy processes, optimizing waste transportation, composting, and use of newer, more-efficient transformers and condensers to replace those containing PCBs, and among many others.



Run-off and releases from sectors such as mining, agriculture and industry can lead to the pollution of waterways, oceans and seas. It can cause nutrient pollution and contamination of the oceans' food chain. Waste that ends up in oceans, rivers, and other waterways, leads to the death every year of hundreds of thousands of sea turtles, whales, and other marine mammals, and more than 1 million seabirds from entanglement, indigestion and pollution. Improving the management and disposal of wastes and reducing the release of harmful chemicals is an important intervention in protecting the world's oceans, seas and marine resources.



Production, use and handling of chemicals and waste, if not properly managed, can cause severe environmental degradation, contamination of water, soil, air, flora and fauna and disrupt ecosystems. SMCW, by preventing or minimizing releases of harmful chemicals and waste into the environment, protects habitats and ecosystems and reduces the need for difficult and costly remediation.

RECENT CASE STUDIES: RESULTS AND LESSONS LEARNED

CASE STUDY 1

Georgia: Clean-up and disposal of POPs Pesticides

During 1976-1985, around 3,000 tonnes of obsolete pesticides (including POPs) were dumped at the country's main pesticide dumpsite Lagluja, 80 km from the capital Tbilisi. The most hazardous ones – including DDT – were stored in concrete waste cells while less toxic pesticides were dumped in open trenches and covered with soil. A GEF/UNDP project was approved in 2011 to help the Ministry of Environmental Protection & Natural Resources safely dispose of up to 250 tonnes of POPs pesticides at Lagluja.

Working with the Marneuli municipality, the site was fenced off and warning signs installed. Drainage ditches were restored to minimize run-off and soil/water pollution. Drilling and sampling/assessment located the buried pesticides and showed the concrete waste cells had collapsed, leading to mixing of pesticides with other materials including soil.

230 tonnes of POPs pesticides and contaminated soil (including 118 tonnes of DDT) were excavated, repackaged and transported to certified disposal facilities in Belgium and France. Formulation and adoption of national technical guidelines for the handling, transport, storage and disposal of POPs pesticides followed. Determination of the quantity of pesticides left in the landfill and finalization of a long-term cleanup and remediation plan will be the last activity. The project has safeguarded the health of 137,000 people and their livestock, while national capacity developed for dumpsite investigation, risk assessment, and export of hazardous waste will ensure that the Government can effectively manage its hazardous wastes in future.



- Proper site assessment prior to excavation/ remediation can provide good insight as to the quantity of pesticides to be excavated and the costs involved.
- A well-designed and implemented POPs pesticides demonstration project can facilitate adoption of national guidelines and regulations for effective disposal.

EXCAVATION OF POPs PESTICIDES AT THE LAGLUJA PESTICIDE BURIAL SITE IN GEORGIA. PHOTO BY VLADIMIR VALISHVILI.

CASE STUDY 2

Viet Nam: Eliminate Pesticide Stockpiles (2009-2015)

The project demonstrated treatment methods for high, medium & low contaminated sites, including co-processing in cement kilns, biochemical decontamination, and safeguarding through fencing and constructing ditches.

Viet Nam has a ban on import and use of POPs pesticides. However, lack of funding and access to technologies led to the accumulation of unused pesticide stockpiles in sheds or buried underground. With no safeguards in place, the high concentration of buried pesticides led to severe pollution of water, soil and food. Communities constructed housing or relied on polluted water sources leading in certain locations to severe health impacts including deaths and birth abnormalities.

Since 2009, a GEF/UNDP/FAO project has assisted the Government clean up priority sites and destroy 1,140 tonnes of POPs pesticides. 1,153 potentially contaminated sites have been reviewed, 335 assessed in detail, and the top 100 included in the National Target Programme on Pollution Management and Environmental Improvement. It facilitated national regulations on management and remediation of POPs pesticides contaminated sites, developed a 5-phase technical guideline for environmentally contaminated site management, and is preparing a guidance document on locally available BAT including combustion and non-combustion approaches.

Remediation of 10 priority hot spots was completed with more than 700 tonnes of obsolete POPs and highly contaminated soil destroyed and 5,200m³ of POPs pesticides contaminated soil and sediment safeguarded. Around 600 central and local Government agency staff were trained on contaminated site management and related subjects. In 2015, remediation in Nghe An and Ha Tinh provinces will dispose of 80 additional tonnes of POPs contaminated soil. Local communities have been safeguarded from the health effects of exposure to POPs, and national capacities strengthened to continue clean-up of remaining sites.



REPACKAGING POPs PESTICIDES WASTE IN NGHE AN, VIETNAM. PHOTO PROVIDED BY POP PESTICIDES PROJECT MANAGEMENT UNIT.

CASE STUDY 3

Mauritius: POPs Management and Disposal

The safe disposal of hazardous waste is a challenge for many small island-developing states (SIDS) as land is limited and bad waste practices can quickly result in ecosystem damage and health impacts. This is the case in Mauritius whose pristine environment is a major tourism attraction.

Of particular concern was a large quantity of DDT (150 tonnes, of which 0.6 tonnes used each year for malaria control), 5 tonnes of PCB-containing oil and 100 kg of other POPs pesticides. Most were stored in unsafe conditions causing severe soil and water contamination. Disposing of obsolete POP chemicals, cleaning-up POPs contaminated areas, and developing alternative strategies for vector management to reduce the country's reliance on DDT were the main objectives of this GEF/UNDP project.

The project has so far disposed of 139 tonnes of DDT, 5 tonnes of PCB-contaminated waste, and 300 m³ of excavated POPs contaminated soil (from three hot spots which were also remediated).

To reduce dependence on DDT to control malaria, project staff worked with the Ministry of Health and Quality of Life to develop an Integrated Vector Management (IVM) strategy which included identification, testing and selection of effective and safe alternatives to DDT (such as pyrethroids), surveillance of mosquito breeding places, and bed nets.

- The project's awareness-building activities and risk assessment report resulted in DDT spraying being discontinued in 2011, and since then no malaria outbreaks have occurred.
- Co-financing from waste holders was leveraged to dispose of an additional 4.88 tonnes of non-POPs hazardous waste.



PACKAGED DDT CONTAMINATED SOIL IS LOADED INTO SHIPMENT CONTAINERS AT PAMPLEMOUSSES, MAURITIUS. PHOTO BY HILDA VAN DER VEEN.

CASE STUDY 4

Kazakhstan: PCB Management and Disposal (2010–2015)

- SMC and hazardous waste issues were mainstreamed into the “Concept for the Transition of the Republic of Kazakhstan to a Green Economy”.

PCBs pose significant environmental and health hazards in Kazakhstan, which ranks second among CEIT countries with an estimated 980 tonnes of PCB contaminated oils and 255,000 tonnes of PCB contaminated soils.

The main aim of GEF/UNDP PCB Management Plan for Kazakhstan was to demonstrate sound management of PCBs in all its life cycle phases. Project results included adoption of a regulatory framework for PCB management; training of 1,100 people, 2 national hazardous waste companies and 10 laboratories on PCB management and analysis; identification of an additional 571 PCB-containing capacitors and 48 PCB-containing transformers; and stakeholder awareness.

Six different land-based export routes for PCB wastes were explored - none were feasible due to PCB transboundary movement bans. 80 tonnes of contaminated oil were then sent by plane to France for disposal – the first time ever for a GEF project. An additional 150 tonnes of repacked capacitors (~1,400) are awaiting similar export procedures in 2015.

The PCB air export procedures and the amendments prepared for Custom Union (CU) and Eurasia Economic Committee (EEC) legislation for future transboundary PCB transport by land, will allow Kazakhstan to continue its efforts to phase-out PCB containing equipment and dispose of PCBs abroad, until a hazardous waste treatment facility is operational in the country hopefully by 2020.



DRAINING OF PCB OIL FROM TRANSFORMERS AT ARCELORMITTAL TEMIRTAU IN KAZAKHSTAN. PHOTO BY POLYECO.

CASE STUDY 5

Jordan: Implementation of a Comprehensive PCB Management System (2011–2015)

Jordan's NIP indicated important barriers for the sound management of PCBs, including absence of a centralized data system, lack of regulations on the handling of PCBs, inadequate capacity of laboratories and storage facilities, and low awareness on risks.

The GEF/UNDP project addressed these challenges by supporting the accreditation of the national laboratory and testing 14,062 pieces of electrical equipment. Those showing a concentration of 50 ppm and higher were again analyzed by gas chromatography. All equipment was labeled and registered in a PCB database.

Workers were trained on PCB identification, proper handling, storage, drainage, transport and disposal. The resulting regulation - in combination with training and awareness raising - have helped safeguard workers by minimizing further cross-contamination and minimizing exposure to PCB-contaminated equipment, waste and soil.

The project also drained, packed and labeled 65 tonnes of PCBs (19 transformers and 68 capacitors), which are currently safely stored and awaiting transport to an approved disposal facility in Europe.

The project worked hard to engage those holding PCB stocks. As a result, most energy utility companies now provide facilities for PCB storage and oil analysis; data on equipment; technical expertise, and co-financing for the inventory process and replacement of PCB equipment.



TRAINING ON PCB OIL ANALYSIS IN JORDAN. PHOTO BY LINA M. ALSOUR.

CASE STUDY 6

Nigeria: Reduced Open Waste Burning for a Cleaner Earth (2010 -2015)

- Local employment was created in pilot communities through composting, landfill upgrading and production of animal feed.
- UPOPs releases from agricultural waste burning have been reduced by 60%, while releases have been reduced by 25% and 57% from open burning of collected and uncollected municipal waste respectively.

This GEF/UNDP project has helped reduce releases and exposure to UPOPs from the open burning of municipal and agricultural wastes by introducing alternative approaches through training and practical demonstration. Support was provided for development of a *National Policy on Municipal and Agricultural Waste Management*, and training of 1,500 project stakeholders and beneficiaries on BAT/BEP in the same areas. One key result was upgrading of an aggregate of 35 ha of dumpsites to controlled dumpsites in the two pilot states to reduce open burning.

In Anambra State, community-based waste sorting, collection and composting was established. Three colour-coded waste sorting receptacles were provided to 560 households to sort their waste. Recyclable and compostable waste was taken to the compost plant for processing into organic fertilizer and plastic crumbs, and then sold to farmers and horticulturists for soil replenishment and to industry for recycling.

In Kano state, farmers were shown how to turn crop residue into animal feed. In addition to the provided agricultural waste shredders, farmers purchased 10 more and processed 858 MT of crop residues in 2014. Microfinance institutions are now interested due to the economic viability of this approach.

So far, total UPOPs releases have been reduced by 300 g-TEQ per year, reducing exposure to farmers, waste handlers and the global environment, with health and environmental benefits. Improved waste management has also reduced local water and soil pollution, reduced greenhouse gas emissions, and supported job creation and sustainable livelihoods.



A FAMILY IN OKPUNO COMMUNITY (AWKA, ANAMBRA STATE, NIGERIA) IS SIGNING FOR THE RECEIPT OF COLOR-CODED BINS FOR SEGREGATED COLLECTION OF HOUSE HOLD WASTE. PHOTO BY IDI MOHAMMED MALEH.

CASE STUDY 7

Honduras: Reducing UPOPs from municipal waste burning

The UNDP/GEF project “*Strengthening national management capacities and reduction releases of POPs in Honduras*” shows how a small country, through a holistic chemicals management approach, can successfully address various POPs and chemicals management challenges.

This multi-POPs project is on course to dispose of 60 tonnes of POPs pesticides, 112 tonnes of PCB containing wastes, and reduce UPOPs releases from open burning of municipal and health-care waste by 80 g-TEQ. The national chemicals management regime is being strengthened through adoption of the *National Policy for Environmentally Sound Management of Chemicals*, the creation of a National Commission on Chemicals Management, and regulations for the management of PCBs and contaminated sites.

Comayagua, with 120,000 inhabitants, was one of three pilot municipalities where the project aimed to reduce open burning of solid waste in backyards and at the city dump. It helped the municipality formulate and implement a masterplan for Integrated Solid Waste Management and trained municipal staff in optimizing waste collection routes to extend collection coverage and start composting.

The city dump was closed and a new landfill developed. Now 30,000 tonnes of waste are properly disposed of yearly and not being burned. Public and private health care facilities were trained in proper healthcare waste management and a special area at the landfill now receives healthcare waste.

- Garbage collection service coverage has increased from 65% (2012) to 85% (2015) making Comayagua the cleanest city in Honduras.
- The project assisted 65 former waste picker families establish recycling companies while eliminating child labour through the reentry of 40 children into schools.
- 13 new recycling companies established and involved in the collection and recovery of recyclables.



WASTE PICKERS COLLECTING RECYCLABLES AT THE FORMER DUMPSITE IN COMAYAGUA, HONDURAS. PHOTO BY LUIS ORTEGA.



NEWLY CONSTRUCTED LANDFILL IN COMAYAGUA, HONDURAS. PHOTO BY LUIS ORTEGA.

CASE STUDY 8

China: Phasing-out DDT and Sustaining Livelihoods

- A national ban was issued in 2009 for the production, distribution, use and import of POPs pesticides, including the use of DDT.
- DDT production facilities have been dismantled, and, studies on DDT levels in the marine environment already show a decline in DDT levels as compared to the project's baseline.

China started producing DDT in the 1950's. At its production peak, it had 11 facilities producing 21,000 tonnes. In 1983, China stopped large-scale production and agricultural application of DDT and since 1995 production has averaged 5,000–6,000 tonnes/yr. To minimize the release and potential risk of DDT, China worked with UNDP to develop two GEF projects to phase-out all remaining uses of DDT and then shut down all DDT production facilities.

The first project *"Improvement of DDT-based Production of Dicofol and Introduction of Alternatives Technologies including IPM for Leaf Mites Control in China"*, completed in 2013, eliminated 2,800 tonnes of DDT used each year for production of Dicofol. By demonstrating Integrated Pest Management (IPM) approaches in pilot areas for important cash crops (apples, citrus, cotton), the project spurred production and use of alternatives and phased-out Dicofol use in agriculture, helping safeguard and improve livelihoods and incomes of farmers who received higher prices for DDT-free cash crops.

The second project *"Alternatives to DDT Usage in the Production of Antifouling Paint (AFP)"*, completed in 2014, eliminated 250 tonnes of annual DDT use in AFP production used to coat the bottom of ships to prevent the adhesion of organisms such as sea-mussels and algae. The AFP manufacturing industry was converted to non-toxic and environmentally friendly alternatives, end-users were convinced to accept the new AFPs, and environmental management at shipyards was improved. Economic incentives resulted in cost benefits for end-users – in particular smaller fishing vessel owners who were most vulnerable to AFP price increases.



HARVEST OF DDT-FREE CITRUS IN YIDU CITY, HUBEI PROVINCE. PHOTO BY MR. LUO YI. THE FOREIGN ECONOMIC COOPERATION OFFICE (FECO).



SHIP YARD WORKERS APPLYING DDT-FREE ANTI-FOULING PAINT ON THE HULL OF A VESSEL IN YANGJIANG CITY, GUANGDONG PROVINCE. PHOTO BY MS. SHI SHENGNAN. THE FOREIGN ECONOMIC COOPERATION OFFICE (FECO).

CASE STUDY 9

China: E-waste management

With technology advancement, rapid economic development and an increased standard of living, China is now one of the largest consumers of electronic products. In 2014, China processed around 70 million units of e-waste including TVs and computers.

In the past, most e-waste was imported illegally and mainly processed by the informal sector, using polluting practices that released several toxic chemicals (mercury, lead, cadmium) and POPs (dioxins, furans, PBDEs, PFOS and PCBs) associated with serious environmental pollution and health consequences.

China has, since 2003, been implementing several approaches to create a formal e-waste processing sector. A GEF/UNDP project started in 2014 and is part of the national Extended Producer Responsibility (EPR) e-waste programme (targeting national coverage by end-2015). The project will develop procedures for efficient operation of the EPR Treatment Fund, and will develop national technical standards for e-waste management, Life Cycle Management, eco-design labeling and cleaner production. Awareness raising and training will promote EPR system implementation and help customs officers distinguish between second-hand and illegal e-waste imports.

Three demonstration sites will test more efficient collection systems, ensure certification and registration of processing facilities, and introduce environmentally sound procedures to dismantle, treat, process and dispose of e-waste components utilizing demonstrated BAT/BEP technologies to minimize environmental and human health problems.

- The “Big Data Joint Laboratory” in Beijing and UNDP jointly developed an app allowing users to snap a picture of their e-waste, provides an indicative price, and can schedule pick-up by a certified company.
- Information from the app can be utilized to help electronic manufacturing enterprises establish effective recycling systems.



NEW E-WASTE PROCESSING EQUIPMENT AT THE TCL-AOBO ENVIRONMENTAL PROTECTION AND DEVELOPMENT CO., LTD. IN TIANJIN CITY. PHOTO BY MR. GAO PENG. THE FOREIGN ECONOMIC COOPERATION OFFICE (FECO).

CASE STUDY 10

Guinea, Liberia and Sierra Leone: The Fight against Ebola

The project will install 20 state-of-the-art autoclaves for the treatment of healthcare waste in the three countries most impacted by the Ebola epidemic.

The Ebola epidemic in West Africa has been destroying lives, decimating communities, orphaning children and reversing economic and social gains in the three countries. Getting the epidemic under control is the main focus of health and development partners in these three countries. In addition to direct contact, the Ebola Virus Disease (EVD) can be transmitted by exposure to infected medical equipment and wastes.

Most healthcare waste (HCW) is being burned in open pits, burn barrels, or inexpensive brick oven-type “incinerators”, with harmful emissions making the problem worse. UNDP, as part of its Global Project for Ebola Response, and with financial support from the Republic of Korea, South-Africa, GEF and the UNDP Thematic Trust Fund, is improving the capacity of Ebola Treatment Units (ETUs) and Health Care Facilities (HCFs) for treatment of HCW resulting from the care of Ebola infected patients, using environmentally safe long-term solutions.

This is being done by installing autoclave technologies specifically designed for Sub-Saharan Africa under the GEF/UNDP/WHO/HCWH Global Medical Waste Project (2008–2014). These autoclaves are state-of-the-art yet easy to use non-burn healthcare treatment technologies using pressurized steam to sterilize infectious healthcare waste. The use of autoclaves allows for safer handling of the infectious waste with less risk for the handlers and without polluting the surrounding areas. Training is provided in proper waste segregation and proper handling as well.

After the Ebola epidemic is under control, the capacity developed will continue to support key national health sector programmes such as those focusing on infectious diseases (HIV/AIDS, TB, etc.) while minimizing environmental pollution.



DECONTAMINATION AREA OF THE EBOLA TREATMENT UNIT AT THE 34 MILITARY HOSPITAL IN FREETOWN, SIERRA LEONE. PHOTO BY LESLEY WRIGHT.



DEMONSTRATING THE MEDI-CLAVE AUTOCLAVE TECHNOLOGY DESIGNED FOR SUB-SAHARAN AFRICA UNDER THE GEF/UNDP/WHO/HCWH GLOBAL MEDICAL WASTE PROJECT. PHOTO BY JORGE EMMANUEL.

CASE STUDY 11

Promoting South-South cooperation: Exchange of POPs experiences, ideas and initiatives in LAC

UNDP Country Offices and its Chemicals and Waste Team in Panama have – since 2011 - been organizing annual regional workshops, which strive to generate opportunities for countries to brainstorm and share solutions to project implementation challenges that are common to all. To keep costs down, these workshops are organized in conjunction with other training opportunities.

In October 2014, a regional workshop was held in Cali, Colombia, bringing together 8 project teams comprising project and government staff from Argentina, Brazil, Colombia, Costa Rica, Ecuador, Honduras, Mexico and Uruguay.

Each project team discussed progress to date in project implementation and the challenges faced. Experts and international service providers were conferenced in to provide further insight into technical and service solutions. The workshop also allowed participants to observe project results first-hand by visiting a PCB decontamination plant (Lito S.A.) and a Mercury Waste management facility.

- Early identification of issues that could affect project implementation.
- Ideas exchange and identification of solutions for project implementation and challenges.
- Analysis of different approaches to the same task leads to creative ways for optimization.
- Identification of experts.
- Strengthening the relationship between UNDP and national staff and between projects.



REGIONAL PCB WORKSHOP IN CALI, COLOMBIA (OCTOBER 2014). PHOTO BY CARLOS ANDRÉS HERNÁNDEZ ARIAS.

LOOKING FORWARD



The focus of UNDP's work in the area of POPs during the implementation of the UNDP Strategic Plan (2014–2017) will continue to support developing countries and countries with economies in transition comply with their commitments under the Stockholm Convention. This is fully in line with UNDP's Strategic Plan Outcome 1, whose aims include work towards developing solutions at national and sub-national level for the sustainable management of chemicals and waste.

During the GEF-6 funding cycle, UNDP will expand its programme in chemicals and waste, and continue to work towards the GEF-6 Chemicals and Waste long-term goal, which is to prevent the exposure of humans and the environment to harmful chemicals and waste of global importance, including POPs, through a significant reduction in the production, use, consumption and emissions/releases of POPs chemicals and waste.

In particular, UNDP's support to countries will contribute to achieving the GEF-6 POPs target, which is to dispose of 80,000 tonnes of POPs (PCBs and obsolete pesticides) by 2018.

Throughout GEF-6, UNDP will provide support to countries and national stakeholders to phase-out and reduce Persistent Organic Pollutants through the following type of programmes:

A. Update and revision of National Implementation Plans (NIPs)

B. PCB management projects either supporting countries that are undertaking their first PCB management projects or countries that have completed their first PCB management project, but would like to undertake additional replacement and disposal and/or management, decontamination and disposal of contaminated equipment and oils. PCB management and disposal projects support:

- Strengthening the legal framework and improving enforcement capacity
- Undertaking additional PCB inventories to identify remaining PCBs and hot spots
- Improving PCB management practices (such as handling, storage, transport and destruction)
- Ensuring safe disposal of PCBs in partnership with holders of PCB stocks
- Implementing public awareness campaigns and communication strategies

C. POPs pesticide management through:

- Development of national capacity to safely manage and dispose of obsolete POPs pesticide stockpiles
- Promoting sustainable alternatives to POPs pesticides

D. Reduction and elimination of UPOPs from:

- Healthcare waste management
- E-waste management
- Municipal waste management
- Agricultural waste management
- Metallurgical production processes and recycling

E. Reduce use and releases of flame retardants from:

- Manufacturing and production processes
- Plastics waste management and recycling

F. Green chemistry and supply chain management through:

- Application of the sound management of chemicals along the manufacturing and supply chain

- Design of processes that minimize the use and generation of hazardous substances and waste, in particular those controlled by multilateral environmental agreements

G. Multi-POPs programmes combining components related to PCBs, POPs pesticides, UPOPs as well as “new” POPs. Such an approach is particularly effective in smaller countries.

H. Multi-Focal Areas and/or Sustainable Cities programmes which combine funding from various GEF focal areas, such as Chemicals and Waste; Biodiversity; Climate Change; Land Degradation; International Waters and Sustainable Management of Forests. Such programmes address environmental management in a holistic manner focusing attention on cities, a protected area or a large region, which would benefit more from a holistic integrated approach rather than stand-alone smaller GEF projects.

In addition, throughout GEF-6, UNDP will continue to support countries in developing and implementing programmes and projects that improve the management of Mercury and other toxic metals (e.g. lead) as well as Ozone Depleting Substances (ODS). For additional information on these types of projects, please refer to the other reports in this publication series.



DDT-FREE ANTI-FOULING PAINT PRODUCER ZHEJIANG FEIJING PAINT CO., LTD, IN ZHOUSHAN, CHINA. PHOTO BY MR. LUO YI. THE FOREIGN ECONOMIC COOPERATION OFFICE (FECO).

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Cover photos: Top: Packaging and labeling of excavated POPs pesticides at the Lagluja pesticide burial site in Georgia in preparation for disposal abroad. Photo by Vladimer Valishvili. Middle left: Decontamination area of the Ebola Treatment Unit at the 34 Military Hospital in Freetown, Sierra Leone. Photo by Lesley Wright. Middle right: Excavation of POPs pesticides at the Lagluja pesticide burial site in Georgia. Photo by Vladimer Valishvili. Lower left: Draining of PCB oil from transformers at ArcelorMittal Temirtau in Kazakhstan. Photo by POLYECO. Lower right: Open burning of municipal waste at the dumpsite in Comayagua, Honduras. Photo by Luis Ortega.



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