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International SAICM Implementation Project (ISIP)

In 2010, in an effort to demonstrate SAICM implementation via IPEN Participating Organizations, IPEN launched an International SAICM Implementation Project, also known as ISIP. ISIP aims to mobilize resources for initial enabling activities pertaining to national priorities, in keeping with the work areas set out in the strategic objectives of section IV of the SAICM Overarching Policy Strategy.

In particular, the ISIP supports the Governance objective of SAICM's Overarching Policy Strategy paragraph 26, which calls for enhanced "cooperation on the sound management of chemicals between Governments, the private sector and civil society at the national, regional and global levels."

In addition, ISIP builds on the 2008-2009 Global SAICM Outreach Campaign to raise awareness about SAICM and strengthen collaboration among the public interest, health and labor sectors.

ISIP Objectives

ISIP's four objectives include:
• Promoting the need for sound chemicals management
• Advancing National SAICM Implementation
• Promoting global SAICM implementation by global civil society
• Building capacity among NGOs developing countries and countries with economies in transition

Title of activity: Situational Analysis of Morogoro Hotspot Area in Tanzania for Persistent Organic Pollutants
NGO: Tanzania Association of Public Occupational and Environmental Health Experts (TAPOHE)
Country: Tanzania
Date: March 2011

Elements of SAICM Covered:

Identify, explain problem, make initial recommendations on how to address the problem, may be linked to public awareness-raising about the issue; Facilitate the identification and disposal of obsolete stocks of pesticides and other chemicals (47, 68)

Provide a physical description of the site

The Morogoro pesticide hotspot area for persistent organic pollutants (POPs) and obsolete pesticides is located within Morogoro Municipality, in Morogoro Region in Tanzania. The municipality is found at 500-600m above sea level, 37°-39ºE and 5°- 6º S and is situated 220

km south west of Dar es Salaam city. The human population is estimated at about 400,000. Morogoro Municipality has a mixture of warm and cool temperature ranging between 27°C to 34°C in the dry/warm season and 14°C to 22°C in cold/wet season. The Uluguru Mountains, which rise to 3000 metres above sea level, have a major temperature moderation effect. They make the Municipality experience a sub-humid tropical climate with a bimodal rainfall pattern characterized by two rainfall seasons in a year with a dry season falling between the short rains (October to December) and long rains (March to June). There are about 6 months of dryness, the peak being September. The mean annual rainfall is about 870mm and total annual evapo-transpiration is about 1300mm.

The Morogoro pesticide hotspot area is located within the gently sloping land towards the residential blocks near the central railway station. Downstream from the site at a distance of about 300 meters is a seasonal Mjimwema stream that feeds into Ngerengere River. This site is located at an elevation of about 480m above sea level, 37°40' E and 6°5'S and is bordered by the Morogoro Railway central station, a Secondary School owned by the Institute of Adult Education of Tanzania (government owned), offices for private companies and NGOs, and an open area which is used for illegal farming and grazing of livestock; in particular, cattle, sheep and goats. Since the area is located in the city, there are no specific wildlife species found in the area, with the exception of some few bird species.

Give a history of the site

Owners and activities; government regulatory actions

The history for Morogoro hotspot area for persistent organic pollutants (POPs) and obsolete pesticides goes far back to the colonial era during when the ownership of the area and facilities was by the Tanganyika cotton company under the RONLO British Company that also owned big companies in South Africa and Zimbabwe (Rhodesia). For the time being, this site is officially owned by three institutions: Morogoro Farmers' Cooperative Union (MOFACU), the National Housing Cooperation (NHC) that owns the former Morogoro Pesticide Link (that was initially used for formulations of DDT and endosulfan), and the Cotton Board of Tanzania. The NHC in particular is the one that owns the largest area of the contaminated site.

The Morogoro Cooperative Union started in 1963 and it became very strong in 1968 for cash crops, mainly cotton and coffee (both Robust and Arabica). The optimal productivity of these crops was highly dependent on agrochemicals; in particular, pesticides and chemical fertilizers. For instance, the fact that cotton seeds are sweet and are highly vulnerable to pests meant that planting of cotton seeds undressed with pesticides lead to crop failures. To prevent that, seeds were coated by Bruno®, a chemical that was also highly effective even against rodents. Additional pesticides applied included Fluometuron (Cotoran®), and Cypermethrin (Cymbush® and Ripcord®). For unknown reasons, the farmers' cooperatives were dissolved by the government in 1976. It wasn't until 1984/1985 that the cooperatives became functional again. After dissolution of the farmers' cooperative union, marketing boards were formed instead and became very strong and took the responsibility of sourcing and distributing agrochemicals to the cooperatives in rural and high remote areas. During the same period, pesticides were brought by the Coffee and Cotton Boards of Tanzania in larger quantities than what farmers demanded. Thus, this is one of the reasons that lead to a pile-up (accumulation in large quantities) of pesticides (obsolete pesticides) in the Morogoro pesticide storage site. The main cause for accumulation of obsolete pesticides in the country were donation of unneeded pesticides, purchase of pesticides in excess of demand, contingency stocks and the unused surplus, and poorly stored and managed pesticide stocks.

Although the Morogoro Link is well known and famous for being among the central key sites for formulation of DDT and endosulfan (among other pesticides) in the past, the history about the study site is scanty. The available information indicates that this site was owned by an Israeli company that was unique in its capacity to produce (formulate) large quantities of DDT and endosulfan in the country. However, due to perceived side effects to humans and the environment (Stockholm Convention), production of such chemicals was banned and the site

was eventually abandoned. To date, in this site, human settlements and commercial premises are found within 500 meters of the store and also the Railway station is just 50 meters away from the site. Vegetable cultivation takes place along Mjimwema stream. The closest garden downstream is situated at about 300 meters from the site. Due to proximity to human activities and river systems, this site has a very high potential for environmental and social impacts. The environmental impacts include the pollution of Mjimwema steam, exposure of local communities to the pesticides (including railway station workers) through gases emitted from the pesticides or by direct contact with leaking pesticides.

Description of the chemical characterization

In Morogoro hotspot areas, pesticides and pesticide residues are the main types of chemicals present. Pesticides available include those falling into categories of POPS and obsolete pesticides of different functional groups (organochlorine, synthetic pyrethroids, miscellaneous compounds and some of which are unknown). There are two main sources of these chemicals; the Tanzania Link Pesticide Company that was formulating and packaging the pesticides; in particular, DDT and endosulfan (Thiodan®), and the Tanzania Cotton Board that was importing and keeping them in the warehouses before distribution to farmers. Before carrying out this study, there was limited information (data) about pesticides that existed. Surveys carried out by ENVIROCARE (NGO) recorded the existence of the largest quantities of DDT in the hotspot area (IPEP Report). During 1998 – 2004, the quantity of DDT recorded to exist in the site was over 19,000 kg. Although during implementation of this project actual measurements were not taken, existence of such chemicals at high levels was confirmed. Other pesticides found in the site include Bruno®, Flumeturon (Cotoran®), Cypermethrin (Cymbush® and Ripcord®) and others which were unknown (Table 1).

Table 1: Type of pesticides found in the study area during this study

Functional group	Trade name	Use/Purpose
Fluometuron	Cotoran®,	Herbicide
Cypermethrin	Cymbush® and	Insecticide and Miticide
Cypermethrin	Ripcord®.	Insecticide and Miticide
-	Bruno®,	Insecticide

Data to demonstrate the types and quantities of pesticides in the environment are limited. However, during this study, it was evident that NEMC was also collecting data and analyzing water samples from different sites within the hotspot for pesticides and pesticide residues using chemical analysis. Findings from the analysis carried out are shown in Table 2.

Table 2: Results for DDT analysis on water samples from different obsolete pesticide storage sites in the country

Location	Concentration in µg/mL			
	pp-DDT	pp-DDD	op-DDT	pp-DDE
Shallow well downstream of Vikuge store site	0.57	0.15	0.23	0.02
Pond upstream of Vikuge store site	0.43	0.10	0.31	0.01
Morogoro River downstream of MOFACU store site	***0.32***	***0.11***	***0.13***	***ND***
Borehole in Fungafunga area near MOFACU store site	***ND***	***ND***	***ND***	***ND***
Canal within Mbarali farm site	0.03	ND	ND	ND
Tap water from network located in Uyole store site	ND	ND	ND	ND

ND = Not detected

Realizing that most of the data collected by NEMC focused on the premises owned by NHC, during this study, more soil and biota samples were collected for analysis of pesticide and pesticide residues using chemical methods.

Description of the environmental and health consequences

In Morogoro pesticide hotspot area there is evidence of environmental and health consequences. The environmental consequences refer to loss of biodiversity in the hotspot area. During this study, it was evident that the number of insect species and the population size per insect species increased along the gradient from the center of the hotspot to the periphery in about 200 - 500 meters that was under observation. This also included the number of birds. It was also evident that crops that were cultivated within the hotspot area and within the radius of about 30-50 meters were never affected by pests (army worms, for instance) that affected the neighboring cultivated area. One of the testimonies from one of the farmers during Focus Group Discussions was that, "*I like farming in the area because farming without application pesticides is cheap and since I started farming in this area I never apply pesticides and my crops are never affected*".

On the human side, there was no clear description of the health consequences as perceived by respondents. Testimonies from respondents (among those who were workers with Morogoro Link) demonstrated that almost over 90% of workers died during 1970 – 80's for unknown reasons, and some with mysterious diseases/disease conditions possibly due to pesticide poisoning. From the testimonies, there was evidence that very few (less than 5%) of former workers in this hotspot area were still alive. Although during the study it was evident that pesticides including DDT were seen grossly in vicinity (Picture 3B), no one among the risk groups perceived to be at risk. Some people were sleeping in the former storage site and in warehouses that, although empty, heavily smelled of pesticides. Workers in the security company, in the secondary school, informal food vendors and in warehouses were at high risk of exposure. In addition, farmers and livestock keepers that used the area were at high risk of exposure. Apart from perceived risk, in this study, it was not possible to affirm levels of exposure to the risk population.

Description of who is responsible for the site

Initially, the site and the whole complex was owned by the Tanganyika Cotton company under the British Cotton Company RONLO, which also owned other companies in the South African countries. For the time being, the whole site is under ownership of Morogoro Farmers' Cooperative Union (MOFACU) and the National Housing Cooperation (NHC). Most of the buildings that belong to NHC have been rented to one of the security companies (Lupanga Security Company), Tanzania cotton board and MVIWATA (Mtandao wa Vikundi vya Wakulima Tanzania). Some of their buildings, however, are open and are illegally used for residential purposes. On the other hand, the buildings that belong to MOFACU are still used for storage of pesticides and MOFACU properties. Only a few have been rented by Morogoro 21st Century Textile and used as warehouses.

Description of the plans for cleanup

Morogoro pesticide hotspot area is ranked as the number one risk area for obsolete pesticides. From this recognition, the National Environment Management Council (NEMC) is for the time being coordinating the clean-up plans with financial assistance from the World Bank under the Africa Stockpiles Program (ASP). According to the reports, the clean-up will involve the pesticides and their containers, and the top layer of the floor, since it also contains a high concentration of pesticides.

Project Outcomes:

Description of the activity conducted

Inception and planning meetings

After approval of the project, consultative and project inception meetings were made between TAPOHE researchers and local leaders at ward and street levels, owners of the site and users of the buildings in the contaminated site. Further consultations to seek permission to carry out the study in the area were made between TAPOHE researchers and the management of the National Environment Management Council (NEMC) and National Housing Cooperation (NHC). Thereafter, the researchers held planning meetings with Morogoro Municipal Council Authorities responsible for environment, public health and agriculture and livestock development officers, and the medical personnel working in the area. These meetings helped in drawing up the implementation plan, which focused on who would be involved during data collection and sharing information at the end of the study. Following consultations with key stakeholders, it was evident that other studies by NEMC (but with different objectives than our study) were in progress in the same hotspot area. As a result of that, further consultations with NEMC were made to ensure that findings from this study would not lead to duplication of their efforts; rather, that they would complement one another. Specific activities that were conducted in this project included focus group discussions, in-depth interviews with key informants, participants' observations, desk study and collection and submission of samples for pesticide chemical analysis. A quick scan for biodiversity change along the pollution/contamination gradient was also done. The focus group discussions (FGDs) were conducted with the group of teachers in the secondary school (7 members); students in the secondary school (12 members); farmers that were farming in the hotspot area (5 members); a group of women (3) and men (2) (total of 5 members) involved in food vending; and casual labourers in the area. The key informants included the Manager of MOFACU, one of the former workers and administrator of Morogoro Link, ward leaders (Ward Executive Officer, Ward Councillor, Agriculture and Livestock Extension Officer, Ward Educational Officer, and the Ward Heath and Environmental Officer) in which the hotspot area is located, workers of the Railway Cooperation, and people living adjacent the hotspot area. Through the desk study, relevant documents were reviewed and the information gathered served as a platform for what deserved further detailed investigation. Consultations and in-depth interviews with key informants and other stakeholders were made in order to gather information on the history for POPs and obsolete pesticides contamination and how and to what extent they had caused health impacts in the study area. Direct observations and physical inspections were made within the contaminated site and outside the area, about 1 km away from the borders of the contaminated area. Relevant photo shots for the site and events during the site visits were taken for pictorial illustrations. Assessment for impact of POPs and obsolete pesticides on flora and fauna was mainly based on a comparative approach from the biodiversity indices that were established in polluted and in non-polluted areas. Transect walks from all directions were made to gather preliminary data for biodiversity indices along the gradient from core contaminated areas to the surroundings. Finally, three (3) soil samples and four (4) biota samples were collected and submitted for pesticide chemical analysis using Gas Chromatography with Electron Capture Detector to provide abstract quantitative information for POPs. Due to high costs for analysis of samples (far beyond what we anticipated while developing the proposal) in laboratories within the country, attempts were made to ship and carry out the analysis in Belgium. Unfortunately, this arrangement did not yield fruitful outcome. In collaboration with researchers on pesticides in Norway, arrangements have been made to collect new samples and analyze them at the Norwegian Institute for Agricultural and Environmental Research, Norway (Bioforsk). Due to limited funds available for this activity, it has been rather difficult to establish a time frame. The anticipation, however, is to have the results ready

before December 2012, the time when we will have the results for samples being collected for other pesticide projects.

Impact on target groups:
The target groups for this project were communities living or working in buildings located within the hotspot area, as well as those living within or near to the hotspot area. During the situational analysis studies, FGDs with relevant groups and in-depth interviews with key informants demonstrated that most of the poor and vulnerable groups lack knowledge and understanding about human, animal and environmental health risks associated with pesticide exposure. According to their understanding, pesticides can only kill if taken orally and in large quantities. Long-term exposure of low doses was not known. Although the design of this study did not provide opportunity to assess its impact, the results from this study will be useful for raising awareness about the risk, evidence-based risk management and demonstrations to community members about qualitative and quantitative risks to biodiversity along the gradient.

Impact on target policies:
The national policies that underpin the management of obsolete pesticides include the following: National Environmental Policy (1997): In the agriculture sector, it emphasizes strengthening of environmentally sound use, monitoring, registration and management of agrochemicals and control of runoff of agrochemicals to minimize pollution of both surface and groundwater. National Water Policy (2002): Recognizes that pesticides are serious water pollutants and advocates creation of public awareness in the importance of protection of water resources from pollution, including that resulting from inappropriate use of agrochemicals. Agriculture and Livestock Policy (1997): Emphasizes the strengthening of agro-chemical monitoring and registration as well as controlling of agricultural run-off of agrochemicals to minimize pollution of both surface and ground water. National Health Policy (2003): Main objective is to safeguard and ensure disposal of obsolete pesticides in a way that does not cause harm to human health and the environment. Although in the area there is no obvious evidence for surface water contamination with obsolete pesticides, with a low water table in Morogoro, the possibilities for causing ground water pollution are high. Leakage of pesticides on the ground as well as exposure in the open pit increases risks of ground water pollution, especially during the rainy seasons. The results from this activity were related to all of the above-stated policies, with emphasis on pollution and exposure to obsolete pesticides. From the situational analysis made, the results indicate that humans and the environment in Morogoro pesticide hotspot area are at high risk of exposure.

Outreach to stakeholders:
The stakeholders and sectors that were engaged in this activity included MOFACU (Morogoro Farmers' Cooperative Union), who are owners of the buildings with stored pesticides and contaminated buildings. Others included workers and students in the nearby secondary school, different users of the buildings in the hotspot areas, local authority in the ward, former workers in the Morogoro Link and communities living in and around the hotspot area. The sectors involved included health, agriculture and livestock, and environment. During this study it was evident that evidence-based decision-making for the risks associated with obsolete pesticides and POPs in the area was lacking. All stakeholders agreed upon the relevance of setting up a study that will provide information for decision-making, specifically on the effectiveness of mitigation measures in the recovery processes of the ecosystem. Overall, the potential for follow-up to advance the relationships with all the stakeholders included in the study is high.

Deliverables, outputs and/or products:
For the time being, the project report is the main deliverable output from this project. After obtaining all the results after chemical analysis of samples, the project will produce additional deliverables that will include leaflets (brochures) in English and Kiswahili that will communicate the information to stakeholders.

Communication Efforts:

The Morogoro hotspot area is in the national project under the ASP for disposal of obsolete pesticides. The need to involve media in all stages of the operation so as to ensure that the general public understands and fully participates in the monitoring process is critical. In addition, since, Morogoro has been proposed as a collection centre for obsolete pesticides from all regions in the central part of the country, it is also important to ensure that the public and stakeholders are fully made aware. In realization of this, the project proposes for communication to the public through local radio and newspapers. During data collection, photos were collected and will be useful during communication of the findings with stakeholders.

NGO Recommendations for next steps:

Following are the recommendations for the next steps:

i. Collection of baseline information about the extent of pollution.
ii. Assess the levels of exposure in humans.
iii. Have the biological monitoring capacity to be able to judge the recovery of the health of the ecosystem.