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## The International POPs Elimination Project (IPEP)

*Fostering Active and Effective Civil Society Participation in  
Preparations for Implementation of the Stockholm Convention*

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### Hotspot report for a Contaminated Site:

### Old Korogwe DDT Site in Tanzania



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For *Environment* and Responsible Development

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## About the International POPs Elimination Project

On May 1, 2004, the International POPs Elimination Network (IPEN <http://www.ipen.org> ) began a global NGO project called the International POPs Elimination Project (IPEP) in partnership with the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Program (UNEP). The Global Environment Facility (GEF) provided core funding for the project.

IPEP has three principal objectives:

- Encourage and enable NGOs in 40 developing and transitional countries to engage in activities that provide concrete and immediate contributions to country efforts in preparing for the implementation of the Stockholm Convention;
- Enhance the skills and knowledge of NGOs to help build their capacity as effective stakeholders in the Convention implementation process;
- Help establish regional and national NGO coordination and capacity in all regions of the world in support of longer term efforts to achieve chemical safety.

IPEP will support preparation of reports on country situation, hotspots, policy briefs, and regional activities. Three principal types of activities will be supported by IPEP: participation in the National Implementation Plan, training and awareness workshops, and public information and awareness campaigns.

For more information, please see <http://www.ipen.org>

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## TABLE OF CONTENTS

TABLE OF CONTENTS .....	iii
LIST OF FIGURES.....	iv
LIST OF ABBREVIATIONS.....	v
1. PHYSICAL DESCRIPTION OF SITE .....	1
1.1 Choice of the site .....	1
1.2 Type of site.....	1
1.3 General characteristics.....	2
1.4 Surrounding wildlife and plant life.....	4
1.5 Social-economic characteristics .....	4
2. HISTORY OF CONTAMINATED SITE.....	6
3. CHEMICAL CHARACTERIZATION.....	7
3.1 Type of pesticides.....	7
3.2 Quantity of pesticides.....	8
4. ENVIRONMENTAL, SOCIOECONOMIC, AND HEALTH CONSEQUENCES .....	9
4.1 Environmental effects.....	9
4.2 Socioeconomic consequences .....	9
4.3 Health consequences .....	10
5. RESPONSIBLE PARTY .....	11
6. PLANS FOR CLEANUP .....	11
7. RECOMMENDATIONS OF NGO.....	12
8. REFERENCES.....	13

## LIST OF FIGURES

Fig. 1 A map of Korogwe District in Tanga Region, Tanzania.....	2
Fig. 2 A map showing the location of the Old Korogwe site.....	3
Fig. 3 Main water supply pump at a white-painted building within 50 meters from the pesticides storage facility .....	4
Fig. 4 Building used as CREW office within about 10 m from the pesticides store on the left side.....	5
Fig. 5 The new storage facility at Old Korogwe .....	7
Fig. 6 Stocks of DDT pesticides at Old Korogwe Site .....	8

## LIST OF ABBREVIATIONS

AGENDA	AGENDA for Environment and Responsible Development
ASP	Africa Stockpiles Programme
BAT	Best Available Techniques
BEP	Best Environmental Practices
CREW	Credit for Women (NGO)
DDT	Dichloro Diphenyl Trichloroethane
GTZ	Gesellschaft für Technische Zusammenarbeit (Germany Development Agency)
IPEN	International POPs Elimination Network
NEMC	National Environment Management Council
NGO	Non Governmental Organization
POPs	Persistent Organic Pollutants
SIPU	Small Industries Promotion Unit

## **1. PHYSICAL DESCRIPTION OF SITE**

### **1.1 Choice of the site**

The Government of the United Republic of Tanzania through the Vice President's Office carried out a countrywide survey in 2003 to identify the stockpiles of obsolete pesticides [1]. As a result of this survey a report [1], which contains a POPs pesticides inventory, was compiled. In this report which covered a total of 19 out of 26 regions of the United Republic of Tanzania, about 300 sites with obsolete pesticides were identified. Furthermore, it was found that the magnitude of contamination of some sites was alarming and remediation measures were needed. The sites which were given high priority based on quantities of obsolete pesticides and qualitative or physical assessment include the Vikuge site with 70 metric tons of POPs pesticides formerly stored in an open air and the Old Korogwe site with 50 metric tons of DDT stored in an open shed close to one of the tributaries of the Pangani River. The Vikuge site has been a subject of many studies, including the recent study by AGENDA in collaboration with IPEN through "Community Monitoring Working Group"[2]. The Old Korogwe site was therefore identified and selected to be appropriate for this study.

### **1.2 Type of site**

The Old Korogwe contaminated site is located within latitude 4° 10' and 4° 20' South of the Equator and longitudes 38° 45' and 38° 55' East of Greenwich. Administratively, the Old Korogwe site is in Korogwe District Council, in Tanga Region, Tanzania. Figs. 1 and 2 show the geographical location of the Old Korogwe Village. Other Villages near the contaminated site include Kitopeni, Lwengela Relini and Gerezani (Prison). According to the 2002 population and housing census, the Old Korogwe Village has 9,564 people whereas Kitopeni and Lwengela Relini had a total of 1,600 people [3].

The contaminated site is located within the area formerly called Mnyuzi Sisal Estate. The size of store in which the obsolete chemicals are stored is 14m long x 10m wide x 3m high. Whereas at a distance of about 10 meters there is an office for one non-governmental organization called Credit for Women (CREW), within 12.8 meters on the eastern side there is a shed where goats are illegally kept during the day. The site is easily accessible from the Old Korogwe Railway Station via a 400 meters un-tarmacked road which crosses a watershed of the tributary of the Pangani River. The Old Korogwe Township has good access to other parts of the country via the Tanga-to-Moshi and Dar-es Salaam -to-Moshi roads and also by railways.

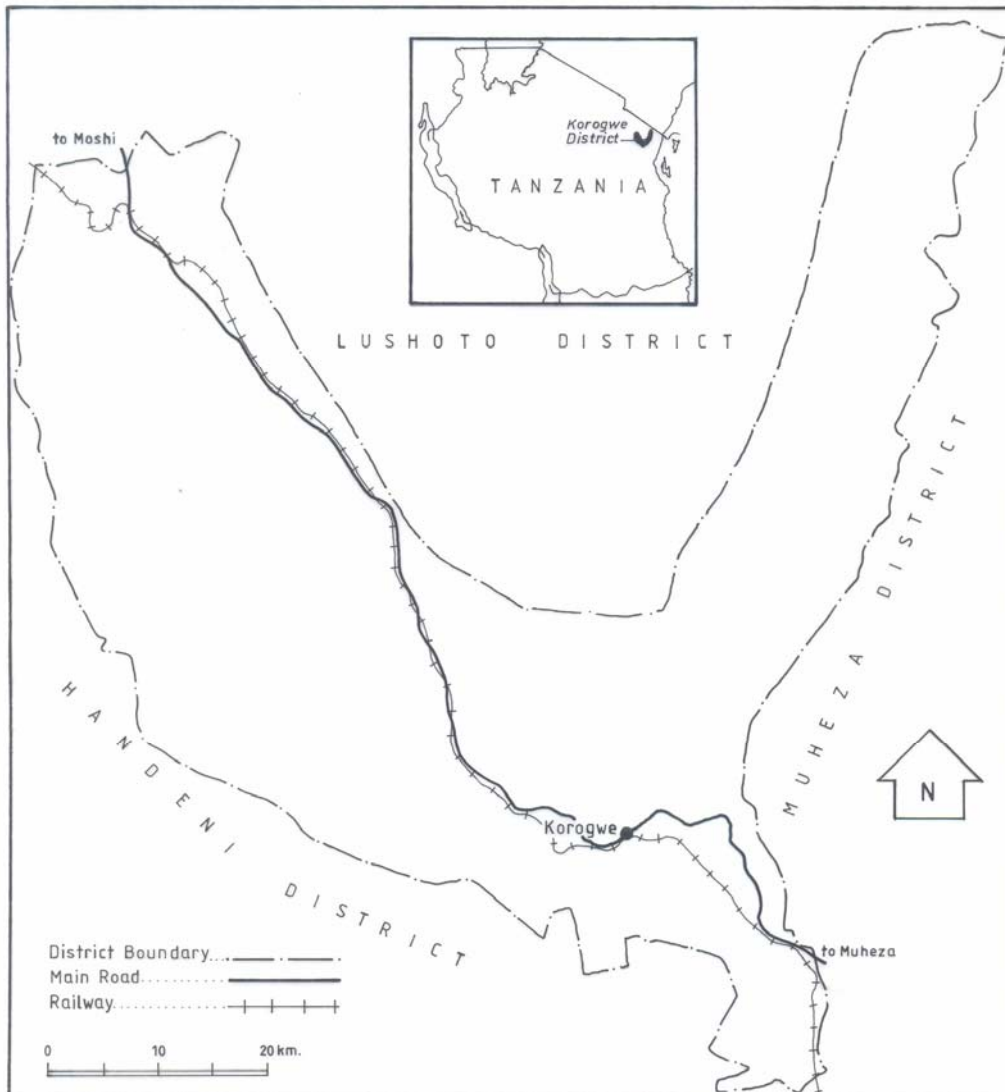


Fig. 1 A map of Korogwe District in Tanga Region, Tanzania

### 1.3 General characteristics

The climate of the Old Korogwe Village is between tropical and sub-tropical type with an average annual rainfall of 900 millimeters per year. The minimum average temperatures range from 15°C to 25°C whereas during the hottest month, the mid-day temperature could exceed 30°C [3].

The North-Eastern part of the Old Korogwe Village is surrounded by mountains. The mountainous zone lies between 900 and 1500 meters above sea level and has temperate climatic condition with rainfall ranging between 1000 and 2000 millimeters annually [3]. During the day wind normally, blows in the East-West direction. The site where the store is built seems to a watershed of the tributaries of the Pangani River. Whereas the site plot is

almost flat, the remaining area of the site gradually slopes towards the tributary of the Pangani River, which is 80 meters on the western side.

The Old Korogwe Village is drained by tributaries of the Pangani River which also serve the community water for washing, gardening, irrigation, fishing and drinking water for livestock. The Pangani River pours its water into the Indian Ocean. The Pangani River is important for paddy production. Within 50 meters (North) from the contaminated site (storage facility), there is a water pump and a deep-well (180 ft deep borehole) as shown in Fig. 2, which is the only source of drinking water for the entire Old Korogwe population. The quality of water from the deep well near the contaminated site is not known.

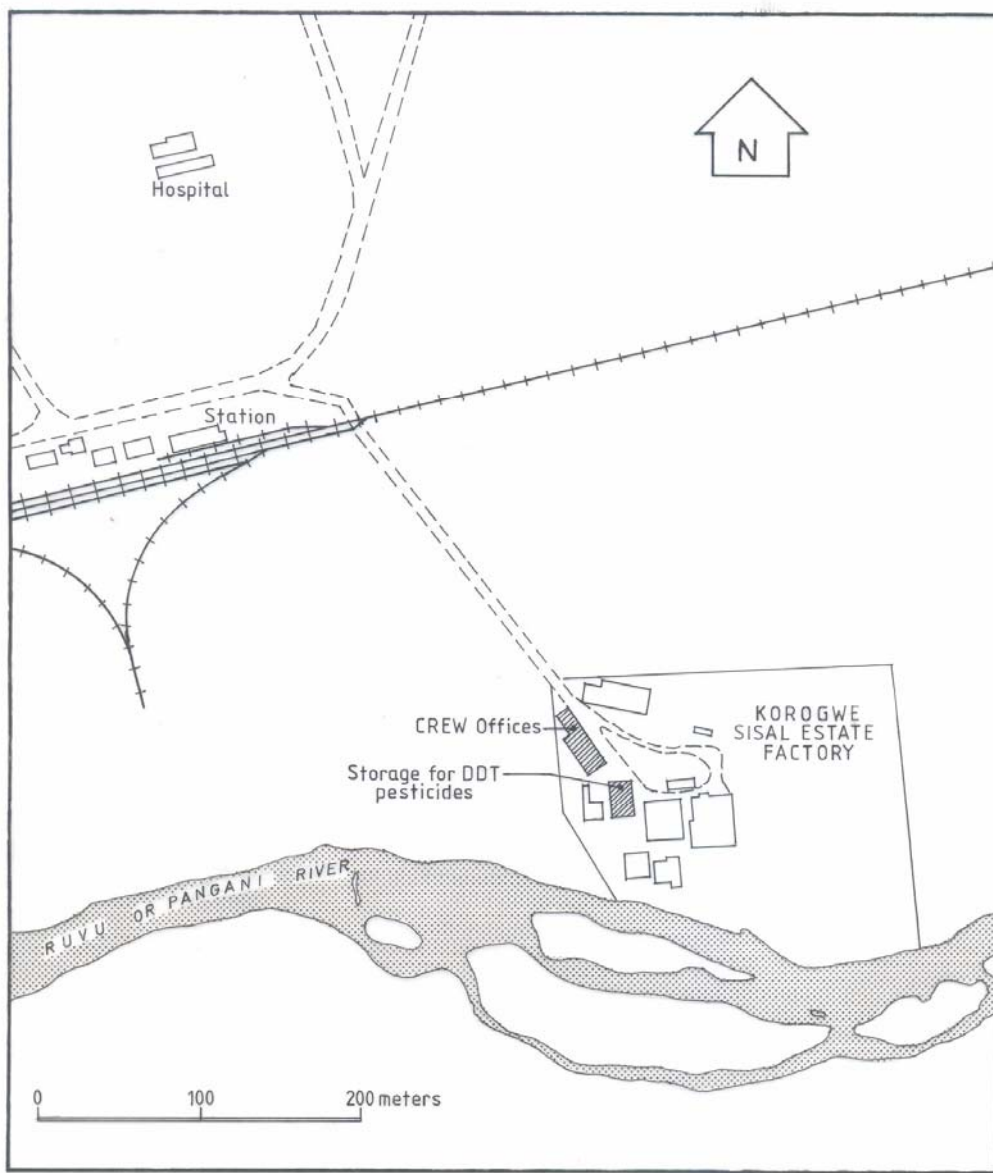


Fig. 2 A map showing the location of the Old Korogwe site





**Fig. 3 Main water supply pump at a white-painted building within 50 meters from the pesticides storage facility**

#### **1.4 Surrounding wildlife and plant life**

The soils of the Old Korogwe Village are divided into loamy, sandy and clay. Most of the vegetation in this area is natural of the tropical type. The area near the contaminated site is mostly covered by indigenous grasses with few shrubs and trees. Most of the indigenous trees near the Store have been decimated due to long time use of the land for such activities as farming, grazing and firewood collection. The trees found at the contaminated site were mango, cashew nut and a few indigenous trees.

The presence of crocodiles has been reported by the villagers and workers along the tributaries of Pangani River which is near the contaminated site. There is no reliable information about the presence of big wild animals within 1 kilometer diameter from the site. Also there are no endangered species in the area close to the contaminated site. At the site, both flying and crawling insects are rarely seen.

#### **1.5 Social-economic characteristics**

The Old Korogwe Site is close to residential areas in the Old Korogwe Village. The residents earn income from farming, livestock keeping and fishing. However, agriculture is the main stay of the economy. The community is engaged in the production of food and cash crops on small scale basis. Crops

grown this area include maize, paddy, beans, cassava and potatoes for food; whereas cash crops include cashew-nuts, sisal, fruits and cotton. The Villagers grow vegetables and use water from the tributaries of the Pangani River. The farmers use fertilizers, pesticides and herbicides during farming.

Livestock keeping is another activity in Old Korogwe Village where the livestock is mainly of indigenous cattle, goats, sheep and chickens. Sometimes grazing of livestock is not controlled as such goats and sheep can be left to graze around the contaminated site. Since the site area is left unattended, green grasses around the storage facility attracts pasture and grazing of goats, sheep and cows. At a nearby village, Kilole (about 1 km from Old Korogwe), there is a well known livestock market where people from the Coastal areas and from Zanzibar can buy livestock. In addition, fishing in the river is one of the activities for the villagers. Nevertheless, the average daily income is very low whereby a daily income of a person is less than \$1.00 USD (equivalent Tanzanian shillings Tshs. 1,000).

Most of the buildings near the site area have been demolished. However, there is one building which is used as an office for CREW (Credit for Women) activities. The CREW activities include amongst others; conducting seminar to credit applicants who are female, meetings and Office business. The office building (see Fig. 3) is within about 10 meters from the DDT storage shed.



**Fig. 4** Building used as CREW office within about 10 m from the pesticides store on the left side

## 2. HISTORY OF CONTAMINATED SITE

The history of the contaminated site goes back to 1980's whereby the Government of Tanzania was in full implementation of the policy well-known as "Siasa ni Kilimo" (literally means, Politics is Agriculture). The Government received a good quantity of different pesticides, herbicides and fertilizers from several countries, possibly in form of donations, grants, etc. The common entry points of the consignments to the country are Tanga and Dar es Salaam ports. Due to good accessibility and transport network by both railway and roads, the Old Korogwe Site was used as the storage place for stocks aimed for users in the Northern Zone of Tanzania. Therefore, a large quantity of pesticides was stocked at this site waiting for distribution.

Currently, the Old Korogwe Site contains at least 50 metric tons of obsolete pesticides characterized as DDT which is poorly stored. The presence of large stockpiles of DDT at Old Korogwe Site could be due to a number of factors which include; quantity received being more than the amount needed inefficient distribution system of the pesticides to reach the users on time, inability of farmers to buy them, access to cheap illegally imported pesticides from neighboring countries etc. (restriction of POPs was not yet in place).

The contaminated site is situated within the then Mnyuzi sisal Estates. With the exceptions of the land under the then Mnyuzi Sisal Estates, the remaining land is managed under the village council whereby the villagers are the main beneficiaries. The Mnyuzi sisal Estates buildings including the storage facility for pesticides (although most of them have been demolished), used to be under the management of Sisal Estate Authority which was then transferred to the District Authority. The compound of the old Mnyuzi Sisal Estates including the contaminated site is, administratively, under the Ministry of Agriculture and Food Security. In 1984 the buildings were handed to a GTZ<sup>1</sup>-SIPU (small industries promotion unit) project. In 1992, a credit organization, CREW rented one of the buildings at the site after the GTZ-SIPU project has closed their business. The reasons for closing their business are not known. Throughout these changes, the stockpiles of obsolete DDT has been dumped and left in an open air without appropriate attention. In mid 1990s more attention has been paid to the site by not only the National Environment Management Council (NEMC) [4, 5], but also other stakeholders including research institutions and environmentalists.

The stockpiles of DDT pesticides at Old Korogwe site is owned by the Ministry of Agriculture and Food Security. The piles of obsolete pesticides used to be in an open shed until November 2003 when the store was improved with corrugated iron sheets. However, the current storage status is

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<sup>1</sup> GTZ = Gesellschaft für Technische Zusammenarbeit; a German enterprise for sustainable development with worldwide operations.

still very poor since the package bags have been worn out leaving the bulk of DDT powder vulnerable to wind uptake.



**Fig. 5** The new storage facility at Old Korogwe

The old storage facility was generally poorly constructed as it was an open air construction. In 1999 a shelter was constructed by NEMC to prevent draining of chemicals during rain season. The store however was still an air open shed which could not prevent the uptake of DDT powder by blowing wind into nearby Pangani River tributary and the surrounding environment. The shelter was slightly improved by NEMC in 2003 by half-fixing the store sides with corrugated iron sheets, leaving that top half open to air as can be seen in Fig. 4. The smell of DDT at the nearby area indicates that the present shelter does not prevent dispersion of dust by wind and also vaporization.

### **3. CHEMICAL CHARACTERIZATION**

#### **3.1 Type of pesticides**

The consignments of pesticides received at the site in 1980's normally were in different forms such as liquids, powder and pellets. However, the available stocks at the site are in form of powder. It is not known whether the liquid

pesticides were completely distributed to users or illegally taken from the site through vandalism or theft.

The stockpiles of chemicals at the site were identified from the remains of the worn out bags/packages which were labeled DDT powder. A detailed chemical characterization of the powder materials was not undertaken. To our knowledge, apart from DDT powder, no other chemicals were found at the site. Fig. 5 shows the bulk of DDT pesticides inside the store where the bags/packages have been worn out.

### 3.2 Quantity of pesticides

The quantity of pesticides at the site was estimated from the measurements of the storage facility which are: 14m long x 10m wide x 3m high. The effective height occupied with chemicals was 1.2m, which gives a gross volume of 168m<sup>3</sup> (pesticides and worn out bags). The observed quantity of DDT powder at Old Korogwe site seems to be comparable to that recorded in the 1997-98 inventories of obsolete pesticides undertaken by NEMC [5]. The same amount was also reported during the 2003 inventories and preparation of the Africa Stockpiles Programme (ASP) document by the Government of Tanzania [1]. However, a slight decrease in quantities could be attributed to probable continuous application in agricultural activities and wind dispersion. However, this study could not establish whether the obsolete stocks are still applied on farms.



Fig. 6 Stocks of DDT pesticides at Old Korogwe Site

## **4. ENVIRONMENTAL, SOCIOECONOMIC, AND HEALTH CONSEQUENCES**

### **4.1 Environmental effects**

The villagers and community at large are not aware of the consequences resulting from use of DDT pesticides. Before the improvement of the storage shed by NEMC in 1999 a lot of chemicals could be drained away to the waterways during the rain season. Even with the 1999 NEMC intervention, the shed was still an air-open type which could not prevent the uptake of DDT powder by blowing wind into the nearby tributary of the Pangani River and the surrounding environment.

Korogwe District Officials reported that one of their big concerns relating to the contaminated site was its potential for adverse environmental effects, which include: contamination of the adjacent land and water by leaching of contaminants into groundwater or surface water run-off. From a human health perspective, groundwater contamination is a serious concern when the aquifer is used as a drinking water supply as is the case in Korogwe. The main source of water for Old Korogwe community, a deep-well (180 ft), is within 50 meters from the contaminated site. However, no data is available on the quality of water supplied before 1999.

Although the shelter was slightly improved by NEMC in 2003 by half-fixing the store sides with corrugated iron sheets, the top part was left open to air. The smell of DDT at the nearby area and the CREW Office indicates that the present shelter does not prevent dispersion of dust by wind and also vaporization. The community leaders and the District Authority are also concerned about the contamination of the natural environment in agricultural processes and to the presence of pesticides residues in food to be eaten by humans. Although these concerns could not be substantiated, accumulated worries as a result of pesticides could lead to social unrest by community members.

### **4.2 Socioeconomic consequences**

Recently, some members of the Old Korogwe community have shown great concern about the presence of obsolete pesticides. Since the contaminated site is close to residential areas in the Old Korogwe Village, the presence of the obsolete pesticide has affected some of the traditional activities such as farming, livestock keeping and fishing.

According to the residents, there is a decrease of income, albeit small, for peasants who grow vegetables and use water from the tributaries of the Pangani River. This is because the villagers are not allowed to cultivate crops on the land close to the contaminated site and they do not have alternative sites. In addition, customers are sometimes reluctant to buy vegetables grown from the land near the contaminated site. According to District Officials, fishing in the nearby waterways is restricted due to potential contamination of water. Livestock keeping is another slightly affected; however, grazing of goats and sheep around the contaminated site is not restricted. The Korogwe District Authority is concerned about tarnishing the good image of the Kilole livestock market where people from the coastal areas and from Zanzibar buy livestock.

While the buildings near the site area have been demolished, there is no immediate reuse of the land. It seems that the plot could be declared useless or abandoned. The Manager of CREW expressed concern for embarrassment she experiences when the smell is so intense while she is with customers, visitors or seminar participants.

#### **4.3 Health consequences**

The impacts of pesticides to human health are well-known. However, it is difficult to get short-term results from the field. The health information was therefore obtained through interviewing the members of the village, District Council and Health Officers.

It was observed that 12 out of 20 interviewed people (60%) complained of an irritating smell of the DDT pesticides at a distance beyond 100 meters. Similarly, during the windy days the smell could reach as far as 600 meters. This shows that wind uptake or dispersion takes the DDT powder to residential areas of the Old Korogwe village, which is about 500 meters from the site. The extent, to which the smell goes, depends on the wind speed and direction. At the CREW Offices the smell of the DDT becomes strong and irritating. This may be due to the poorly constructed storage facility.

Several cases of skin and respiratory diseases are reported by the villagers, which they attribute to the pesticides. The Health Officers from the Korogwe District Hospital also acknowledged to have received such complaints from the area, however, there is no proof on whether these cases are directly linked to the presence of DDT stockpiles. The workers of the CREW have also raised a number of cases which claimed to be related to the presence DDT stocks and longtime exposures. For example, their former Manager died 3 years ago (in 2002) due to cancer. The office secretary/typist is reported to have died due to kidney malfunctions. The community leaders also believe that some adverse health effect occurred in the village as a result of either direct exposure to DDT or through water, vegetables, fish, etc.

Others cases reported during the interview are related to livestock. The villagers who used to take their livestock for grazing at the site have recently observed abnormalities to new born animals including disabled or handicapped ones.

Although there this study did not intend to establish cause and effect relations between health effects and DDT stocks, it prudent to assume that there is a need for further research.

## **5. RESPONSIBLE PARTY**

Contaminated land management involves local council and Government, developers, land users and residents. The main responsible party in relation to the contaminated sites are; Ministry of Agriculture and Food Security, Plant Protection Division; the Division of Environmental under the Vice Presidents Office, and the National Environment Management Council (NEMC). At the district level, the Department of Agriculture of the Korogwe District Council has the full responsibility in regard to security and control of the site.

In order to raise the awareness about the consequences of the obsolete pesticides, social pressure groups and non-governmental organizations (NGO's) need to play a big role. Unfortunately, there are no strong NGO's or social pressure groups in the area. It is therefore necessary that training, through seminars and workshops, of the members of community environmental committees and/or pressure groups be conducted. Trained community members are of great help during implementation of cleanup plans and monitoring.

## **6. PLANS FOR CLEANUP**

There is a need to recognize that unless further contamination with obsolete pesticides is stopped; cleaning up polluted sites will be a never-ending and futile task. In determining significant risks to public caused by pesticides and communicating those risks to public expertise is required.

- ❖ There is a need to train a wide range of technical staff and supervisors in several government departments and NGOs who will spearhead a cleanup program,
- ❖ Public awareness of the dangers of the pesticides is key to a sustainable management of obsolete stocks



- ❖ Pesticide contamination is never just a local or national problem. Pesticides do not recognize international borders. The international community has a role to play in the implementation of international clean up plans.
- ❖ At present, there is no clean up technology in Tanzania. It is therefore, important to know that the process of cleaning up one site does not result in simply transferring contamination to another area.
- ❖ Cleaning up contaminated land requires balancing the desirable objective of removing contaminants against economic practicalities. Many clean up technologies are currently prohibitively expensive and are not guaranteed to clean up land to the desired level.

## 7. RECOMMENDATIONS OF NGO

The most important task that faces all stakeholders is to be involved in raising awareness about the dangers of pesticides and providing training in the proper management and storage of these deadly chemicals. Also there is a need to inform the public that contaminated sites are equally dangerous as the obsolete stocks themselves. The major recommendations from this study are as follows:

- 1) The use of water for irrigation and other agricultural processes needs to be carefully monitored to prevent land and food contamination.
- 2) It is important that public awareness campaign be undertaken to educate the decision makers, traders, villagers and the general public on the adverse effects of obsolete pesticides and ways of avoiding future accumulation of stocks.
- 3) The Government and NGO's should encourage farmers to use the best available techniques (BAT) and best environmental practices (BEP) in order to prevent or minimize heavy use of pesticides thereby contaminating land and impacting human health.
- 4) The contaminated sites should be remediated to prevent further contamination of the land and water. However, a long term detailed study and investigation to establish levels of contamination needs to be conducted and needs to address the question of recovery.
- 5) Both remediation of the site and introduction of a site monitoring program need to be undertaken.
- 6) Develop criteria for contaminated site ranking for a country-wide study of contaminated sites.

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