PROJECT DEVELOPMENT FACILITY
REQUEST FOR PDF Block B APPROVAL

AGENCY'S PROJECT ID: GF/RAF/05/XXX
GEFSEC PROJECT ID: 2720
COUNTRY: Regional (Nigeria, Ghana)
PROJECT TITLE: Regional project to develop appropriate strategies for identifying sites contaminated by chemicals listed in Annexes A, B and/or C of the Stockholm Convention
GEF AGENCY: United Nations Industrial Development Organization (UNIDO)
OTHER EXECUTING AGENCY(IES):
DURATION: 12 months
GEF FOCAL AREA: Persistent Organic Pollutants
GEF OPERATIONAL PROGRAM: OP #14
GEF STRATEGIC PRIORITY: POP-2: Implementation of Policy/Regulatory Reforms and Investments
ESTIMATED STARTING DATE: May 2005
ESTIMATED WP ENTRY DATE:
PIPELINE ENTRY DATE: March 2005

FINANCING PLAN (US$)	
GEF ALLOCATION	
Full Project *(estimated)*	US$ 4,000,000
Full Project Co-financing *(estimated)*	US$ 2,000,000
PDF A	
PDF B*	**US$ 650,000**
PDF C	
Sub-Total GEF PDF	
PDF CO-FINANCING (details provided in Part II, Section E – Budget)	
Government of Nigeria (in-kind)	*US$ 25,000*
Government of Ghana (in-kind)	*US$ 25,000*
Others: UNIDO (in-kind)	*US$ 30,000*
Sub-Total PDF Co-financing:	US$ 80,000
Total PDF Project Financing:	**US$ 730,000**

RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT:

Prof. O.A Afolabi, Director, Pollution Control
Federal Ministry of Environment, Abuja, Nigeria — Date: 3 March 2005

Mr. E.O. Nsenkyire, GEF OFP
Ministry of Environment and Science
Accra, Ghana — Date: 9 March 2005

This proposal has been prepared in accordance with GEF policies and procedures and meets the standards of the GEF Project Review Criteria for approval.

Name & Signature

Mr. A.J.J. Rwendeire
Managing Director
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PART I - PROJECT CONCEPT

A – SUMMARY

PROJECT RATIONALE, OBJECTIVES, OUTCOMES AND ACTIVITIES

PROJECT RATIONALE:

The inventory of obsolete pesticides and other Persistent Organic Pollutants (POPs) chemical stocks is an integral component of the GEF funded Enabling Activities for the development of the National Implementation Plans (NIP) underway in Ghana and Nigeria and is expected to provide national listings of chemicals and chemicals contaminated sites. The listings are not, however, associated with the identification of the risks to health and the environment that these sites pose. Both countries are covering NIP activities with the support of UNIDO.

Section 1e of Article 6 of the Stockholm Convention states that Parties would "endeavour to develop appropriate strategies for identifying sites contaminated by chemicals listed in Annex A, B or C; if remediation of those sites is undertaken, it should be done in an environmentally sound manner."

The implication is that it is incumbent on countries to undertake rehabilitation of contaminated sites following their identification. Furthermore, the Africa Stockpiles Project (ASP) of the WB/GEF, even while recognizing the importance of clean up of contaminated sites has not included this aspect in its programme of work except in the case of Mali where there was consensus between partners that the severity of contaminated land requires attention.

The countries recognize the problem of sustainability that ongoing POPs project would face where they deal only with the problem of disposal of stockpiles while ignoring the related problem of cleanup of lands contaminated with POPs chemicals. Such contaminated lands, if redeveloped or redeployed for agricultural purposes will pose significant and immediate threats to human and animal health and the environment. They have consequently approached UNIDO to assist them through GEF funding to develop policies and regulations for the rehabilitation of contaminated sites and at later stage through other donor support promote in situ clean up of such lands while promoting the transfer of appropriate remediation technologies. Some of the rationale to limitations mentioned were as follows:

Lack of suitable legislative framework: The near total absence of legislation on issues related to contaminated lands is the first major barrier to their identification and management. Yet, it is universally acknowledged that the provision of appropriate legislation is "the beginning of wisdom" in this regard. A suitable legislative framework providing the "rules of engagement" for contaminated lands including sanctions and economic incentives tied in to compliance or failures is crucial. Difficulties in the development of suitable legislation include:

- lack of capacity to draft and pass such legislation;
- often fragmented nature of responsibility for management of chemicals and contaminated lands;
- lack of data and information that normally underpins such legislation;
- considerable cost of such an undertaking.

Lack of comprehensive scientific/socio-economic data: The formulation of suitable and effective management framework for contaminated lands should be underpinned by adequate scientific and socio-economic data and information. The information gathered must cover sources, pathways, fate and transport, human and ecosystem exposure, toxicology and ecotoxicology. A detailed understanding of the socio-economic indices must complement it. Decision makers must take account of threats posed and costs incurred by possible changes and identify realistic measures needed to

ensure effective management of contaminated lands. Difficulties in achieving adequate scientific and socio-economic data include:

- absence of comprehensive scientific data on contaminating chemicals and the risks they pose to humans, wildlife and the environment;
- insufficient analytical facilities for hazard/risk assessment;
- lack of tools for proper assessment of the socio-economic aspects of remediation and contaminated land management;
- limited technical expertise to enable rational choice of remediation technologies and ensure successful implementation;
- Unsatisfactory environmental practices.

Ineffective enforcement of regulations and legislation: Even in countries where there is a semblance of legislation, there is no functional enforcement and surveillance procedure to ensure the effectiveness of such laws. Designing an effective system of enforcement and linking this to appropriate monitoring strategies is a complex task that calls for ongoing inputs in terms of training and resources. The difficulties in providing this necessary outfit include:

- providing suitable training and resources to achieve a critical mass of personnel with the requisite skills and equipment to enforce envisaged legislation;
- near absence of resources to undertake required inspection and pursue offenders and reward compliers;
- lack of technical and management capacity for monitoring to underpin enforcement;

Lack of a National Classification System: Setting priorities for remediation of contaminated lands require the existence of a rational approach. A National Classification System affords a vantage platform based on scientific and socio-economic considerations for such judgment. The difficulties in adopting such a system include:

- lack of capacity to develop a National Classification System;
- weakness in the procedures of risk assessment;
- lack of necessary legislation to underpin such a system.

Absence of clear responsibilities and limited coordination: The multi-sectoral nature of chemicals management in most developing country situations results in a lack of coordination, which is a *sine qua non* in the management of contaminated lands. Assigning responsibilities explicitly must be dealt with any framework legislation on contaminated lands. Barriers in assigning and agreeing responsibilities include:

- rivalry between the plethora of Ministries and Departments concerned with the management of contaminated land;
- absence of key players and potential problems with assumption of liability;
- historical actions carried out in ignorance of potential for future problems;

Lack of Financial Resources: The implementation of remediation of contaminated lands requires adequate financial resources. In developing country situation, money is and will always be a problem for reasons, which include:

- often limited budgets from governments and from bilateral/multilateral donors;
- competing demands for limited resources and lack of mechanism for evaluating comparative seriousness of competing problems;
- difficulty in applying the “polluter pays” principle while ensuring needed improvement and actions; and
- difficulties in ensuring the rational use of meager resources.

Lack of awareness and information: In most developing countries, information is not available to stakeholders who are in a position to influence decisions on contaminated lands management.

Provision of vital scientific as well as socio-economic data to politicians and policy makers is generally inadequate. Awareness for stakeholders on the requirements and practices for effective contaminated lands management needs to be improved. Difficulties in achieving this include:

- lack of effective tools to communicate appropriate messages in a form that is easily understood and relevant to the target audience; and

lack of adequate resources to undertake outreach campaigns

PROJECT OBJECTIVES:

The main objective of this PDF-B is to develop a Project Brief that would promote and facilitate environmentally sustainable development in Ghana and Nigeria through development of strategies for identification of industrial and agricultural lands contaminated by POPs. This full project will then complement ongoing Activities in the framework of the "Enabling Activities to facilitate the early Implementation of the Stockholm Convention on POPs" which encompass *inter alia*, the following:

- Undertake preliminary inventories of sources and emissions of POPs listed in Annexes A and B to the Convention;
- Prepare a preliminary assessment of stockpiles of POPs and of products contaminated with POPs, and identify management options, including opportunities for disposal of as described in Article 6 of the Convention;
- Build capacity to identify sites contaminated by POPs; and support communication, information exchange, and raising awareness through multi-stakeholder participatory process, as described in Articles 9 and 10.

PROJECT OUTCOMES

The main outcomes of the Full Project would involve development of policy and legal frameworks for the management of POPs contaminated lands in Ghana and Nigeria and possibly use this experience to extend the results to the West African region. It would also include activities leading to enhance national and regional assessment capacity and institution strengthening on issues of POPs contaminated land. Over and above it will establish planning details for pilot case demonstration for identification and assessment of use of low cost but environmentally sound remediation technologies in selected hotspots in the two participating countries. The activities would also address outcome issues of socio-economic importance namely Stakeholder Involvement and Establishment of Information Management System, Public Awareness and Environmental Education Programme.

PROJECT ACTIVITIES

Implementation of the PDF-B project will lead to the production of a comprehensive assessment report of the above outcomes of national sustainable development efforts linked to the management of contaminated sites as follows:

- Overview of appropriate legislation including adequate economic and financial instruments for contaminated land management;
- Assessment of a National classification system for contaminated lands;
- Gap identification of capacity for mitigation of land contamination and for sustainable land management through awareness, mainstreaming and policy reform;
- Need assessment of institutional infrastructure and arrangements at relevant levels in the countries for effective management of contaminated land;
- Outlines of frame for regional and national information management system supporting sustainable contaminated land reclamation and management;
- Identification of experts to perform pilot learning case for technologies of demonstration of selected low cost remediation models and guidelines on technologies and enhanced levels of public awareness and education;

- Assess aspects of involvement and development of public-private partnerships in rational contaminated land management.

B - COUNTRY OWNERSHIP

1. COUNTRY ELIGIBILITY

Ghana and Nigeria are both signatories of the Stockholm Convention. Ghana ratified the Convention on 30 May 2003 while Nigeria on 24 May 2004 and are presently at various stages of developing their National Implementation Plans (NIPs).

2. COUNTRY DRIVENNESS

Driving forces and barriers largely influence efforts to implement effective management of contaminated lands, determination of the extent and type of contamination being addressed, the location of the sites and the particular circumstances in the country where the sites occur. Such barriers are found to include the areas discussed below. This account is not exhaustive but based on the so far identified constraints by NIP on the issue of contaminated sites and the several meetings with Nigerian and Ghanian authorities, the last of which was the visit of the Nigerian Minister of Environment to UNIDO Hqs. during the first week of March 2005. The two countries are fully engaged in the AMCEN meetings as well as the SAICM process. UNIDO and UNEP held a regional waste management training workshop in Ghana and Nigeria in 1999 for the West African region and several issues related to contaminated landfills were thoroughly discussed. The waste sector has undergone several privatization activities to close the gap between public and private sector in the two countries.

C – Program and Policy Conformity

1. PROGRAM DESIGNATION AND CONFORMITY

The proposal is consistent with the Operational Programme # 14 with the POPs Strategic Priority No. 2 - "Implementation of Policy/Regulatory Reforms and Investments".

2. PROJECT DESIGN

The PDF-B proposal would elaborate the conceptual descriptions of the baseline versus the GEF incremental part for the Full project as well as nominal budget breakdown by component. The project will be designed in full conformity with GEF policies and programme guidelines. It is built upon a partnership between UNIDO, the Governments, the Private Sector, and enjoys the support of Civil Society at local, national, regional and international levels.

3. SUSTAINABILITY (INCLUDING FINANCIAL SUSTAINABILITY)

This PDF-B proposal is based on the assumption that the necessary political support shall be provided by governments in participating countries and the participation of the private sector and local communities in the project sites assured. This will be critical since the project will require considerable government inputs in cash but mostly in-kind and the participation of the private sector and local communities in identification and subsequently the formulation and implementation of the demonstration projects. The project will also require an effective multi-sectoral approach involving close co-operation and coordination between different government ministries and departments (i.e. those with responsibility for lands, agriculture, local governments, environment, the private sector and NGOs).

The main risks are directly related to these basic assumptions, since in the absence of effective political and institutional support, it will not be possible to achieve the necessary national consensus between government, communities and the private sector. However, in view of the strong endorsement given by the governments and their private sectors to participate and support the project,

it is expected that the required national level support and commitments exist. A number of activities proposed would contribute to sensitization and ensuring adequate political and institutional support for the project.

Another risk relates to the long-term viability of the project, which will require effective human and institutional capacity building. The capacity of the two counterpart institutions [Environmental Protection Agencies (EPA) of the Ministry of Environment] in both countries would be supported and the staff would be trained to carry on building programmes and projects. When policies and legislatives developed and implemented by the EPAs, the governments would be able to move to cleanup stages and use the land for residential, industrial or agricultural purposes, thereby upgrades the value of the land to induce private sector for more investment. In this way, the proposed project would become financially self-sustainable. This has been covered by the capacity building activities, which have been built into the project conception.

It is also important to note that the policy and strategy activities proposed in the project would be jointly implemented with the private sector, governments and local communities to assure country ownership. Private sector institutions and Chamber of Commerce and Industry will be invited to participate together with property developer agencies.

4. REPLICABILITY

Replicability will be ensured through a number of specific activities. These include: a) development of a West Africa regional approach to the development of appropriate strategies for identifying sites contamined by chemicals listed in the Annexes A, B and C; b) implementation of workshops in selected provinces/states stressing the importance and advantages of such strategies including the dissemination of workshop outputs; c) preparation of national policies and strategies, operational manuals; d) provision of technical advice and other programme and project related information to public and private sector entities; and e) dissemination of programme and project related information and results through a dedicated programme and project website.

Replicability will be assured by stimulating the regional approach to the problem of contaminated sites with a view to develop a programme on environmentally sound management of POPs contaminated land in the West African countries and including the issue of hamornized policies and legislations.

5. STAKEHOLDER INVOLVEMENT/INTENDED BENEFICIARIES

The PDF-B project will stress participation of relevant stakeholders within the participating countries and will also sponsor regional workshops to disseminate project information and results of the coordinated policy and strategy development in Nigeria and Ghana. For Nigeria, mainly the Federal Ministry of Environment, Pollution Control Department, would be the main counterpart institution but it would invite the Forums of Environment in the country as stakeholder. In Ghana, the Ministry of Environment and Science would be the counterpart institution and would decide on the relevant stakeholders in the country who should be involved including private sector and academia. A stakeholder's involvement plan would be developed.

The project calls for the establishment of a consultative process among government officials and relevant stakeholders to develop process planning guidelines and secure commitment by government agencies, provincial officials, business groups, and other affected stakeholders to develop and structure new approaches to policy development. The process will result in multiple consultations in Nigeria and Ghana initially, which will be replicated in other countries of the region.

The project will focus on POPs contaminated land areas and wastes as well as on POPs related storage houses and distribution centres in the identified zones as demonstration sites if necessary.

D - FINANCING

1. FINANCING PLAN

Detailed financing plan will be prepared in coordination with the project partners, taking into account the various components and national and international activities presently ongoing in the countries which are also needed to be included in the project.

2. CO-FINANCING

The costs attributed to national contribution for PDF-B phase are in-kind costs in terms of provision of facilities for meetings and the work of visiting consultants/experts who will be involved in the preparation of national reports and participation in consultations. Though GEF expects at least 1:1 ration, the nature of the Full project is capacity building support and it is unlikely that this ratio would be reached from national budgetary support alone. Bilateral donors would be encouraged to provide cash cofinancing for the two countries to offset the cash imbalance in the course of implementation.

The expected contributions from UNIDO would also be in-kind and would include staff salaries and preparations of technical reports.

E - Institutional Coordination and Support

1. CORE COMMITMENTS AND LINKAGES

Commitment of the participating countries (Federal Republic of Nigeria and Ghana)

The Federal Republic of Nigeria and Ghana have both signed and ratified the Stockholm Convention on POPs. The concerned governments expressed the need for development of policies and legislation on the management of contaminated sites. The countries will ensure high level communication between the policy and legislation development project and the work being undertaken in their Enabling activity projects and other related projects and activities. The legislative issues of concern in the restoration of contaminated land are related to Risk Assessment and the subsequent phase of Risk Management.

2. CONSULTATION, COORDINATION AND COLLABORATION BETWEEN AND AMONG IMPLEMENTING AGENCIES, EXECUTING AGENCIES, AND THE GEF SECRETARIAT, IF APPROPRIATE.

The policy development and implementation processes will establish and ensure close working linkages with the World Bank implemented Africa Stockpiles Programme (ASP), the UNEP/UNIDO MSP project for NGO Capacity Building in Stockholm Convention related activities, and other POPs relared activities and programmes. This could be done through joint consultation meetings during the PDF-B phase to shape the linkages and avoid duplication of efforts since all ongoing projects of POPs in these countries are managed by the same Ministries. Participation in the Steering Committees, engaging National Project Directors in the planning process and conduct joint monitoring and mid-term evaluation could ensure maintenance of these synergies.

These working linkages will result in strong levels of collaboration between and among the GEF, UNDP, UNIDO, the World Bank, UNEP, STAP, FAO, WHO, International Centre for Science and Technology (UNIDO-ICS) and Civil Society at local, national, regional and global levels.

3. IMPLEMENTATION/EXECUTION ARRANGEMENTS

During the PDF-B implementation, the United Nations Industrial Development Organization (UNIDO) will be the Implementing/Executing Agency for the Project while screening local institutions that could qualify to assume executing agency responsibilities during the Full Project. UNIDO is well positioned to act as an effective executor of the PDF-B project activities based on its comparative advantages in this area. At its 1997 Forum II meeting, IFCS "invited UNIDO to

consider carrying out pilot projects". At the GEF Council meeting of November 2003, UNIDO was granted direct access to GEF resources by virtue of its comparative advantage in the POPs area.

UNIDO has accumulated significant knowledge in the pesticide sector as well as through its Cleaner Production Programme. Issues related to the unintentionally generated by-products such as dioxins and furans have also been addressed specifically, more importantly in the Pulp and Paper sector. Finally, through the Pure and Applied Chemistry Programme of UNIDO International Centre for Science and High Chemistry (ICS), Trieste, Italy has been involved jointly with UNECE in the preparation of a Compendium of Soil Clean-up Technologies and Soil Remediation Companies (2nd edition, 2000), which compendium also covers technologies for elimination of POPs.

UNIDO has assumed responsibility for implementation of a significant number of POPs Enabling Activities globally, and these Enabling Activities in Ghana and Nigeria, given that they all will have to address the problem of destruction of POPs stockpiles, will have direct linkage to the proposed project.

Lastly, a new initiative in cooperation with the University of Cardiff would bring in results of some research work done by GEO Environmental Research Centre in Poland under the EU funding. If this experience is documented in a useable format for developing countries and countries with economies in transition, UNIDO would seek cooperation to promote and replicate the economically suitable parts of this experience at interntional level.

PART II - PROJECT DEVELOPMENT PREPARATION

A - DESCRIPTION OF PROPOSED PDF-B ACTIVITIES

The Full project will focus mainly on the issues related to the removal of barriers that are preventing or hindering the rational management of contaminated lands. The PDF-B will carry preliminary assessment for management of contaminated lands that requires the identification and quantification of the problem, the prioritization of the issues and establishment of the rationale for actions to address the related problems, the assessment of various approaches/options either currently available or their prospective lies in the near future, the identification of needs for development and demonstration of preferred solutions.

The Full project will assist the participating countries to:

- develop policy and legal frameworks for the management of contaminated lands;
- build/strengthen institutional capacities/arrangements for contaminated land management
- develop a National Classification System for the Management of Contaminated Lands;
- provide methodology and guidelines to select, acquire, adapt and implement low cost but environmentally sound remediation technologies;
- identify priority locations for the demonstration of appropriate technologies;
- establish Information Management system as a decision making support system;
- establish local, national, regional and international scientific technical and socio-economic networks and partnerships for the management of contaminated lands; and
- strengthen public awareness campaigns in the communities and environmental education programmes.

B – PDF BLOCK B OUTPUTS

Output 1: Overview of policy and legal frameworks for the management of contaminated lands

One of the most pressing problems faced by the participating countries during the NIP development process is the necessity for the decontamination of POPs contaminated sites. This has arisen because large tracts of land suitable for agriculture and/or for use in physical development besides having lost their eco-functionality, often present a serious risk for human health and wild life. The conducive government need for policy for restoration of natural resources has thus become a priority in the chemicals legislation umbrella.

Appropriate policies and regulation constitute the first of two axes in managing the problem of contaminated land. This calls for legislation. It has been revealed in the Steering Committees of the NIPs that great disparities in existing legislation in the countries surveyed that range from “non existent” to a semblance of a framework law. Past legislative efforts to control chemicals and manage contaminated lands have not always been effective due to crippling legislative gaps, fragmented institutional responsibilities and lack of inter-sectoral coordination, insufficient resources, weak enforcement, and inadequate stakeholder participation.

All these must be explicitly specified in the policy and legislation.

During PDF-B phase, specific activities would be undertaken under this output which include identification of:

Activity 1.1 Drafting Group on Contaminated Land Policy, Strategy and Regulation.

Activity 1.2 Working Group on Risk assessment and Risk Management policy requirements.

Activity 1.3 Working Group on Financial and economic incentives.

Activity 1.4 Working Group on National Classification System for Contaminated Lands.

Output 2: Assessment of national and regional level capacity building and institutional strengthening

This output aims to assess a critical mass of human resources capacity building and establish appropriate institutional arrangements at local, national and regional levels for overall environmental governance relating to management of POPs contaminated lands and visualize ways to promote the harmonization of environmental policies and laws to remove ambiguities.

Need for capacity building, institutional strengthening and trainings will be assessed to enable upgrading of skills of relevant staff members from a broad spectrum of stakeholders from governmental and non-governmental institutions aimed at:

- providing coordination support for harmonization, integration and mainstreaming of POPs contaminated land management priorities and activities.
- Strengthening of participatory institutional mechanisms and capacity for contaminated land management, planning and implementation with regard to land suitability analysis, at the national and local levels and across sectors.
- Strengthening skills for monitoring and enforcement of and/or compliance to environmental laws and regulations related to contaminated lands.
- Strengthening of information management systems to support decision-making at the regional, national and local communities levels on contaminated lands.

During the PDF-B phase, the activities to be carried out under this output include assessment of:

Activity 2.1 Local/National/Regional Training needs on various aspects of contaminated lands management including on information management systems as decision-making support tools.

Activity 2.2 Training needs on design and implementation of POPs contaminated land management plans.

Activity 2.3 Need for establishment of Inter-Sectoral Committees for the Joint Management of contaminated lands at local, national and regional levels.

Output 3: Identification of national expertise available to perform Pilot Case Project for identification, assessment and use of Low Cost but Environmentally Sound Remediation Technologies in selected hotspots in the region

The activities to be undertaken under this output include identification of:

Activity 3.1 Working Group on the methodologies for identification of POPs contaminated land and hot spots.

Activity 3.2 Working Group on assessment of best available Low Cost Remediation Technologies (Technology Transfer).

Activity 3.3 Technical Group on identifying implementation elements of Remediation Technologies related to community perception of risks and social impact.

Activity 3.4 Scientific Group on continuous identification of social capital requirements for post – implementation monitoring.

During the main phase of the full project, this pilot case would constitute the learning platform for the region to cooperate in developing regional investment opportunities for the private sector.

Output 4: Outlines of a frame for stakeholder involvement and establishment of Information Management System, public awareness and Environmental Education Programmes

Local, national, regional and international science and technical networks and partnerships have a major role to play in the development of capacity for contaminated land management. The roles that would be played by the networks and partnerships to be developed within the PDF-B project include assessment of a frame for:

- mobilization and enhancement of scientific skills in POPs land contamination and remediation;
- research on the interactions between contaminated land and identification of scientific methods and guidelines for remediation; and
- provision of information on best practices of POPs contaminated land management to government agencies, private sector, NGOs and the general public.

During the Full Project, this output will facilitate the establishment of an efficient communication system at project sites to assist in information exchange and networking between and among stakeholders. An electronic database of experts working in government, NGOs, private sector and international agencies will be established, thereby ensuring knowledge sharing and encouraging the adoption of best practices and diffuse lessons learned. The Federal Ministry of Environment, Department of Pollution Control will lead the process of executing the project in Nigeria, while the Ministry of Environment and Science, Office of the Chief Director, will execute the project in Ghana.

The activities to be carried out during the PDF-B phase would include assessment for:

Activity 4.1 Information material needed to develop a database for contaminated sites.

Activity 4.2 Establishment of Information Management System to disseminate methodologies and techniques on best practices.

Activity 4.3 Strengthening of public awareness for communities and environmental education

Output 5: Monitoring and evaluation plan

In order to monitor the outputs of this project and enable measurable evaluation of the outcomes, the following activities will be undertaken:

Activity 5.1 Working group on M&E for the project.

Activity 5.2 Task for development of indicators.

Activity 5.3 Task for development of targets.

Activity 5.4 M&E consolidated plan.

Output 6: Preparation of Full Project Brief

The PDF-B facility would produce a full project brief and a subsequent project document. The following activities should be undertaken to enable the development of the project brief.

Activity 6.1 Formation of Project Steering Committee and Managers Task Force.

Activity 6.2 Compilation and integration of all inputs emanated for project activities.

Activity 6.3 Preparation of the Full Project Brief in accordance with GEF established format.

Activity 6.4 Following approval by GEF, the SC would develop and finalise the project document including detailed budget, Terms of Reference, work plan and implementation time table.

C - JUSTIFICATION

The project will be a good example of new priority areas on capacity building and post NIP activities to be financed under the POPs OP14, the interim financial mechanism of the Stockholm Convention. Further, it is anticipated that the project will be useful to the many countries that now in the midst of implementing GEF funded POPs Enabling Activities and have already been aware of the sustainability issues related to land contaminated with POPs.

URGENCY

A PDF-B grant is essential for the development of the Project Brief for GEF consideration. Detailed country-led planning activities will then be defined to complete the assessment process of selecting, securing and preparing for the deployment of technical knowledge; to start arrangements for its safe and environmentally sound cleanup operation in the future; and also to identify how to operationalize procedures for social mobilization and socio-economic rational build up.

This PDF-B is consistent with GEF objectives addressing existing barriers to the adoption of best practices and civil society involvement.

D. Timetable

The project preparation activities would start immediately after approval of the funds. The full Project Brief will be submitted to the GEF, 10-12 months later. The following timetable is envisaged to illustrate the time for progress of the outputs.

Step	Description	Key Implementers	Time from Start (months)
1	Appointment and installation of project staff	UNIDO/Governments	1-2
2	Overview of policy and legal frameworks for the management of contaminated lands	UNIDO/Governments	2-3
3	Assessment of national and regional level capacity building and institutional strengthening	UNIDO/Other Agencies/Government	3-4

4	Identification of national expertise available to perform Pilot Case Project for identification, assessment and use of Low Cost but environmentally sound remediation technologies in selected hotspots in the region	UNIDO/other Agencies/Government	4-7
5	Outlines of a frame for stakeholder involvement and establishment of information management system, public awareness and environmental education programmes	UNIDO/Other Agencies/Government	7-8
6	Monitoring and evaluation plan	UNIDO/Other Agencies/Governments	9-10
7	Preparation of Full Project Brief	UNIDO/Other Agencies/Governments	10-12

E. Budget

Upon approval of this request, detailed Terms of Reference will be prepared for the individual international and national experts. The GEF Block B grant request is for the amount of **US$ 650,000**. The total Full Project costs will depend on the extent of the envisaged capacity building knowledge associated with guidelines and methodologies development for land contaminated with POPs demonstration technologies. It is considered that US$4.0 million over three years will be sufficient to implement a productive project.

The costs attributed to the government are in-kind contribution in terms of provisions of facilities for meetings and the work of visiting consultants/experts who will be involved in the preparation of national reports and participation in consultations. National/regional inputs amount to **US$50,000** which includes salaries of the national project directors and national experts assigned to the Working/Drafting Groups and scientific/technical/socio-economic Task Teams of the project both at the national and regional levels, the provision of offices and facilities, hosting of meetings, etc.

The expected contributions from UNIDO will also be in-kind at a level of US$ 30,000 and would include staff salaries and preparations of technical reports. It is expected to mobilize co-financing from donors during the PDF-B phase to enable a firm 1:1 ratio expected to match the GEF effort.

Detailed Budget in US$ by outputs

Output	Description	US$
1	Overview of policy and legal frameworks for the management of contaminate lands	150,000
2	Assessment of National and Regional Level Capacity Building and Institutional Strengthening	140,000
3	Identification of national expertise to perform Pilot Case Project for identification and assessment to use Low Cost but Environmentally Sound Remediation Technologies in Selected Hotspots in the region	150,000
4	Outline of a frame for stakeholder involvement and establishment of Information Management System, Public Awareness and Environmental Education Programmes	120,000
5	Monitoring and Evaluation plan	50,000
6	Preparation of full Project Brief	40,000
TOTAL		**650,000**

It is expected that the management team of the project would identify additional co-financing during the PDF-B implementation as well.

Co-financing Sources				
Name of co-financer (source)	Classification	Type	Amount (US$)	Status
Government of Nigeria	National contribution	In-kind	25,000	Available
Government of Ghana	National contribution	In-kind	25,000	Available
UNIDO	GEF Executing Agency	In-kind	30,000	Available
Bilateral Donor (for the full project)	International contribution for the two countries	In cash	400,000	To be mobilised
Total Co-financing			**480,000**	

PART III - ANNEXES

Annex 1: Threats and Root Causes for the Existence of Contaminated Sites in Africa

Threats and Root Causes

Organochlorines are synthetic chlorinated hydrocarbons and include pesticides (e.g. DDT and derivatives, aldrin, dieldrin, heptachlor, etc.) as well as some commercial or industrial chemicals and by-products of combustion such as polychlorinated biphenyls (PCBs) hexachlorobenzene (HCB), polychlorinated Hdibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF). The peculiar characteristics of these chemicals are that they have a relatively high chemical stability and persist in the environment for long periods of time, are trans-boundary pollutants traveling long distances from their points of origin and bio-accumulate in humans and other organisms through the food chain.

The environmental fate as well as the adverse eco-toxicological and human health effects of Organochlorines and other persistent organic pollutants have been well investigated and documented in the developed countries while such environmental data are scarce in the developing nations. Consequently, most developed countries have banned or severely restricted the use of most of the organochlorinated chemicals replacing them with the less persistent organophosphates and carbamates. In spite of these measures, some of the Organochlorines still persist in the environment at dangerous levels threatening humans, wild life, ecosystems and biodiversity.

In Africa, population explosion, rapid urbanization and industrialization in addition to severe pest problems including insects, plant diseases, weeds, rodents as well as the occurrence of most of the devastating plagues known to man, especially the African army worm, locusts and grain eating birds have increased the continent's reliance on the use of pesticides. It is pertinent to note that Organochlorines pesticides are used in the region, even where known alternatives exist, of their relatively cheap costs and also because of their status as first generation insecticides.

The history of Organochlorines use on the continent dated from the 1940s for agricultural production for the rapidly growing population and for mechanized farming coming with the advent of World War II and for cash crops for economic buoyancy. The use of the chemicals was for disease vectors control activities. Application or Anthropogenic activities provide the primary point source of organochlorines into the environment either through deliberate application or accidental release into the African Environment. Among the main sources of introduction are the following:

- Spraying of pesticides to control insects, snails, aquatic weeds; or aircraft spraying of commercial farms for control of birds, disease vectors, tse-tse fly, etc.
- Dumping of obsolete stock of Organochlorines, wastes/containers from public health, agricultural and industrial usage on land and water. Release of Organochlorines in this way had caused massive fish kills in many countries such as Senegal, Nigeria, and Kenya. According to preliminary estimates, there are at least 20,000 tonnes of stock of obsolete industrial chemicals and pesticides all over Africa.
- Accidental spillage from agricultural, industrial and electrical transformer sites, road and rail vehicles and ships.
- Drainage and runoff (including leachates) from farmlands, garbage and industrial solid wastes dumps.
- Domestic and industrial effluents – effluents from pesticide manufacturing or formulating industries or industries (e.g. food industry) using Organochlorines.
- Dumping of sewage sludge, municipal, agricultural and industrial solid wastes on land and inland waters.
- Atmospheric input, e.g. in dry deposition and wet precipitation; burning or uncontrolled incineration of Organochlorines.
- Domestic, municipal or agricultural solid wastes, industrial emissions e.g. through evaporation/vapourisation, of pesticides stored in the sun for long periods or leaks/seepages from stored containers.

Food and water contamination, and the issue of contaminated soils and derelict land are some of the problems arising from some or all of the above cited applications/accidental releases.

Most of the pesticides used in the region are imported from developed countries, especially Europe, America and Japan, but there are a few production/formulation facilities in some countries like Nigeria and Senegal.

It is estimated that Africa uses about 100,000 metric tonnes of pesticides annually out of the world annual total use of 2.5 million metric tonnes. Based on agrochemicals expenditure, the largest pesticides users in sub-Saharan Africa are Sudan, Tanzania, Zimbabwe, Cameroon, Ivory Coast, Kenya, Nigeria, and South Africa. The bulk of pesticides are used in the following cash crops: cotton, coffee, cocoa, maize, tobacco, bananas, sugar cane and rice. About 50,000 tonnes of Organochlorines are used annually in the region while regulatory control is lacking. The types, quantities, and application mode of Organochlorines vary across the continent.

A survey of pesticide use in Nigeria indicated that about 15,000 metric tonnes of pesticides comprising about 135 pesticides chemicals marketed locally under 200 different product brands and formulations were imported annually during 1983-1990. About 2,500 tonnes of Organochlorines mostly DDT, toxophene and endosulfan were used annually on the cotton plantations in Sudan in the 1970s. More than 3,500 tonnes of DDT were used in cotton plantations in Uganda between 1965 and 1972. In the Ivory Coast about 600 tonnes of Lindane were used for cocoa and 320 tonnes of DDT were applied on cotton in 1976. In 1981, about 350 tonnes of Lindane, Dieldrin, Heptachlor and Endrin were used for timber protection. In Zimbabwe, about 300 tonnes of DDT applied at the rate of 2-3 kg/ha were used in agriculture between 1981 and 1982. In Burkina Faso, in the Hounddougou region, 30 tonnes of DDT and 30 tonnes of endosulfan were used annually on cotton.

In the areas north of the Sahara (Mauritania, Mali, Niger and Sudan) the control of desert locusts for several years was by application of Organochlorines (Dieldrin and Lindane). These travel down to the coastal areas where their attenuation endangers underground waters. Limited amounts of Dieldrin were still used during 1986-1988 while presently organophosphates are used which are less persistent than the Organochlorines.

Ground spraying and aerial application of Organochlorines, especially DDT, Dieldrin and Endosulfan to control vectors for human and livestock diseases are also an important source of contamination of land and aquatic systems. Since 1944, DDT had been used largely for the control of the black fly larvae (Simuiidae) in many regional programmes in Africa. About 60 tonnes of DDT were used annually in the continent to control Simuiidae from 1996 to 1970. Tse-tse fly control and eradication programmes involving the spraying of DDT, dieldrin, and Endosulfan have taken place in different parts of the continent over the last 20-30 years as well.

The pesticide usage rate and the quantities are likely to increase substantially in the third millennium in view of the commitment of most African governments to the green revolution, local sourcing of raw materials, food security and improved health care for the bourgeoning populations. The implication is that the problem of contaminated lands (and the necessity for its rational management) should loom large.

A recent UNIDO study found that land contamination from POPs is a commonplace in the countries surveyed and results from poor industrial management, including dumping of obsolete stocks of POPs chemicals or in the maintenance and/or disposal of PCB containing transformers/capacitors. It also results from excessive use of usually toxic POPs chemicals – including agricultural use of pesticides--and the generation of too much hazardous wastes containing POPs. Chemicals that operators do not know how to, or cannot afford to, dispose of properly thereby resulting in serious consequences both for human health and the environment.

Contamination can make future land uses, such as residential development or agriculture, hazardous. For example, pesticide contamination around former storage/dump sites has made some agricultural lands too toxic to grow crops. Ground water aquifers providing drinking water to whole communities have had to be abandoned due to the migrations of POPs chemicals into them from contaminated soils.

Implications for the Marine Environment

The choice of the countries in the Guinea Current Large Marine Ecosystem stems from the recognized impacts of Organochlorines pollution from land based sources.

The principal land based sources of Organochlorines into the aquatic environment are soils sprayed with pesticides for agricultural practices or vector control operations, landfills, industrial sites (including sites where electrical transformers have been installed), storage sites, etc. Leachates from these sources are therefore recognized as principal sources of Organochlorines pollution of surface and ground water in Africa.

Land-based sources especially agricultural run-off, rivers and direct discharge of industrial and municipal wastes have been estimated to contribute a total Organochlorines pesticide load of about 90 tonnes per annum to

the Mediterranean Sea. No similar information exists in respect of the load into the coastal and marine environment in regions of Africa.

Hopefully similar calculations should be possible from activities under the Africa Stockpile Project.

According to FAO, there are about 20,000 tonnes of stock of obsolete industrial chemicals and pesticides all over Africa with potential hazard to the environment. While data for individual countries are not generally available, recent surveys, albeit preliminary, claim that Nigeria has about 22 tonnes of obsolete stocks of pesticides, while Gambia had about 25 tonnes of obsolete/banned pesticides, which included contaminated soils.

Electrical transformer oils are the principal source of PCBs release into the environment. Most of the electrical transformers presently in use in the vast majority of African countries were purchased by the National Power Generating Companies in the 1970s and 1980s and contain PCBs. Recent surveys under the Enabling Activities POPs Projects showed that a large number of them were leaking oil in locations without bounding walls around them thereby creating a problem of PCBs contaminated soil. Generally, the practice for disposing of spilled PCBs or disused/decommissioned PCBs containing transformers is through burial in shallow pits which practice is environmentally unsustainable. Leachates from such sources constitute sources of PCB introduction into the coastal and marine environment.

The choice of the GCLME Region derives from the lack of a GEF funded project which includes studies related to POPs contaminated land and the marine environment. This project is expected to yield illuminating data and information on the extent of POPs' pollution of the marine environment related to contaminated soils in the region.

Degradation and attenuation of POP pesticides in soils of the GCLME Region

The half-life of a pesticide is a measure of its persistence in the environment and has been recognized as one of the key chemical properties apart from the vapor pressure at 25 C, the octanol-water partition coefficient (Kow) and the Octanol-air partition coefficient (KoA) as generic criteria in the selection of candidate Organochlorines for international control and phase- out.

There is however, a paucity of data on the half-lives of Organochlorines in soils in Africa. Transposing Organochlorines degradation data from developed countries with temperate climate will not be realistic for tropical climate conditions typical for Africa. A review of the pathways of Organochlorines in the atmosphere suggested volatilization as a major pathway. Scientific literature has shown that volatilization And degradation of pesticides are more rapid in the tropics than in the temperate zones. In view of the long history of Organochlorines use in Nigeria, the persistence of some commonly used Organochlorines namely Lindane, aldrin and DDT in cropped and un-cropped soils from southeastern Nigeria had been investigated.

Table 1 indicates the half-life values obtained for these Organochlorines pesticides in Nigerian soils compared to values reported in literature for temperate, African and Asian countries. These Organochlorines pesticides in Nigeria degrade much faster with shorter half-life of a few weeks in the tropical Nigerian soils compared to the half-life of several weeks in the cold temperate soils. The trend of the persistence of Organochlorines was aldrin<Lindane<DDT and is consistent with the vapour pressure trend of these chemicals.

The half-life for DDT was found to be 8.7 weeks compared to 146-161 weeks reported for temperate countries, 8.6 weeks in Kenya, 2.6 weeks in Sudan and 56 weeks in Taiwan. Aldrin had a half-life of 3.5 weeks compared to15.6-208 weeks reported for temperate countries. Last but not the least, Lindane was found to have a half-life of 7.1 weeks compared to 62.4-104 weeks in temperate countries. The potential mobility of Organochlorines in soils was also found to have the trend, Lindane>Aldrin>DDT similar to the water solubility trend of the chemicals. This suggests a higher potential for Lindane to leach into ground water.

Inspite of the relatively short half-lives of Organochlorines in Nigerian soils, there is widespread contamination of Nigerian soils. The contamination trend in soils (Table 2) is private farms<industrial sites<municipal refuse dumps. Refuse dump soils had the highest concentrations (in nannogram/gram) of Organochlorines with the mean and range as follows: Lindane 135(ND-712), Aldrin 104(9-360), DDE 57(4-204), total DDT 201(ND-530), heptachlor84 (ND-352), Dieldrin 41(7.4-159), endosulphan 16(ND-60), and PCBs 1,141 (353-3311).

Table 1. Persistence of some Organochlorines pesticides in Nigerian soils compared to soils in other countries

OCP	Half life, $t_{1/2}$ (weeks)		
	Cropped soils from other countries	Nigeria (*outcropped*)	Nigeria (*cropped*)
DDT	146 (Temperate climate)	7.9	8.7
	161 (Temperate climate)		
	8.6-17.1 (India)		
	28.6 (Kenya)		
	2.6 (Sudan)		
	56 (Taiwan)		
Aldrin	15.6(Temperate climate)	2.7	3.5
	52-208(Temperate climate)		
Lindane	62.4(Temperate Climate)	7.1	

Table 2. Chlorinated Hydrocarbon levels in some Nigerian farmland, industrial and refuse dump soil

Pollutant	Concentration (ng/g) dry weigh		
	Farmland Soils	Industrial Soils	Refuse Dump Soils
Lindane	8.7(ND-0.5)	8.6(ND-13.7)	135(ND-712
Aldrin	ND	ND	104(9-630)
P, p-DDE	7.9(ND-60)	32(ND-127)	57(4-204)
Total DDT	2(ND-11)	195(4-774)	201(ND-530)
Heptachlor	6(3-43)	8(ND-56)	84(nd-352)
Dieldrin	-	11(ND-28)	41(7.4-159)
Endosulfan	-	-	16(ND-60)
PCBs	ND	122(ND-740)	16(ND-60)

N.B. = implies non detectable; ND = Non detectable

Contaminated Sites in Ghana

Results from the Inventory of obsolete POPs and contaminated sites have not yet revealed any stockpiles of POPs pesticides. However, there is suspicion that volumes of pesticides were buried at the premises of the Plant Protection and Regulatory Services Directorate site at Pokuase in the Ga District of the Greater Accra Region. Also, at the Tono and Vea Irrigation projects in the Upper East Region, information available indicate that there had been burial of volumes of some containers that might include POPs containers in the early 1970s. The report concludes that, "work will have to be done on these and other such sites to evaluate the extent of the contamination and possible re-mediation".

The Electricity Company of Ghana (ECG) has decommissioned and disconnected 147 capacitors from use. These are stored at two capacitor banks - the Accra Power Station H at Achimota, and the Tema Station H at Tema. The Electricity Company of Ghana is the custodian of these capacitors. At the time of the inventory, some of the capacitors were leaking badly, thus contaminating the immediate environs. The Electricity Company of Ghana has been so much concerned about the contamination at these sites that it has solicited the assistance of the Environmental Protection Agency (EPA) of Ghana to dispose of the waste and decontaminate the facility.

Annex 2: Policy and Legal Framework in Nigeria and Ghana

Legal Framework

In most developing countries, the legal framework for the management of POPs exists, but in a too general, fragmented and scattered, skeletal and sometimes partial form. It is generally uncomplied with and fraught with gaps and omissions. Capacities and roles are not clearly defined or outlined. One commonality of existing legal frameworks is their sectoral nature and disharmony.

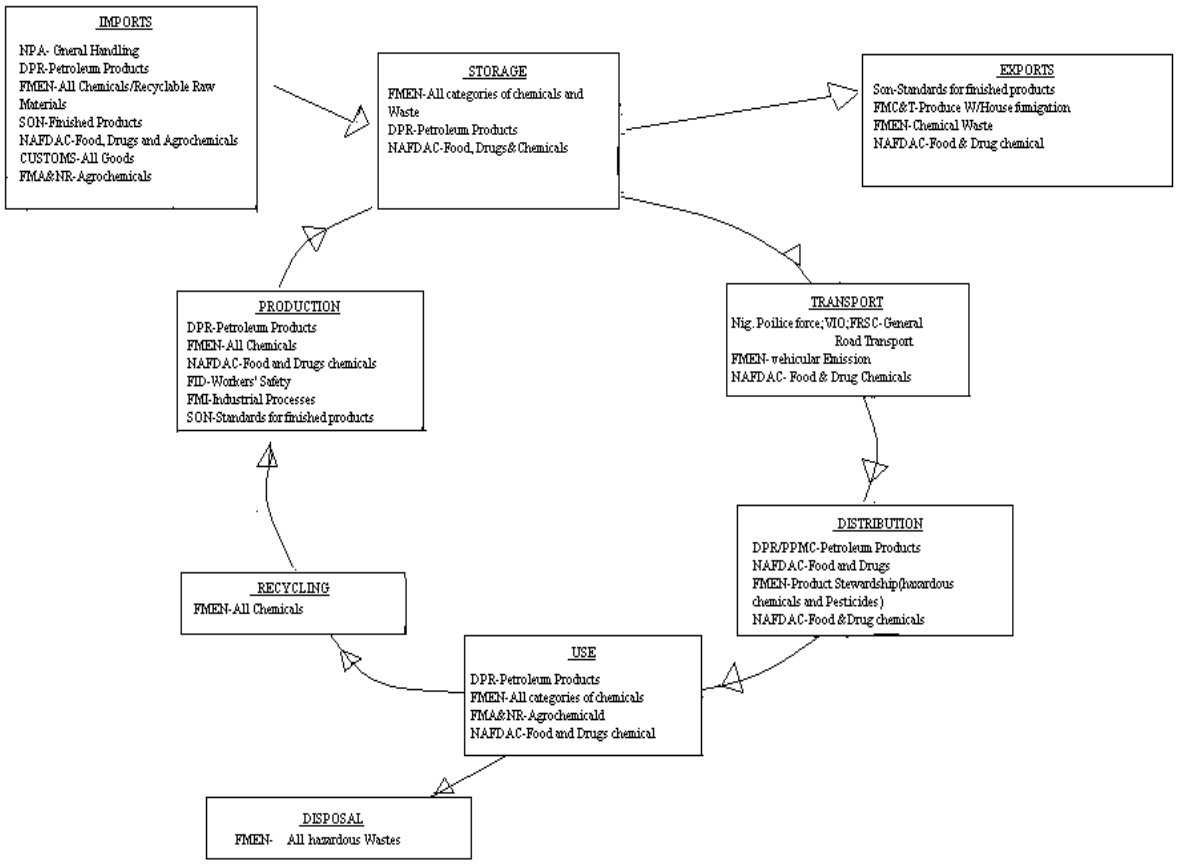
Legal requirements, which influence the management of chemicals, are found in a variety of legislation and typically, the legal chemicals management framework in developing countries is determined by a combination of different types of laws. These include general environmental legislation, legislation addressing specific sectors such as agriculture, health, labour and transport; legal instruments addressing different stages in the life cycle of chemicals, specific protection objectives and /or target groups; and legal instruments addressing different categories of substances.

The sectoral laws give the relevant ministries/agencies/departments the responsibilities/mandates and budgets to establish capacities which are of relevance to chemicals management, such as inspectorates, libraries and databases, laboratory facilities, scientific expertise, training and extension services, etc. Such responsibilities often represent only a small fraction of the overall mandates of the concerned ministries/agencies/departments.

In Nigeria, four main organizations are identified as major players in the management of chemicals in the country. They are the Federal Ministry of Environment (which replaced the former Federal Environmental Protection Agency, FEPA), Federal Ministry of Health, National Agency for Food and Drug Administration and Control (NAFDAC) and the Factory Inspectorate Division of the Federal Ministry of Labour and Productivity. The others are the Federal Ministry of Transport, Federal Ministry of Finance (which oversees the Department of Customs and Excise), the Directorate of Petroleum Resources (DPR), the Federal Ministry of Agriculture, Federal Ministry of Industry and the Federal Ministry of Justice. This listing is not exhaustive.

There are several legal instruments, which addresses the management of chemicals in Nigeria. All the legislations are made public through the government gazettes. In all the legislations there are in-built administrative and management schemes such as permitting, classification, restriction, reporting and feedback with mechanisms to monitor the implementation. Inspections, revocations of licenses/permits, audit procedures and reporting have been the major mechanisms adopted nationally for compliance. There are also punitive provisions to ensure compliance such as shut- down of such facilities and prosecution/prison terms. The scope of some of the permit databases includes import data of industrial, consumer chemical products and pesticides under restriction; and free import. The objectives of such permits have been among others to strengthen the governments control and successfully implement appropriate enforcement laws. These legislations, however, are not quite consistent as among themselves and lack logical basis in some cases, e.g. shut down without specific criteria to situations where shut down may be resorted to.

Figure 1. Nigeria: Schematic Representation of Involvement of Various Agencies and Ministries in Chemicals Management in Line with their Mandates



In Ghana, there are about sixteen laws that have relevance to the management of chemicals included under the Stockholm Convention. Many of these laws do not, however, address the dangers posed to humans and the environment by the chemicals in question.

The sixteen laws in Ghana are as follows:

- Infectious Diseases Ordinance (Cap 78)
- The Minerals (Offshore) Regulations, 1962 (as amended)
- The Oil in Navigable Waters Act, 1964
- Prevention and Control of Pests and Diseases of Plants Act, 1965 (Act 307)
- Prevention of Damage by Pests Decree, 1968(NLCD 245
- Cocoa Industry (Regulation) (Consolidation) Decree, 1968 (NLCD 278)
- Factories, Offices and Shops Act, 1970 (Act 328)
- Standards Decree, 1973 (NRCD 1973)
- Merchant shipping (Dangerous Goods) Rules, 1974 (LI 971)
- Customs and Excise and Preventive Service (Management) Law, 1993 (PNDCL 330)
- Food and Drugs Law, 1992(PNDCL 305B)
- Local Government Act, 1993 (Act 462)
- Environmental Protection Agency Act, 1994 (Act 490)
- Export and Import Act, 1995 (Act 503)
- Pesticides Control and Management Act, 1996 (Act 528)

- Environmental Assessment Regulations, 1999 (LI 971)

Act 528 is the only legislation that addresses the importation, manufacture, formulation, distribution, use and transportation of pesticides in Ghana. The POPs, which are not considered as pesticides, are, however, not covered by the Act. Public awareness of the requirements of these laws is also low and compliance is consequently at a minimum.

In addition to the numerous uncoordinated pieces of legislation, there are a number of institutions whose activities impinge on POPs management, regulation and enforcement. They include, the Environmental Protection Agency, Customs and Excise and Preventive Service, the Ministry of Food and Agriculture, Ministry of Health, Ministry of Trade and Industry, Ministry of Mines and Energy, Ghana Standards Board, Pharmacy Council, Food and Drugs Board, Ministry of Transport, Factories and Shops Inspectorate, Ministry of Local Government Ministry of Justice, Electricity of Ghana. Again, the list is not exhaustive.

Fragmentation of Existing Legislation

What is clear from the discussion above is that, rather than having a cohesive legal and regulatory framework for chemicals, the relevant legislative provisions are dispersed under a plethora of sectoral laws. The general complaint in these countries is that this kind of "dispersal" makes it difficult for regulated parties to understand and comply with, the various legal requirements and in turn, can lead to unnecessary duplication and inefficient use of resources on the part of governments.

Compounding the problem of fragmentation of existing legislation is a glaring lack of co-ordination and information exchange among various ministries/agencies/departments concerned with chemicals management, which prevents the effective implementation of relevant sectoral legislation. This study showed that conflicts of interest among such concerned entities exist due to their differing mandates and policy objectives. For example, the Ministry of Agriculture, responsible for registering pesticides, may have as its highest priority the promotion of agricultural productivity, while the Ministries of Health and Environment, respectively, are seeking to protect human health and the environment as their central goal. It is the case that oftentimes, more than one ministry may consider that it has primary responsibility and mandate for chemicals management, leading to "turf fighting" and the consequent lack of collaboration/coordination between them. In addition, in some countries with a federal structure, e.g. Nigeria, the division of responsibility between the federal and state governments is not well defined and presents a potential for contradictions.

Gaps in Existing Legislation

Adding to the problem of incoherence in existing legal frameworks for addressing the sound management of chemicals, this study showed substantial gaps in the legal framework. In many countries, there is either the absence or insufficiency of legislation covering the life cycle stages that follow importation and production. Inadvertent gaps in this type of "patchwork" legislation can also mean that certain stages in the life cycle, certain user groups and /or certain categories of chemicals are not adequately addressed. For example, the protection of workers in the agricultural sector through occupational health and safety legislation was found to be one area not adequately covered in many countries. In particular, a serious need remains for legislation to reduce the risks resulting from handling and use of hazardous chemicals, both by professional users (in industry and /or agriculture.

Additionally, it was found that many countries do not have legal provisions concerning treatment and disposal of obsolete chemicals and pesticides, and chemical wastes. Finally, hardly any mention is made in the legal scheme of contaminated lands (including risks to surface and groundwater) and to measures/technologies for their cleanup and re-use. And yet, the concept of "cradle to grave" in chemicals management implies that the grave of chemicals, which is intimately linked with disposal sites (intentional or unintentional) and contaminated sites, should be a matter deserving urgent and close attention.

Developing an appropriate legal framework

For sound chemicals management, appropriate chemicals legislation is indispensable. Chemicals legislation should cover all stages of the chemical life cycle including import/export, production/manufacturing, formulation, transport, distribution (domestic and export), storage, use and disposal. Coverage of main user groups and scenarios should be considered. Also, linking legislative aspects and/or policy instruments-such as import control, chemical emissions inventories such as pollutant release and transfer registers (PRTRs), etc- for various group of chemicals rather than addressing each separately can enhance integration, efficiency and user-friendliness.

Furthermore, national chemicals legislation should also be embedded in, or linked to, national environmental and development policies and objectives. Considering that poor chemical s management practices will have a detrimental impact on environmental resources (e.g. water and soil quality)' as well as on the sustainability of a number of economic sectors (e.g. agriculture, textile industry), sound chemicals legislation should be understood as a means of contributing to sustainable economic and social development.

Of particular relevance is the issue of contaminated lands as a resource in need of rehabilitation for reuse for agricultural purposes or for physical development.

The case for special attention to contaminated lands

One of the most pressing problems faced by both developed and developing countries is the necessity for the decontamination of contaminated sites. This has arisen because large tracts of land suitable for agriculture and/or for use in physical development besides having lost their eco-functionality, often present a serious risk for human health and wild life. The policy for restoration of natural resources should thus be a priority in the chemicals legislation.

The legislative issues of concern in the restoration of contaminated lands are related to Risk Assessment and Risk Management.

Risk assessment and the subsequent step of risk management are intimately related elements that form the basis for decisions on the fitness-for-use approach to land affected by contamination.

The goal of risk assessment is to provide an objective, scientific evaluation of unacceptable impacts to human health, wild life and the environment. The goal of risk management is to support decisions on risk acceptability for specified land uses and determine actions to be taken. It is the process of making informed decisions on the acceptability of risks posed by a contaminated site, either before or after treatment, and how any needed risk reduction can be achieved efficiently and cost effectively. In this way, the overriding needs for the protection of human health, wild life and the environment can be clearly identified and work prioritized accordingly.

The assessment and management of land contamination risks considers three elements:

1) the source of contamination (e.g. Pesticides or PCBs);
2) the receptor (i.e. a part of the ecosystem that could be adversely affected by the contamination ,such as groundwater, human beings, wild life, fauna and flora;
3) the pathway (the route by which a receptor could be exposed to the contaminating substances

Risk occurs when all three elements are present. The presence of all three elements is also referred to as a pollutant linkage.

Risk assessment involves the determination and characterization of such a relationship, including, for example, delineation of the source, measurement/modeling of fate and transport processes along the pathway, and potential effect and behaviour of the receptor. A consideration of risk must also take account of not only the existing situation but also the likelihood of any changes in the conditions in the future.

Risk management is the art of managing environmental contamination so that the risks posed by contamination are controlled or reduced levels agreed upon by regulation, problem owners and other stakeholders.

The process of making national risk assessment decisions for contaminated lands should be formalized by law in order to enhance transparency for all stakeholders. The procedures to be defined should be analogous to those required for Environmental Impact Assessment. A stepwise approach for a typical contaminated land planning could look like the following:

A) Phase 1 Report: Consists of a desk-top study, site work-over, conceptual model and a basic hazard assessment.

B) Phase II Report: Usually consists of an intrusive site investigation and risk assessment.

C) This is a document that details what action is to be carried out so that contamination no longer presents a risk to site users, property or ecological system.

D) Site Completion Report where contamination has been found and /or re-mediated, the developer will be required to submit a site completion report or statement. In certain situations, it may be necessary for the developer to conduct post completion monitoring.

Institutional arrangements

Earlier, the problem of fragmentation and scattering of chemical control instruments in a plethora of different legal documents (e.g. laws, acts, decrees, regulations, notifications, etc) was highlighted. Allied to this problem is the sectoral nature of these legal instruments and the control exercised in their implementation by a whole number of ministries/agencies/departments /boards.

In the quest to carry out necessary legal reforms, there has been vigorous debates as to whether to establish an overarching, "framework type" legislation possibly within an omnibus law on environmental protection (with responsibility exercised by a ministry of environment) or to broaden the scope and strengthen the enforcement of existing laws in the light of the multi-sectoral nature of chemicals management, which can require action and responsibility on the part of a dozen or more ministries/agencies/departments/Boards.

A glaring advantage of addressing chemicals through a Framework Law is that it would ensure coherence with regards to chemical issues dealt with under various sectoral/specialized legislations, and thereby provides a simpler and more comprehensive regulatory coverage of chemicals, which would facilitate its implementation and enforcement. In addition, obligations under various international agreements dealing with chemicals could be more easily integrated in the national legislative context in a more coordinated way.

The obvious drawback of the above described approach is that a framework law may prove not only unwieldy but would lead to over-concentration of power for a concerned Ministry, which may be undesirable in certain situations particularly when it is known that Ministries of Environments in developing countries are understaffed and under-funded. Also, resistance may be encountered from those, who have benefited from the status quo, in particular those who may stand to lose certain privileges (e.g. the ability to collect fees). In addition, framework law may prove difficult and/or costly to develop and /or justify due to lack of experience in this sphere and thereby derail attention and resources away from other important efforts.

A growing preference in many developing countries is to formulate an integrated or consolidated national chemicals management policy, which would serve as a blueprint for all players and actors in addressing chemicals management in a cradle to grave approach. Integrated in this effort will be the identification of amendments needed to bring existing legislation into line with the comprehensive policy. Under this latter scheme of things, it would be necessary to establish a national coordinating committee for the sound management of chemicals deriving its authority from the Presidency or the office of the Prime Minister. The role of such a committee should be coordination and not executive. While composition of the team should not be unwieldy, every effort must be made to include all principal players involved in the sound management of chemicals.

With this preference for multiple ministries/agencies/departments/boards, the responsibility for contaminated lands should logically belong to the Ministry of Lands or some variant of this Ministry. However, because contaminated lands occur in a variety of locations ranging from urban to rural, it makes eminent sense to give the responsibility to local government councils who determine land-use and issues permits for development of lands. It means that the association of local government councils should be a member of the National Coordinating Committee.

Financial and Economic Instruments

Economic instruments are useful tools in the management of chemicals in general and contaminated sites in particular. Such instruments must, however, be chosen and applied with care, as they may affect broad market forces and their results are not always entirely predictable.

Regulations that require land owners and/or polluters to remediate contaminated land are intended to mitigate/eliminate further threats to humans, wild life and the environment and encourage the "rehabilitation" of natural resources, in this case, land and water resources. Such regulations would include the introduction of innovative technologies in the remediation process and involves importation of equipment and/or know-how. Economic Instruments can be negative or positive.

Negative economic instruments include:

- Charges or taxes on contaminated sites
- Government levies to fund development/adaptation of remediation technologies
- "Security bonds" for enterprises/persons that own contaminated lands

These instruments are extensions of the "polluter pays principle" which makes the owner of a contaminated site responsible for any harm it causes. The principle should form the basis for liability and compensation for lands (and associated surface and ground water contaminated by POPs.

Examples of positive economic instruments include:

1. reduced taxes or customs duty, full loans or subsidized interest rates for the purpose of remedial process equipment;
2. tax breaks/tax holidays on redeveloped re-mediated land. This will ensure that investors are able to recuperate the cost of such remediation over a number of years before the land is subjected to any dues or rents required by law;
3. contaminated land can be offered to the public on a "reclaim and inherit basis" . Contaminated land in urban areas has been reclaimed in the recent past for the development of shopping malls, car parks, open parks, ports, etc. Due to the generally high cost of land for such developments, a "reclaim and own" policy on the part of the local council will be attractive to commercial developers and estate agents. The application of such a policy must be seen to be transparent and beyond reproach and should typically involve all interested stakeholders;
4. assistance from competent government ministries/agencies (to land owners/ private developers/farmers cooperatives , industries, in the site characterization process and in particular, in risk assessment). While in the industrialized world, this "melange" of government and private sector interests is discouraged, it is to be recognized that in developing country situations, it is the government ministries and parastatals that have both the skills and means to undertake such intensive and oftentimes costly, investigations. Failing such assistance, the stakeholders concerned will necessarily have to import such competence at very great expense which may prejudice negotiations particularly in reclaim and own' scenarios. Again, this concession should be granted only after due process involving public hearings with the participation of a broad spectrum of stakeholders;
5. provision of subsidies for the development and use of technology that prevents pollution by reducing the source of harmful contaminants or breaking the "pollution linkage" of source-pathway and receptor. In this regard, the emphasis should be on "best available technologies" (BAT), which meet the requirements for "best environmental practices" (BEP);
6. use advantages for enterprises, to allow reclaimed contaminated land to be used on a "safe for use" basis rather than on a basis of zero pollution;
7. deposit-refund systems in which money is returned to those undertaking remediation of contaminated sites if pollution is avoided during the remediation procedure;
8. a national investment code to award bonuses for environmentally sound remediation and management of previously contaminated lands.

Governments must include such economic and financial instruments as are described above in the legislation to ensure that they have the force of law and would not be subject to the whims of succeeding governments (except in case of a regulation being repealed). This will boost investor confidence.

Economic instruments must be applied equally to all bodies that are involved in the remediation of contaminated lands, including both domestic and foreign companies. However, in most developing countries and particularly in Africa, land has become an emotive issue. Ownership of land is seen as the ultimate act of independence and sovereignty and citizens frown at foreign ownership of land. Great discretion is therefore called for in the application of this seemingly evenhanded approach. It would stand to reason that wherever such sensitivities are known to exist, some preference must be given to domestic companies in the case of contaminated sites targeted for redevelopment. In cases, where the contaminated land is to be reclaimed for agricultural practice, indigenous farmers or farmers' co-operatives should have priority consideration.

Annex 3: Hot Spots of the GCLME Region

The geographical area denominated as the Guinea Current Large Marine Ecosystem (GCLME) begins in Guinea Bissau to the north and includes all the coastal states up to Angola in the south. Of the sixteen countries, eight namely, Sierra-Leone, Liberia, Ghana, Togo, Nigeria, Sao Tome, Gabon, and Congo have chosen UNIDO as their Implementation Agency for the preparation of their National Implementation Plans (NIPs).

Beginning 2002, these countries have undertaken various activities in pursuit of the preparation of their National Plans. Among the listed objectives of the NIP is "Inventory of stocks and contaminated sites; assessment of opportunities for disposal of obsolete stocks".

The NIP and its action plans will be based on the findings of the assessment and inventory reports. Relevant international management options will be reviewed for selection of the most appropriate alternatives. The intention is to identify those management options which can be implemented using existing management systems or which need little adjustments either in the present or proposed legislation.

Prior to undertaking the preparation of the NIP, there were very few hard data and information on the occurrence and extent of contaminated sites.

In Nigeria, for example, in relation to the problem of contaminated sites, the Nigerian National Chemical Profile (1999) reports that "there is heavy pollution nation-wide across the different environmental media even though Nigeria has authorities and programmes geared towards sound chemical management" (p.8). Several studies in the late eighties and Nineties (Osbanjo 1980; Tongo 1985; Okonna 1985; Osibanjo and Jensen 1986; Ogunlowo 1991; Ojo 1991; Nwakwuola and Osibanjo 1992) have reported levels of POPs in the coastal and marine environment high enough to generate concern. In addition, there are mostly unpublished reports, which document high levels of PCBs in mothers' milk, human hair, and edible vegetables and in animal fat tissue (Osibanjo, 2001).

Togo, which did not have a National Chemicals Management Profile stated in their proposal for undertaking NIP that, "there are many PCB containing transformers that are still in operation [or abandoned] and the heavy use of POPs pesticides during the last decades hypothesize serious environmental contamination. Due to the un-assessed but apparent existence of obsolete stocks of obsolete stocks, eco-friendly disposal opportunities will also be elaborated in details during the NIP development process. Restoration of contaminated sites will also be addressed as a matter of priority."

Ghana, which had prepared its National Chemical profile reported, suspected cases of contaminated land mostly around enclosures housing either functional or abandoned transformers in addition to farmlands and land around suspected burial sites for obsolete chemicals. For example, Osafo and Frimpong (1998) documented the persistence of the pesticides (Lindane and Endosulfan) and their effects on maize grown in two soil ecosystems. In investigations of pesticide contamination in farming areas in Ghana, the Water Research Institute studied the use of pesticide use in tomato farming in Akomadan. The results showed that Lindane and Endosulfan occurred in both water and sediments whilst other organochlorine pesticide residues such as Hexachlorine, p,p-DDE and Heptachlor Epoxide occurred additionally in sediments. Heptachlor Epoxide was the only organochlorine residue detected in appreciable quantity in tomato crops. Significantly, higher HCB and p,p-DDE residues were found in human blood and milk samples. The mean values of HCB and p,p-DDE in blood were 30µg/kg and 380 µg respectively. The mean values of HCB and p,p-DDE in milk were 40 µg fat (1.75g/kg whole milk) and 490µg/kg fat (17.15µg/kg whole milk respectively. From the analysis of soil, water and shallots, Lumor (2001) found higher levels of pesticide residues in soil samples as compared to shallots and water. Residues from soil showed higher activity than residues from water and shallot.

These were to be inventoried and investigated as part of the activities leading to the development of the NIP.

Congo, on its part, had no National Chemicals Profile and mentioned only cases of "suspected contaminated sites" and her determination to acquire definitive information one way or the other in the course of the development of the NIP.
The objective of this Chapter is to examine the NIPs of the relevant countries and, according to the TOR, "document in detail, according to risks to health and the environment, the hotspots of the region where remediation operations are required ".

Identified Hotspots

Hotspots are areas with ecological conditions facilitating adverse environmental effects and which may facilitate the occurrence of diseases associated with those conditions.

At the time of this Study, only Congo, Ghana, Nigeria and Togo had made sufficient progress in the development of their National Implementation Plan to merit any examination of the problem of contaminated sites.

Risks to Health and the Environment

Typically, risks to human health and the ecosystem are used as a first basis for setting remediation goals. Other decision factors such as technical feasibility and cost are used to select from amongst the suitable remedial techniques

Determinants of a POP's adverse health effects include:

- its physical form,
- toxicity,
- route of entry into body,
- concentration which persons are exposed and duration or (period) of exposure,
- body absorption,
- other materials contaminating the POPs,
- solvents used as a vehicle in its application,
- residues, and
- time (in the case of dermal contact) between skin exposure and removal of pesticides from the skin by washing.

Effects of Specific POPs on human/animal health

One or a combination of the 12 POPs of concern under the Stockholm Convention can cause land contamination. It is therefore pertinent in this section to review what is known from published literature on the adverse effects or otherwise of these POPs.

Aldrin /Dieldrin

Aldrin and Dieldrin are highly toxic to human beings with a high acute oral toxicity while the dermal toxicity is moderate. Dermal sensitization has not been found. Effects observed in acute, short-term studies involve the central nervous system (CNS). The liver is also a target organ.

Aldrin and dieldrin do not appear to cause teratogenic effects at doses below those causing maternal toxicity and feto toxicity Male and female reproductive toxicity has not been reported. Mutagenicity studies have demonstrated that neither Aldrin nor dieldrin has mutagenic potential. There is inadequate evidence of carcinogenicity in experimental animals.

All the available information on Aldrin and Dieldrin taken together, including studies on human beings supports the view that for practical purposes, these chemicals make very little contribution, if any, to the incidence of cancer in human beings. (EHC 91, 1989)

Chlordane

Chlordane may affect the human immune system and is classified as a possible human carcinogen. Acute poisoning in man and animals is characterized by manifestations of CNS stimulation such as disorientation, tremors, and convulsion. Death may follow respiratory failure. (EHC 34, 1984)

Endrin

In mild cases of poisoning, dizziness, weakness of the legs, abdominal discomfort, nausea and vomiting have been reported. Severe poisoning is manifested by sudden epileptic-form, fits, with frothing at the mouth, facial congestion, and violent movement of limbs. (EHC 130, 1992)

Heptachlor

Heptachlor is generally classified as a neurotoxin, characterized by toxic symptoms of central nervous system (CNS) hyperactivity, which include tremors and convulsions. In experimental animals, prolonged low-level

exposure resulted in the induction of hepatic microsomal enzymes. At higher levels, heptachlor is hepatotoxic. It was not a teratogen in tests conducted but at higher exposure levels it may interfere with the reproduction and the viability of the offspring. There is limited evidence for the carcinonogenicity of heptachlor in experimental animal, however, is classified as neurotoxin. (EHC 38, 1984)

Hexachlorobenzene

Available data on the effect of HCB in humans are limited principally to those people exposed in an accidental poisoning incident that occurred in Turkey between 1955 and 1959. They developed a variety of symptoms including photosensitive skin lesions, colic and debilitation. Hence data is inadequate to serve as a basis for assessment of effects from exposure to HCBs. (EHC 195, 1997)

Mirex

No data on human health effects are available in connection with occupational exposure to mirex. Based on the findings in mice and rats this chemical is considered for practical purposes as being potentially carcinogenic for human beings. (EHC 44. 1984)

Toxaphene (Camphechlor)

Toxaphene has been shown not to have an effect on reproduction. It is not teratogenic. There is sufficient evidence for its carcinogenicity for rats and mice. It is mutagenic in bacterial tests. Epidemiological studies are inadequate to evaluate the carcinogenic potential of toxaphene for human beings. However, for practical purposes it is considered as a human carcinogen. Signs and symptoms of acute toxicity are salivation and vomiting and at higher exposures, excitation of the CNS with convulsions, respiratory failure and death. (EHC 45, 1984)

DDT

The best-known toxic effect of DDT is eggshell thinning among birds of prey. The short-term effects of DDT on humans are limited, but long-term exposures have been associated with neurotoxic effects. The earliest symptom of poisoning by DDT is hyperaesthesia of the mouth and lower part of the face. This is followed by paraesthesia of the same area and the tongue and then by dizziness, an objective disturbance of equilibrium, paraesthesia, and tremor of the extremities, confusion, malaise headache, fatigue and delayed vomiting. Convulsion only occurs in severe poisoning. In most instances of fatalities following ingestion of DDT solution, the signs and symptoms were predominantly those of poisoning by the solvent vehicle. According to the IARC listing of chemicals, DDT has been classified as possibly carcinogenic to humans in the light of sufficient animal data but inadequate human data. (IARC MONOGRAPH LYON 1997) (Pesticide Vol. 53 1991)

The most fatal long –term effects associated with DDT is carcinogenesis. Unlike genotoxic carcinogens, which generally produce tumors in a number of different organs or tissue, and at very low exposure doses, DDT is a non-genotoxic carcinogen. This means that it evokes sustained mitogenesis (cell proliferation) in specific target organs some of which are tissues or organs that ate normally quiescent. It has been shown in rats and mice to cause hepatocellular cancer through the induction of a variety of mixed-function oxidases. Data to prove the carcinogenicity of DDT in human beings is however inadequate (Hunter, 1994).

Dioxins and Furans

Potential health effects from dioxins and furans are numerous. These chemicals are toxic by mouth, skin contact (especially liquid formulations) and by inhalation of the dust from powder concentrates.

Dioxin exposure to humans are associated with increased risk of severe skin lesions (chloracne and hyper-pigmentation), altered liver function and lid metabolism, general weakness due to drastic weight loss, depression of the immune system and endocrine and nervous system abnormalities.

Dioxins and furans build up in fatty tissue of living species accumulating as they move higher through the food chain and with time. They are transferred in breast milk. (UNEP CHEMICALS 1999)

Laboratory animals given dioxins suffered a variety of effects including an increase in birth defects and stillbirths. Fish exposed to these substances died shortly after the exposure ended. Food, particularly from animals is a major source of exposure for humans. They are classified as possible human carcinogens. (EHC 88, 1989)

Polychlorinated Biphenyls (PCBs)

Acute exposures to high levels of PCBs have been associated with skin rashes, itching and burning, eye irritation, skin and fingernail pigmentation changes, disturbances in liver function and the immune system, irritation of the respiratory tract, headaches, dizziness depression, memory loss, nervousness and impotence. Chronic effects of low level PCBs exposures reported included liver damage, reproductive and developmental effects, and possibly cancer (UNEP GUIDELINES 1999).

PCBs are considered as probable carcinogens in humans. Much of the data on effects of PCB exposure on humans comes from incidence of PCB contamination in cooking oil or food or from the long-term exposure to PCBs of workers manufacturing capacitors.

PCBs bio-accumulate in the fatty tissues of exposed animals and humans and this exposure is believed to be responsible for the wide variety of health effects. It is primarily stored in the adipose and has been in blood serum and breast milk thus putting infants at risk. People with no direct exposure to PCBs may have been contaminated by the food chain (UNEP GUIDELINES, 1999).

A summary of the health effects of the 12 POPs according to biological systems is given in table below.

Table 1: Summary of health effects of POPs according to biological systems

Aldrin/Diedrin	Reproductive system	No effect, not teratogenic
	Liver	Target organ
	Central nervous system	Effects observed
	Skin	Dermal toxicity is moderate Not a possible carcinogen though toxic to humans
Chlordane	Central nervous system	Tremors, convulsion disorientation
	Respiratory system	Respiratory failure Not classified as to carcinogenic potential to humans
Endrin	Central nervous system	Convulsion, dizziness, nausea, headaches
	Respiratory system	Respiratory failure
Heptachlor	Central nervous system	Tremors, convulsion neurotoxin
	Reproductive system	Not a teratogen but at higher exposure levels it may interfere with reproduction and the viability of the offspring. Limited evidence of carcinogenicity.
Hexachlorobenzene	-	Available data on humans are inadequate to serve as a basis for assessment of effects.
Mirex	-	No data on human health available with regards to occupational exposure. Potentially carcinogenic based on findings in mice and rats.
Camphechlor (Toxaphene)	Reproductive system	No effect, not teratogenic
	Central nervous system	Effects observed excitation of CNS with convulsion
	Respiratory system	Respiratory failure
		Considered as possible human carcinogen sufficient evidence from mice and rats.
DDT	Central nervous system	Tremor, convulsion, headaches, fatigue, confusion, malaise Inadequate human data but sufficient animal data.
PCDD/PCDF	Skin	Chloracne
	Central nervous system	Nervous system abnormalities
	Immune system	Depression of immune system Altered liver function

PCBs	Skin	Chloracne
	Central nervous system	Headache, dizziness, depression, fatigue impaired
	Liver	Liver function
	Reproductive system	Altered reproductive system
	Respiratory system	Chronic bronchitis
	Gastrointestinal tract	Gastrointestinal disorders
	-	Probable carcinogen (inadequate human data, sufficient animal data)

Contaminated Land Management

The concern over actual or potential human/animal health effects resulting from poor environmental practices and the limited amount of clean land in economically desirable areas (either for agricultural practice or redevelopment) has led to the growing need to evaluate the extent of contamination and remediate as necessary. The management of contaminated land must support multiple goals that are often conflicting

Contaminated land management involves a series of decisions. Types of management problems might include: prioritizing a number of contaminated sites, setting an overall sustainable development strategy for contaminated land management in a particular region, etc. Typically, the management tasks identified for dealing with land contamination include:

- problem identification (including historical assessment and as a result the identification of potential sites;
- problem investigation, determination of the need for remediation;
- risk identification (actual and potential);
- detailed risk evaluation and the identification of the remediation goal; selection and implementation of remedial measures; and
- monitoring of sites following remediation

Applying the proposed National Classification System as a "screening tool"

A National Classification System is proposed as a rational and scientifically defensible tool for the comparative assessment of contaminated sites nationwide in concerned countries. Under the National Classification System, contaminated sites identified in each country are evaluated using existing or generally available information on the sites characteristics, contaminant and location and the sites are ranked according to actual or potential impacts on human/animal health and the environment. It is worth emphasizing, that the National Classification System is only a screening tool. Firm conclusions about the need for remedial action will still depend on a number of factors (including planned long term use or redevelopment of the site, application of contaminated site criteria and relevant/site specific objectives of the jurisdictions in which the site is located, local issues, availability of technology, remediation costs, etc) examined under the more involved risk assessment. Although involving more intrusive investigations than the basic hazard assessment implied in the National Classification System, the proposed Risk Assessment in itself, is but an early component of site characterization.

Due to the complexity and ballooning costs of intrusive site investigation, the application of the National Classification System to the array of contaminated sites identified in each country would ensure an adequate prioritization of sites deserving further assessment (risk assessment through site characterization) and the commitment of meager national resources to remediation.

Risk Assessment: a critical early component to site characterization

Under the risk-based decision making process, characterization follows planning and scoping (step 1), and analysis (step 2). 'Beginning with the end in mind' means that the purpose of the site characterization step, which includes planning and scoping and analysis, is to compile information so that an adequate evaluation of the threat that the site poses to human health and the environment can be completed. US experience clearly demonstrates that cost effective site characterization requires early involvement of human and ecological risk assessment experts at the initial planning and scoping stage. Primary focus on Conceptual Site Model (CSM) development and data quality objectives before fieldwork begins has been demonstrated to lead to technically defensible, scientifically based, and cost effective investigation and remediation (US EPA 1996, 1998, 2000b).

Cost effective remediation is almost always coupled with risk-based decision making. Risk communication is a critical process throughout the contaminated land management life cycle. Therefore, risk assessment and risk communication are fundamental components of cost effective contaminated land characterization and management.

The Risk-Based Decision Making (RBDM) paradigm is generally defined as a decision making process that integrates quantification of risk with elements of the decision making process. It is a combination of traditional risk assessment and traditional risk management. In essence, risk assessment is of RBDM, which is a component of risk management. An example of the direct involvement of risk assessment in characterizing soil is the US EPA's Soil Screening Guidance (SSG) (US EPA 1997b). The SSG is a risk-based tool originally introduced to help standardize and accelerate the evaluation and clean up of contaminated soils at National Priority List (NPL) Superfund sites. The SSG provides a tiered framework for developing risk-based, site-specific soil screening levels (SSLs). These values are not intended as final clean-up standard. Rather, they are used to guide the site characterization process (e.g. identify 'problem areas' at a site needing further characterization, identify and/or rank chemicals of concern, identify exposure pathways that need further characterization).

Site Characterization

Characterizing the nature and extent of environmental contamination at a site is a fundamental part of any remedial investigation and corrective action programme. Whereas the site characterization process generally proceeds in accordance with policy-driven objectives (for example regulatory, legal or corporate), it is the technical-driven objectives and procedures that tend to dictate actual success in the field. 'Success' is generally defined as accomplishing corrective action/ restoration objectives in the most cost effective manner possible. The potential benefits from an optimized process can be derived from all steps in the entire contaminated land 'life cycle', from site identification and listing, through characterization and remediation/restoration to de-listing (or 'closure' in the US context). Those benefiting are not only the responsible parties (e.g. property owners and 'problem owners'), but also the society in general.

Site characterization methodologies - value driven approaches

Driven by goals of improving decision making efficiency and reducing cost, the US EPA has exerted significant effort to develop and apply smarter approaches to investigating and remediating contaminated sites. As a result, many new tools and technologies have been developed, which have given rise to revolutionary strategies for their implementation in remediating contaminated sites. This phenomenon has been accompanied by a corresponding paradigm shift in the remedial action process, from a largely linear and compartmentalized process to a more dynamic and iterative process. The underlying philosophy of the latter is best characterized by the common adage 'begin with the end in mind'. As applied to site characterization and remediation projects, project managers and decision makers have the responsibility of evaluating every action against the basic decision making paradigm throughout the process. Historically, contaminated land characterization and remediation decision making employed a perspective approach, including prescribed clean-up objectives typically involved removal actions, long-term pump treat and attempted clean-up to pristine criteria and/or drinking eater standards. As a result, site characterization programmes became compartmentalized; they frequently focused on identification of sources and quantification of contaminant concentrations, including vertical and lateral extent of contamination, with little consideration as to how the information would ultimately be used in decision-making. In addition, the extensive requirements for 'legally defensible data' promoted the development of regularly frameworks mandating that all plans had to be reviewed and approved in advance of implementation, data strictly reviewed and validated with extensive documentation, and thorough reporting and reviewing requirements met for each phase of effort. Again, frequently little to no consideration of ultimate decision-making was accorded. This management approach was a recipe for inefficiency, high cost and slow decision-making. For example, redundant mobilizations of personnel and equipment for fieldwork and off-sire laboratory analysis increased cost and diminished efficiency. However, with the shift toward a more dynamic (less compartmentalized) and iterative (integrated steps) risk-based decision making process, which has gradually become incorporated into policies, regulations and scientific objectives, site characterization methodologies have also changed.

Today in the USA, the movement toward applying the risk-based decision making (or RBMD) paradigm and process to environmental restoration projects is well under way. The basic paradigm is illustrated in figure 2, which is taken from US EPA's *Risk Characterization Handbook* (US EPA 2000a). As shown, seven factors are dynamically involved in a five-step process beginning with planning and scoping and ending with decision making. Conceptual site model development, collection of essential data of sufficient decision-making value, use of dynamic work plans and incorporation of performance-driven field analytical and innovative site

characterization methods are integral components. Risk assessment (ecological, human health), which is the primary 'scientific factor' in the process, is discussed above. Technological factors are critical to improving efficiency and effectiveness of contaminated land management programmes.

Selection and implementation of remedial measures

As stated in preceding sections, whereas the site characterization process generally proceeds in accordance with policy-driven objectives, it is the technique-driven objectives and procedures, which dictate actual success in the field.

Article 6 (e), provides inter alia that "---if remediation of sites undertaken, it should be done in an environmentally sound manner". This implies the choice of low cost Best Available Technology (BAT) and compliance with international Best Environmental Practices (BEP).

Annex 4: Terms of Reference

1. Post title Senior consultant on POPs Capacity Building and Institutional Strengthening

Duration 4.0 w/m

Duty station Nigeria/ Ghana and West Africa

Counterpart Ministry of Environment, Agriculture and Industry as well as Environmental Protection Agencies

Duties

The consultant is requested to perform the following duties in cooperation with UNIDO staff members, field staff, UN Agencies, consultants and counterpart national experts and institutions:

1. Carry capacity building need assessment identification missions and consult with all institutions that are involved in management of contaminated lands.
2. Establish Inter-Sectoral Committees for the Joint Management of contaminated lands at local and national Levels.
3. Perform local/national/regional Training Workshops on various aspects of contaminated lands management including on information management systems as decision-making support tools.
4. Establish a Working Group to report on contaminated land capacity building needs and devise an implementation strategy for that.
5. Submit Final Report on the above to be incorporated in the Project Brief.

Qualifications The consultant must have a higher degree in economics/environment studies with extensive experience in the environmental/industrial issues, especially in the Africa region.

Language English

2. Post title Senior consultant on Information Management System, Public Awareness and Environmental Education Programmes on Contaminated Sites management

Duration 3.0 w/m

Duty station Nigeria/ Ghana and West Africa

Counterpart Ministry of Environment, Agriculture and Industry as well as Environmental Protection Agencies

Duties

The consultant is requested to perform the following duties in cooperation with UNIDO staff members, field staff, UN Agencies, consultants and counterpart national experts and institutions:

1. Carry capacity assessment for identification of information and education systems needs in relation to management of contaminated sites.
2. Establish a working Group to report on technical aspects of information and institutional capacity needs for awareness on remediation of contaminated land and devise an implementation strategy for that.
3. Establish an information network and a website for information and education on the subject of contaminated lands management for the region.
4. Submit Final Report on the above to be incorporated in the Project Brief.

Qualifications The consultant must have a higher degree in information and or educational systems, environmental data collection and studies with extensive experience in the environmental/industrial issues, especially in the Africa region.

Language English

3. Post title Senior consultant on Low Cost Contaminated Sites Remediation Technologies

Duration 3.0 w/m

Duty station Nigeria/ Ghana and West Africa

Counterpart Ministry of Environment, Agriculture and Industry as well as Environmental Protection Agencies

Duties

The consultant is requested to perform the following duties in cooperation with UNIDO staff members, field staff, UN Agencies, consultants and counterpart national experts and institutions:

1. Carry capacity assessment for identification of low cost remediation technologies for contaminated sites.
2. Establish a Working Group to report on aspects of socio-economic impact of the low cost technologies for remediation of contaminated land and devise an implementation strategy for that.
3. Establish a network of a scientific group on continuous identification of social capital requirements for post implementation stage and monitoring.
4. Submit Final Report on the above to be incorporated in the Project Brief.

Qualifications The consultant must have a higher degree in economics/environment studies with extensive experience in the environmental/industrial issues, especially in the Africa region

Language English

4. Post title Senior consultant on POPs policy and strategies development

Duration 5.0 w/m

Duty station Nigeria/ Ghana and West Africa

Counterpart Ministry of Environment, Agriculture and Industry as well as Environmental Protection Agencies

Duties

The consultant is requested to perform the following duties in cooperation with UNIDO staff members, field staff, UN Agencies, consultants and counterpart national experts and institutions:

1. To review environment and land resources policy of reclamation and use of contaminated land in West Africa.
2. To study and investigate regulations efficiency and performance and information need in comparison with EU regulations on contaminated land.
3. To establish a Working Group to report on contaminated land policy, strategy and regulation.
4. To establish a Working Group to report on risk assessment and risk management at community level.
5. To establish a Working Group to report on financial and economic incentives.
6. To establish a Working Group to report on National Classification System for contaminated land.
7. To compile Final Report on the above and prepare the Project Brief.

Qualifications The consultant must have a higher degree in economics/environment studies with extensive experience in the environmental/industrial issues, especially in the Africa region.

Language English