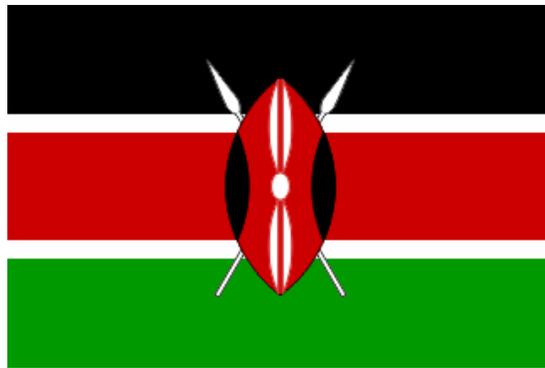


**BASELINE STUDY
TOWARDS
NON TOXIC ENVIRONMENT IN AFRICA
COUNTRY REPORT**

KENYA



08 August 2007



Basel Convention Regional Centre
Pretoria
for English-speaking African countries



**The study was conducted
by**

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ACRONYMS & ABBREVIATIONS

| | |
|---------------|---|
| AAK | Agrochemical Association of Kenya |
| AMCEN | African Ministerial Conference on Environment |
| BATs | Best Available Technologies |
| BEP | Best Environmental Practices |
| BCRC | Basel Convention Regional Centre |
| CBO | Community Based Organisation |
| CBS | Central Bureau of Statistics |
| COMESA | Common Market for East and Southern Africa |
| COP | Conference of the Parties |
| DOHSS | Directorate of Occupational Health and Safety Services |
| EMCA | Environmental Management and Coordination Act |
| FAO | Food Agricultural Organization |
| GCD | Government Chemist Department |
| GDP | Gross Domestic Product |
| GEF | Global Environment Facility |
| HCDA | Horticultural Development Authority |
| ICIPE | International Centre for Insect Physiology and Ecology |
| IFCS | International Federation for Chemicals Safety |
| IPEN | International POPS Elimination Network |
| IPM | Integrated Pest Management |
| ITDG | Intermediate Development Technology Group |
| IVM | Integrated Vector Management |
| JICA | Japanese International Cooperation Agency |
| KARI | Kenya Agricultural Research Institute |
| KAM | Kenya Association of Manufacturers |
| KEBS | Kenya Bureau of Standards |
| KEMRI | Kenya Medical Research Institute |
| KEPHIS | Kenya Plant Health Inspectorate Services |
| KETRI | Kenya Trypanomiasis Research Institute |
| KIRDI | Kenya Industrial Research Institute |
| KNPCP | Kenya National Cleaner Production Centre |
| KPA | Kenya ports Authority |
| KPLC | Kenya Power Lighting Company |
| KRA | Kenya Revenue Authority |
| MENR | Ministry of Environment, Natural Resources and Wildlife |
| MOU | Memorandum of Understanding |
| NCP | National Chemical Profile |
| NCST | National Council of Science and Technology |
| NEMA | National Environmental Management Authority |
| NGO | Non Governmental Organization |
| NIP | National Implementation Plan under the Stockholm Convention on POPs |
| ODS | Ozone Depleting Substances |
| PCB | Polychlorinated Biphenyls |
| PIC | Prior Informed Consent Procedures |
| PCDD | Polychlorinated dibenzo -p- dioxins |
| PCDF | Polychlorinated dibenzo -p- furans |
| PCPB | Pest Control Product Board |
| POPs | Persistent Organic Pollutants |
| PSR | Physicians for Social Responsibility |
| SAICM | Strategic Approach to Integrated Chemicals Management |
| SERC | Standards and Enforcement Review Committee |
| SME | Small and Medium Enterprises |
| TOR | Terms of Reference |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| UNES | University of Nairobi Enterprises Services |
| UNIDO | United Nations Industrial Development Organization |
| WCO | World Custom Organisation |
| WSSD | World Summit on Sustainable Development |
| WHO | World Health Organization |

EXECUTIVE SUMMARY

It is now widely accepted that risks posed by chemicals need to be managed to protect the human health and the environment. In this regard many international initiatives have been taken to achieve this goal which culminated into the adoption of the Strategic Approach to International Chemicals Management (SAICM) in Dubai Emirates, in February 2006 during the International Conference on Chemicals Management (ICCM). Kenya has all along taken a strong interest and participated in all the initiatives.

As a follow-up of the Dubai meeting, Kenya participated in the African Regional meeting for SAICM held in Cairo in September 2006 where the African Regional Action plan on SAICM was adopted. Furthermore, Kenya successfully hosted the 8th Meeting of the Conference of Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous wastes and their Disposal held 27th November to 4th December, 2006 which addressed in detail African concerns on the transport and management of hazardous waste.

This Baseline Study and capacity needs assessment is therefore part of the process to prepare Kenya to implement the SAICM. In undertaking the study, it was important to consult amongst the principal institutions involved in chemicals and waste management so as to identify, constraints, opportunities and areas for improvement.

It is important to note that:

- (i) Kenya has not completed its detailed inventory of wastes as such it cannot fully monitor the movement or adequately advise transporters and entrepreneurs on waste reduction efforts. The envisaged broader project could assist in this specific area.
- (ii) Kenya is a large importer of chemicals. It does not produce a lot of chemicals but extracts many minerals used for chemicals production and recovers toxic chemicals from products. This and the activities of certain industries cause heavy environmental and health problems.
- (iii) Kenya is participating actively in international agreements and conventions in the environmental sector. Unfortunately, these commitments are not transmitted to a national level and converted into reality.
- (iv) Institutions and initiatives do exist. Kenya needs to strengthen them with financial, personnel and infrastructure (laboratories, computers, etc.). Regulations, frameworks, laws, standards, etc. need to be revised.
- (v) The informal sector is a huge challenge. The chemicals and hazardous waste problems are especially urgent in this sector because non trained workers are exposed to many risks. The informal sector and SMEs have a bigger environmental impact than larger industries.
- (vi) There is a lot of waste generation, especially in cities, where the environmental pollution is very high. Waste management in general is an unsolved problem that needs to be addressed. Basic arrangements like waste collection, waste transport, disposal sites, awareness of the population, etc. need to be tackled.

- (vii) Hazardous waste management does hardly exist and needs to be established.
- (viii) The trade liberalizations have weakened the capacity of the institutions to regulate and monitor the imports and exports of chemicals. This affects also data availability.
- (ix) Not many stakeholders (especially NGOs) participate actively in the SAICM process at the moment because most of them lack the necessary knowledge. On the other hand, they are very important for the creation of awareness and the organization of trainings.
- (x) Key drivers at the national level, for the Chemicals and waste management process will be the National Chemicals Policy committee under the Ministry of Environment and Natural Resources which offers a national chemical governance framework for the country. It is important to ensure that issues of wastes are adequately articulated in this policy committee.
- (xi) Kenya as a transit country faces challenges and has to build adequate surveillance and quick analytical capacity to fully implement controls of possible illegal traffic as well as an investigating chemicals accidents.
- (xii) The Kenya Government has already invested heavily on the governance, data, monitoring and control of illegal trade on chemical and hazardous waste. What is needed is to support institutions to implement their mandate on chemicals risks management.
- (xiii) This study recognizes that the respective institutions which manage chemicals need to re-evaluate their strategic plans in the light of SAICM to include chemical risk management and capacity to these institutions to be able to tackle these new challenges.
- (xiv) The country experts support strongly the idea of using alternatives to toxic chemicals and hence a call for more support in this direction to such pioneering organization the like of ICIPE.
- (xv) Ideally the BCRC-KemI project should aim at training a pool of trainers through very selective criteria for the trainers.

RECOMMENDATIONS

These are the key recommendations for Kenya

1 Training and awareness programmes have to be developed to address each of the five SAICM areas.

(a) Risk Reduction

The following are the issues to be addressed:

- (i) Knowledge on the impact of chemicals and wastes on humans and environment.
- **This is a relatively new area which has to be developed to cater for the various stakeholders and hence institutions have to be made aware of these fundamentals.**
- (ii) Knowledge and information on country measures to stop production and use of risk chemicals and promote the safer substitutes.
- **This can largely be attributed to inadequate channels for dissemination of such information from the responsible institutions. This should be a collaborative national effort with adequate resources to address this gap.**
- (iii) Application and promotion of pollution prevention in own organizations.
- **This is at the borderline, these principles have to be taught and there has to be management commitment to institutionalize them.**
- (iv) Awareness on the quantity, type and toxicity of hazardous waste generated in Kenya
- **This can largely be attributed to both inadequate information sharing and non-completion of the national inventory on these items, hence the need for capacity and resources to undertake this exercise.**
- (v) Lack of knowledge of institutions and local Research and development producing new, safer chemical and biological materials.
- **This can largely be attributed to lack of effective and aggressive dissemination of knowledge from these institutions which generate this information. What might be needed is a national effort to compliment these institutional initiatives with resources and marketing skills.**
- (vi) Knowledge on the role of chemicals and waste conventions in risk reduction.
- **This shows that that more of such awareness programmes have to be mounted with clear demonstration projects which will market these conventions.**
- (vii) Training and awareness to deal with poisoning and chemical incidences.
- **This is an emerging area which has to be addressed as the country continues to grow economically.**
- (viii) Institutional awareness on risk assessment, management and communication.
- **These are the fundamental building blocks for an effective risk reduction strategy in any country.**
- (ix) National capacity & readiness to tackle global concerns addressing the following:
 - Inadequate financial resources
 - Low administrative capacity
 - Other poverty alleviation priorities
 - Poor linkage of environment issues to development
 - **This is the perception of the majority of the institutions including Government departments. What is important here is to ensure there are effective awareness programmes to ensure that issues of environment and**

development are well understood resulting into more resources to address the global concerns through national actions.

(b) Knowledge and Information

These are the areas of concern:

- (i) Information on chemical management throughout their life-cycle.
- This is an emerging issue which has to be addressed in languages that can be easily understood by the various stakeholders.
- (ii) Knowledge on the presence of national laws ensuring confidentiality of commercial & industrial information.
- As the country continues to industrialize, the key players have to be equipped with this knowledge to enable them continue to protect the environment without jeopardizing economic development.
- (iii) Knowledge on the extent to which own local institutions generate scientific information on chemicals & waste management.
- This can largely be attributed to lack of effective and aggressive dissemination of knowledge from these institutions which generate this information. What might be needed is a national effort to compliment these institutional initiatives with resources and marketing skills.
- (iv) Extent of interface between local institutions and policy making bodies.
- This is important and existing working networks can be enhanced and institutions empowered to be active and constructive in these debates of national importance.
- (v) Awareness on information on hazard & risk assessments
- This is a relatively new area which has to be developed to cater for the various stakeholders and hence institutions have to be made aware of these fundamentals.
- (vi) Access to international database on chemical safety data to promote risk reduction strategies.
- This is where national institutions such as NEMA and the Government Chemist could be equipped to be one stop resource centres for such information to benefit the rest of the institutions in the country.

(c) Governance

These are the issues of concern:

- (i) Close working with other sectors in Government in promoting sound chemicals and waste management.
- This is essential and this can be built on the existing working relationship whether formal or informal between the various institutions and Government.

- (ii) Knowledge of “corporate environment & social responsibility” concept.
- **Awareness on this subject is essential to ensure that the corporate sector and the rest of the stakeholders are active participants in the quest to protect the environment. The Corporate sector can mount these programmes through projects and programmes which are visible.**
- (iii) Improvement on the part of the corporate body on its public image and perception.
- **As in (ii) above this is the perception of the institutions. It is important that actions as stated in (ii) above are designed and implemented by the corporate sector.**
- (iv) Involvement of these institutions in setting up policies.
- **This is important and existing working networks can be enhanced and institutions empowered to be active participants in these debates of national importance.**
- (v) Involvement of women in decision making processes.
- **Deliberate efforts have to continue to uplift the women at every available opportunity through deliberate programmes to enhance their effectiveness.**
- (vi) Building of local capacity to train key players in priority setting as opposed to relying on international sources.
- **It is essential to have local pool of trainers in this area.**

(d) Capacity Building and International Cooperation

From the study, it is apparent that these institutions’ capacity to train others on chemicals management is **limited** and has to be improved.

- **This is an emerging area of concern, hence new programmes have to be developed and trainers trained to equip them with knowledge to undertake this new task.**

(e) Illegal International Traffic

- (i) The roles of the Basel and Stockholm conventions in combating illegal international traffic is well known compared to the Rotterdam and Montreal Protocol.
- **There is need for more training and awareness on the Rotterdam Convention and Montreal Protocol.**
- (ii) Knowledge on the extent of domestication of these conventions into local laws.
- **This can be attributed to lack of adequate information sharing among the focal points and the rest of the stakeholders and this has to be improved through awareness programmes**
- (iii) Knowledge of the extent to which the Government shares information with other Governments. Since it is far from adequate it is an area of concern if these institutions have to play an active role in the prevention of illegal International traffic.

- This can be attributed largely to inadequate mechanisms for dissemination of such information. The country can deliberately mount such awareness programmes through the popular media to ensure that the public and all key institutions continue to support such efforts.

2 Training content

The proposed BCRC-KemI training content should take into account of the following when developing the various topics:

- (i) Trade and Environment**
 - Need to protect Africa from illegal dumping from banned chemicals and hazardous waste.
 - Senior management in public and private sector should be trained to improve quality of decision making on chemical safety and their sustainable use.
 - Participants should be challenged to air views in an interactive way around practical cases in the countries or subregions.
 - Experts should be trained to design economic instruments and interpret those already designed.

- (ii) Chemicals and waste agenda**
 - More case studies should be presented –on incidences, initiatives, failures derived from country experiences.
 - A regional database could be useful.

- (iii) Global, Regional and National stakeholders**
 - Issues covered by some IGOs such as COMESA should be addressed, including the impacts of the Customs union and experience of implementing decisions of the World Customs Union.
 - Regional collaboration in research done to develop alternatives to toxic chemicals.

- (iv) Chemicals and waste conventions**
 - More emphasis on the synergies to avoid duplication.
 - Training should be coupled with role playing.
 - Emphasis on how to access useful information on this subject beyond training by establishing networks.

- (v) National systems and Institutions for Chemicals and waste management in Africa**
 - Apart from individual country systems, it is ideal to group countries according to interaction in trading or ecosystems with a potential for harmonisation of procedures such as the Lake Victoria Environment Management Project covering three countries, Kenya, Uganda and Tanzania.

- (vi) Consideration of vulnerable groups**
 - Important to promote gender mainstreaming.
 - Men should also be included considering the case of impacts to the productive systems of men due to environmental exposure to some chemicals.
 - Special consideration for leaders in informal groups and cooperatives.

- (vii) **Consideration of vulnerable eco-systems**
- Select a few ecosystems to show impacts of chemicals to water, air, and soil such as Lake Naivasha or Lake Nakuru in Kenya.
 - Analyse effectiveness of measures taken for regional.
- (viii) **Risk Reduction**
- Many cases go unreported due to lack of incentives or confidence that action will be taken.
 - Important to factor in the ratio of Environmental experts to population in the Millennium development goals.
 - GHS has not been understood properly, with a misconception that it is meant for those who attend meetings only-it should be tailored to cater for various key stakeholders such as the Ports authorities.
- (ix) **Capacity building and technical cooperation**
- Additional tools to be included such as project development and financial mobilization.

3 Training of trainers

It is quite essential that the programme creates a pool of local trainers who would reach the larger part of the country. The list of trainers can be developed and upgraded using the format provided in this study.

4 Areas where specific projects could be developed

| SAICM AREA | POSSIBLE PROJECTS |
|---|---|
| RISK REDUCTION | Waste management (minimization) |
| | Formulation of prevention and response measures to mitigate environmental and health impacts |
| | The Role of GHS in risk Reduction |
| KNOWLEDGE AND INFORMATION | Research, monitoring and data management |
| | Hazardous data generation and availability |
| | Information management and dissemination |
| | Highly toxic pesticides risk management and reduction |
| | Use of Indicators to monitor children's environmental health |
| GOVERNANCE | International Chemicals and waste conventions-promotion of ratification and synergies |
| | Stakeholder participation in decision making processes |
| | Social and economic considerations |
| | Legal, Policy and institutional aspects |
| | EIAs to include chemicals and hazardous waste |
| CAPACITY BUILDING AND TECHNICAL COOPERATION | Capacity-building to support national actions |
| | Formulation of preventive and response measures to mitigate environmental and health impacts of emergencies involving Toxic chemicals |
| | Remediation of contaminated sites and poisoned individuals |
| | Waste management |
| ILLEGAL INTERNATIONAL TRAFFIC | Prevention of illegal traffic in toxic and dangerous goods |

CHAPTER 1. INTRODUCTION TO THE DOCUMENT

Africa participated effectively during the Strategic Approach towards International Chemicals Management (SAICM) process which led to its adoption by the world environmental ministers in February 2006 in Dubai. The following five SAICM focal areas were adopted:

- a. **Risk Reduction**
- b. **Knowledge and Information**
- c. **Governance**
- d. **Capacity Building and International cooperation**
- e. **Illegal International traffic**

The Dubai meeting, proposed quick start up actions towards the International Chemicals Management. This approach was also endorsed at the recent 11th African Ministerial Conference on Environment (AMCEN) meeting held in Congo Brazzaville from 22-26 May 2006 as a policy framework key to the realization of the 2020 Chemicals goal of the Johannesburg Plan of Implementation and called upon an all inclusive multi-sectoral and multi-stakeholder approach.¹ The African response towards SAICM implementation is articulated in the African plan for the implementation of SAICM. This plan sees challenges on how SAICM implementation can be raised as a priority issue at the national level, given the range of competing problems and issues facing most African countries. It also emphasizes the importance of defining how SAICM implementation activities can effectively support other programmes and objectives, recognising that managing chemicals is one component of **broader national** efforts to achieve environmental protection and sustainable industrial and agricultural development. Some of the key areas that have to be addressed are to demonstrate on how:

- SAICM can contribute to **national efforts** to promote pollution prevention and cleaner production, particularly within small and medium-sized enterprises.
- Decisions made in the context of SAICM implementation can have an impact on regional and international trade.
- Stronger management of chemicals positively might influence the country's international image and the market for its products
- Improvements in chemical safety enhance the health and quality of life of its citizens.

This project seeks to contribute to the **first steps** for the implementation of the SAICM.

A regional approach in the capacity building to address chemicals and waste issues has been re-emphasized and articulated through the recent AMCEN XI meeting held in Congo Brazzaville in June 2006 which emphasizes through Decision 5(j), “To request international and regional partners to support efforts to strengthen the ability of the Basel Convention regional centres to undertake capacity-building for chemicals and hazardous waste management in related multilateral environmental agreements in Africa, in line with the objectives of the Strategic Approach to International Chemicals Management and the environment initiative of the New Partnership for Africa’s Development (NEPAD)”.

At the Cairo African Regional SAICM meeting held from 11-17th Sept 2006, the Regional action plan was endorsed for implementation.² Thus the BCRC-KemI project has adopted a regional approach in its activities.

¹ African Action Plan on Implementation of SAICM

² www.chem.unep.ch/saicm

Kenya has for the past thirty years been an active participant in initiatives to protect the global environment. The consideration for chemicals management is to renew the commitment, as advanced in Agenda 21 held in Rio De Janeiro in August 1992³. The objectives on sustainable use of chemicals are contained in its Chapter 19 which is a commitment to environmentally sound management of chemicals and of hazardous wastes. This is good for the protection of human health and the environment.

1.1 Kenya's Political Commitment to SAICM

As an indication that the Government of Kenya recognises the importance of managing risks posed by chemicals, it has developed programmes and activities for informing chemical users of human health and risks when used inappropriately. Existing national policies and national action plans indicate that the Government intends to improve this through continuously building capacity for chemicals management at all levels of development⁴. However, the ability of manpower trained to manage chemical risks urgently needs to be enhanced.

1.2 Kenya's Long-term Vision on Chemicals Risk Management

The longer-term development strategy for Kenya is to revitalize its efforts to link its chemical risks management activities and projects with national development activities programmes and strategies. For example the greatest effort is to ensure that Kenya is in line with the current three years 9th National Development Plan which has a long-term national commitment to chemicals management.⁵ The plan just like SAICM encourages relevant government and private sectors to establish and participate in an effective national chemical safety co-coordinating mechanism. Aside from the Development Plan, sectoral policies are encouraging, voluntary procedures of self-regulation. Ultimately, since the Plan was made with agenda 21 and the Johannesburg Plan of implementation in mind, it will help Kenya to reach the target of the World Summit on Sustainable Development (WSSD) to ensure that by 2020 chemicals are produced and used in ways that do not negatively affect human health and the environment. Many instruments to achieve the objectives of Agenda 21 and the JPOI have been made and Kenya has actively participated in them. However currently, there is no policy on chemicals management though draft regulations have been developed. Regulations on waste management were finalized last year⁶.

Any capacity building activity should be designed to achieve synergies with other initiatives and provide better coordination among global chemical and waste management agreements MEAs, specifically between the Stockholm Convention on persistent organic pollutants (POPs), the Rotterdam Convention on the Prior Informed Consent Procedure on Industrial Chemicals and Pesticides in International Trade and the Basel Convention on the Control of Transboundary Movements of Hazardous wastes and their Disposal

³ <http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=52>

⁴ www.nema.go.ke: 1999 Policy on Environment and development

⁵ GOK , Ministry of Planning and National Development
National Development Plan 2003-2007

⁶ www.nema.go.ke :Regulations on Hazardous waste

CHAPTER 2. OVERVIEW OF THE OBJECTIVES

A number of initiatives have been made to implement SAICM in Africa and in Kenya. The Basel Convention Regional Centre for English-speaking African countries located in Pretoria, South Africa has developed together with Swedish Chemicals Agency a regional capacity assessment project to assist Kenya and other members covered by the BCRC to implement SAICM at a global, national and regional. The present baseline study and capacity needs assessment is part of this process. It is a culmination of a consultative process for key institutions involved in chemicals and waste management and broadly looks at the situation of chemicals in Kenya.

The main objectives of this pilot study were:

- To establish baseline data on National Chemicals and Wastes
- To assess the capacity of national institutions to manage chemicals and disposal facilities which include civil societies
- To review environmental legal frameworks and regulations
- To make an inventory of: (i) Industries using chemicals
(ii) Chemical importers / exporters
- To assess the capacity and needs for training
- To assess the projects-on going/completed

CHAPTER 3. METHODOLOGY

In undertaking this exercise, it was important to take advantage of information already available in Kenya through various national programmes and other expertise from various regional and international institutions as follows:

- i) National reports made towards the preparations leading to the SAICM and all relevant background information on the subject
- ii) Reviewing of relevant technical documentation available as outlined below with the help of various country experts :
 - Draft National Chemicals Profiles of 2004
 - National Implementation Plans (NIP) under the Stockholm Convention 2007⁷
 - NEMA - National Waste Management Handling, Classification and Disposal regulations and guidelines, 2007⁸
 - Inventories of training providers, universities, NGOs etc.
 - Available training curricula, training and awareness materials on chemicals and wastes of secondary and post secondary institutions
 - Policy documents such as the strategic plans
 - Academic and research institutions publications and the means in place for accessing them
 - Reports on public participation as regards effects of measures on chemical safety
 - Yearly and quarterly reports and the level of information in them
 - Responding to questionnaires which were developed by the BCRC in cooperation with KemI targeting the key stakeholders in Kenya. Five sets of questionnaires were sent

Further follow up of the respondents ensured that the questionnaires were completed. Five uncompleted questionnaires were ignored as not having substantive information for inclusion. In addition visits were made to the following institutions in which formal discussions on the questionnaires were held:

- The Government chemist
- The Agro chemical Association of Kenya
- The Ministry of Environment and Natural Resources
- The National Environment Management Authority

Discussions were held with various enterprises, institutions and individuals in business, research institutions, regulatory agencies and the Non government Organizations (NGOs).

It is important to note that some enterprises which were consulted felt that the questionnaires were too lengthy⁹.

Finally there was one stakeholders' meeting held on the 28th May 2007 in Nairobi where key institutions were represented. The meeting aimed at assessing the country's choice of potential future projects of national importance.

⁷ www.pops.int : Nips/Kenya

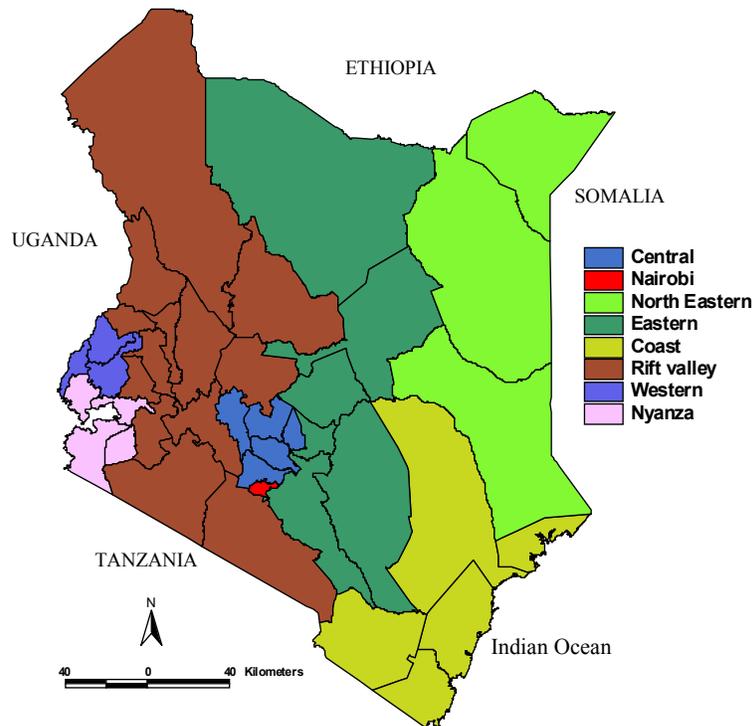
⁸ www.nema.go.ke : Waste regulations

⁹ Kenya Association of Manufacturers - email exchange Kihumba/Kamau

CHAPTER 4. BACKGROUND COUNTRY INFORMATION

4.1 Basic National Data

Fig 4.1 Provinces in Kenya



Source: Survey of Kenya

4.1.1 Physical and Demographic Context

- Size: 580,697 Sq km
- Form of The Government: **Republican**
- Official Languages: **English, Swahili**
- Local Languages: **42 different local languages**
- Total Population: **32 Million in 2003**
- Urban Population: **25% (under city, municipality of Town Council)**
- Rural Population: **75%**
- Average Age Of Population: **18.6 Years**
- Population Of Working Age: **20%**
- Birth Rate: **27.82/1000 Population**
- Life Expectancy: **44.94 Years**
- Average Education Level Of Population: **Secondary school**
- Unemployment Rate **60%**
- Percentage of women employed outside the home: **30%**

4.1.2 Administrative Regions

Kenya has eight administrative provinces namely Nairobi, Central, Eastern, Rift Valley, Coast, North Eastern, Western, and Nyanza. These are headed by Provincial Commissioners. In turn the provinces are divided into 101 districts, which are the basis for providing government services. They are headed by District Commissioners. Districts are divided into divisions headed by a district officer and finally to a location headed by a chief.

Fig 4.1 shows the major provinces of Kenya. NEMA is represented at district, provincial and national level.

The central government enforces laws, regulations and administrative directives from ministers at the provincial, district and location levels with financing from the Treasury. The local Government is headed by the Minister for Local Government. The local authorities though financed by a local Government allocation from the central government are distinct entities of government.

4.1.3 Urbanization, Municipalities, Towns Council and Other Urban Centres.

The high rate of urbanization in Kenya is associated with high rates of industrial and agricultural solid waste generation. It is estimated that 34.8% (i.e., 10 million) of the total population of Kenya resides in the urban centres, with the largest five cities (Nairobi, Mombasa, Kisumu, Nakuru, and Eldoret) accounting for a third of the urban population. It is fuelled by both natural growth and rural-urban migration. This has strained the capacity of Kenyan cities to provide critical services such as the collection, transport, treatment and disposal of wastes which eventually become hazardous. That is why impacts of toxic chemicals and wastes are mostly manifested. The 2005 population growth rate is 2.95% with an inflation rate of 11%.¹⁰

The most recent United Nations estimates suggest that Kenya's urban population will expand to 38 million by the year 2030, accounting for 62.7 percent of the national population. While the exact rate of urbanization may be disputed, the trend is that within 20 years or so, the majority of the Kenyan population will be living in urban areas. The scale of future urbanization will pose further socio-economic, environmental and institutional challenges for Kenyan cities. The Government's launch of its *Vision 2030*¹¹ highlighted rapid urbanization as one of four key challenges for the country alongside income inequality, unemployment and low savings. Kenya is also striving hard to meet its Millennium Development Goals.

The physical size of a municipality and its population is important because it determines their industrial, agricultural and service sector which are likely to use chemicals and generate waste.

The other major determinant is the economic activities and especially the type and complexity of the industries and informal groups in such an area. It also is a typical characteristic that there is an over concentration of chemical related activities in one area.

¹⁰ Source: Central Bank of Kenya Monthly review for June 2005

¹¹ Kenya Vision 2030

Table 4.1 shows the Nairobi City and municipalities while Table 4.2 has the data on population in the town councils with over 70,000 people.

Table 4.1. Population in the Municipalities

| No. | Name of centre | District | Status | Population |
|-----|-----------------|-----------------------|---------------------|------------------|
| 1. | <u>Nairobi</u> | <u>Nairobi</u> | <u>City</u> | <u>2,143,254</u> |
| 1. | <u>Mombasa</u> | <u>Mombasa</u> | <u>Municipality</u> | <u>665,018</u> |
| 2. | <u>Kisumu</u> | <u>Kisumu</u> | <u>Municipality</u> | <u>322,734</u> |
| 3. | <u>Nakuru</u> | <u>Nakuru</u> | <u>Municipality</u> | <u>231,262</u> |
| 4. | <u>Eldoret</u> | <u>Uasin Gishu</u> | <u>Municipality</u> | <u>197,449</u> |
| 5. | <u>Naivasha</u> | <u>Nakuru</u> | <u>Municipality</u> | <u>158,678</u> |
| 6. | <u>Kehancha</u> | <u>Kuria</u> | <u>Municipality</u> | <u>151,465</u> |
| 7. | <u>Machakos</u> | <u>Machakos</u> | <u>Municipality</u> | <u>143,274</u> |
| 8. | <u>Meru</u> | <u>Meru Central</u> | <u>Municipality</u> | <u>126,427</u> |
| 9. | <u>Karatina</u> | <u>Nyeri</u> | <u>Municipality</u> | <u>126,337</u> |
| 10. | <u>Malindi</u> | <u>Malindi</u> | <u>Municipality</u> | <u>118,428</u> |
| 11. | <u>Ruiru</u> | <u>Thika</u> | <u>Municipality</u> | <u>109,574</u> |
| 12. | <u>Vihiga</u> | <u>Vihiga</u> | <u>Municipality</u> | <u>109,508</u> |
| 13. | <u>Kitui</u> | <u>Kitui</u> | <u>Municipality</u> | <u>106,873</u> |
| 14. | <u>Thika</u> | <u>Thika</u> | <u>Municipality</u> | <u>106,707</u> |
| 15. | <u>Nyeri</u> | <u>Nyeri</u> | <u>Municipality</u> | <u>101,238</u> |
| 16. | <u>Kericho</u> | <u>Kericho</u> | <u>Municipality</u> | <u>93,213</u> |
| 17. | <u>Kitale</u> | <u>TransNzoia</u> | <u>Municipality</u> | <u>86,282</u> |
| 18. | <u>Bomet</u> | <u>Bomet</u> | <u>Municipality</u> | <u>84,320</u> |
| 19. | <u>Kakamega</u> | <u>Kakamega</u> | <u>Municipality</u> | <u>74,115</u> |
| 20. | <u>Bungoma</u> | <u>Bungoma</u> | <u>Municipality</u> | <u>73,048</u> |
| 21. | <u>Webuye</u> | <u>Bungoma/Lugari</u> | <u>Municipality</u> | <u>70,137</u> |

Source: 1999 Population Census

Table 4.2 Town Councils with population of over 70,000 people

| No. | Name of Centre | District | Status | Population |
|-----|----------------|------------------|--------------|------------|
| 1. | Tala/Kangundo | Machakos | Town Council | 179,952 |
| 2. | Kikuyu | Kiambu | Town Council | 156,131 |
| 3. | Mumias | Butere/Mumias | Town Council | 105,446 |
| 4. | Nyamira | N/Kisii(Nyamira) | Town Council | 100,082 |
| 5. | Molo | Nakuru | Town Council | 96,158 |
| 6. | Migori | Migori | Town Council | 95,446 |
| 7. | Awendo | Migori | Town Council | 90,153 |
| 8. | Rongo | Migori | Town Council | 79,817 |
| 9. | Nandi Hills | Nandi | Town Council | 77,514 |
| 10. | Kilifi | Kilifi | Town Council | 75,527 |
| 11. | Karuri | Kiambu | Town Council | 71,475 |
| 12. | Kimilili | Bungoma | Town Council | 71,461 |

Source: CBS 1999 Population Census

4.1.4 Kenya's Economy in the Region and the Economic Situation.

Kenya has the largest economy in East Africa with a Gross Domestic Product (GDP) of US\$12.2 billion in 2005 according to the Central Bank of Kenya Monthly review for June 2005. This is more than a third larger than that of Tanzania and twice the size of that of Uganda. Agriculture dominates Kenya's economy accounting (with forestry and fishing) for about 24 % of GDP. Agricultural products also make up the nation's principal exports and the sector is one of the largest consumers of chemicals.

Manufacturing is also an important user of chemicals. Formal manufacturing accounts for 13 % of GDP¹². In both agriculture and manufacturing, the informal sector is large and growing currently employing about 40% of the labour force. The sector contains all semi-organized small-scale and unregulated activities. They are involved in reformulation and repackaging of chemicals, recovery and recycling of wastes as well as their treatment and disposal

The main contributors of the Kenyan economy are agriculture, tourism, services, energy and manufacturing. Agriculture and manufacturing constitute the largest users of chemicals and also generators of waste. The Kenya Economic policies have been following a constructive trend since 2002 when the Government of the National Rainbow Coalition (NARC) Party took the reigns of power. Since then it has been on a recovery trend. Real Gross Domestic Product (GDP) computed on the basis of the new system of Nations Accounts (1993 SNA) expanded by 4.3% in 2004 compared to 2.8% in 1993. Growth was reflected in areas of chemical use such as manufacturing, services and agriculture.

The summary of Kenya's population, growth, GDP for selected economic indicators for the period 1998-2003 is shown in Table 4.3.

Table 4.3 Social Economic Indicators

| Criteria | 2000 | 2001 | 2002 | 2003 | 2004 |
|-----------------------------------|---------|---------|---------|---------|---------|
| Population | 30.2 | 30.9 | 31.8 | 32.7 | 33.6 |
| Area Sq km | 580,697 | 550,697 | 580,697 | 580,697 | 580,697 |
| Share of agriculture (GDP %) | 28.4 | 27 | 24.9 | 24.6 | 24.7 |
| Share of Manufacturing in GDP (%) | 10.3 | 9.7 | 9.8 | 9.6 | 9.9 |
| Inflation Rate | 8.9 | 9.6 | 10.1 | 9.9 | 10.3 |

Source: Central Bureau of Statistics: Statistical Abstracts, 2004

¹² CBS 2005.

The contribution of each sector is as shown in Table 4.4.

Table 4.4 Overview of the industrial, agricultural and mining sectors

| <u>Item</u> | <u>Sector</u> | <u>Contribution to GDP (%)</u> | <u>Activities Chemicals</u> |
|-------------|---|--------------------------------|---|
| <u>1</u> | <u>Industrial/ manufacturing sector</u> | <u>18.6</u> | <u>Chemicals and paints</u> <u>Agro based industry</u> <u>Construction materials</u> <u>Plastics</u> <u>Metals virgin</u> <u>Scrap metal</u> <u>Paper printing and Publishing</u> <u>Textile and Leather</u> |
| <u>2</u> | <u>Mining and Extraction</u> | <u>1.0</u> | <u>Production of :</u> <u>Soda ash</u> <u>Lime</u> <u>Cement</u> <u>Salt mining</u> <u>Diatomite</u> <u>Fluorspar</u> <u>Titanium</u> |
| <u>3</u> | <u>Agriculture</u> | <u>19.7</u> | <u>Agricultural fertilizers</u> <u>Pest Control Chemicals:</u> <u>Coffee</u> <u>Horticulture</u> <u>Fishery</u> <u>Pyrethrum</u> <u>Livestock</u> <u>Cotton</u> |
| | <u>Total</u> | <u>39.3</u> | |

Source: Central Bureau of Statistics: Statistical Abstracts, 2004

The set up of firms is as shown in Table 4.5

Table 4.5 Firm size

| <u>Firm Description</u> | <u>No of employees</u> | <u>%</u> |
|-------------------------|------------------------|-------------|
| <u>Small</u> | <u>10 – 49</u> | <u>38.3</u> |
| <u>Medium</u> | <u>50 – 99</u> | <u>17.4</u> |
| <u>Large</u> | <u>100 – 499</u> | <u>31.1</u> |
| <u>Very Large</u> | <u>+ 500</u> | <u>13</u> |

Source World Bank; enhancing the competitiveness of Kenya manufacturing sector. The role of the investment climate. November, 2004

Most informal sector enterprises fall in the small scale description while most small formal enterprises are classified. From medium and above, enterprises are required to have health and safety committees. They are also required to have annual environmental audits under the EMCA.

Table 4.6: Firms by Activity

| | <u>FIRM ACTIVITY</u> | <u>%</u> |
|----|-----------------------------|----------|
| 1 | Agro Industry | 24.5 |
| 2 | Bakery | 5.0 |
| 3 | Chemicals and Paints | 8.9 |
| 4 | Construction Materials | 6.0 |
| 5 | Furniture | 2.8 |
| 6 | Garments | 7.1 |
| 7 | Leather | 1.8 |
| 8 | Machinery | 2.5 |
| 9 | Metal | 14.9 |
| 10 | Paper, Printing, Publishing | 6.4 |
| 11 | Plastic | 8.2 |
| 12 | Textile | 7.8 |
| 13 | Wood | 4.3 |

Source World Bank; enhancing the competitiveness of Kenya manufacturing sector. The role of the investment climate. November, 2004

Much work has been done to address all risks posed to workers by the working environment in order to address issues of worker compensation and insurance premiums. From adhoc surveys done by various safety and risk surveyors, it is apparent that the understanding of risks caused by chemicals and related issues is not wide.¹³ In a study done by the World Bank and KIPPRA for the government of Kenya to diagnose problems in various economic sectors, a survey of the Kenyan workforce in manufacturing indicated that the workforce is well educated¹⁴ and therefore should be able to read safety notes. About 10.7% have some sort of secondary post or some sort of university education. However the largest proportion of workers with a university degree is found in sectors with significant technological requirements such as chemicals (17.2 %), agro industry (13.9%) and plastics (11%). The bulk of trained professionals prefer to work for large and very large firms which means in these areas workers are exposed less to chemical risks.

4.2 Production of Chemicals

Kenya is not a major producer of chemicals. However there is an extensive extraction of minerals. The other major source is the recovery of chemicals from.

4.2.1. Basic Industrial Chemicals

These are chemicals produced with minimal inputs from outside. These include oxygen, nitrogen, chlorine, hydrogen chloride, carbon dioxide, sulphur dioxide, sulphuric acid, sulphonic acid, fertilizers, acetylene are key products in this category. Industrial alcohol, methanol, liquid petroleum gas, pyrethrum extract, lead, lead oxide, mercury and others. The main producers of these chemicals are in Table 4.5 There are 32 registered industries involved in the manufacture of basic industrial chemicals. Agrochemicals and Mollases Ltd-Kisumu are main producers of ethanol and industrial spirits for local and consumption and export. Agrochemicals and Foods Company Ltd produces methane mainly for its energy needs. Orbit Chemicals Ltd produces sulphuric acid mainly for its detergent factories.

¹³ Ministry Of Agriculture: Strategy for revitalizing agriculture 2004 – 2014

¹⁴ World Bank; enhancing the competitiveness of Kenya Manufacturing sector. The role of the investment climate. November, 2004

Table 4.7 Major Producers of Basic Chemicals

| <u>N</u> <u>o</u> | <u>Producer</u> | <u>Location</u> | <u>Specialization</u> |
|----------------------|----------------------------------|-----------------|--|
| <u>1</u> | BOC(K)Ltd | Nairobi | Oxygen |
| | | | Nitrogen |
| | | | Inert Gases(|
| <u>2</u> | Pan African Paper Mills | Webuye | Hydrogen Chloride |
| | | | Chlorine |
| <u>4</u> | Carbacid (K)Ltd | Uplands | Carbon Dioxide |
| <u>5</u> | Kenya Breweries Ltd | Ruaraka | Carbon Dioxide |
| <u>6</u> | Kel chemical Ltd | Thika | Sulphuric Acid |
| <u>7</u> | East African Heavy Chemicals Ltd | Webuye | Sulphuric Acid |
| <u>8</u> | Agro Chemical and Foods Ltd | Muhoroni | Industrial Ethanol, Industrial spirits. Alcohol Methanol |
| <u>9</u> | Kel Chemicals Ltd | Thika | Fertilizers |
| <u>10</u> | Chloride Exide(K) Ltd | Nairobi | Lead |
| <u>11</u> | Orbit Chemicals(K) Ltd | Mavoko | Sulphonic Acid |
| <u>12</u> | Kisumu Molasses Ltd | Kisumu | Ethanol |

Source: Kenya Association of Manufacturers Directory, 2005

4.2.2 Production of Mineral Based Chemicals.

The mining sub-sector contributes 3% of Kenya's total export earnings annually. The significant minerals produced in the country include among others soda ash, gypsum, fluorspar, limestone, diatomite, salt, carbon dioxide, glass sands, clays, soapstone and building stones. Minerals currently contribute about 1 % of GDP per annum. Substantial deposits of titanium minerals are known and are being exploited at the Coast Region of Kenya. There is a lot of small scale mining such as gold mining in Kakamega using Mercury. However, the environmental or health impacts of such mining activities are yet to be documented except for the very extensive environmental impact assessment carried out for the mining of Titanium¹⁵.

Table 4.8: Quantity of Mineral production 2000-2004.

| <u>Minerals (tons)</u> | <u>Location</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> |
|---------------------------|-------------------|----------------|---------------|---------------|---------------|----------------|
| <u>Soda Ash</u> | <u>Athi River</u> | <u>238,190</u> | <u>297.78</u> | <u>304,11</u> | <u>352,56</u> | <u>355,110</u> |
| | <u>Baringo</u> | | <u>0</u> | <u>0</u> | <u>0</u> | |
| <u>Fluorspar</u> | <u>Malindi</u> | <u>100,102</u> | <u>118,85</u> | <u>5,015</u> | <u>80,201</u> | <u>117,986</u> |
| <u>Salt</u> | <u>Athi river</u> | <u>16,359</u> | <u>0</u> | <u>18848</u> | <u>21,199</u> | <u>26,607</u> |
| <u>Crush refined Soda</u> | <u>Kariandusi</u> | <u>382,556</u> | <u>5,665</u> | <u>474,01</u> | <u>576,14</u> | <u>600,209</u> |
| <u>Diatomite</u> | <u>Bamburi</u> | <u>8,323</u> | <u>297.64</u> | <u>4</u> | <u>6</u> | <u>7,092</u> |
| <u>Cement</u> | <u>Portland</u> | <u>1366</u> | <u>7</u> | <u>5,668</u> | <u>4,971</u> | <u>1,873</u> |
| | | | <u>6,087</u> | <u>1537</u> | <u>1,649</u> | |

Source: MENR: Department of Mines and Geology

¹⁵ NEMA, state of Environment Report, 2005

Table 4.9. Value on Kshs (10)9

| <u>Mineral</u> | <u>2000</u> | <u>2001</u> | <u>2002</u> | <u>2003</u> | <u>2004</u> |
|---------------------|-------------|-------------|-------------|-------------|-------------|
| <u>Soda Ash</u> | <u>1.96</u> | <u>2.7</u> | <u>2.7</u> | <u>3.1</u> | <u>3.5</u> |
| <u>Fluorspar</u> | <u>0.62</u> | <u>0.73</u> | <u>0.63</u> | <u>0.50</u> | <u>1.0</u> |
| <u>Salt</u> | <u>0.05</u> | <u>0.10</u> | <u>0.06</u> | <u>0.06</u> | <u>0.1</u> |
| <u>Refined Soda</u> | <u>0.04</u> | <u>0.02</u> | <u>0.04</u> | <u>0.05</u> | <u>0.05</u> |
| <u>Other</u> | <u>0.9</u> | <u>1.2</u> | <u>1.3</u> | <u>1.4</u> | <u>0.67</u> |
| <u>Total</u> | <u>3.6</u> | <u>4.8</u> | <u>4.7</u> | <u>5.0</u> | <u>5.3</u> |

Value in (Billion) (1US \$ = 69 KSHS)

Source: MENR: Department of Mines and Geology

a) Lead

Lead is used mainly in motor vehicle and solar battery lead acid production mainly by Chloride (K) Ltd in Nairobi industrial area with sulphuric acid from KEL Chemicals Ltd. In the past Chloride relied on virgin material with lead ore obtained from Kinango in the Coast Province. Lately, lead ore has become less attractive and in Kenya, lead is normally recycled from the old batteries. Kenya's old battery lead smelter is managed by Chloride (K) Ltd and is located in Athi River. It requires about 500 tonnes of scrap batteries in a month. At the moment the smelter is only getting 300 tonnes i.e. 3600 tonnes per annum. Previously the company used to be overwhelmed by the supply of scrap batteries with Nairobi alone contributing 120 tonnes per month. Demand for scrap batteries has shot up in the face of unavailability of new lead in the market. The high demand for lead has led to the birth of a few other informal smelters in Nairobi's Kariobangi area. On the plains of Athi River, another illegal smelter has been cashing in on the increased demand. There is also large export of battery scrap lead to China.

b) Cement and Lime Products

There are three cement plants whose combined production capacity is 1.87 million tonnes per year. They are East Portland Cement Co Ltd in Athi River, Bamburi Portland Cement Co Ltd, and Kaloleni Cement Company in Kaloleni. Domestic consumption of cement is currently at 1.5 million tonnes per year leaving a surplus of 0.3 million tonnes for export. The main raw materials for cement production are limestone, pozzuolana and gypsum which are available in adequate quantities in various parts of Kenya especially in the Athi Plains and also plenty in the North Eastern Province. In addition there is one clinker grinding plant with a combined production capacity of about 1 million tonnes/year. All the plants engage cement kilns for cement manufacture by dry process. Cement factories were subjected to intense study during the inventory for sources of persistent organic pollutants carried under the development of a national implementation plan for SAICM. Cement industries are concerned because the fuel they use could be a source of polychlorinated dioxins and furans (PCDD/Fs)¹⁶ which can arise from any thermal process where chlorine is present in any form. For example, coal used by Bamburi Portland cement contain trace amounts of chlorine compounds which can under certain combustion conditions result in PCDD/F formation. In addition PCDD/Fs can themselves be present in the feed stock material, or chlorinated impurities may be introduced into the feed stock of the thermal processes especially when waste oil, tyres or solid waste is used to fuel the cement production processes.

¹⁶ MENR, Kenya POPs Inventory, July 2006

c) Ceramics:

There are three ceramic plants producing crockery, wall tiles and sanitary ware. The basic raw materials such as silica sand, Kaolin, Kisii soapstone, quartz etc. are locally available. Despite adequate raw materials availability, the industry is poorly developed and unable to meet local demand. The industry also lacks qualified and well-trained ceramists. The risk and hazards posed by this industry are to a lesser extent the same exhibited by the cement industry. It happens that the cement, ceramics and tanneries are located in one area in Athi river, Mavoko Municipality which does not have adequate waste management infrastructure.

Lime production involves three main processes: quarrying the raw materials, crushing and sizing and calcining at high temperatures of around 1100 °C to produce lime and calcium hydroxide. This combustion at high temperatures leads to release of unintentionally produced persistent organic pollutants. It also produces high level of particulate matter. Lime is used in pulp and paper industry, construction materials, effluent treatment, water softening, pH control and soil stabilization.

d) Glass

In brick manufacturing the finished products are fired in closed up kilns with a temperature range of 1000-1200 °C. This combustion process is a source of PCDD and PCDFs whose levels are relative to scale of production and pollution control mechanisms. Most brick manufacturing are generally small. The major ones are in Table 4.10

Table 4.10: Mineral Production Companies:

| | <u>COMPANY</u> | <u>LOCATION</u> | |
|----|---|--|--------------------------|
| 1 | <u>East Africa Portland Cement</u> | <u>Athi River, Machakos</u> | <u>Cement</u> |
| 2 | <u>Bamburi Portland Cement Co. Ltd</u> | <u>New Malindi Rd, Mombasa</u> | <u>Cement</u> |
| 3 | <u>Bamburi – Nairobi grinding plant</u> | <u>Athi River, Nairobi</u> | <u>Clinker</u> |
| 4 | <u>Homa Lime CO Ltd</u> | <u>Koru, Kericho</u> | <u>Lime</u> |
| 5 | <u>Central Glass Industries Ltd</u> | <u>Nairobi</u> | <u>Glass recycling</u> |
| 6 | <u>Kenya Glassworks Ltd</u> | <u>Mbaraki St., Mombasa</u> | <u>Glass</u> |
| 7 | <u>Magadi Soda</u> | <u>Magadi</u> | <u>Soda ash</u> |
| 8 | <u>Mombasa salt works ltd</u> | <u>Mombasa</u> | <u>NaCl</u> |
| 9 | <u>Krystalline Salt Ltd</u> | <u>Coast - Zanzibar Rd</u> | <u>NaCl</u> |
| 10 | <u>Kaloleni cement & limeworks</u> | <u>Nairobi</u> | <u>Cement</u> |
| 11 | <u>Clayworks Ltd</u> | <u>Thika Rd, Nairobi</u> | <u>Bricks</u> |
| 12 | <u>Kenya Clay Products Ltd</u> | <u>Ruiru</u> | <u>Bricks</u> |
| 13 | <u>M/S Ceramics manufacturing ltd</u> | <u>Nairobi</u> | <u>Ceramics</u> |
| 14 | <u>Refractories Ltd</u> | <u>Kamiti, Nairobi</u> | <u>Ceramics</u> |
| 15 | <u>Atlantics Ceramic Ltd</u> | <u>Ind. Area, Nairobi</u> | <u>Ceramics</u> |
| 16 | <u>Ceramic Industries E.A. Ltd</u> | <u>Kitui Road, Industrial. Area, Nairobi</u> | <u>Ceramics</u> |
| 18 | <u>Kenya Asbestos Cement Co Ltd</u> | <u>Malindi Road, Mombasa</u> | <u>Asbestos Products</u> |

These products are relevant in the chemicals they release to the working environment as silicates, carbonates and asbestos dusts. They also use coal and heavy diesel for heating and curing bricks as well as releasing large amounts of acid rain air pollutants such as sulphur dioxide.

There is only one major glass container plant in the country namely Central Glass Industries located at Ruaraka in Nairobi. The basic raw materials for glass manufacture such as soda ash, silica sand, sodium sulphate and flourspar etc. are locally available. There is also

extensive recycling of bottles for both the beer and soda industries. The major chemical components are silicates and air pollutant emissions from the blast furnaces.

e) Fertilizers

Kenya relies largely on commercially produced and aid fertilizer imports from the United States of America, Gulf States, Europe, the Middle East and parts of Asia. Over the past three years, imports were in the range between 196,000 to 244,000 tonnes per annum, while the estimated consumption ranged between 237,000 and 253,000 tonnes per annum.¹⁷ Donor-aid fertilizer has constituted about 40 per cent of phosphate (DAP) for planting and Calcium Ammonium Nitrate (CAN) for top-dressing. Also large amounts of NPK 25:5:5 + 5S are imported and used mainly on tea.¹⁸ Presently Kenya has one plant fertilizer (KEL Chemicals Ltd) which has a production capacity of 40,000 tonnes per year (the local market demand) of super-phosphate. The rest of the fertilizers whose demand is about 240,000 tonnes per year are imported. A fertilizer release into aquatic ecosystems is causing eutrophication in lakes a major problem in Lake Naivasha and Victoria.

f) Chlorine and Soda Ash Production

The major chlorine plants and soda ash also use heavy fuels for extraction. PCDD/Fs have been identified as been produced during production of pulp using elemental chlorine.¹⁹ Most of these emissions are generated during bleaching stage where chlorine is used. A secondary source of pulp is the recycling of waste paper purchased from collectors. Paper recycling involves the de-inking process that results to release of air pollutants into the environment.

Kenya's largest pulp and paper mill is located in Webuye Town, Bungoma District. The company uses elemental chlorine for its bleaching process for its high production capacity of about 26,000 tonnes/year. Environmental pressures arising from pulp and paper mills include high demand for paper in view of the absence of any other paper mill in the country. Cleaner production measures for reducing or eliminating toxic elements in wood and non-wood bleaching processes include eliminating elemental chlorine and replacing it with chlorine dioxide (elemental chlorine-free bleaching) or in some cases with total chlorine-free a fact which has been addressed extensively under the National Implementation Plan (NIP) for POPs processes.

Table 4.11: Paper and Paper Products Manufacturing Industries

| NO | COMPANY | LOCATION | |
|----|---------------------------------|-----------------------------------|--------------------|
| 1 | Kenya Papermill E.A. ltd | Factory St, Thika | Recycling |
| 2 | Panafrican paper mills (EA) LTD | Webuye, Bungoma | Pulp and recycling |
| 3 | Kisumu Paper Mills Ltd | Busia Road, Kisumu | Recycling |
| 4 | Madhu Paper International Ltd | Ind. Area, Nairobi | Recycling |
| 5 | Highland Paper Ltd | Somali Road, Eldoret, Uasin Gishu | Recycling |

Source KAM Directory, 2005

4.3 Chemical Imports

The chemical sector is heavily dependent on imported raw materials which constitute on average 70% of the manufacturing sector requirements. In 2004 import costs for the sector were 16%. This was for chemical elements and their compounds, insecticides, fungicides,

¹⁷ Kenya Tea Development Authority, Quarterly Report 2006

¹⁸ MOA Strategic Plan 2006-2014

¹⁹ www.pops.int : Meetings/ BAT/BEP Guidelines

disinfectants, and various finished products. The major imports originating countries were European Union countries mainly UK, Germany, Netherlands, Switzerland, Japan, USA and India. Most of the raw material is duty free if they are not available locally.

The overall import for the year ended April 2005 was 16.5% for chemicals and for oil 24.8%.

Most of the toxic chemicals used in Kenya are imported in bulk and distributed through networks of small scale enterprises like the informal sector described above. Kenya in an effort to encourage capital investment has embraced trade liberalization and one stop licensing and project approvals. This has weakened rather than strengthened chemicals monitoring. Taking into account that there are many chemical laboratories, it is also noted that use of laboratory chemicals is very minimally regulated as there is no institution charged with doing so.

This aspect is complicated by Kenya's position as a transit country.

The Port of Mombasa provides an entry and outlet for the land-locked countries of Uganda, Rwanda, Burundi, Tanzania, DRC and Sudan. In the period between 2000 –2004, 72% of the Kenya railways²⁰ traffic were imports, of which 44% was oil, 15% was transit traffic bound for neighbouring countries and 28% were exports. 70% of Kenya Ports Authority hinterland bound traffic is handled by the road network while the railway handles the remaining 30%.

Table 4.12 Imports and exports of chemicals in 2006

| <u>Chemical Type and use</u> | <u>Production/manufacturing (tonnes/year).</u> | <u>Imports/year tonnes</u> | <u>Exports (tonnes/year)</u> |
|---|--|----------------------------|------------------------------|
| <u>Pesticides (agricultural, public health & consumer use).</u> | 133 | 7708 | 1922. |
| <u>Fertilizers</u> | 40,000 | 522,422 | NIL. |
| <u>Petroleum Products</u> | NIL | 1,382,000 | 3000 |
| <u>Industrial</u> | 600,000 | 175,000 | 657,283 |
| <u>Total</u> | 640,133 | 2,087,130 | 662,205 |

Source: Central Bureau of Statistics

The only chemicals exported to the tune of 600,000 tonnes are sodium carbonate and fluorspar (calcium fluoride). The later is important as a health risk since dental fluorosis is a major health hazard in Kenya especially in the districts of Muranga and Baringo where levels of fluorides far exceed the World Health Organization guidelines²¹

4.3.1 Petroleum Products

Petroleum is the major source of many chemical based industries as well as energy. In 2004 Kenya imported 2,504,700 tonnes of crude and refined products. Some of the imported petroleum is re-exported to neighbouring landlocked countries of Rwanda, Burundi, Eastern Democratic Republic of Congo, Southern Sudan and Uganda. The transport sector (rail, road,

²⁰ Central Bureau of Statistics Economic survey, 2006

²¹ Threat From The Lake: The East African Standard, 12 May, 2007

marine and aviation) is the largest consumer of petroleum fuels. The key products of petroleum are gasoline, liquid petroleum gas and butane. All other basic hydrocarbons are imported. The risks posed are from spills and air pollution from combustion of the fuels.

4.3.2 Pesticides (including pyrethrum extract)

The pesticides industry consists mainly of firms formulating and repacking pesticide materials. They contribute 3% of the manufacturing sector. Some of the major raw materials are not locally available and this has led to low growth in the industry. The only raw material available locally is pyrethrin extracted from pyrethrum flowers. The Government is encouraging firms to add value on pyrethrin so that Kenya exports semi processed or finished products²².

4.3.3 Agro-chemicals

This comprises of pesticides and fertilizers. Kenya being an agricultural country imports many of these products but lacks proper facilities for disposal of resulting wastes.

Agro-chemical wastes are also generated at farm level for instance flower and coffee farms. Inadequate disposal facilities affect the management of pesticides wastes in several Government institutions, co-operative unions, and societies. The inventory on POPs found out that these sources and other places generate waste totalling about 400 metric tonnes throughout the country. These are awaiting disposal. There are five identified sites in the country with suspected toxic chemicals contaminated soils estimated at 700 metric tonnes awaiting excavation and disposal²³. The sites are located at Gaitu in Meru Central, Naivasha, Ngurumaini in Kajiado, Wajir and Mandera. The site at Kitengela, with an estimated 200 metric tonnes of toxic chemicals, needs careful management as it is located next to a river prone to flooding²⁴.

4.3.4 Importation of pest control products in 2005

Approximately 8370 metric tonnes of pesticides with a value of Kshs 4.68 billion were imported into the country in 2005²⁵. The major active substances involved were glyphosate(702,000 l), copper oxychloride (476,150 kg), mancozeb (449 000 kg), amitraz (433,388 l), 1,3-dichloropropene (432, 000), 2,4-diamine (240,600 l), sulphur (203,000 kg), chlorothalonil (203,000kg),(cuprous oxide(202,000kg), methyl bromide(187,000 kg) and dimethoate (173,320 l) in order of decreasing volume. In the year 2005 more insecticides were imported in comparison to other pesticides. Figure 4.13 shows the types and quantities of the agrochemicals imported and their values.

²² MENR, The Kenya NIP for POPs, 2007

²³ MENR, Kenya POPs Inventory, 2006

²⁴ iLima, IPEN Egg Report Report,2006

²⁵ Agrochemical Association of Kenya, Pest Control Products Board Annual Reports 2006

Table 4.13: Volume and value of pesticides imported in 2005

| <u>NO</u> | <u>Category</u> | <u>Quantity in Kg.</u> | <u>Value in Kshs</u> |
|-----------|--------------------|------------------------|----------------------|
| <u>1</u> | <u>Fungicides</u> | <u>2,490,421.07</u> | <u>1,492,432,125</u> |
| <u>2</u> | <u>Herbicides</u> | <u>1,909,757.60</u> | <u>833,766,673</u> |
| <u>3</u> | <u>Insecticide</u> | <u>2,960,230.00</u> | <u>2,100,159,886</u> |
| <u>4</u> | <u>*Others</u> | <u>1,010,538.40</u> | <u>248,774,625</u> |
| | <u>Total</u> | <u>8,370,947.07</u> | <u>4,675,133,311</u> |

Source: Pest Control Products Board

*These include fumigants, rodenticides, growth regulators, defoliators, proteins, surfactants and wetting agents. Data is based on applications for importation of pest control products for commercial purposes approved by the Pest Control Products Board (PCPB). This excludes quantities imported by the Ministry of Agriculture as commodity aid | grants.

4.4 Chemical Exports

Approximately 65 metric tonnes worth Ksh 52million were exported from Kenya in 2005 to the neighbouring countries mainly (Burundi, Uganda and Tanzania). The pesticides exported were mainly cypermethrin, sarbofuran and chlorfenvinphos.

4.5 Chemical Consumption

Agriculture, manufacturing and services are the major consumers of chemicals. The main manufacturing enterprises both large and small are key users of chemicals. They represent an estimated 6% of the GDP²⁶ in 2004. The transport sector is also a major user of chemicals and wastes are generated in petrol stations, garages, etc. The energy sector using chemicals includes electric power generation using fossil fuels, power storage batteries, oil, refrigeration/metal treatment etc. The transport sector which has both informal and formal polymers is usually prolific non point sources of toxic pollutants mainly such as solvents, oils, greases, additives etc.

Table 4.14 gives a summary of chemical categories in use

Table 4.14: Summary: Annual Chemical by Categories.

| <u>Type of Chemical</u> | <u>Quantity (Kg)</u> | <u>Activity</u> |
|--------------------------------------|----------------------|--------------------------------------|
| <u>Pesticides – Agricultural</u> | <u>3,305,203</u> | <u>Imports</u> |
| <u>Pesticides – Consumer Use</u> | <u>8000</u> | <u>Imports</u> |
| <u>Fertilizers</u> | <u>562,000</u> | <u>Production/import/export</u> |
| <u>Petroleum Products</u> | | <u>Imports –i.e.-exports</u> |
| <u>Industrial Toxic chemicals</u> | <u>5,597,742</u> | <u>Import/Production</u> |
| <u>Paints, pigments, varnishes</u> | <u>1,090,890</u> | <u>Imports</u> |
| <u>Medicinal and Pharmaceutical</u> | <u>9,728,239</u> | <u>Imports</u> |
| <u>Soaps, cleansing and plastics</u> | <u>586,320</u> | <u>Imports</u> |
| <u>Fertilizers</u> | <u>1,107,567</u> | <u>Imports and Locals Production</u> |

²⁶ Manufacturing in Kenya-A Survey of Kenya's Manufacturing Sector,2006

| | | |
|------------------------------------|----------------------------------|----------------|
| <u>Nitrogenous Phosphate</u> | <u>3,765</u> <u>5,412,903</u> | |
| <u>Synthetic Plastic Materials</u> | <u>11,211,376</u> | <u>Imports</u> |
| <u>Other</u> | <u>6,027,523</u> | <u>Imports</u> |

Source: CBS Statistical Abstract, 2004, National Development Plan 2003-2008

Table 7.15 indicates that Kenya has banned the production and use of five pesticides that are included in the Stockholm and the Rotterdam Conventions. Three others (aldrin, dieldrin and lindane) are restricted. Dieldrin and aldrin are no longer available in the country but there is evidence of massive contamination by these two especially in Wajir Livestock Market, Kitengela and possibly Wilson Airport. These substances were dumped at these sites by the Desert Locust Control Organization in the mid-1960s. Since then the Pest control Board has fenced off and restricted access to the contaminated sites Pesticide Control Products Board. The PCPB keeps a register of banned and restricted pesticides whose current list is reproduced in Table 7. 15

Table 7.15 : Some banned or restricted pesticides in Kenya

| <u>Chemical</u> | <u>Use</u> |
|---------------------------------------|---|
| <u>Common name</u> | <u>Formerly used as</u> |
| <u>Dibromochloropropane (DBCP)</u> | <u>Soil fumigant</u> |
| <u>Ethylene dibromide (EDB)</u> | <u>Soil fumigant</u> |
| <u>2,4,5,T phenoxy herbicide</u> | <u>Herbicide</u> |
| <u>Chlordimefom</u> | <u>Acaricide/insecticide</u> |
| <u>All isomers of HCH</u> | <u>Insecticide</u> |
| <u>Chlordane</u> | <u>Insecticide</u> |
| <u>Captafol</u> | <u>Fungicide</u> |
| <u>Heptachlor</u> | <u>Insecticide</u> |
| <u>Toxaphene (camphechlor)</u> | <u>Acaricide</u> |
| <u>Endrin</u> | <u>Insecticide</u> |
| <u>Parathion (methyl and ethyl)</u> | <u>Insecticides</u> |
| <u>Restricted pesticides in Kenya</u> | |
| <u>Common name</u> | <u>Permitted Use</u> |
| <u>Lindane</u> | <u>Seed dressing only</u> |
| <u>Aldrin, Dieldrin</u> | <u>Termiticide in building industry –</u> |
| <u>DDT</u> | <u>Public health only (Control of mosquitoes)</u> |

Source: Pesticide Control Products Board, 2006

Candidate pesticides for registration in Kenya are subjected to rigorous scrutiny through well-established scientific processes to ensure that they do not pose health risks or accumulate to undue residue levels. The procedure determines the product efficacy, safety and environmental impact before use or marketing. The government has formulated tabulation of maximum residue levels (MRLs) or tolerable limits contained in Food, Drugs and Chemical Substance Act, Laws of Kenya Cap 254 revised in 1980.

4.5.1 The Informal Sector

The informal sector is categorized as enterprises with less than 10 employees.

It includes provision of public services, motor vehicle repair and maintenance garages, fabrication workshops, transport, agriculture and trade and other activities. Such other services may include waste collection, transport, treatment, and disposal, immunization and pest control, storage, repair, maintenance, etc. This sector has shown rapid growth in the last

20 years employing approximately 4.0 million people in 2005. It represents about 57% of the GDP. It is therefore one of the largest single employers after agriculture and a majority of the poor, urban women and men depend on it. The activities of the sector are carried out by unskilled and semi skilled people under low technology work safety environments. Typical sites include temporary structures, residential premises or street corners. It uses chemicals and chemical products in such a diverse and widespread system which is not easily individually quantifiable. They have long been suspected of being most affected by chemical risks and exposure to workers.

4.5.2 Agriculture

Agriculture is the engine of Kenya's economic growth. It is the major provider of employment and foreign exchange earner. 75% of Kenya's population depend on it in one way or the other. The large and small scale farmers determine the volumes of chemical employed as well as environmental soundness of the waste disposal methods they employ. Unfortunately the small scale farmers and industries are also the regulated and monitored. Agriculture also supports agro-based industries. Thus the contribution of agriculture to the GDP in terms of real growth currently (2004) stands at 46%. As it will be seen later this growth is supported by the use of chemicals to enhance output, by controlling proliferation of pests and vermin and reducing post-harvest losses. Agrochemicals used are in the pesticides, fungicides, fertilizers, and veterinary chemicals. The main agro-based industries which are large users of chemicals comprise of coffee, hide and skin, leather industries, pulp and paper, and services. These are briefly described here below.

a) Coffee Industry

Coffee processing is a major industry in Kenya. There are about 100,000 hectares under coffee in Kenya of which 30% are plantations and the rest 70% small-scale under cooperatives. In total, there are about 1,200 coffee factories, located near streams and rivers. In 2003, 61,225 tonnes of coffee were produced²⁷. Coffee farming is a major user of fungicides especially copper oxy-chloride and insecticide.

Chemicals fertilizers are used on the farm to control weeds and pests especially to control coffee berry disease. Only one local company Saroc Ltd produces copper oxy-chloride from scrap copper. This an emission source controlled under Annex C of the Stockholm convention on Persistent organic Pollutants because of the potential to produce dioxins and furans from the polyvinyl chloride in the scrap copper wires.

b) Tea Sector

Tea has been Kenya's leading export commodity accounting for about 24% of export earnings in 2003. Use of fertilizers in farming activities is the main consumer of chemicals of the sector.

c) Sugar Factories and Refineries

Kenya currently produces about 70% of sugar for her domestic consumption. There are six sugar factories with an annual production capacity of 550-600,000 tonnes and four sugar refineries. They are Mumias, Sony, Nzoia, Chemelil, Muhoroni (under

²⁷ leading Economic Indicators, March 2004, Central Bank of Kenya, quarterly Report March 2004

receivership), Miwani (under receivership). The agrochemical Food Corporation (Muhoroni) produces ethanol and industrial spirit from molasses. This product was originally meant to be power alcohol to be blended with gasoline but now it is mainly used as industrial spirits. Most sugar factories have the capacity to co-generate electric power for their use from using bagasse. For instance ACFC²⁸ has a methane recovery unit of 120,000m³ from its anaerobic ponds which replaces fossil fuel for boiler operations.

d) Horticulture

Horticulture is the second main foreign exchange earner in Kenya after tourism. Horticulture has expanded rapidly in the last two decades to become the largest export earner in 2004 contributing about 26.7% of total export earnings. The cut flower industry in Kenya has witnessed an exponential expansion within the last two decades. With an estimated annual growth rate of 20 per cent it has increased its export volume from 19,807 to 41,396 tonnes between 1992 and 2001, which was an increase of 108 per cent²⁹ (HCDA, 2000). Within a relatively short period of time, Kenya has surpassed both Israel and Columbia to become the largest cut flower exporter to the European Union commanding a 25 percent market share. Although there are a numerous flower farms in Kenya, three-quarters of the exports are supplied by about 40 large and/or medium scale operations.

This industry has grown from being nascent to one of the leading sectors of the Kenyan economy. The sector currently uses a surface of about 250,000 ha with total annual production estimated at US\$ 610 million. The largest number is concentrated around Naivasha and more specifically Lake Naivasha but Athi River, Thika, Eldoret and Meru are also major sources. The majority of horticulture farmers are small scale holders constituting about 80% of all growers and accounting for 60% of export produce.

According to the inventory of POPs in 2006, horticulture is the major user of fungicides, pesticides, etc. The main chemicals used are diverse depending on pests of the flower growing area. The type and quantity of chemicals used are a major determinant of the viability of the horticulture industry. For example there has been intense debate on the impact of methyl bromide use, as it is a major ozone depleting chemical³⁰. There are thus many projects to assist farmers to find environmentally sound alternatives to methyl bromide. Most of these projects are financed under the multilateral ozone fund.

²⁸ Kihumba F.N report of 1999 waste audit for ACFC

²⁹ 2000 Annual Report of the Horticultural Development Corporation

³⁰ David Okioga, Coordinator Kenya Ozone Office- national report, 2006

e) Pyrethrum

Pyrethrum is an important crop in Kenya's economy since it offers livelihood to approximately 200,000 households. It is also a major foreign exchange earner ranking fifth after tea, horticulture, tourism and coffee. It makes Kenya the leading world producer of natural pyrethrum producing 65-75% global annual produce³¹.

The Pyrethrum Board of Kenya has the monopoly of purchasing the produced pyrethrum, processing the flowers and marketing the products. The local market consumes about 5% of the annual production while 95% is exported *exclusively* to an American company (Johnson and Wax). The current acreage under pyrethrum is about 10,000 hectares. Pyrethrum growing requires only fertilizers as chemical inputs. The sub sector products are alternatives to synthetic chemicals used for pest control.

f) Livestock Sector

The livestock sector which contributes about 10% of GDP, accounts for 30% of the farm-gate value of agricultural commodities. It employs over 50% of the agricultural labour force, and earns some foreign exchange through exports of hides and skins, dairy products, live animals and canned beef. It is a major consumer of veterinary products to control livestock pests such as East Coast Fever, tsetse flies, rinderpests, anthrax etc. It is a major source of containers containing toxic substances which are also used by ignorant farmers for milk or water.

g) Fisheries

Fishery products are an important source of protein, employment and foreign exchange earner particularly for Kenyans living in the Lake Victoria region and the Indian Ocean Coastal Area. Fish catches totalled 115,747 tonnes in 2004³² but unfortunately the catches have been declining due to over fishing. Lake Victoria is one of the most important sources of fish accounting for 93 % of the national catch.³³ Fish stocks are constantly exposed to chemical pollutants in the water.³⁴ The main reason why there are water quality standards is to protect fish stocks from accidental and deliberate release of toxic chemicals into the water courses. Water quality standards have been gazetted recently to protect human health and the environment. The water quality standards specifically have guidelines for discharges to the water systems to protect fish.

4.5.3. Small and Medium Scale Enterprises in the chemicals sector

This sector receives much attention in the African SAICM Regional Plan. Kenya boasts of a well-established and growing informal sector comprising of 1.3 Million SMEs employing about 16.4 million people and contributing about 18.4% of the GDP. The rapid expansion of this sector is attributed to credit schemes through (NGOs) cooperatives and revolving financing schemes.

³¹ Investment Promotion Centre , sector profile on agriculture 2005

³² Kenya NIP 2006

³³ MENR -Lake Victoria Environment Project Report of the Economic Potential of the Lake Basin Area

³⁴ NEMA : Water Quality Regulations, 2007

Most of these SMEs are situated adjacent to/within residential areas, or in marginal and ecologically sensitive zones. They lack the appropriate infrastructure such as sewerage and waste disposal services hence the significance of their environmental impacts. Their technologies are obsolete being only adapted to particular production processes and hence inefficient in use of both energy and raw materials. Some SMEs use general waste as a resource leading to higher toxicity concentration in the waste to be disposed. Often, the cumulative environmental impacts from SMEs surpass that from larger industries reinforcing the need to incorporate environmental measures into them. SAICM prioritizes them in the concrete action plans.

The SMEs inputs include used industrial products such as in plastics, car batteries, aluminium cans, paper, and scrap metal among others. The sector lacks appropriate technologies resulting in production losses translating to heavy environmental impacts as investors do not have enough resources to control discharges and emissions.

Another source of chemical pollution is the flourishing of hawking activities. These unregulated individual operators have been associated with indiscriminate disposal of their by-products resulting in loss of aesthetics and dispersal of pollutants.

4.6 Production of waste

4.6.1 Introduction

It is important to mention the role that people play in the generation and management of hazardous wastes. In Kenya, during a period of 40 years (between 1963 and 2003), the population has risen from 8.6 million in 1963 to about 33 million. The majority of the population is dependent on the immediate environment for their social economic needs. 44% of the population is less than 15 years old and therefore we are at a critical time to inculcate a sound waste management philosophy. 54% of the population is 15-64 years and active in generating waste. The over 65 years old 2% of the population contribute little to waste generation.

The quantity and type of waste is dependent on the population distribution. For Kenya, 70% of the population live in rural areas and some 60% are involved in agricultural practice or other. Of the urban population, almost 60% live in informal settlements and engage in the informal sector employment characterized by small streams of highly toxic and hazardous wastes. Growth of informal settlements is currently 8%. The urban centres of Nairobi, Thika, Mombasa, Nakuru, Kisumu Eldoret and Mavoko have the highest populations and the highest incidences of environmental pollution because of their high concentration of chemical based activities.

The next ten years must therefore holistically address the issue how to prevent and minimize waste and maximize reuse, recycling and use of environmentally friendly alternative materials with the participation of government authorities and all stakeholders. In order to minimize adverse effects on the environment and improve resource efficiency, these communities need financial, technical and other assistance. The 8th Meeting of the Conference of Parties to the Basel convention held in Nairobi on 27th November to 1st December 2006, was a wakeup call to Kenyans that the solution to our waste problems

remain with us and we must address it across generations. The minister Hon Kivutha Kibwana said in his statement to COP8 of the Basel Convention said,

“I feel a deep sense of responsibility and anticipation that the preparation process will change the perception of how Kenya’s manage their waste and are prepared to play their role since we must all bear responsibility³⁵”

21% of the municipal wastes generated in the urban centre emanate from industrial enterprises and 61% from households and institutions. Generally about 40% of the total wastes generated in the urban centre are collected and disposed off at designated disposal sites. All such sites are dumpsites as there are no sanitary landfills in Kenya. Open burning of waste at these dumps and landfills is the greatest source of air pollutants such as sulphur oxides, oxides of carbon, particulates, dioxins and furans. Such waste also may have industrial waste composed of toxic chemicals including heavy metals, salts, detergents, and medical waste. This is dumped in unsuitable areas or let to pour into rivers that traverse the urban centres, wetlands and ecosystems. Such is the case with the rivers in the Nairobi River basin which have unacceptable levels of chemical oxygen demand, heavy metals and pesticides.³⁶ In addition, a significant number of municipalities in Kenya do not have designated disposal sites and in those towns, the mode of transportation of waste or its disposal is not regulated and lacks coordination. This is likely to change when waste regulations by the Government of Kenya which requires that all transporters and those treating or disposing waste should be registered with the national Environment Management Authority (NEMA) comes into force³⁷

4.6.2 Municipal Liquid Waste

Liquid waste includes used oils, grey water, sewage, expired chemicals and medicines etc. Of the 174 local authorities only 32 have some form of sewage collection and disposal infrastructure, which were developed in the 1970s. Nairobi and Kisumu have conventional anaerobic/ mechanical sewage treatment works as well as oxidation ponds while about 30 of the other townships have oxidation ponds. Typically, industries generating organic waste are routinely using conventional treatment systems to remove the high pollution load followed by oxidation ponds to attain the discharge standards.³⁸ With the regulations on water came discharge standards to municipal sewers, natural water courses and the Indian Ocean. Industries generating wastes with heavy metals are not allowed to discharge into municipality water treatment systems. However, even in situations where there is waste water treatment, the maintenance and performance level varies from one local authority to the other. Lack of enforcement policies in the sector has been identified as a weakness in implementing wastewater management systems. Fortunately, guidelines for municipal waste are available at the NEMA, local authorities as well as the many water authorities which have been established in the last three years.

4.6.3 Solid Waste Management

Solid wastes in urban centres in Kenya are a by-product of a broad spectrum of industrial, services as well as manufacturing processes. Solid wastes in Kenya include industrial,

³⁵ www.basel.int : Meetings/Report of the 8th Conference of Parties, 2006

³⁶ UNEP/Regional Office for Africa: Report of Phase I and II of Nairobi River Basin Programme

³⁷ GOK/MENR/Waste Regulations

³⁸ GOK/MWI:Water Quality Regulations

municipal, medical and agricultural waste. Typical wastes include plastic, scrap metals, clinical wastes, etc. Left unattended, it turns toxic. As a common practice, there is generally poor solid waste management in most urban centres, with low garbage collection. Over 60% of solid waste is not collected and has potential of increasing environmental degradation, pollution, loss of aesthetic and amenities and critical disease outbreaks.

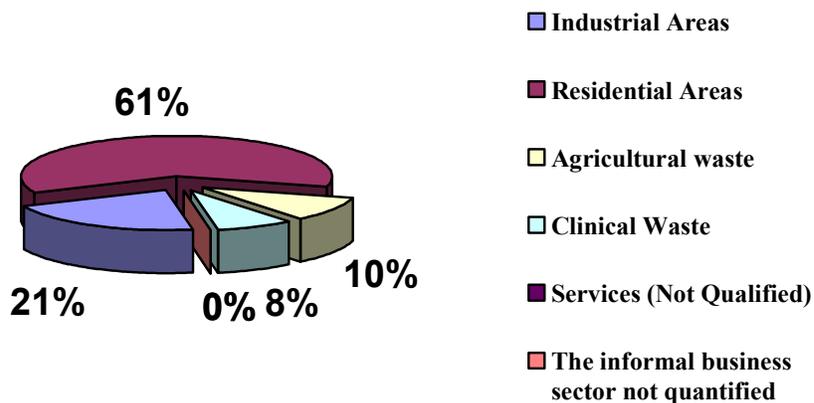
The Nairobi City with about three million inhabitants generates solid waste in the range of 2,400 tonnes³⁹ per day. The amount of solid waste generated is increasing mainly due to large scale rural-urban migration into Nairobi. Kenya has problems in solid waste management that are very representative of other countries in Sub-Saharan Africa due to the country's high growth and governance problems. Furthermore, the complexity (mixture of medical, industrial and agricultural) of waste makes its management difficult.

Inadequate solid waste management (SWM) practices evidently affect the quality of the environment and public health of residents in many urban centres. For example, Nairobi city has only one disposal site located at Dandora on an area of about 26.5 hectares, but with no facilities provided to prevent secondary environmental pollution. Because there are no controls to guide the disposal of different types of solid waste to prevent toxic and even hazardous waste being dumped, there is a high risk of environmental pollution, which in turn affects the health of residents downstream and the Athi River.

The country faces challenges as the impact of current interventions is minimal. There is therefore need for a multi-sector and integrated approach that includes public engagement and community participation both at local and national level in addressing issues of solid waste management.

³⁹ A 1997 JICA study estimated that about 1,450 tonnes of solid waste was generated daily in Nairobi in the late 1990s (which translated to about 245 kg per person per year at the time). A more recent study (ITDG, 2004) puts the daily solid waste generation at a relatively higher value of 2,400 tonnes (i.e., estimated per capita solid waste generation of about 253 kg per person per year).

Fig 4.1. Sources of Solid Waste⁴⁰



4.6.4 Characterization of Sources of Hazardous Wastes

Typical streams of hazardous waste are as defined under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

The following are the major sources of hazardous wastes

- 14 tanneries processing 920,000 hides, 6.5m skins per year
- Webuye Pulp and Paper mill with 145,000 tons per year
- Petrochemical industries especially tetraethyl lead and waste oil
- 165 Chemical based Industries
- Pesticide Industry formulation firms
- Plastics Industry
- Iron and Steel fabrication
- Scrap metal refining
- Non ferrous metals refining
- Motor vehicle and automotive components
- Pest Control Products Board facilities

⁴⁰ MENR-Report of the Kenya Delegation to 8th COP

4.6.5 Non industrial sources of Hazardous waste

SMEs are often the most obvious hazardous waste sources in Kenya. An example is that of Thika town where the first waste audit under EMCA attributes 80% of the hazardous waste problems to small generators in just two sectors: metal finishing and leather. These small workshops generally operate in cramped conditions and lack space for the on-site treatment which is standard practice, i.e. to ‘separate’ hazardous waste waters into waste water acceptable for discharge to sewer systems from more concentrated solutions or sludge’s to be disposed of as hazardous wastes.

4.6.6 Waste Oil

Waste oil is a key component of waste from transport and service sector. Table 4.16 gives the amount of waste oil generated across the country⁴¹. The non-industrial waste sources can be found in every town, although the quantities may be small enough to be insignificant, often they are simply discarded with household rubbish eventually end up in many ad hoc dumping grounds. Smaller sources have the problem of being far more dispersed, with the potential for widespread low-level contamination. They ultimately end up in the water courses, contaminate soil or when burnt in the open, end up as air pollutants.

Table 4.16 shows the annual quantity of used oil generated in Kenya⁴²

| Annual Quantity of Used Oil Generated in Kenya | | | | | | | |
|---|----------------|----------------|---------------|----------------|---------------|------------------|---------------|
| Approximate quantities of used oil generated in Kenya ('000 Liters) | | | | | | | |
| SECTOR | Nairobi | Mombasa | Kisumu | Eldoret | Nakuru | Mt. Kenya | Total |
| Retail Outlets | 4,166 | 1,250 | 667 | 500 | 500 | 1,250 | 8,332 |
| Distributors | 4,520 | 753 | 1,507 | 0 | 753 | 0 | 7,534 |
| Commercial | 3,623 | 1,610 | 1,208 | 805 | 805 | 0 | 8,052 |
| Manufacturing | 3,785 | 1,262 | 946 | 0 | 315 | 0 | 6,309 |
| Bunkers | 0 | 478 | 0 | 0 | 0 | 0 | 478 |
| SALES | 16,095 | 5,353 | 4,328 | 1,305 | 2,374 | 1,250 | 30,705 |
| Approximate quantity of used oil potentially available annually | 6,438 | 2,141 | 1,731 | 522 | 950 | 500 | 12,282 |
| Average used oil generated monthly | 537 | 178 | 144 | 44 | 79 | 42 | 1,024 |


 Nutek Solutions Ltd. POPs workshop 06-16-2004.ppt

⁴¹ Petroleum Institute of East Africa: Project on Waste Oil Management

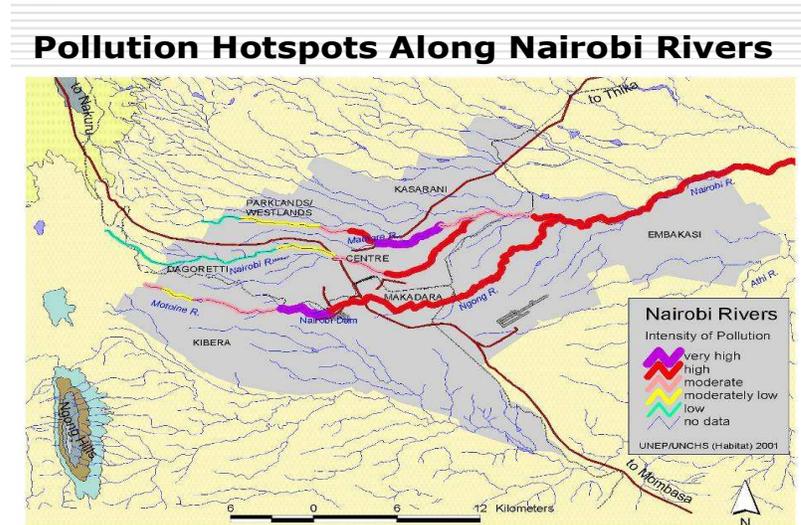
⁴² Sanjay Gadhi Nutek Solutions Ltd

4.6.7 Typical case of river pollution in Nairobi and its management challenges in Nairobi

The city of Nairobi is traversed by many small rivers which form tributaries of the Athi River. They are the Ngong, Nairobi, Ruaka, Gitathuru and Gatharaini Rivers.

The rivers traverse undeveloped and developed sections of Nairobi. They become recipients of solid and liquid waste resulting from industrial and domestic activities. In many places, the river natural flow has been far exceeded by the volume of waste stream discharged. The solid waste is so much that it is an eyesore. Thus, the rivers are a health hazard for all uses. This fact is highlighted in the Nairobi Environmental Outlook Report 2007. Many institutions are making efforts to rehabilitate and restore the river back to its past glory. This however, is an uphill battle. One reason why the efforts are not succeeding is because they are neither coordinated nor harmonized. It is for this reason that the monthly meeting of Permanent Secretaries sitting on 2nd July, 2007 formed a Steering Committee of Permanent Secretaries to guide the process.

Fig 4.2: Polluted Rivers in Nairobi:



Source MENR 2007

CHAPTER 5. BASIC NATIONAL SET UP OF MANAGEMENT OF THE ENVIRONMENT

5.1 Introduction

Judging from the many policies on chemicals and wastes developed in the recent past, the Government of Kenya recognises the importance of managing risks posed by chemicals. It now has programmes and activities for informing chemical users of their risks if used inappropriately. Some development policies⁴³, national development plans and action plans indicate that the Government intends to improve this through building capacity for chemicals management. Accordingly, Kenya has invested heavily in science education from primary to tertiary levels. Chemistry is a compulsory subject at the secondary school level and all the nine public universities and their constituent colleges all offer chemistry major or in combination with some other science degree. As such Kenya does have well trained chemists. However, the ability of manpower trained to manage chemical risks urgently needs to be enhanced. The SAICM could be just that vehicle.

In order to integrate chemicals management into the development process, the strategy adopted is to link its chemical risks management activities and projects within other national development programmes. For example, all new development activities now have to undergo an environmental impact assessment before commencement or an environmental audit every year in line with the current three years 9th National Development Plan which prioritizes national commitment to chemicals management. The plan encourages relevant government and private institutions to establish and participate in established chemical safety co-ordinating mechanisms. Sectoral policies are also encouraging, voluntary initiatives at self-regulation.

Recognising the many international initiatives that Kenya subscribes to, any capacity building would be designed to achieve synergies and provide better coordination amongst the global chemical and waste multilateral environmental agreements specifically between the Stockholm, Rotterdam and the Basel Conventions.

5.2 The Policy Environment

The Ministry of Environment and Natural Resources (MENR) has been operating in an environment delineated by various national policy papers and legislation including the Sessional Paper No. 6 on Environment and Development (1999), The Forest Act (Cap 385), the Mining Act (Cap 306), the Water Act of 2002, the Kenya Forestry Master Plan, Environmental Management and Co-ordination Act (1999), the National Environment Action Plan (NEAP - 1994) and the Kenya Forestry Policy. Several other policies and legislation that are supportive of environmental policy and legislation are health, industry, trade; local government as well as land are in play. They also support chemicals management as indicated according to its strategic plan⁴⁴. The Ministry in its strategic plan indicated that it will continue to take necessary interventions with a view to achieving implementation of the Environmental Management and Coordination Act 1999, the Environmental Impact

⁴³ GOK/MENR/Sessional Paper on Environment and Development, 1999

⁴⁴ www.mazingiraasili.go.ke, MENR Strategic Plan 2006-2010

Assessments and Environmental Audits, as well as to achieving compliance and enforcement of environmental regulations, guidelines and standards.

The enforcement is however very critical. It has indicated that it will put more energy to:

- Prosecution of offenders failing to meet the provisions of EMCA(1999), environmental standards, regulations and guidelines;
- Coordination of environmental matters amongst all lead agencies/stakeholders;
- Environmental planning, research, inventorying and monitoring;
- Implementation of actions in the Multilateral Environment Agreements on chemicals and wastes;
- Integration of environmental concerns into national development policies, plans and programmes;
- Establishment of an award scheme for best environment practices among individuals, Organizations at district, provincial and national levels.

5.3 National Institutional Arrangements on Chemicals and Wastes

In 1999, Kenya issued the Sessional paper on environment and development on Principles of the Environmental management and Environmental Management and Coordination Act (EMCA) which constitutes a “framework” law. It lays out the general principles, approaches and instruments that should be used to fulfil the obligations required to maintain a safe and healthy environment and to prevent environmental pollution.

The EMCA establishes a legal framework for the management of pesticides, toxic and hazardous chemicals for the promulgation of legislation through the development of subsidiary regulations. The Act also adopts the preferred precautionary principle. EMCA has addressed several of the shortcomings of the earlier statutes on chemical management. EMCA deals with a more comprehensive and wide listing of toxic chemicals. It captures the listing and categorization of hazardous chemicals and chemical wastes from industrial processes, research, photographic processes, surface treatment of metals and wastes from the petrochemical industry, etc.

Section 92 of the Act empowers the Minister of Environment to make regulations prescribing the guidelines and policies for management of toxic and hazardous chemicals including among others the classification, registration, importation, export, packaging and advertising of these chemicals. In this regard draft regulations have been developed.

Section 93 is regulates and in some instances prohibits the discharge of hazardous substances, chemicals and materials or oil into the environment. Owners or operators of any facility or equipment that discharges contrary to the Act are responsible for the mitigation of the impact of their actions. Section 94 mandates SERC to prepare standards for pesticides and toxic substances. Also in relation to pesticides and toxic substances, the Act provides for registration, storage, manufacturing, importation and exportation. In Section 100, EMCA empowers the Minister for Environment and Natural Resources to make regulations governing registration of toxic substances. Accordingly waste regulation and guidelines have been gazetted. SAICM may assist in their implementation.

5.3.1. The standards and Enforcement Review Committee (SERC)

The EMCA establishes Standards Enforcement and Review Committee (SERC) which is responsible for recommending criteria for the classification of hazardous wastes and processes. It is made up of representatives of government, private sector, and civil society.

The following institutions are key in chemicals management:

- i) National Environment Management Authority (NEMA)
- i) The Government Chemists Department (GCD)
- ii) Kenya Medical Research Institute (KEMRI)
- iii) Kenya Plant Health Inspectorate Services (KEPHIS)
- iv) The Kenya Cleaner Production Centre (KNPC)
- v) The Department Of Occupational Health And Safety Services (DOHSS)
- vi) Kenya Bureau Of Standards (KBS)
- vii) Kenya Association of Manufacturers. (KAM)
- viii) Kenya Mission to UNEP (KMUNEP)
- ix) The Pest Control Products Board.

5.3.2 Legislation:

Kenya mainly relies on international norms and practices when it comes to issues of chemical safety, regulation of production, importation, use and registration of Chemicals including pesticides in Kenya. Local legislation include;

- (i) Pharmacy and poison Act Cap 245.
- (ii) Public health Act Cap 242
- (iii) Food drugs and chemical substance Act Cap 254
- (iv) Radiation protection Act cap 243
- (v) Environmental management and co-ordination Act of 1999
- (vi) Malaria Control Act.
- (vii) Cattle Cleansing Act Cap 358
- (viii) Pests Control Products Act Cap 346
- (ix) The Use of Poisonous Substances Act Cap 247
- (x) Public Health Act 264
- (xi) Water Act Cap 271
- (xii) Fertilizers and Animal food stuffs Act Cap 345

CHAPTER 6. STATUS OF RATIFICATION OF THE VARIOUS CHEMICALS AND WASTE CONVENTIONS

6.1 Introduction

Kenya is party to the following multilateral and bilateral environmental agreements:

- The Stockholm Convention on Persistent Organic Pollutants
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal;
- The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade;
- The Convention on the Marine pollution currently being implemented under the New Partnership for Development (NEPAD);
- The Framework Convention on Climate Change (FCCC);
- The Montreal Protocol on substances that deplete the ozone layer and
- The Cartagena Protocol on Biotechnology.

6.2 Detailed Discussion of the Multilateral Environmental Agreements

6.2.1 The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

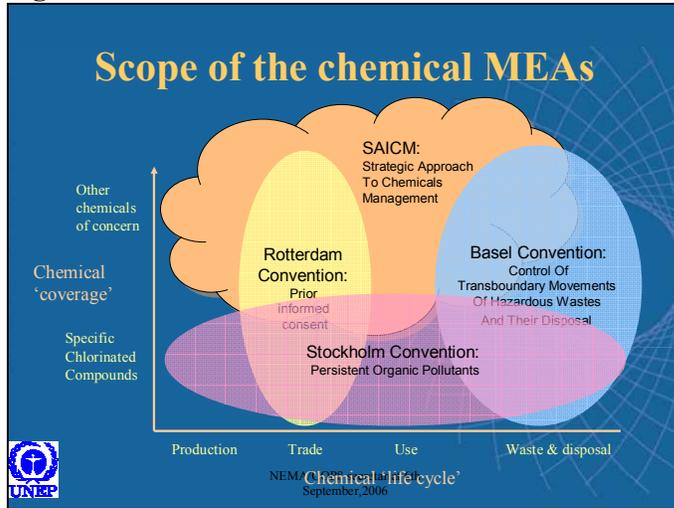
The Convention was adopted on 11th September 1998 and came into force on 24th February 2004. Kenya deposited her instruments of ratification on 4th February 2004. It came into force on 4th May 2004. It covers pesticides and industrial chemicals banned or severely restricted for health or environmental reasons. The listing of these chemicals is obtained from notifications by Parties to the Convention. Kenya has two Designated National Authority (DNA)⁴⁵, the Pest Control Product Board for pesticides and NEMA for industrial chemicals.

The Convention emphasizes on the Prior Informed Consent (PIC) consultations and promotes the eventual minimization of the use of harmful pesticides and industrial chemicals. Under the Convention the exporter of these chemicals is supposed to provide extensive information to the proposed importer on the potential hazards that the chemical poses to human health and the environment. In February 2007 the PIC Secretariat held a training session for PIC for Eastern African Countries in Nairobi. It is expected that this will support awareness and decision making in Kenya and facilitate easier management of toxic chemicals.

The three MEAs and SAICM are interrelated as shown in Fig 6.1. The Conference of the Parties of the three conventions have formed an ad hoc working group on the MEAs. Kenya is a member of the ad hoc working group ADHWG established by the Conference of the Parties for the three MEAs.

⁴⁵ www.pic.int : Implementation

Fig 6.1 Interaction of the three MEAs and SAICM



6.2.2 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

The Basel Convention was adopted on 22nd of March 1989 and came into force on 5th May 1992. This Convention provides for import and export management and control regimes relating to hazardous wastes. The Convention has developed guidelines for managing hazardous wastes. These guidelines have been used extensively in formulating the EMCA as well as the waste regulations developed by NEMA and the By-laws developed by the City Council of Nairobi.⁴⁶

The responsibilities of Party States include minimization of the generation of hazardous wastes, provision of adequate disposal facilities, prevention of pollution, reduction of the Transboundary movement of hazardous wastes and requirement of information on hazardous wastes imported into the country⁴⁷. Kenya acceded to this Convention on the 1st of June 2000. The Convention has been domesticated in the EMCA Section 141, which makes it an offence to import, dispose or otherwise manage hazardous wastes contrary to the provisions of the Act. NEMA has also gazetted regulations on waste management.

6.2.3 Bamako Convention

The Bamako Convention was adopted in Bamako Mali, on 30th January 1991 and it came into force on 22nd April 1998. The Convention has 18 parties (ten ratifications and eight accessions). Kenya signed the Convention on 25th March 2004. It has yet to be ratified. The treaty was inspired by the fact that Africa had over the years become a cheap dumping site for hazardous wastes produced in developed countries. Kenya has indicated that it will ratify the convention soon.

The responsibilities of the parties are similar to those set out in the Basel Convention, but are specific to the African region. With regard to management of the impact of chemicals the Conventions creates a platform and network of information within Africa to deal with the importation of hazardous wastes.

⁴⁶ www.nairobicity.org: Departments/Environment

⁴⁷ www.basel.int

6.2.4 Vienna Convention for the Protection of the Ozone Layer

This Convention sets an important precedent as it was the first time the participating nations agreed in principle to tackle the global environmental concern on the depletion of the ozone layer. The Convention was concluded in Vienna on 22nd March 1985. It was a Convention intended to address the adverse effects on human health and the environment brought about by change in the ozone layer resulting from the use of man-made chemicals, the so called ozone depleting substances (ODS). Parties to the Convention are expected to co-operate in research and information exchange as well as develop appropriate legislative and administrative measures to tackle activities likely to adversely impact on the ozone layer. ODS are some of the substances that may cause the modification of the ozone layer and for that reason fall within the convention. Kenya is a party to this Convention. It acceded to it on 9th November 1988. However, ozone is not one of the issues addressed under SAICM.

Montreal Protocol on Substances that Deplete the Ozone Layer

Whereas the Vienna Convention established a framework, the Protocol deals with the substantive provisions for the management and preservation of the ozone layer. Using science based decision-making, the Montreal Protocol identifies the ODS and prescribes measures for their management and the disposal of waste arising from them.

The Protocol was concluded on 16th September 1987. Its overall purpose was to gradually reduce and finally phase out global emissions of all ODS. In particular, the Protocol revises phase-out schedules for identified substances. Kenya acceded to this Protocol at the same time as the Vienna Convention on 9th November 1988. Kenya has developed a country programme started in 1995 and set the Kenya ozone office. It has been able to address ODS solvents such as tetrachloroethane, chloroflourocarbon refrigerants and more importantly methyl bromide used in horticulture growing.

6.3 Programmes in support of MEAs

These include:

- Safe Chemical use Project implemented by CropLife international With PCPB
- Introduction of cleaner production methods through the national cleaner production centre
- Annual Environmental Audits as required by EMCA
- Environmental Impact Assessment phase out programmes under EMCA
- Phase out of ozone depleting substance under the Montreal Protocol
- Proposed East African Community programmes on agrochemicals

CHAPTER 7. KEY STAKEHOLDERS FOR THE STUDY

7.1 Stakeholders who were either consulted or whose programmes were reviewed

These include the following:

- a) Government Ministries
 - i) Ministry of Environment and Natural Resources
 - ii) Ministry of Health (Malaria Control Programme)
 - iii) Ministry of Trade and Industry (MT&I)
 - iv) Ministry of Health
 - v) Ministry of Agriculture (MOA)
 - vi) Ministry of Labour. (MOL)
 - vii) Ministry of Local Government Authorities. (MOLA)
 - viii) Ministry of Water development and Irrigation(MoWI)
 - ix) Ministry of Finance (MOF)
 - x) Ministry of Planning and National Development(MPND)

- b) Specialized agencies whose reports and strategies were analysed
 - i) National Environment management Authority
 - ii) Kenya Bureau of Standards
 - iii) National Water Management Authority
 - iv) Government Chemist Department
 - v) Pest Control Products Board
 - vi) Kenya Ports Authority
 - vii) Kenya Revenue Authority
 - viii) Department of Occupational Health and Safety Services
 - ix) Kenya Medical Research Institute
 - x) Kenya Industrial Research Institute
 - xi) Export Promotion Council
 - xii) Investment Promotion Council

- c) Private Sector Associations were:
 - i) Agrochemical Association of Kenya
 - ii) Kenya Association of Manufactures
 - iii) Federation of Kenya Employers

- d) Non governmental Organizations
 - i) Physicians for Social Responsibility(PSR)
 - ii) iLima Kenya
 - iii) Centre for Environmental Governance(CEAG)
 - iv) Intermediate Development Technology Group(ITDG)

- e) Universities
 - i) University of Nairobi- Chemistry Department
 - ii) United States International University
 - iii) Jomo Kenya University of Technology

- f) Local Authorities
 - i) Nairobi City Council
 - ii) Thika Municipality

- iii) Mavoko Town Council
- iv) Limuru Municipality

7.2 Ministerial responsibilities.

Ministerial responsibilities with regard to chemicals are the following:

- i) Ministry of Health (Malaria Control Programme): The Ministry provides policy guidelines on human health in Kenya.
- ii) Ministry of Trade and Industry (MT&I): The Ministry regulates and enforces trade regulations both locally and internationally.
- iii) Ministry of Agriculture (MOA): The Ministry is mandated to oversee sustainable agricultural practices and the use of agrochemicals.
- iv) Ministry of Labour: The Ministry handles matters related to workers health and exposure to chemicals and related issues.
- v) Ministry of Local Government Authorities: The Ministry regulates the functioning of all city councils, municipal councils and town councils in the country and especially waste treatment and disinfections.

Table 7.1 provides information on the summary of responsibilities of government ministries.

Table 7.1: Responsibilities of Government, Agencies and Institutions on Chemicals

| No | Ministry | Importation | Production | Storage | Transport | Distribution/Marketing | Use/Handling | Disposal |
|----|---------------------------------|-------------|------------|---------|-----------|------------------------|--------------|----------|
| 1 | Environment & Natural Resources | X | - | X | - | X | X | X |
| 2 | Ministry Health | X | - | X | X | X | X | X |
| 3 | Agriculture | X | - | X | X | X | X | - |
| 4 | Labour | - | X | X | - | - | X | - |
| 5 | Trade and Industry | X | X | - | - | - | - | - |
| 6 | Finance | X | X | - | - | - | - | - |
| 7 | Justice | X | - | - | - | - | - | X |
| 8 | Public works | X | X | X | X | X | - | - |
| 9 | Local Government | X | X | X | X | X | X | X |
| 10 | Education | X | X | X | X | X | X | X |

Source: NIP 2007

Table 7.2 Shows the specialized Ministries and Institutions

Table 7.2 Government Ministries with Pesticide Mandates

| No | Government Ministries | Specialized Departments | Role | Mandate |
|----------|--|--|---|---|
| <u>1</u> | <u>Ministry of Agriculture</u> | <u>KARI/KETRI</u> <u>PCPB</u> <u>NARL</u> <u>KEPHIS</u> | <u>Pesticide/fertilizer, Registration of pesticides, Monitoring of pesticide residues</u> | <u>Agriculture Act/Pest control Production</u> |
| <u>2</u> | <u>Ministry of Health</u> | <u>Government Chemist</u> <u>National malaria Control Programme</u> <u>KEMRI</u> | <u>Pesticide for yield analysis</u> <u>Pesticide tests for Malaria</u> <u>Research on medical impacts</u> | <u>Public Health Act</u> <u>Malaria Control</u> <u>Medical Research</u> |
| <u>3</u> | <u>Ministry of Environment & Natural Resources</u> | <u>National Management Authority</u> <u>Kenya forestry Research Institute</u> | <u>Overall Environment Policy</u> <u>Toxic Chemicals Focal Point</u> | <u>Government Policy/EMCA</u> |
| <u>4</u> | <u>Ministry of Industry & Trade</u> | <u>Kenya Industrial Research Institute</u> <u>Kenya Bureau of Standards</u> | <u>Import, trade and production licensing Standards</u> | <u>Customs and Exercise act</u> <u>Standards Act</u> |
| <u>5</u> | <u>Ministry of Labour</u> | <u>Department of Occupational Health and Safety Services</u> | <u>Factory and chemicals use and Disposal</u> | <u>Health and Safety of workers</u> |

Source NIP 2007

7.3 Cities and Local Authorities

These have been introduced earlier in section 4.1.3. The cities and municipalities are usually headed by a mayor and councillors while town and urban council are headed by chairmen. Part of their function is to license businesses, manage solid waste and participate in the control of pests using fumigation methods that use chemicals.

7.4 Key Industrial and Agricultural Associations

Industrial Associations Related to Pesticides includes:

- The Industrial and Agrochemical Associations.
- The Agro-chemical Association of Kenya controls the agro-chemical usage in Kenya and enforces a code of conduct among key players.
- The Kenya Flower Council is an apex body in charge of all flower farmers in Kenya and especially it ensures they practice safe use of chemicals.
- The Horticulture Crops Development Authority (HCDA) is a parastatal responsible for the horticultural development in the country on behalf of the Government.
- The International Centre of Insect Physiology and Ecology (ICIPE) is among other responsibilities involved in research on alternatives to toxic chemicals.
- The Fresh Produce Exporters Association of Kenya (FPEAK) represents the food horticulture growers.

7.5 Chemical Manufacturers

There are no significant toxic chemicals manufacturers in Kenya. The closest to these is the oil refinery and recycling facilities which produce petroleum gas and bitumen.

7.6 Chemical Importers

Key toxic chemicals importers are shown in Table 7.3

Table 7.3: Some major Importers and Chemical Industries in Kenya.

| NO | COMPANY | LOCATION |
|-----------|--|-------------------------------------|
| <u>1</u> | <u>Orbit chemicals</u> | <u>Athi River</u> |
| <u>2</u> | <u>Henkel chemicals (K) LTD</u> | <u>Enterprise Rd Nairobi</u> |
| <u>3</u> | <u>Twiga Chemical Industries Ltd</u> | <u>Nanyuki Rd, Ind. Area, Nrb</u> |
| <u>4</u> | <u>Kleenway Chemicals Ltd</u> | <u>Lunga Lunga, Ind. Area, Nrb</u> |
| <u>5</u> | <u>Murphy Chemicals (E.A.) Ltd</u> | <u>Nairobi</u> |
| <u>6</u> | <u>Henkel chemicals (EA) LTD</u> | <u>Mombasa</u> |
| <u>7</u> | <u>Saroc Ltd</u> | <u>Lusaka Rd Nairobi</u> |
| <u>8</u> | <u>Devani minerals and Toxic chemicals</u> | <u>Ind. Area, Nairobi</u> |
| <u>9</u> | <u>Kenya synfans and chemicals ltd</u> | <u>Ind. Area, Nairobi</u> |
| <u>10</u> | <u>United Chemicals Industries Ltd</u> | <u>Busia Rd, Ind. Area, Nrb</u> |
| <u>11</u> | <u>Nova Chemicals (NCL) Ltd</u> | <u>Lunga Lunga, Ind. Area, Nrb</u> |
| <u>12</u> | <u>Catalyst chemicals ltd</u> | <u>Nairobi</u> |
| <u>13</u> | <u>Dear Chemical Industries (K) Ltd</u> | <u>Lusaka Close, Ind. Area, Nrb</u> |

Source: Kenya Association of Manufacturers Directory 2005

7.7 Chemicals Consumers

7.7.1 Private Sector

Key stakeholders in pesticide use are the following:

- Agrochemical Manufacturers & Formulators (AAK)
- Fresh Producers and Exporters (FPEAK)
- Socfinaf: Independent coffee producer
- Pesticide Importers/Stockiest/Warehouses
- Importers of Pesticides. Under AAK
- Coffee Research Foundation

7.7.2 Printing Industry

Printing industries are major users of toxic chemicals and dyestuffs. In printing industry emissions into the air consist of organic solvents and other organic solvents. Other waste include photographic and residue chemicals, metal hydroxides sludge, dye stuff and solvent residues. Table 7.4 shows the major players in the printing and publishing industry.

Table 7.4: Printing Companies in Kenya

| NO | COMPANY | LOCATION |
|-----------|---|---------------------------------|
| <u>1</u> | <u>Lake printers & stationers ltd</u> | <u>Kisumu</u> |
| <u>2</u> | <u>Alfa Printers & Publishers Co.</u> | <u>Ronald Ngala St, Nairobi</u> |
| <u>3</u> | <u>Delux Printers Ltd.</u> | <u>Likoni Road, Nairobi</u> |
| <u>4</u> | <u>D.L. Patel Press (K) Ltd</u> | <u>Accra Road, Nairobi</u> |
| <u>5</u> | <u>Cosmic Press Ltd</u> | <u>Kijabe Street, Nairobi</u> |
| <u>6</u> | <u>Converters (EA) Ltd</u> | <u>Ind. Area, Nairobi</u> |
| <u>7</u> | <u>Paper Convector Ltd</u> | <u>Nakuru</u> |
| <u>8</u> | <u>Majestic printing works</u> | <u>Nairobi</u> |

Source : Kenya Association of Manufacturers, 2005 Directory of Members

7.7.3 Tanning and Leather Finishing Sector

Tanning uses many chemicals which are often toxic. Tanneries also generate odorous emissions, solid waste and discharges to watercourses. The tanning sector releases toxic chemicals through incineration of solid wastes (trimmings, fleshing, chrome shavings, chrome-split waste and solids in the treatment sludge) generated from tanneries. Improved

knowledge of inputs and outputs, general good management and housekeeping are possible practices to minimize emissions. Table 7.5 shows the major tanneries and leather industries.

Table 7.5 Tanning and Leather Finishing Companies

| NO | COMPANY | LOCATION |
|----|---------------------------------------|-------------------------------|
| 1 | East African Leather Factory | Juja Rd, Nairobi |
| 2 | Nakuru Tanners Ltd | Nakuru |
| 3 | Kitale Tanners Ltd | Kitale, Trans Nzoia |
| 4 | Leather Industries of Kenya Ltd. | Thika |
| 5 | African Trade Agency Ltd | Athi River Rd, Ind. Area, Nrb |
| 6 | Sagana Tanneries Ltd. | Sagana, Kirinyaga |
| 7 | Tanneries (K) Ltd. | Athi River, Machakos |
| 8 | Bulleys Tanneries Ltd. | Ngozi Rd, Thika |
| 10 | Garissa Tanneries Ltd (Mini Leather) | Sankuri Rd, Garissa |
| 11 | Afro Leather Goods Manufacturing Ltd. | Busia Rd, Ind. Area, Nairobi |
| 12 | Bata Shoe Co. Ltd. | Limuru, Kiambu |
| 13 | Slapper Shoe Industries Ltd. | Changamwe, Mombasa |
| 14 | Kenya Shoes Company Ltd. | Uplands, Kiambu |

Source : Kenya Association of Manufacturers, 2005 Directory of Members

7.7.4 Textile Sector

This sector leads to the release of chemicals where materials containing synthetic fibres dyestuffs are used. These hazardous wastes are introduced into the environment mainly in form of solid waste products or through discharge of liquids and sludge. In textile industries occurrence of toxic chemicals is due to use of chlorinated chemicals, especially pentachlorophenol to protect raw materials such as wool, cotton and other fibres. Table 7.6 shows the major textile factories.

Table 7.6: Textile Factories/companies

| NO | COMPANY | LOCATION |
|----|------------------------------|-----------------------------|
| 1 | African Cotton Industries | Taveta Road, Mombasa |
| 2 | Kenya Textile Mills | Factory St., Ind. Area, NRB |
| 3 | Londra Ltd. | Lower factory St, Nakuru |
| 4 | Rift Valley Textiles Ltd. | Eldoret, Uasin Gishu |
| 5 | Kenwool Enterprises Ltd. | Koinange St., Nairobi |
| 6 | Kenya Rayon Mills Ltd. | Mombasa |
| 7 | Blanket industries ltd | Mombasa |
| 8 | Ken Knit (K) Ltd. | Eldoret, Uasin Gishu |
| 9 | Mt. Kenya Manufacturers Ltd. | Nyeri |
| 10 | Thika Cloth Mills Ltd. | Thika |
| 11 | Kisumu Blanket Manufacturers | Busia Rd., Kisumu |
| 12 | Spin knit ltd | Nakuru |
| 13 | Megaspin Ltd | Nakuru |

Source: Kenya Association of Manufacturers, 2005 Directory of Members

7.7.5 Battery industry

Batteries contain heavy metals such as mercury, lead, cadmium, and nickel, which react with chemical electrolyte to produce the battery's power. These heavy metals can contaminate the environment when batteries are improperly disposed of.

a) Battery Recycling: Lead-Acid Automobile Batteries

All lead-acid batteries can be recycled. Recycling operators recycle crush batteries into nickel-sized pieces and separate the plastic components. They send the plastic to a reprocess or for manufacture into new plastic products and deliver purified lead to battery manufacturers and other industries. A typical lead-acid battery contains 60 to 80 percent recycled lead and plastic. Recycled batteries keep heavy metals out of landfills and the air. Recycling saves resources because recovered plastic and metals can be used to make new batteries. However, Kenya is currently experiencing shortages of recyclable lead due to high demand of the same by China's automobile industry. Consequently on 25th May, 2007 the major recycling factory could not raise enough scrap batteries and closed operations. In addition, 30,000 – 40,000 wet-cell lead-acid batteries are manufactured in Kenya each month or 360,000 – 480,000 per year by five major battery manufactures. Wet-cell batteries, which contain a liquid electrolyte, commonly, power automobiles, boats, or motorcycles.

b) Rechargeable Batteries

Some kind of rechargeable batteries which can be recycled include nickel-cadmium (Ni-CD), nickel metal hydride, lithium ion, and small-sealed lead. A charge up to recycle programme offers various recycling plans for communities, retailer, businesses, and public agencies.

7.7.6 Plastics

There are about 100 manufacturers of plastic products in the country. The products are locally marketed and exported to the COMESA sub region. Almost all the raw materials are imported. There are also 20 plants recycling plastic wastes. Most are based in Nairobi. These manufacture a total of 192,836 t/yr of plastics from a raw material input of 239,602 t/yr. Out of the manufactured total, 49,022 t/yr (25%) comprises of plastic carrier bags. 27,813 t/yr of finished plastic products are imported. Of the total plastic carrier bag produced, about 50% (24, 511 t/yr) are less than 15 micron thickness and are primarily used for carrying consumer products. They are difficult to recycle⁴⁸, responsible for most pollution and often end up in the environment. They have now been banned by the city council of Nairobi through a bylaw.

Total plastic consumption in Nairobi is 211,316 t/yr, taking into account imported plastic products (27813 t/yr), Nairobi based production (192,836t/yr) and less exports (9,333 t/yr). Out of this total plastic consumption (211,316 t/yr). 38,516 t/yr are retained and reused while (172,800t/yr) are classified as waste. Only 1,728 t/yr of the above waste is recycled with the remaining bulk (171, 072 t/yr) being dumped into the environment. The major manufacturers of plastics are shown on Table 7.7.

⁴⁸ The UNEP.ROA/NEMA project on sustainable management of Plastic waste has developed a 10-point plan to manage the plastic waste. The Minister for Finance in his June 2007 Budget Speech slapped a heavy duty on Plastic flimsy papers. In line with this the CCN has developed tough laws on carrying plastic paper in the City of Nairobi.

Table 7.7: Plastic Manufacturing and Recycling Enterprises companies

| | <u>Company</u> | <u>LOCATION</u> | <u>LOCATION</u> |
|-----------|---|-----------------|--|
| <u>1</u> | <u>Devani (plastic) R.H. Ltd</u> | <u>Nairobi</u> | <u>Kitui Rd., Industrial Area, Nrb</u> |
| <u>2</u> | <u>PolyFabs Ltd</u> | <u>Mombasa</u> | <u>Mombasa</u> |
| <u>3</u> | <u>Acme Containers</u> | <u>Mombasa</u> | <u>Msa/ Nrb Rd.</u> |
| <u>4</u> | <u>Afro Plastics Ltd</u> | <u>Nairobi</u> | <u>Ind. Area</u> |
| <u>5</u> | <u>Allied Association Ltd</u> | <u>Nairobi</u> | <u>Dakar Rd.</u> |
| <u>6</u> | <u>Cables & Plastics Ltd</u> | <u>Mombasa</u> | <u>Port Reitz Rd</u> |
| <u>7</u> | <u>Kenpoly Manufacturers Ltd</u> | <u>Nairobi</u> | <u>Lunga Lunga Rd., Ind. Area, Nrb</u> |
| <u>8</u> | <u>Kenya Plastics Industries</u> | <u>Kisumu</u> | <u>Nkuruma Rd., Kisumu</u> |
| <u>9</u> | <u>Kentainers</u> | <u>Nairobi</u> | <u>Nairobi</u> |
| <u>10</u> | <u>NAV Plastics Ltd.</u> | <u>Thika</u> | <u>Off Garissa Rd., Thika</u> |
| <u>11</u> | <u>Kenya Laminate(1975) Ltd.</u> | <u>Nairobi</u> | <u>Nanyuki Rd, Ind. Area</u> |
| <u>12</u> | <u>Pan Plastics Ltd</u> | <u>Nairobi</u> | <u>Ruaraka</u> |
| <u>13</u> | <u>Uni Plastics Ltd</u> | <u>Nairobi</u> | <u>Nairobi</u> |
| <u>14</u> | <u>Coast Plastic Ltd.</u> | <u>Mombasa</u> | <u>Mombasa</u> |
| <u>15</u> | <u>Plastics Products Co. Ltd</u> | <u>Nairobi</u> | <u>Ind. Area</u> |
| <u>16</u> | <u>E.A Packaging Industries ltd</u> | <u>Nairobi</u> | <u>Ind. Area</u> |
| <u>17</u> | <u>EMCO Plastic (Inter) Ltd</u> | <u>Mombasa</u> | <u>Chai St. Mombasa</u> |
| <u>18</u> | <u>Euro Plastic</u> | <u>Nairobi</u> | <u>Kirinyaga Rd</u> |
| <u>19</u> | <u>Classons Plastic Ltd</u> | <u>Nairobi</u> | <u>Lunga Lunga Rd, Ind. Area</u> |
| <u>20</u> | <u>Elson Plastics (K) Ltd.</u> | <u>Nairobi</u> | <u>Enterprise Rd, Ind. Area</u> |
| <u>21</u> | <u>Plastic & Rubber Ltd.</u> | <u>Nairobi</u> | <u>Gilgil Rd, Ind. Area,</u> |
| <u>22</u> | <u>Tee Gee Electrics & Plastics Co. Ltd</u> | <u>Vihiga</u> | <u>Water Supply Rd, Tiriki, Vihiga</u> |
| <u>23</u> | <u>Textile & Plastic Industries Ltd</u> | <u>Mombasa</u> | <u>Mombasa</u> |
| <u>24</u> | <u>Nairobi plastics ltd</u> | <u>Nairobi</u> | <u>Nairobi</u> |
| <u>25</u> | <u>Cosmo Plastic Ltd.</u> | <u>Nairobi</u> | <u>Homa Bay Rd, Ind. Area,</u> |
| <u>26</u> | <u>King Plastics industries ltd</u> | <u>Nairobi</u> | <u>Nairobi</u> |
| <u>27</u> | <u>Edaflam Plastics Ltd</u> | <u>Nairobi</u> | <u>Ind. Area.</u> |
| <u>28</u> | <u>General Plastics Ltd</u> | <u>Nairobi</u> | <u>Enterprise Rd, Ind. Area, Nrb</u> |
| <u>29</u> | <u>Mepal Plastics (K) Ltd</u> | <u>Nairobi</u> | <u>Lunga Lunga, Ind. Area, Nrb</u> |
| <u>30</u> | <u>Flora Plastics Industries</u> | <u>Nairobi</u> | <u>Rimba Rd, Msa</u> |
| <u>31</u> | <u>Sera Coatings Ltd</u> | <u>Nairobi</u> | <u>Lusengeti Rd, Ind. Area, Nrb</u> |

Source : Kenya Association of Manufacturers, 2005 Directory of Members

7.7.7 Pharmaceuticals

Kenya has about 30 pharmaceutical manufacturers producing a wide range of medical and sanitary products⁴⁹. Over 95 percent of raw material inputs are imported. The industry has in the past years grown rapidly and diversified in product manufacture to become one of the largest in the COMESA sub region. For all the pharmaceutical products made locally, the industry is able to meet the local demand and export to non-COMESA countries. Most pharmaceuticals usually contain many organic solvents, residue and heavy metals (mercury and zinc for example). Most pharmaceutical companies are of medium scale.

⁴⁹ Kenya Association of Manufacturers. Directory, 2005

7.7.8 Soaps, Perfumes, cosmetics and other toiletry Preparations

There are 43 registered manufacturers of soaps, detergents, disinfectants, cosmetics and perfumes. Most of the raw material inputs are imported, despite good potential for their local production such as sodium hydroxide, essential oils and vegetable oils.

7.8 NGOs and Community Based Organizations

Some NGOs involved in environmental work in Kenya are listed below:

- Physicians for social Responsibility;
- iLima;
- Kenya Centre for Environmental Governance on toxic chemicals and waste Management.

There are many other community based organizations (CBOs) involved in waste recycling. Currently there are very few non governmental organizations (NGOs) involved in the SAICM. This is mainly due to the fact that this is a highly technical area, which requires high level of training, which is often lacking in NGOs. During the second SAICM Preparatory Meeting (INC2) in Nairobi, IPEN organized a one-day NGO forum to induct NGO activism in this area in Kenya. The meeting was attended by more than 38 NGOs but surprisingly enough only PSR-Kenya was able to embrace the toxic Chemicals challenge and has continued to lead in the SAICM. Only three NGOs are actively involved in the campaign against toxic chemicals. However there are potential NGOs like the Centre for Industrial Ecology, which have the expertise in chemicals management.

The major obstacle to NGO participation in the SAICM is that the toxic chemicals management is a relatively new area in the “sustainable environment” campaign. Most local private enterprises either do not understand it or have not developed focal areas for funding chemicals activities. For example UNEP- Small Grants Programme is only now developing a focal area for chemicals funding non toxic chemicals in general. Secondly NGOs have not been able to access funding for chemicals activities under both bilateral and multilateral pecuniary arrangements unlike other programmes like soil conservation, climate change and bio-diversity.

These NGOs have to be adequately represented in implementation of the MEAs. Those few that are already on the ground dealing with these issues do still need technical support/supervision for effective implementation of the conventions.

7.8.1 Some capacity building activities with NGOs

The three NGO communities have mounted spirited campaigns to address chemicals issues in Kenya. In September 2003 PSR-Kenya and Health Care without Harm conducted a training exercise on the Management of medical waste for representatives of 200 CBO in Nairobi. The overall objective of this training was the reduction of dioxin emission and occupational safety. This has been followed up by a PSR-Kenya consultative meeting with representatives of hospital heads in Nairobi on the management of hospital waste.

On 22nd March 2004, PSR-Kenya authored a full-page article in the East African Standard challenging the World Bank recommendation to sell the Pyrethrum Board of Kenya. The organization took the opportunity to educate Kenyans on the health effects of DDT and the important role the Board was already playing in the search for alternatives to DDT as

required by the Stockholm Convention. Other than the educative aspect the gist of the article was to promote the new products, which have been produced by the Board in the fight against malaria vector,

Kenyan NGOs could be more active in promoting the vision of SAICM. However, availability of funds is a major constraint to their activities. Recently UNEP through NEMA conducted a capacity self-needs assessment of major stakeholders in Climate Change, Biodiversity and POPs. There are high hopes that this exercise might culminate in the facilitation of the organizations and institutions to promote anti-toxic Chemicals activities. PSR-Kenya is currently working towards generating, distilling and disseminating information amongst stakeholders in order to build and sustain their capacity to respond to the challenges of implementing the chemical conventions. Another activity by the NGOs was by the centre for environmental Governance.

On 13th May 2003, CEAG Africa organized a consultative workshop on “*Dioxin Reduction in Nairobi – A community based Approach*”. The workshop was attended by Representatives of Community based Organizations that are involved in waste management in Nairobi, senior government officials, NGOs and officials from the UNEP-SGP – the financiers of the workshop. The workshop resolved to prioritize the elimination of practices that lead to the production of dioxins and furans in Nairobi and mandated CEAG Africa to provide leadership to the joint project⁵⁰. A grant proposal is currently being formulated with the support of UNEP-SGP offices in Nairobi.

Several activities should be undertaken in support of the preparations and implementation of the SAICM by the NGOs. Very significant progress should be realized by ensuring that the preparation and the implementation of the SAICMs is participatory and adopts a bottom-up approach. This may include ensuring the following activities:

- i. Awareness raising, on note of chemical mobilization and preparing main stakeholders through workshops.
- ii. Raising awareness through the use of print and the electronic media.
- iii. Support to community initiatives addressing environmental conservation and poverty alleviation issues.
- iv. The Government may consider identifying a local NGO for further training, monitoring and evaluation of the work of civil society.
- v. A preliminary stakeholder inventory was done which needs continuous up dating. The latter helped in the identification of potential stakeholders for the sensitization and consultation process and was also used in the NGO and CBO needs assessment.

7.9 Trade Unions

Workers and trade unions play a major role in the achievement of sustainable development through involvement in industry, protection of the working environment and promotion of socially responsible and economic development. Through their networks and extensive membership, trade unions provide important channels for supporting concepts and practices of sustainable development. The key trade Union in Kenya is the chemicals and allied workers Union under the central Organization of Trade Unions (COTU)

Their roles include:

⁵⁰ NGO's are being encouraged by the GEF Small Grants programme to take active part in implementation of the NIP for POPs

- Promoting the rights of individual workers to freedom of association;
- Promoting the active participation of workers in decisions on the design, implementation and evaluation of national and international policies and programmes on environment and development, including employment policies, industrial strategies, labour adjustment programmes and technology transfers;
- Ensuring that workers and their representatives are provided with all relevant information to enable effective participation in these decision-making processes;
- Establishing the framework for a joint environmental policy, and set priorities to improve the working environment and the overall environmental performance of enterprise;
- Seeking to ensure that workers are able to participate in environmental audits at the workplace and in environmental impact assessments;
- Promoting access to adequate training to augment environmental awareness, ensure their safety and health, and improve their economic and social welfare. Such training should ensure that the necessary skills are available to promote sustainable livelihoods and improve the working environment.

Environment Health and safety committees (EHS) are supposed to enforce regulations and create awareness.

7.10 Description of Some Key law enforcement Agencies.

7.10.1 NEMA's Mandate to Chemicals Management

NEMA is the specialized institution for the environmental impact assessment and environmental audits. The bulk of the projects in the schedule of EMCA related to chemicals and hazardous waste management include:

- The development of standards regulations and guidelines;
- Promote partnerships between lead agencies, the private sector and the civil societies to enhance complementarities and synergies with specialized institutions;
- Foster sustainability by encouraging that environmental costs and benefits are fully reflected in socio-economic decisions.

7.10.2 Pest Control Products Board (PCPB).

The Pest Control Products Act of 1982, which created the Pest Control Products Board in 1983, is the main regulatory organ for pesticides. A Pest control product is defined as “a device, product, organism, substance or a thing that is manufactured for directly or indirectly controlling or preventing, destroying, attracting or repelling any pest. The Board regulates the importation, exportation, manufacture, distribution and use of pesticides in Kenya in all sectors of agriculture and health. The Pest Control Products Board (PCPB) was established in 1982 through an Act of parliament (Pest Control Products Act Cap 346 Laws of Kenya). PCPB became operational in 1985.

The goal in regulating pesticides is to ensure provision of pest control products that are safe to human health and the environment. The mission of the board is to provide an efficient and

effective regulatory service for registration, importation, exportation, manufacture, distribution, transportation, sale and safe use of pest control products and mitigate harmful effects to the environment. The above mission is achieved through operations such as:

- a) Inspections of pesticide premises countrywide
- b) Training of all stakeholders on chemical risks
- c) Quality monitoring
- d) Information dissemination
- e) Products registration.
- f) Publicity and public relations

The Registration Department of PCB is responsible for pesticides registration. Currently there are six hundred and twenty pesticides registered in Kenya of which 30 are bio-pesticides. In the 2002/2003 financial year PCPB inspectors inspected a total of three thousand six hundred and fifty nine pesticides premises spread around the country. A total of 1.1 tonnes of illegal pesticides were impounded. These pesticides include expired, obsolete, smuggled, fake (counterfeit) or unregistered products. All these pesticides were disposed by a registered consultant. The consultant has a kiln at Athi River where destruction of these pesticides is done under the supervision of Pest Control Products Board Inspectors.

The following constraints have been cited to the work of the board:

- Lack of corporate status of the Board which would fasten investigation and prosecution of cases without referring to the Attorney General;
- The current Act needs to be revised in line with the current status especially on environmental protection;
- Lean staff which makes it difficult to address all cases as reported.

Training and information

Is also a major activity of the board to educate and inform the users and the general public on matters concerning the safety and risk posted by pesticides. Other functions that fall under this category are advising relevant authorities on aspects of pesticide management, training government extension agents and other interested people on pesticide management, and advising the government on the status of approved pesticides. The PCPB is in a way in charge of the maintenance of the registered pesticide, those restricted and also those banned. The main functions of the Pest Control Products Board are regulatory in nature. They include;

Regulatory

- To register and approve for use all pest control products;
- To regulate the sale and distribution of pest control products through licensing of imports and exports;
- To inspect and license facilities used for the manufacture, storage and distribution of pesticides;
- To analyze any pesticide for efficiency before recommending for use.

Technical

- To receive and evaluate data from manufacturers and importers on the merits of a pest control product;

- To undertake as appropriate, short and long term research to evaluate the impact of pesticides on the environment;
- To collect information from international organizations such as FAO, WHO, EPA, UNEP etc that are relevant to pesticide use and regulation.

7.10.3 Department of the Government Chemist

The Government Chemist Department was established in 1912 as the first general testing laboratory. It was initially established to analyse soil samples and adulterated foodstuffs. Currently, the core functions of the department fall under the provision of analytical services in the fields of public and environmental health. These include qualitative and quantitative analysis, the provision of analytical services and the assembly and review of scientific evidence for the administration of justice.

The department employs university graduates in Chemistry or biochemistry as analysts while polytechnic diploma graduates in applied sciences are employed as Laboratory Technologists. The former have general understanding of the theory and applications of chemistry to analytical investigations while the latter are exposed to hands on experience of instrumentation as well as some theory. Consultation with the staff conducted during the data gathering for this study confirmed this weakness which has to be addressed through more resource allocation in order to meet the critical training needs.

Government Chemist branches have adequate workspace facilities. However, modernisation to install professional work areas and storage space is still needed. Financial constraints have limited modernization resulting in the necessity of out-sourcing of some services. New/replacement equipment requirements include:

- Additional atomic absorption spectrophotometer;
- Gas chromatograph with an electron capture or nitrogen phosphorous detectors;
- Gas chromatograph-mass spectrophotometer (GCMS);
- Diode ray spectrophotometer;
- Additional high pressure liquid chromatograph;
- Fourier transform infra-red spectrophotometer;
- pH/conductivity meter and
- Incubators.

7.10.4 The Kenya Plant Health Inspectorate Service (KEPHIS)

KEPHIS is a regulatory body and commenced its operations in 1997. Its role in chemical issues is to provide dependable, effective, efficient and competitive regulatory service for ensuring quality agricultural inputs and produce thereby promoting sustainable agriculture and economic growth. It aims at being the leading regulatory agency for quality agricultural inputs and produce. The agricultural inputs include those that are chemical based, i.e. pesticides and fertilizers. One of the KEPHIS mandates is to establish service laboratories to monitor the quality and levels of toxic residues in plants, soils and crop and animal produce. The analysis carried out includes:

- Fertilizers for conformity to required standards;
- Pesticide formulations for active ingredient concentration;

- Pesticides in the environment;
- Pesticide residues in food. This is to verify compliance to maximum residue levels (MRLs) and Good Agricultural Practices in pesticide use.

Kenya is a key exporter of commodities susceptible to contamination when environmental pollution occurs. In collaboration with the Lake Victoria Environment Monitoring programme and the Fisheries Department, the organisation has since 2004 been monitoring pesticide residues in fish, water and sediment. The monitoring is a requirement by the European Union for the fish export from Kenya to the region. The fish export ban to the EU in the late 1990s was lifted after ACL produced convincing analytical results on the safety of our fish in relation to pesticide residues.

Involvement in pesticide residue analysis in both agricultural and environmental commodities, and the capacity to evaluate WTO notifications and the EU Directives and Regulations related to pesticides, places the organisation in a consultancy position for food commodities exporters and non-agricultural chemical users, e.g. the National Public Health Department. (Consider the use of DDT in Public Health and the low tolerance levels of the same in our fish and fresh produce by the EU).

7.10.5 Directorate of Occupational Health and safety Services. (DOHSS)

a) Mandate

The DOHSS's mandate is spelt out in the Factories and Other Places of Work Act Cap 514 laws of Kenya. Officers in the department carry out health and safety audits at the workplaces to identify toxic substances and advise on safe handling and disposal of harmful chemical substances. There is also provision of audits by safety and Health advisers approved by the department under the safety and health committee rules. The department monitors the work of the advisers and undertakes medical surveillance through medical examination of workers and surveys of healthy conditions in workplaces.

b) Data Collection on Human Health Risks

The department has an infrastructure to collect data and has established an Occupational Health and safety Information Centre to serve as a referral point on occupational health and safety matters. This centre also serves as a national centre of the international health and safety information centre (CIS) of the International Labour Organization.

The act also requires that every medical practitioner notifies the Director of Occupational Health and Safety on any occupational diseases brought to his her notice. Through workplace inspection and audits, useful data and statistics are collected on harmful chemicals in use and also exposed workers including audits relating to marking of containers filled with harmful substances and availability of instructions for the safe handling of chemicals at workplaces.

c) Health and Safety Committees

The Act has provision for the formation of Health and safety committee in workplaces where twenty or more employees are employed, in which employer and the workers are represented. The rules are now in place to regulate the functions of these committees and enhance participation of workers in the management of occupational health and safety including

chemical management at the workplace. This concept is being strongly enforced by the health insurance firms through health audits and safety surveys.

The occupiers are required to post safety and health pamphlets and posters including summaries of rules and regulations developed by the department, at workplaces in order to pass the information to workers. Key institutions include Kenya Safety Surveyors, Kenya Fire Company and many environment and health committees.

The department disseminates information to educate workers by carrying out training and education on health and safety. For effective and efficient implementation of the developed legislation, codes of practice and other technical guidelines, workers representatives are involved through the National Advisory committee on Occupational Health and safety established under the Act.

d) Human Exposure to Chemicals

Chemical risk assessment is done through monitoring of the work environment in order to establish any relationship between occupational diseases and the work environment and remedial measures are recommended. The department advises the employers and employees on appropriate personal protective equipment and the process of establishing standards in regard to chemical exposure.

The Factories and Other Places of Work Act give provisions for making of rules to govern safety and health at workplaces. The department is in the process of developing criteria dealing with toxic materials and harmful physical substances and agents, which will describe exposure levels (TLV) that are safe for various periods of employment. Other rules to be developed include works on hazardous installations, chemical safety regulations and formulating inventories on the same in Kenya.

e) Risk Assessment

A draft of the medical examination rules are in place addressing works involving a risk to the health of employee that may lead to ill health and diseases and also introduces the need to have DHP (Designated Health Practitioners) in all district offices to provide for medical examination of workers.

The department is improving the dissemination of information on chemical safety to communities likely to be affected by toxic chemicals using the print and electronic media. Some proposal include addressing constraints such as the need to equip the laboratories at the department with modern, efficient monitoring equipment at all the provincial offices, inadequate transport systems that hamper the effective coverage of workplaces and training of the technical personnel in Health and safety for the better management of Occupational safety and health services.

f) Health and Safety in Horticulture Industry

The lack of importance attached to workers' issues in horticultural trade policy. This ministry should play a greater role in conjunction with the ministries of Agriculture and Trade and Industry, so that the workers' concerns are adequately catered for in horticultural trade policies. The Ministry of Environment's engagement in policy formulation revolves around environmental issues arising out of the cut flower industry. It is concerned that the cut flower

industry should observe national environmental legislation for example, regarding the use of agro-chemicals to minimize pollution. In this respect it seeks to ensure that clauses regarding the environmental management are catered for in any horticultural trade policy. And to ensure that horticultural trade policy is in harmony with economic policy in the country, consultations take place with the Ministry of Finance.

7.10.6. Kenya Revenue Authority

The Kenya Revenue Authority is responsible for the collection of government revenue and the enforcement of laws and regulations concerning Customs & Excise, Income Tax, Value-Added Tax and Road Transport Registration.

(i) Customs control of international trade goods

Customs, as a gateway to international exchange of goods, is responsible for facilitating legitimate trade, enforcement of import and export controls to ensure compliance with international agreements and national legislations. This involves clearance of goods through ports, airports and borders ports and the inspection of goods prior to entry. It is the right institutional candidate for the Rotterdam “PIC” Convention.

Illegal international trade in commodities such as ozone depleting substances, toxic chemicals and hazardous wastes can undermine the effectiveness of multilateral agreements.

Because the Customs administration performs across a wide range of government policies, it interacts with many other agencies, ministries or departments.

(ii) Classification of goods and international trade statistics

As the world integrates economically, solutions to international trade issues can only be effectively achieved by collective efforts through international co-operation. In this regard, Kenya is a member of the World Customs Organization (WCO) concerned with harmonization and uniform application of customs systems and procedures governing the movement of commodities, people and conveyance across customs frontiers.

International trade statistics are an important source of economic indicators of any country. The accuracy of this kind of information is essentially dependent on the correct classification of goods. The WCO therefore promotes the Harmonized Commodity Description and Coding System (or the Harmonized System) tariff nomenclature used as a basis for collection of customs duties and international trade statistics, surveillance of controlled goods and enforcement (risk assessment and targeting).

(iii) Detailed National Customs Tariff Nomenclature

At the request of several United Nations organizations, the WCO has adopted recommendations to monitor trade in substances depleting the ozone layer, environmentally hazardous materials and toxic wastes. Kenya has therefore amended the customs tariff to facilitate monitoring of chemical substances controlled under international conventions. For example CFC-11 (trichlorofluoromethane), CFC-12

(dichlorofluoromethane), HCFC-22 (chlorodifluoromethane) and CFC-113 (trichlorotrifluoroethane) classified in HS heading 29.03.

(iv) Training of Customs Officers

In cooperation with the WCO, the secretariats of Multilateral Environment Agreements (MEAs) that have trade provisions, such as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and the Montreal Protocol on Substances that Deplete the Ozone Layer, have trainer-training programmes. Two (2) Kenya customs officials have been trained. Training is also anticipated concerning national implementation of the Rotterdam Convention on Prior Informed Consent (PIC) and the Stockholm Convention on POP.

(v) Needs identified concerning international chemicals management

There is need to build the capacity of customs officials, who are at the forefront of efforts to combat illegal trade. This is aimed at enabling the officers to control and monitor the imports and exports. In this regard, there is need to strengthen the capacity of customs officers to manage chemicals in international trade with regard to description, labelling, packing, handling and hazard classification of goods.

It would also be useful to equip customs department with screening and analytical laboratory equipment for fast and effective identification and monitoring of illegal and dangerous chemicals. Establish infrastructure which facilitate local and international exchange of information on hazardous chemicals.

7.10.7 The Kenya Bureau of Standards

Kenya Bureau of Standards is implementing over 82 chemicals standards covering 200 registered chemical firms in the country. These include firms dealing with cosmetics, detergent, pens, toothpaste, industrial chemicals, fertilizers, paints, adhesives, polishes auto motive oils, glass and books etc. KEBS also handles imported chemicals guided by the standards applicable to them.

KEBS has not developed Kenyan standards on chemicals/hazardous waste management disposal. It has however formed a technical committee on hazardous waste management and shall be calling for a technical meeting before the end of the year. KEBS has also been involved in writing the waste management regulations in collaboration with key stakeholders.

7.11 The Media (Electronic and Print Covering Environmental Issues)

The media covering environmental issues are grouped in four categories:

- i) Radio
- ii) Television
- iii) Daily Newspapers
- iv) Scientific magazines

There are more than ten radio stations covering environmental issues dedicatedly. The key ones include: Kameme FM, KISS100, Capital FM, Kenya Broadcasting Corporation, Citizen Radio, and Coro FM. They respond well to issues of chemical and waste and will often have at least one programme per week dedicated to a topical issue on environment, such as chemicals.

The television stations with dedicated slots for environment include Nation TV, Kenya Television Network, Kenya Broadcasting Corporation. The major programmes include EcoJournal, Capacity 21 and news events. They usually pick chemical topics which have policy and regulatory implications. The major newspapers having coverage of the environment are Nation Newspapers which on Thursday has four pages on environment, The Standards newspapers, the Kenya Times and the People.

Major scientific magazines with regular topics on the environment include the quarterly NEMA News and AGROCHECAM News. There are other specific magazines whose publications are based on corporate interests such as Bamburi Cement Company Limited. There are also many regional magazines publishing issues on chemicals such as the African Newsletter on occupational matters, COMESA News on trade, etc.

7.12 Academia and Centres of Chemicals Management Excellence

The Government of Kenya has in collaboration with the relevant international organizations, facilitated the establishment of:

- The Kenya National Cleaner Production Centre, KNCPC, located at the Kenya Industrial Research and Development Institute, KIRDI.
- The Kenya Productivity Centre located at Kenya Industrial Research and Development Institute, KIRDI
- The GEF – KAM Industrial Energy Efficiency Project located at the Kenya Association of Manufacturers premises in Westland's part of Nairobi.
- The National WTO Committee with representation from the various stakeholders is operational.

The following have been the Achievements in waste reduction and chapter 19 of the Agenda 21:

- (i) Application of Cleaner Production technologies in industry (KNCPC)
- (ii) Improvement of energy efficiency in industry
- (iii) Increased recycling of plastics, paper, glass etc.
- (iv) Gradual phase out of leaded gasoline
- (v) Gradual phase out of certain hazardous pesticides in the agricultural sectors

The main academic centre of excellence in chemicals remains the Chiromo campus of the University of Nairobi. Others are:

- i. The Kenya Industrial Research and Development Institute (KIRDI) that conducts industrial research in the country.
- ii. The Kenya Medical Research Institute (KEMRI) undertakes medical research in the country. It has very efficient incineration facilities.
- iii. The Kenya Marine and Fisheries Research Institute (KEMFRI) undertakes marine and fisheries research in the country.
- iv. The International Association of Pesticide Manufacture (FIFAP) Safe Use Project
- v. The National Council of Science and Technology (NCST) regulates science and technology developments in Kenya.

- vi. The Kenya Agricultural Research Institute (KARI) which undertakes all Agriculture related research in the country.
- vii. The Kenya Plant Health Inspection Services (KEPHIS) which inspects and supervises all agronomic research in Kenya to ensure that they conform to international standards and benchmarks.

7.13 Research

Kenya has a long history of agricultural research and a well- developed agricultural research infrastructure that cover crops, livestock, fisheries and related fields. There are over 28 agencies that engage in agricultural research which employ 833 full line researchers. The organizations are:

- Public funded institutions
- The Kenya Agricultural Research Institute
- The Kenya Marine Fisheries Research Institute
- The Kenya Forestry Research Institute
- Universities
 - Department of Pharmacology – University of Nairobi
 - Department of Public Health- University of Nairobi
 - Institute of Nuclear Research- University of Nairobi
 - Radiation Protection Board Ministry of Health
- Commodity Funded Institutions
- The Coffee Research Foundation – Ruiru
- The Tea Research Foundation – Kericho
- The sugar Research Foundation

These are the major international research Institutions that do research on diseases of the livestock and plants:

- The International Centre for Insect Psychology and ecology (ICIPE) for insects physiology and ecology;
- The International Centre for Research in Agro forestry (ICRAF).

There are also major industries involved in research to control pests these are:

- Kenya Breweries limited
- The Kenya Canners Limited Major horticulture Companies

7.13.1 Kenya Medical Research Institute (KEMRI)

KEMRI was established through parliament’s science and technology (amendment) act of 1979, which mandated it to:

- Carry out biomedical research
- Train persons on relevant research matters
- Collaborate nationally and internationally with research organs
- Cooperate with NCST, MoH and medical science advisory research committee on matters of research policies and priorities.

The strategy that KEMRI adopted to achieve this was based on conducting all the necessary research under specific programmes. Initially research programmes were specific diseases hence almost every disease was a programme unto itself resulting in a huge number of programmes that were time and money consuming. Given that each programme was guided by a committee in its functions, facilitation and coordination of these committees became more difficult to undertake by the authorities.

There was inevitably, therefore, the need for reorientation of the programmes, their structures and operation mechanisms in order to enhance efficiency. This culminated in the Board of Management (in early 2001, following the outcome of a sub-committee appointed to examine the restructuring of the programmes) to recommend that, all research activities be broadly put under four programmes, namely:

- Epidemiology, Health Systems Research and Public Health Research Programme
- Biomedical Sciences Research Programme
- Parasitic Diseases Research Programme (includes Malaria)
- Infectious Diseases Research Programme (includes HIV/AIDS)

Each programme has a Programmes Committee whose chairperson is also the programme coordinator. Amongst other things, the committee's functions are to:

- Identify Research Priorities in Programme
- Initiate and Coordinate Development of Research Projects in the Programme
- Review Progress on this Periodically
- Identify, Procure and Mobilize Research Resources

Following several committee meetings for this programme, it was thought appropriate to change the programmes name to National Occupational Public Health and Epidemiology Research Programme (NOPHERP) and the committee to National Committee of Occupational, Public Health and Epidemiology Research (NACOPHER).

The operational areas of the programme fall under the following health fields;

- Environmental/occupational Health Research
- Health Systems Research
- Human Nutrition
- Material and Child Health
- Reproductive and Population Studies
- Epidemiology
- Training

Environmental/occupational health research is an important operational area for this programme, as such Chemicals becomes the best entry point, hence the organization of the current workshop.

The membership to this programme committee is drawn from a number of key research, learning and service Institutions namely; KEMRI, NEMA, KETRI, NCST, Ministry of Labour, UoN, MoH and the University of Nagasaki. Each of these institutes are represented by one of its staff.

7.14 Others agencies which promote trade and investment

7.14.1 The Export Promotion Council

The Export Promotion Council (EPC) is involved in trade policy since it seeks to improve the trade environment in order to facilitate the production of export goods and services. It is supposed to: suggest export incentives and set export targets; formulate market strategies for specific products; attract investment and finance to the export sector; and liaise with relevant local, bilateral and multilateral trade institutions on measures to boost exports. Due to the importance of horticultural products in Kenya's export market, the EPC has a special horticultural panel in which different stakeholders are represented.

7.14.2 Investment Promotion Council (IPC)

The main objective of the Investment Promotion Council (IPC) is to promote investment in Kenya. Its role is to approve investment projects, provide information on investment policy, regulation and opportunities. The IPC participates in trade policy formulation by recommending change of certain policies, strategies and administrative procedures necessary to enhance an investment climate. On the other hand, the Export Processing Zone Authority (EPZA) is mandated mainly to promote investment in the export processing zones (EPZs). Since the horticultural industry is predominantly export-oriented it is a potential investor of the EPZs.

7.15 Summary of the roles of the key Institutions in Chemical management

Table 7.9 below provides a summary of the roles of the key institutions in chemicals management

Table 7.8 Summary of Roles of Key Institutions in Chemicals management

| <u>No</u> | <u>Institution</u> | <u>Role in chemicals Management</u> | <u>Chemical Sector</u> |
|-----------|--|---|--|
| 1 | <u>Customs and Exercise Department</u> | <u>The Department regulates international trade and collect tax revenue for the government.</u> | <u>All importers and exporters Revenue agencies Development partners</u> |
| 2 | <u>Kenya Ports Authority</u> | <u>The Authority manages all the sea ports of Kenya. It is an Enforcer, regulator and user of Chemicals</u> | <u>Import/ export Transboundary movement</u> |
| 3 | <u>National Environment Management Authority</u> | <u>Under the EMCA (1999), NEMA is mandated to ensure a healthy environment in Kenya. It is an enforcer and regulator.</u> | <u>Environmental Regulation in all sectors</u> |
| 4 | <u>Pest Control Products Board</u> | <u>The controls the pesticides used in Kenya.</u> | <u>Pesticide products</u> |
| 5 | <u>Agro-chemical Association of Kenya</u> | <u>controls the agro-chemical usage in Kenya</u> | <u>Agrochemical usage only. Trade association</u> |
| 6 | <u>Municipalities</u> | <u>The Municipal Councils manage wastes in all municipalities.</u> | <u>Waste management Pesticides for vector management Fire risk</u> |
| 7 | <u>Kenya Industrial Research and Development Institute (KIRDI)</u> | <u>The Institute conducts industrial research in the country.</u> | <u>Research in industrial processes and technology. Home to KNCP.</u> |
| 8 | <u>Kenya Medical Research Institute (KEMRI)</u> | <u>Undertakes medical research in the country. It has very efficient incineration facilities.</u> | <u>Research on Impact of chemicals on human health</u> |
| 9 | <u>Kenya Marine and Fisheries Research Institute (KEMFRI)</u> | <u>Undertakes marine and fisheries research in the country.</u> | <u>Research and Monitoring.</u> |
| 10 | <u>National Council of Science and Technology (NCST)</u> | <u>Regulate science and technology developments in Kenya.</u> | <u>Research</u> |
| 11 | <u>Kenya Agricultural Research Institute (KARI)</u> | <u>Undertakes all Agriculture related research in the country.</u> | <u>Research and Monitoring</u> |
| 12 | <u>Kenya Plant Health Inspection Services (KEPHIS)</u> | <u>Inspects and supervises all agronomic research in Kenya to ensure that they conform to international standards and benchmarks.</u> | <u>Monitoring and Laboratory analysis.</u> |
| 13 | <u>Universities and Other research institutions</u> | <u>They are involved in academic and research capacity building</u> | <u>Capacity building/Training/monitoring</u> |
| 14 | <u>Ministry of Health (Malaria Control Programme)</u> | <u>The Ministry provides policy guideline son human health in Kenya.</u> | <u>User</u> |
| 19 | <u>Kenya Flower Council</u> | <u>Is an apex body in charge of all flower farmers in Kenya.</u> | <u>Agrochemicals</u> |
| 20 | <u>Horticulture Crops Development Authority (HCDA)</u> | <u>Horticultural development in the country.</u> | <u>Agrochemicals</u> |
| 21 | <u>International Centre of Insect Physiology and Ecology (ICIPE)</u> | <u>Research on alternatives to Chemicals.</u> | <u>Alternatives to chemicals</u> |
| 22 | <u>Fresh Produce Exporters Association of Kenya (FPEAK)</u> | | <u>Agrochemicals</u> |

7.17 Laboratory capacity in the country

Table 7.10 has a list of laboratories that can conduct various subject related analyses.

Table 7.10 Laboratories Offering analysis

| Serial No. | Laboratory | Address & Telephone | Location of Labs | Function |
|------------|--|--|---|--|
| 1. | <u>SGS Kenya Ltd</u> | <u>P.O. Box 72118, Nairobi</u> <u>Tel. 3751811</u> | <u>Mombasa</u> | <u>Air emission, water and effluent assessment/analysis</u> |
| 2. | <u>University of Nairobi- Veterinary Pathology/ Toxicology Labs</u> | <u>P.O. Box 30197, Nairobi</u> <u>Tel. 632211</u> | <u>Upper Kabete Campus</u> | <u>Toxicological, soil and microbiological assessment/analysis</u> |
| 3. | <u>University of Nairobi – Civil Eng. Labs.</u> | <u>P.O. Box 30197, Nairobi</u> <u>Tel. 334244</u> | <u>Nairobi-Main Campus</u> | <u>Water, effluent and soil assessment/analysis</u> |
| 4. | <u>University of Nairobi-Chemistry Labs</u> | <u>P.O. Box 30197, Nairobi</u> <u>Tel. 4446138</u> | <u>Nairobi Chiromo Campus</u> | <u>Water, effluent, soil and air assessment/analysis</u> |
| 5. | <u>Kenya Bureau of Standards</u> | <u>P.O. Box 54974, Nairobi</u> <u>Tel. 502210</u> | <u>Nairobi</u> <u>Mombasa</u> <u>Kisumu</u> | <u>Water and effluent assessment/analysis</u> |
| 6. | <u>Mines and Geological Dep. - Chemical Lab</u> | <u>P.O. Box 30009-00100, Nairobi</u> <u>Tel. 558034</u> <u>Email: cmg@bidii.com</u> | <u>Machakos Road, Nairobi</u> | <u>Water, effluent and soil assessment/analysis</u> |
| 7. | <u>Polucon Services (Kenya) Ltd</u> | <u>P.O. Box 99344, Mombasa</u> <u>Tel. 041-494329</u> | <u>Tudor –Mombasa</u> | <u>Water, effluent and soil assessment/analysis</u> |
| 16. | <u>Kenya Industrial Research and Development Institute (KIRDI)</u> | <u>P.O. Box 30650, Nairobi</u> <u>Tel. 535966</u> <u>Email: kirdi@arcc.or.ke</u> | <u>Nairobi, Industrial Area</u> | |
| 17. | <u>National Agricultural Research Laboratories (KARI)</u> | <u>P.O. Box 14733-00800, Nairobi</u> <u>Tel. 4444251</u> | <u>Kabete, Nairobi</u> | |
| 18. | <u>Kenya Plant Health Inspectorate Services (KEPHIS)</u> | <u>P.O.Box49592, Nairobi</u> <u>Tel. 882933</u> <u>Fax. 882265</u> <u>Email: kephis@nbnet.co.ke</u> | <u>Karen, Nairobi</u> | |
| 19. | <u>University of Nairobi – Department of Vet. Pathology, Microbiology & Parasitology - Parasitology Laboratory</u> | <u>P. O. Box 30197, Nairobi</u> <u>Tel. 632211</u> | <u>Upper Kabete Campus</u> | |
| 20. | <u>University of Nairobi – Food Tech. & Nutrition Labs</u> | <u>P.O. Box 30197, Nairobi</u> <u>Tel. 631340</u> <u>Email: dftn@uonbi.ac.ke</u> | <u>University of Nairobi, Upper Kabete Campus</u> | |
| 21. | <u>Industrial and Scientific Support Service</u> | <u>P.O. Box 59320-00200, Nairobi</u> <u>Tel. 550736 Fax. 550741</u> | <u>1st Floor, ABS Building- Dar es Salaam Road</u> | |
| 22. | <u>Government Chemist</u> | <u>P.O. Box 20753-00200, Nairobi</u> <u>Tel.2725873/4</u> <u>Fax. 2717567</u> | <u>KNH, Nairobi</u> | |

Source: NIP 2007

CHAPTER 8. SITUATION ANALYSIS FOR THE KEY AREAS OF SAICM

Stakeholders who participated in the study

1.iLima-Environmental NGO

2 Nairobi University (Chemistry Department)-Academia/Government

3 Government Chemist-Govt

4 National Environmental Management Authority (NEMA)-Govt

5 Kenya National Cleaner Production Centre-KNCPC-Govt

6. United States International University-Academia/Private

7. Ministry of Environment and Natural Resources-Govt

8. Ministry of Trade and Industry-Govt

9. Kenya Industrial Research Development Institute-Govt

10. Agrochemical Association of Kenya-NGO

8.1 Risk reduction

Part 1: Statistical data

Category 1: Ministries, agencies and NGOs

Table 8.1

| RISK REDUCTION | | | | | | | | | | | | | | | | |
|----------------|--|--|-----------------|--------------|---|---|---|---|---|---|---|---|----|-------|-----|----|
| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % | |
| 1.1 | Impact of chemicals and wastes on humans and environment | 1 | None at all | | | | | | | | | | | | | |
| | | 2 | Not much | | | | X | | X | | | | | 2 | 20 | |
| | | 3 | Moderate | | | x | | | | | x | x | | | 3 | 30 |
| | | 4 | Considerable | | | | | x | | | | | x | x | 3 | 30 |
| | | 5 | Very much | x | x | | | | | | | | | | 2 | 20 |
| TOTAL | | | | | | | | | | | | | | 10 | 100 | |
| 1.2 | Measures in Kenya that protect human health and the environment from chemical exposure | 1 | None at all | | | | | | | | | | | | | |
| | | 2 | Not much | x | | | | | X | | | | | | 2 | 20 |
| | | 3 | Moderate | | | | | | | | | | | | | |
| | | 4 | Considerable | | | x | X | | | | x | x | x | x | 6 | 60 |
| | | 5 | Very much | | x | | | x | | | | | | | 2 | 20 |
| TOTAL | | | | | | | | | | | | | | 10 | 100 | |
| 1.3 | H & Env | Knowledge of National Institutes involved in risk management | 1 | None at all | | | | | | | | x | x | | 1 | 20 |
| | | | 2 | Not much | x | | | | | | | | | | 1 | 10 |
| | | | 3 | Moderate | | | x | X | | X | | | | | 3 | 30 |
| | | | 4 | Considerable | | | | | | | x | | | x | 1 | 20 |
| | | | 5 | Very much | | x | | | x | | | | | | | 2 |
| TOTAL | | | | | | | | | | | | | | 100 | 100 | |
| Social Eco | | | | | | | | | | | | | | | | |
| | Knowledge of National Institutes involved in risk management | 1 | None at all | | | x | | | | | | | | 1 | 10 | |
| | | 2 | Not much | x | | | X | | | | | | | 2 | 20 | |
| | | 3 | Moderate | | x | | | | x | x | x | | | 3 | 30 | |
| | | 4 | Considerable | | | | | | | x | | x | x | 3 | 30 | |
| | | 5 | Very much | | | | | x | | | | | | 1 | 10 | |
| TOTAL | | | | | | | | | | | | | | 10 | 100 | |
| 1.4 | Institutional knowledge of stoppage of production and use of risk chemicals | 1 | Not aware | | | | | x | | x | | | | | 20 | |
| | | 2 | Slightly aware | x | | x | x | | | | x | x | | | 50 | |
| | | 3 | Very much aware | | x | | | | | | | x | x | | 30 | |
| TOTAL | | | | | | | | | | | | | | | 100 | |

| RISK REDUCTION | | | | | | | | | | | | | | | | |
|----------------|--|-------|--------------------|---|---|---|---|---|---|---|---|---|----|-------|-----|----|
| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % | |
| 1.5 | Category of the measures cited in 1.4 above | 1 | Not sure | | | | | | X | | | | | | 10 | |
| | | 2 | Others | | | | | | | | | | | | 0 | |
| | | 3 | Admin | | | x | | | | | x | | x | x | | 30 |
| | | 4 | Legal | x | x | x | x | | | | | x | | x | | 60 |
| TOTAL | | | | | | | | | | | | | | | 100 | |
| 1.6 | Efficiency of measures in cited in 1.4 above | 1 | Not sure | | | | | | X | | | | | | 10 | |
| | | 2 | Inadequate | x | | x | x | x | | | x | x | x | | 70 | |
| | | 3 | Adequate | | x | | | | | | | | | x | 20 | |
| TOTAL | | | | | | | | | | | | | | | 100 | |
| 1.7 | Knowledge of incidences of chemical releases to environment | 1 | Yes | x | x | x | x | | | | x | x | x | x | 80 | |
| | | 2 | No | | | | | X | X | | | | | | 20 | |
| Total | | | | | | | | | | | | | | | 100 | |
| 1.8 | If yes in 1.7 above; level of preparedness to address incidences | 1 | None at all | | | | | | X | | | | | | 10 | |
| | | 2 | Low | x | x | x | x | X | | | x | x | x | x | 90 | |
| | | 3 | Moderate | | | | | | | | | | | | 0 | |
| | | 4 | High | | | | | | | | | | | | 0 | |
| Total | | | | | | | | | | | | | | | 100 | |
| 1.9 | If yes in 1.7 above; source of information is? | 1 | TV | | x | x | X | x | X | x | x | x | x | | 90 | |
| | | 2 | Papers | x | x | x | X | x | X | x | x | x | x | | 100 | |
| | | 3 | Radio | | x | x | X | x | X | x | x | x | x | | 90 | |
| | | 4 | Personal Contacts | | | x | | x | | | x | x | x | x | | 60 |
| Total | | | | | | | | | | | | | | | 100 | |
| 1.10 | Institutional awareness of Principle 15 of Rio Declaration | 1 | Yes | x | x | x | x | x | X | x | x | x | x | | 100 | |
| | | 2 | No | | | | | | | | | | | | | |
| Total | | | | | | | | | | | | | | | 100 | |
| 1.11 | Extent of Application & Promotion of Pollution Prevention in your organization | 1 | None at all | | | | | | | | | | | | | |
| | | 2 | Low | | | | | | | | | | | | | |
| | | 3 | Moderate | x | | x | x | | | X | | x | | | | 50 |
| | | 4 | High | | x | | | | X | | | x | | x | | 50 |
| Total | | | | | | | | | | | | | | | 100 | |
| 1.12 | If "None" in 1.11 above; state reasons | 1 | None at all | | | | | | | | | | | | | |
| | | 2 | Not enough | | | | | | | | | | | | | |
| | | 3 | Poor culture | | | | | | | X | | | | | | 10 |
| | | 4 | Inadequate funding | x | | | | | | | | | | | | 10 |
| Total | | | | | | | | | | | | | | | 100 | |
| 1.13 | National capacity & readiness to tackle global concerns | 1 | Very low | | | | | | | | | x | | | 10 | |
| | | 2 | Low | x | | | | x | | | x | x | | | 40 | |
| | | 3 | Moderate | | x | x | | | | | | | | x | 30 | |
| | | 4 | High | | | | x | | | | | | x | | 20 | |
| Total | | | | | | | | | | | | | | | 100 | |
| 1.14 | Challenges to 1.13 Human resource | 1 | Very low | | | | | | X | | x | | | | 50 | |
| | | 2 | Low | x | x | x | | | | | | | x | | 30 | |
| | | 3 | Moderate | | | | x | x | | | x | | | x | 20 | |
| | | 4 | High | | | | | | | | | | | | | |

| RISK REDUCTION | | | | | | | | | | | | | | | | |
|----------------|---|-------|--------------|---|---|---|---|---|---|---|---|---|----|-------|----|--|
| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % | |
| | Total | | | | | | | | | | | | | | | |
| | Challenges to 1.13 Financial resource | | | | | | | | | | | | | | | |
| | | 1 | Very low | | | | | | | | | | | | 0 | |
| | | 2 | Low | x | | | | | | | | | | | 10 | |
| | | 3 | Moderate | | | | | | | | | | | | 0 | |
| | | 4 | High | | x | x | x | x | X | x | x | x | x | | 90 | |
| | Total | | | | | | | | | | | | | 100 | | |
| | Challenges to 1.13 Lack of Political Will | | | | | | | | | | | | | | | |
| | | 1 | Very low | | | | | | | | | | | | 0 | |
| | | 2 | Low | | x | | | | | | x | | x | x | 40 | |
| | | 3 | Moderate | x | | x | x | | | | x | | | | 40 | |
| | | 4 | High | | | | | x | X | | | | | | 20 | |
| | Total | | | | | | | | | | | | | 100 | | |
| | Challenges to 1.13 Admin Capacity | | | | | | | | | | | | | | | |
| | | 1 | Very low | | | | | | | | | | | | 0 | |
| | | 2 | Low | x | | | | x | | | x | | x | | 50 | |
| | | 3 | Moderate | | x | x | x | | | | x | | | | 40 | |
| | | 4 | High | | | | | | X | | | | | | 10 | |
| | Total | | | | | | | | | | | | | 100 | | |
| | Challenges to 1.13 Other Poverty & Sustainable Development Priorities | | | | | | | | | | | | | | | |
| | | 1 | Very low | | | | | | | | | | | | 0 | |
| | | 2 | Low | | | | | | | | | | | | 0 | |
| | | 3 | Moderate | | | | x | | | | | | | | 10 | |
| | | 4 | High | x | x | x | | | | | x | x | x | x | 90 | |
| | Total | | | | | | | | | | | | | 100 | | |
| | Challenges to 1.13 Poor Linkage of Environment issues to Development | | | | | | | | | | | | | | | |
| | | 1 | Very low | | | | | | X | | | | | | 10 | |
| | | 2 | Low | | x | | | | | | | | | | 10 | |
| | | 3 | Moderate | | | x | | | | | x | x | x | | 40 | |
| | | 4 | High | x | | | x | | X | X | | | | | 40 | |
| | Total | | | | | | | | | | | | | 100 | | |
| 1.15 | Awareness on the Quantity, type and toxicity of hazardous waste generated in your country | 1 | Not at all | | | | | X | | | | | | 10 | | |
| | | 2 | Not much | | | | | | | | | | | 0 | | |
| | | 3 | Moderate | | | x | x | | X | x | x | | x | 60 | | |
| | | 4 | Considerable | | | | | | | | | | | 0 | | |
| | | 5 | Very much | x | x | | | | | | | x | | 30 | | |
| | Total | | | | | | | | | | | | | 100 | | |
| 1.16 | Extent of awareness on how hazardous waste is generated | 1 | Not at all | | | | | | | | | | | 0 | | |
| | | 2 | Not much | | | | | | | | | | | 0 | | |
| | | 3 | Moderate | | | x | | | | X | x | | | 30 | | |
| | | 4 | Considerable | | x | | x | | | | | X | | 40 | | |
| | | 5 | Very much | x | | | | x | X | | | | X | 30 | | |
| | Total | | | | | | | | | | | | | 100 | | |
| 1.17 | Extent of awareness on how hazardous waste is stored | 1 | Not at all | | | | | | | | | | | 0 | | |
| | | 2 | Not much | | | | X | | | | x | | | 20 | | |
| | | 3 | Moderate | | | x | | | | X | | | | 20 | | |
| | | 4 | Considerable | | x | | | | X | | | x | X | 40 | | |
| | | 5 | Very much | x | | | | x | | | | | | 20 | | |
| | Total | | | | | | | | | | | | | 100 | | |

| RISK REDUCTION | | | | | | | | | | | | | | | | | |
|----------------|---|-------|--------------|---|---|---|---|---|---|---|---|---|----|-------|---|-----|----|
| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % | | |
| 1.18 | Extent of awareness on how hazardous waste is transported | 1 | Not at all | | | | | | | | | | | | | | |
| | | 2 | Not much | | | | | | | x | | | | | | 10 | |
| | | 3 | Moderate | | | x | X | | | | | X | | | | | 30 |
| | | 4 | Considerable | | x | | | | X | | | | x | x | | | 40 |
| | | 5 | Very much | x | | | | | x | | | | | | | | 20 |
| | Total | | | | | | | | | | | | | | | 100 | |
| 1.19 | Extent of awareness on how hazardous waste is treated | 1 | Not at all | | | | | | | | X | | | | | 10 | |
| | | 2 | Not much | | | x | X | | | | | | | | | | 20 |
| | | 3 | Moderate | | | | | | | | | X | | | | | 10 |
| | | 4 | Considerable | x | x | | | | X | | | | x | x | | | 50 |
| | | 5 | Very much | | | | | | | x | | | | | | | 10 |
| | Total | | | | | | | | | | | | | | | 100 | |
| 1.20 | Extent of awareness on how hazardous waste is disposed | 1 | Not at all | | | | | | | | | | | | | 0 | |
| | | 2 | Not much | | | | X | | | | | x | | | | | 20 |
| | | 3 | Moderate | | | x | | | | | x | | | | | | 20 |
| | | 4 | Considerable | | x | | | | X | | | | x | x | | | 40 |
| | | 5 | Very much | x | | | | | | x | | | | | | | 20 |
| | Total | | | | | | | | | | | | | | | 100 | |
| 1.21 | Knowledge of institutions which recover & recycle hazardous materials and waste | 1 | Not at all | | | | | | | | | | | | | 0 | |
| | | 2 | Not much | x | | | | | | | | | | | | | 10 |
| | | 3 | Moderate | | x | x | | | | | x | x | x | x | | | 60 |
| | | 4 | Considerable | | | | X | | X | | | | | | | | 20 |
| | | 5 | Very much | | | | | | | x | | | | | | | 10 |
| | Total | | | | | | | | | | | | | | | 100 | |
| 1.22 | From 1.21; would you describe their operations as environmental friendly | 1 | Not at all | x | | | | x | | | | | | | | 20 | |
| | | 2 | Not much | | | | | | X | x | | | | | | | 20 |
| | | 3 | Moderate | | | x | X | | | | | X | x | | | | 40 |
| | | 4 | Considerable | | | | | | | | | | | x | | | 10 |
| | | 5 | Very much | | x | | | | | | | | | | | | 10 |
| | Total | | | | | | | | | | | | | | | 100 | |
| 1.23 | Knowledge of cleaner production concept (theory& practice) | 1 | Not at all | | | | | | X | | | | | | | 10 | |
| | | 2 | Not much | | | | | | | | x | | | | | | 10 |
| | | 3 | Moderate | | | x | X | | | | | x | | x | | | 40 |
| | | 4 | Considerable | x | | | | | | | | | | x | | | 20 |
| | | 5 | Very much | | x | | | | x | | | | | | | | 20 |
| | Total | | | | | | | | | | | | | | | 100 | |
| 1.24 | Knowledge of institutions in R&D producing new, safer chemical & biological materials | 1 | Not at all | | | | X | x | X | | | | | | | 30 | |
| | | 2 | Not much | x | | | | | | | x | | | | | | 20 |
| | | 3 | Moderate | | | x | | | | | | x | | x | | | 30 |
| | | 4 | Considerable | | | | | | | | | | x | | | | 10 |
| | | 5 | Very much | | x | | | | | | | | | | | | 10 |
| | Total | | | | | | | | | | | | | | | 100 | |
| 1.25 | If score in 1.24 is 2-5; state names of organisations, and your area of concern | | | | | | | | | | | | | | | | |
| 1.26 | Knowledge of role of chemicals and waste conventions in risk reduction | 1 | Not at all | | | | | | | | | | | | | | |
| | | 2 | Not much | | | | | | | | | | | | | | |
| | | 3 | Moderate | | | x | X | | X | x | x | | | | | | 50 |
| | | 4 | Considerable | | | | | | | | | | | x | | | 10 |
| | | 5 | Very much | x | X | | | | x | | | | x | | | | 40 |

| RISK REDUCTION | | | | | | | | | | | | | | | |
|----------------|---|-------|--------------|---|---|---|---|---|---|---|---|---|----|-------|-----|
| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % |
| | Total | | | | | | | | | | | | | | 100 |
| 1.27 | Any training and awareness to deal with poisoning and chemical incidences? | 1 | Not aware | X | | X | X | x | | | x | | | | 50 |
| | | 2 | No | | | | | | X | x | | x | | 3 | 30 |
| | | 3 | Yes | | X | | | | | | | | x | 2 | 20 |
| | Total | | | | | | | | | | | | | | 100 |
| 1.28 | Knowledge of institutional awareness on risk assessment, management and communication | 1 | Not at all | | | | | | | x | x | x | | 3 | 30 |
| | | 2 | Not much | | | X | X | | | | | | | 2 | 20 |
| | | 3 | Moderate | X | | | | | X | | | | x | 3 | 30 |
| | | 4 | Considerable | | | | | x | | | | | | 1 | 10 |
| | | 5 | Very much | | X | | | | | | | | | | 10 |
| | Total | | | | | | | | | | | | | | 100 |
| 1.29 | If score is 2-5, Has your institution benefited from training & awareness? | 1 | Not at all | | | | | | | | | | | | 0 |
| | | 2 | Not much | | | X | | | X | | x | | | 3 | 30 |
| | | 3 | Moderate | X | | | X | | | x | | x | | 4 | 40 |
| | | 4 | Considerable | | | | | | | | | | x | 1 | 10 |
| | | 5 | Very much | | x | | | x | | | | | | 2 | 20 |
| | Total | | | | | | | | | | | | | | 100 |

Category 2: Local authorities: No local authorities answered (As above)

1) From the above it is clear that the institutions have the following strengths:

- Awareness on the measures that Kenya takes to protect human health and the environment from chemical exposure
- Knowledge of National Institutes involved in risk management
- Knowledge of incidences of chemical releases to environment and that the level of preparedness to address incidences is low
- Institutional awareness of Principle 15 of Rio Declaration
- Awareness on **how** hazardous waste is **generated**
- Awareness on **how** hazardous waste is **transported**
- Awareness on **how** hazardous waste is **treated**
- Awareness on **how** hazardous waste is **disposed**
- Knowledge of institutions which recover & recycle hazardous materials and waste and that their operations are considered to be environmentally unfriendly
- Knowledge of cleaner production concept (theory& practice)

2) From the above it is clear that the institutions have the following shortcomings which have to be addressed:

- Knowledge on the impact of chemicals and wastes on humans and environment is inadequate
- Institutional knowledge of stoppage of production and use of risk chemicals
- Application & Promotion of Pollution Prevention in own organizations (50/50)
- Awareness on the Quantity, type and toxicity of hazardous waste generated in their own country
- Lack of knowledge of institutions in local R&D producing new, safer chemical & biological materials.
- Knowledge on the role of chemicals and waste conventions in risk reduction (50/50)

- Training and awareness to deal with poisoning and chemical incidences
- Institutional awareness on risk assessment, management and communication

3) National capacity & readiness to tackle global concerns is considered to be low due to the following main problems:

- Inadequate financial resources
- Low administrative capacity
- Other poverty alleviation priorities
- Poor linkage of environment issues to development

Part 2: Written Views of stakeholders on Risk Reduction extracted from the Questionnaires

Category 1: Ministries and agencies

| Q | Description | Stakeholder | Views |
|------|---|-------------|--|
| 1.34 | Name of organizations involved in research and Development to produce new chemicals or no-chemicals | General | General Comments by all interviewees Control use of pesticides on farms and chemicals by aerial sprays over sensitive ecological zones such as lakes and rivers. Emphasize use of alternatives to chemicals especially those with high residual levels e.g. dieldrin and those used in public health sector. Set universal/national standards for acceptable residual levels of toxic chemicals in the food chain. Eliminate those Toxic chemicals whose alternatives are available. |
| | Kenya Industrial Research Institute | 2 | Introduce cleaner production Make audits more detailed |
| | Pyrethrum Board of Kenya | 3 | PBK can produce efficacious alternatives to toxic chemicals More investment is required to commercialize alternatives Pyrethrum flower can support toxic free Africa |
| | Kenya Medical Research Institute | 4 | Indigenous products and practices can replace toxic chemicals Study in the environment of disease vectors can help introduce Integrated Pest Management which is better than pesticides Many chemical exposures are because of lack of preventive measures |
| | Kenya Agricultural Research Institute | 5 | Bad agricultural practices make use of more toxic chemicals which is unnecessary |
| | International Centre for Insect Physiology and Ecology | 6 | Many research findings lack funding Integrated vector Management can greatly reduce use of Toxic chemicals DDT is not a silver bullet |

8.2 Knowledge and information

Table 8.2 Results on Knowledge and Information

| Q | Knowledge and Information Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % | |
|-------|--|-------|-------------------------|---|---|---|---|---|---|---|---|---|----|-------|----|----|
| 2.1 | Source of information on chemicals/waste | 1 | Others | | x | x | | | x | x | x | x | x | 7 | 70 | |
| | | 2 | Foreign sources | x | x | x | X | | x | x | x | x | x | 9 | 90 | |
| | | 3 | Local Govt | | x | | | | | | | | | x | 2 | 20 |
| | | 4 | Central Govt Statistics | | x | x | X | X | | | | | | | 9 | 90 |
| | TOTAL | | | | | | | | | | | | | | | |
| 2.2 | Adequacy of information for chemical management throughout life-cycle of chemicals | 1 | None at all | | | | | X | | | | | | 1 | 10 | |
| | | 2 | Not much | x | x | | X | | x | x | | | | 5 | 50 | |
| | | 3 | Moderate | | | x | | | | | | x | | | 2 | 20 |
| | | 4 | Considerable | | | | | | | | | | x | x | 2 | 20 |
| | | 5 | Very much | | | | | | | | | | | | | |
| | TOTAL | | | | | | | | | | | | 10 | 100 | | |
| 2.3.1 | Adequacy of Information:- Complexity of Language used | 1 | Not possible | | | | | | | | | | | | | |
| | | 2 | Low | | x | | x | X | x | | | | | | 4 | 40 |
| | | 3 | Medium | x | | | | | | | | | | | 1 | 10 |
| | | 4 | High | | | x | | | | x | x | x | x | | 5 | 50 |
| | | 5 | Very high | | | | | | | | | | | | | 0 |
| | TOTAL | | | | | | | | | | | | | 100 | | |
| 2.3.2 | Effects on human health and environment | 1 | Not possible | | | | | | | | | | | | 0 | |
| | | 2 | Low | | | | X | x | x | x | | | | | 4 | 40 |
| | | 3 | Medium | | | | | | | | | | | | | 0 |
| | | 4 | High | x | | x | | | | | | x | x | x | 5 | 50 |
| | | 5 | Very high | | x | | | | | | | | | | 1 | 10 |
| | TOTAL | | | | | | | | | | | | | 100 | | |
| 2.3.3 | Potential uses | 1 | Not possible | | | | | | | | | | | | 0 | |
| | | 2 | Low | | | | | x | x | | | | | | 2 | 20 |
| | | 3 | Medium | x | | | X | | | | x | | | | 3 | 30 |
| | | 4 | High | | | x | | | | | | x | x | x | 4 | 40 |
| | | 5 | Very high | | x | | | | | | | | | | 1 | 10 |
| | TOTAL | | | | | | | | | | | | | 100 | | |
| 2.3.4 | Protective measures | 1 | Not possible | | | | | | | | | | | | 0 | |
| | | 2 | Low | | | | | x | x | | | | | | 2 | 20 |
| | | 3 | Medium | | | x | X | | | x | x | x | | | 5 | 50 |
| | | 4 | High | x | | | | | | | | | | | 1 | 10 |
| | | 5 | Very high | | x | | | | | | | | | x | 2 | 20 |
| | TOTAL | | | | | | | | | | | | | 100 | | |
| 2.3.5 | Regulations | 1 | Not possible | | | | | | | | | | | | 0 | |
| | | 2 | Low | | | | | X | x | | | | | | 2 | 20 |
| | | 3 | Medium | | | x | | | | | | x | | | 2 | 20 |
| | | 4 | High | x | | | X | | | x | | x | x | | 5 | 50 |
| | | 5 | Very high | | x | | | | | | | | | | 1 | 10 |
| | TOTAL | | | | | | | | | | | | | 100 | | |
| 2.4 | Popular modes of chemical information | 1 | Electronic | x | | | | | x | x | | | x | 4 | 20 | |

| | Knowledge and Information | | | | | | | | | | | | | Total | % | |
|------|---|-------|-------------------|---|---|---|---|---|---|---|---|---|----|-------|-----|----|
| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | |
| | dissemination | 2 | Print media | | x | x | x | X | x | x | | x | x | 8 | 80 | |
| 2.5 | Awareness of GHS on Classification & Labelling of Chemicals | 1 | Yes | x | x | x | x | x | | | x | x | x | 8 | 80 | |
| | | 2 | No | | | | | | x | x | | | | | 20 | |
| | Total | | | | | | | | | | | | | | 100 | |
| 2.6 | Has any work started on GHS implementation | 1 | Not aware | | | | | | | | | | | | | |
| | | 2 | Slightly aware | | x | | | | | | | | | 1 | 10 | |
| | | 3 | Very much aware | | | | | | | | x | | | 1 | 10 | |
| | Total | | | | | | | | | | | | | | 100 | |
| 2.7 | Has your institution benefited from any training? | 1 | Not yet | x | x | x | X | x | x | x | x | x | x | 100 | 100 | |
| | | 2 | Yes | | | | | | | | | | | | | |
| | Total | | | | | | | | | | | | | | 100 | |
| 2.8 | If 'yes' in 2.7, who conducted the training? See Section 12 | | | | | | | | | | | | | | | |
| 2.9 | Presence of Laws ensuring confidentiality of commercial & industrial information | 1 | Yes | x | x | x | | x | x | | x | | | 6 | 60 | |
| | | 2 | No | | | | X | | | | x | | x | x | 4 | 40 |
| | Total | | | | | | | | | | | | | 10 | 100 | |
| 2.10 | Is information on chemicals relating to health, safety & environment confidential? | 1 | Yes | | x | x | X | | | | x | | | 4 | 40 | |
| | | 2 | No | x | | | | | x | x | | x | x | x | 6 | 60 |
| | Total | | | | | | | | | | | | | 10 | 100 | |
| 2.11 | Extent to which institutions generate scientific information on chemicals & waste management. | 1 | Not aware | | | | | x | | | | | | 1 | 10 | |
| | | 2 | Low | x | | x | | | | x | x | x | | 5 | 50 | |
| | | 3 | Medium | | | | | | | | | | | | | |
| | | 4 | High | | | | x | | | | | | x | x | 3 | 30 |
| | | 5 | Very High | | x | | | | | | | | | | 1 | 10 |
| | Total | | | | | | | | | | | | | 10 | 100 | |
| 2.12 | Extent of interface between local institutions and policy making bodies | 1 | Not aware | | | | | | | | | | | | | |
| | | 2 | Low | x | | x | x | x | x | x | x | | | 7 | 70 | |
| | | 3 | Medium | | x | | | | | | | | | 1 | 10 | |
| | | 4 | High | | | | | | | | | x | x | 2 | 20 | |
| | | 5 | Very High | | | | | | | | | | | | 0 | |
| | Total | | | | | | | | | | | | | | 100 | |
| 2.13 | Awareness on information on hazard & risk assessments | 1 | No clue | | | | | | | | | | | | | |
| | | 2 | Slightly aware | | | x | X | | x | x | x | x | x | 7 | 70 | |
| | | 3 | Very much aware | x | x | | | | x | | | | | 3 | 30 | |
| | Total | | | | | | | | | | | | | 10 | 100 | |
| 2.14 | If response in 2.13 is 2-3 dissemination; is via | 1 | Personal contacts | | X | x | | | x | x | x | x | x | 7 | 70 | |
| | | 2 | Informal | | X | x | x | | x | x | x | x | x | 8 | 80 | |
| | | 3 | Formal | x | x | x | | x | | x | x | x | x | 8 | 80 | |
| | Total | | | | | | | | | | | | | | | |
| 2.15 | Any knowledge of National Environment Standards aimed at reducing chemical/wastes effects | 1 | Yes | x | x | x | x | x | | x | x | x | x | 9 | 90 | |
| | | 2 | No | | | | | | | x | | | | 1 | 10 | |

| | Knowledge and Information | | | | | | | | | | | | | | Total | % | |
|------|---|-------|---------------------|---|---|---|---|---|---|---|---|---|----|--|-------|-----|--|
| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | |
| | Total | | | | | | | | | | | | | | 10 | 100 | |
| 2.16 | Is your organization consulted when National Environmental Standards are being set? | 1 | Yes | | x | x | X | x | x | x | x | x | x | | 9 | 90 | |
| | | 2 | No | x | | | | | | | | | | | 1 | 10 | |
| | Total | | | | | | | | | | | | | | 10 | 100 | |
| 2.17 | Access to international database on chemical safety data to promote risk reduction strategies | 1 | Not at all | | | | | | | x | | | | | 1 | 10 | |
| | | 2 | Not much | x | x | | | x | x | | | | | | 4 | 40 | |
| | | 3 | Moderate | | | x | X | | | | x | x | | | 4 | 40 | |
| | | 4 | Considerable | | | | | | | | | | x | | 1 | 100 | |
| | | 5 | Very much | | | | | | | | | | | | | | |
| | Total | | | | | | | | | | | | | | 10 | 100 | |
| 2.18 | Extent of involvement in providing inputs, information, financial; to efforts to reduce unsound management of chemicals | 1 | Not at all | | | | | | | | | | | | | | |
| | | 2 | Not much | | | x | | | | | X | | | | 2 | 20 | |
| | | 3 | Moderate | | | | X | | x | x | | | | | 3 | 30 | |
| | | 4 | Considerable | x | x | | | x | | | | x | x | | 5 | 50 | |
| | | 5 | Very much | | | | | | | | | | | | | 0 | |
| | Total | | | | | | | | | | | | | | 10 | 100 | |
| 2.19 | If score in 2.18 is 1-2; describe the problem | | No systems in place | | | | | | | | | | | | | | |
| 2.20 | Knowledge & information on the role chemicals and waste conventions | 1 | Not at all | | | | | | | | | | | | | 0 | |
| | | 2 | Not much | | | | | | | | | | | | | 0 | |
| | | 3 | Moderate | | | | X | | x | X | x | | | | 4 | 40 | |
| | | 4 | Considerable | | | | X | x | | | | x | x | | 4 | 40 | |
| | | 5 | Very much | x | x | | | | | | | | | | 2 | 20 | |
| | Total | | | | | | | | | | | | | | 10 | 100 | |

(1) From the above it is apparent that the institutions in this survey are strong in the following:

- Awareness of GHS on Classification & Labelling of Chemicals and have benefited from such training
- Have knowledge of National Environment Standards aimed at reducing chemical/wastes effect.
- These institutions are consulted when National Environmental Standards are being set

(2) From the above it is apparent that the institutions in this survey are weak in the following:

- Information on chemical management throughout their life-cycle.
- Knowledge on the presence of national laws ensuring confidentiality of commercial & industrial information.
- Knowledge on the extent to which own local institutions generate scientific information on chemicals & waste management.
- Extent of interface between local institutions and policy making bodies
- Awareness on information on hazard & risk assessments
- Access to international database on chemical safety data to promote risk reduction strategies

- Extent of involvement in providing inputs, information, financial; to efforts to reduce unsound management of chemicals.

8.3 Governance

Table 8.3 Results on Governance

| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % | |
|-------|--|-------|---|---|---|---|---|---|---|---|---|---|----|-------|-----|----|
| 3.1 | Promotion of sound management programmes for chemicals and waste in your organization | 1 | Not apply | | | | | | | | | | | 0 | 0 | |
| | | 2 | Not a priority | | | | | | | | | | | | 0 | 0 |
| | | 3 | Low | | | | | | | | | | | | 0 | 0 |
| | | 4 | Moderate | | | x | X | | x | | x | x | | | 5 | 50 |
| | | 5 | Very much | x | x | | | X | | x | | | | X | 5 | 50 |
| TOTAL | | | | | | | | | | | | | | 10 | 100 | |
| 3.2 | Your institution's working with other sectors in Govt in promoting sound chemicals mgt to all sectors | 1 | Not at all | | | | | | | | | | | 0 | 0 | |
| | | 2 | To some extent | | | x | X | | x | | x | | | 4 | 40 | |
| | | 3 | Very much | x | x | | | X | | x | | | X | X | 6 | 60 |
| TOTAL | | | | | | | | | | | | | | 10 | 100 | |
| 3.3 | Your institution's working with other sectors in Govt & Stakeholders in identifying priorities to chemicals mgt activities | 1 | Not at all | | | | | | | | | | | 0 | 0 | |
| | | 2 | To some extent | | | x | X | | x | | x | | | 4 | 40 | |
| | | 3 | Very much | x | x | | | X | | x | | x | X | | 6 | 60 |
| TOTAL | | | | | | | | | | | | | | 10 | 100 | |
| 003.4 | If score in 3.3 is 2-3; who provided training on how to identify priorities | 1 | NGO | | | | | | | | | | | 0 | 0 | |
| | | 2 | Regional organizations | x | | | | | | | | | | | 1 | 10 |
| | | 3 | International organizations | | | x | | x | x | x | | | X | X | 6 | 60 |
| | | 4 | Govt | | x | | X | | | | | x | | | 3 | 30 |
| TOTAL | | | | | | | | | | | | | | 10 | 100 | |
| 3.5 | Is your institution aware on how national laws & regulations are enforced? | 1 | Not at all | | | | | | | | | | | 0 | 0 | |
| | | 2 | Not much | | | | | | | | | | | 0 | 0 | |
| | | 3 | Moderate | | | x | X | | x | | | | | 3 | 30 | |
| | | 4 | Considerable | x | | | | | | | x | x | X | | 4 | 40 |
| | | 5 | Very much | | x | | | x | | x | | | | | 3 | 30 |
| Total | | | | | | | | | | | | | | 10 | 100 | |
| 3.6 | Comments | | The Act on Parliamentary gazette notices and enforcement procedures | | | | | | | | | | | | | |
| 3.7 | Your knowledge of "corporate environment & social responsibility" concept | 1 | Not at all | | | | | | | | | | | 0 | 0 | |
| | | 2 | To some extent | | | x | X | | | x | | x | | 4 | 40 | |
| | | 3 | Very much | x | x | | | x | x | | x | | X | | 6 | 60 |
| Total | | | | | | | | | | | | | | 10 | 100 | |
| 3.8 | If score in 3.7 is 2-3; then rank the corporate community in observing, promoting relevant codes of conduct, including the concept | 1 | Low | x | | | X | X | | | | | X | 4 | 40 | |
| | | 2 | Moderate | | x | x | | | x | x | X | | X | 6 | 60 | |
| | | 3 | High | | | | | | | | | | | | 0 | 0 |
| Total | | | | | | | | | | | | | | 10 | 100 | |
| 3.10 | Involvement of women in decision making on chemicals policy and mgt. | 1 | Not at all | | | | | X | | | | | | 1 | 10 | |
| | | 2 | To some extent | x | | x | X | | x | | x | x | X | 7 | 70 | |
| | | 3 | Very much | | x | | | | | x | | | | 2 | 20 | |
| Total | | | | | | | | | | | | | | 10 | 100 | |
| 3.12 | Knowledge of the need to promote mutual support between trade & environmental policies | 1 | Not at all | | | | | | | | | | | 0 | 0 | |
| | | 2 | To some extent | | | x | | | x | | x | X | | 4 | 40 | |

| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % |
|------|--|-------|---|--|---|---|---|---|---|---|---|---|----|-------|-----|
| | | 3 | Very much | x | x | | X | X | | x | | | X | 6 | 60 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.13 | If score in 3.12 is 2-3; state your extent of involvement | 1 | Not at all | | | | | X | | | | | | 1 | 10 |
| | | 2 | To some extent | x | x | x | | | x | x | x | x | | 7 | 70 |
| | | 3 | Very much | | | | X | | | | | | x | 2 | 20 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.14 | If score in 3.13 is 2-3; describe your participation | 1 | Passive | x | | x | | x | | | x | | | 4 | 40 |
| | | 2 | Active | | | | X | | | | | | | 1 | 10 |
| | | 3 | Very active | | x | | | | x | x | | x | x | 5 | 50 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.15 | Knowledge of the incentives which support business to develop & improve products that advance strategic approach to chemicals mgt. | 1 | Not aware | x | x | x | | | | | | | | 3 | 30 |
| | | 2 | Aware | | | | X | X | X | X | X | X | X | 7 | 70 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.16 | Awareness of conventions | | | | | | | | | | | | | | |
| | Basel | 1 | Aware | x | x | X | X | X | X | X | X | X | X | 10 | 100 |
| | | 2 | Not aware | | | | | | | | | | | | |
| | Stockholm | 1 | Aware | x | x | X | X | X | X | X | X | X | X | 10 | 100 |
| | | 2 | Not aware | | | | | | | | | | | | |
| | Rotterdam | 1 | Aware | x | x | X | X | X | X | X | X | X | X | 10 | 100 |
| | | 2 | Not aware | | | | | | | | | | | | |
| | Montreal Protocol | 1 | Aware | x | x | X | X | X | X | X | X | X | X | 10 | 100 |
| | | 2 | Not aware | | | | | | | | | | | | |
| | ILO Convention on Chemical Safety | 1 | Aware | x | x | | X | X | | X | X | X | X | 8 | 80 |
| | | 2 | Not aware | | | x | | | X | | | | | 2 | 20 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.17 | Extent to which Focal points of the above conventions interact | 1 | Not aware | | | | | | X | | | | | 1 | 10 |
| | | 2 | Passive | x | | | | | | | | | | 1 | 10 |
| | | 3 | Active | | | x | X | | | | X | X | X | 5 | 50 |
| | | 4 | Very active | | x | | | X | | X | | | | 3 | 30 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.18 | Extent to which your institution liaises closely with other stakeholders' management of chemicals & waste. | 1 | Not aware | | | | | | X | | | | | 1 | 10 |
| | | 2 | Passive | x | | x | | | | | | | | 2 | 20 |
| | | 3 | Active | | | | X | | | | X | X | X | 4 | 40 |
| | | 4 | Very active | | x | | | X | | X | | | | 3 | 30 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.19 | If your score in 3.17 is 2-4; how do you participate with other stakeholders | | | | | | | | | | | | | | |
| | | 1 | Informal | x | x | x | | | | | X | | | 4 | 40 |
| | | 2 | Formal | | | | X | X | X | X | | X | X | 6 | 60 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.20 | What is the name of the structure referred to in 3.18? | | Chemicals and wastes coordination office within the Ministry of Environment | Committee for each multilateral agreement e.g. Basel, POPs, Montreal | | | | | | | | | | | |
| 3.21 | Is there multi-sectoral/ multi-stakeholder mechanism to develop National Plans & priority actions in your country? | 1 | Not aware | | | | x | | X | | | | | 2 | 20 |
| | | 2 | None | | | | | | | | | | | | |
| | | 3 | Yes informal | | | X | | | | X | X | | | 3 | 30 |
| | | 4 | Yes formal | x | x | | | X | | | | X | X | 5 | 50 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.22 | Knowledge on how international agreements are ratified via the National system | | | | | | | | | | | | | | |
| | | 1 | Not aware | | | | | | X | | X | | | 2 | 20 |
| | | 2 | Aware | x | x | x | x | x | | X | | X | X | 8 | 80 |
| | Total | | | | | | | | | | | | | 10 | 100 |

| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % |
|------|--|-------|-------------|---|---|---|---|---|---|---|---|---|----|-------|-----|
| 3.23 | Knowledge on how international agreements are domesticated into National laws | 1 | Not aware | | | | | | X | | | | | 1 | 10 |
| | | 2 | Aware | x | x | x | X | x | | X | X | X | X | 9 | 90 |
| | | Total | | | | | | | | | | | | | 10 |
| 3.24 | Knowledge of the national Focal Points for various Chemicals & waste conventions | 1 | Not aware | | | | | | X | | | | | 1 | 10 |
| | | 2 | Aware | x | x | x | X | x | | X | X | X | X | 9 | 90 |
| | | Total | | | | | | | | | | | | | 10 |
| 3.25 | How is coordination amongst the focal points effected? | 1 | No idea | | | | | | X | | | | | 1 | 10 |
| | | 2 | Ad hoc | x | | | | | | | | | | 1 | 10 |
| | | 3 | Informal | | | | X | | | | X | | | 2 | 20 |
| | | 4 | Formal | | x | | x | x | | X | | X | X | 6 | 60 |
| | Total | | | | | | | | | | | | | 10 | 100 |
| 3.26 | If score in 3.25 is 4; name the structure | | | | | | | | | | | | | | |

From the above it is apparent that the institutions have the following strengths and possible areas for strengthening:

(3) They are strong in the following:

- Promotion of sound management programmes for chemicals and waste in their own organizations
- Knowledge on the linkage of Trade and Environment
- Presence of a multi-sectoral/ multi-stakeholder mechanism to develop National Plans & priority actions
- Knowledge on the focal points for the various chemicals and waste conventions

(2) More work needs to be done in the following:

- Close working with other sectors in Government in promoting sound chemicals and waste management
- Knowledge of “**corporate environment & social responsibility**” concept
- Improvement on the part of the corporate body on its public image and perception
- Involvement of these institutions in setting up policies
- Involvement of women in decision making processes
- Building of local capacity to train key players in priority setting as opposed to relying on international sources

8.4 Capacity-building and technical cooperation.

Table 8.4 Results on Capacity building and technical cooperation questionnaire

| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % | |
|-----|---|-------|-------------------|---|---|---|---|---|---|---|---|---|----|-------|----|-----|
| 4.1 | Capacity to train others a)chemicals management | 1 | None | | | | | | | | | | | | | |
| | | 2 | Low | | | | | | | X | | | | 1 | 10 | |
| | | 3 | Moderate | | | x | x | x | X | | X | X | X | 7 | 70 | |
| | | 4 | High | x | x | | | | | | | | | 2 | 20 | |
| | | | Total | | | | | | | | | | | | | 100 |
| | Capacity to train others (b) Waste management | 1 | None | | | | | | | | | | | | | |
| | | 2 | Low | | | x | | | | X | | | | 2 | 20 | |
| | | 3 | Moderate | | | | x | | X | | X | X | X | 5 | 50 | |
| | | 4 | High | x | x | | | x | | | | | | 3 | 30 | |
| | | | Total | | | | | | | | | | | | | |
| 4.2 | Information Source for capacity building | | | | | | | | | | | | | | | |
| | | 1 | Website searches | x | X | x | x | | X | X | X | X | X | 9 | 90 | |
| | | 2 | UN Organizations | x | X | x | | x | X | X | X | X | X | 9 | 90 | |
| | | 3 | Foreign Embassies | | | | | | | | | | | | | |
| | | 4 | Govt Ministries | x | X | x | | | X | X | X | X | X | 8 | 80 | |
| | Total | | | | | | | | | | | | | | | |
| 4.3 | Awareness of role of chemicals & waste conventions on capacity building and tech. coop. | 1 | None at all | | | | | | | | | | | | | |
| | | 2 | Not much | | | | | | | | | | | | | |
| | | 3 | Moderate | | | x | x | | X | X | | | | 4 | 40 | |
| | | 4 | Considerable | x | | | | x | | | X | X | X | 5 | 50 | |
| | | 5 | Very much | | x | | | | | | | | | 1 | 10 | |
| | Total | | | | | | | | | | | | | 100 | | |

1) From the above they have these strengths:

- Adequate capacity to train others on waste management
- Adequate knowledge on the source of information on capacity building
- They are aware on the role of the chemicals and waste conventions in capacity building and technical cooperation

2) They are weak in the following:

From the above it is apparent that these institutions' capacity to train others on chemicals management is **limited** and has to be improved.

8.5 Illegal international traffic.

Table 8.5 Results on Illegal international traffic

| Q | Description | Scale | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | % | |
|----------|---|------------------|--------------------|----------|----------|----------|----------|----------|----------|----------|---|---|----|--------------|----------|--|
| 5.1 | Ranking of knowledge on the treaty in prevention of Illegal international traffic:- (a) Basel | 1 | Nothing at all | | | | | | | | | | | | | |
| | | 2 | Very low | | | | | | | | | | | | | |
| | | 3 | Low | | | | | | | | | | | | | |
| | | 4 | Moderate | | | x | | | X | X | X | X | X | 6 | 60 | |
| | | 5 | High | x | X | | x | x | | | | | | 4 | 40 | |
| Total | | 1 | | | | | | | | | | | 10 | 100 | | |
| | Ranking of knowledge on treaty in prevention of Illegal international traffic:- (b) Stockholm | 1 | Nothing at all | | | | | | | | | | | | | |
| | | 2 | Very low | | | | | | | | | | | | | |
| | | 3 | Low | | | | | | | | | | | | | |
| | | 4 | Moderate | | | x | x | | X | X | X | | X | 6 | 60 | |
| | | 5 | High | x | X | | | x | | | | | X | 4 | 40 | |
| Total | | | | | | | | | | | | | 10 | 100 | | |
| | Ranking of knowledge on treaty in prevention of Illegal international traffic:- (c) Rotterdam | 1 | Nothing at all | | | | | | | | | | | | | |
| | | 2 | Very low | x | | | | | | | | | | 1 | 10 | |
| | | 3 | Low | | | | | | X | X | | X | | 3 | 30 | |
| | | 4 | Moderate | | | x | x | | | | | X | | 4 | 40 | |
| | | 5 | High | | X | | | x | | | | | | 2 | 20 | |
| Total | | | | | | | | | | | | | 10 | 100 | | |
| Montreal | | | | | | | | | | | | | | | | |
| | Ranking of knowledge on treaty in prevention of Illegal international traffic:- (d) Montreal | 1 | Nothing at all | | | | | | | | | | | | | |
| | | 2 | Very low | x | | | | | | X | | | | 2 | 20 | |
| | | 3 | Low | | | x | | | X | | X | X | X | 5 | 50 | |
| | | 4 | Moderate | | | | x | | | | | | | 1 | 10 | |
| | | 5 | High | | X | | | x | | | | | | 2 | 20 | |
| Total | | | | | | | | | | | | | 10 | 100 | | |
| 5.2 | Extent of Domestication of treaty by government:- (a) Basel | 1 | Not aware | | | | | | | | | | | | | |
| | | 2 | Very low | | | | | | | | | | | | | |
| | | 3 | Low | | | | | x | | | | | | 1 | 10 | |
| | | 4 | Moderate | x | | x | x | | X | | X | X | X | 9 | 90 | |
| | | 5 | High | | X | | | | | | X | | | | 100 | |
| Total | | | | | | | | | | | | | 10 | | | |
| Q | Description | S c a l e | Description | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | Total | % | |
| | Extent of Domestication of | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|-----|--|---|--------------|---|---|---|---|---|---|---|---|---|----|-----|
| | treaty by government:- (b) Stockholm | | | | | | | | | | | | | |
| | | 1 | Not aware | | | | | | | | | | | |
| | | 2 | Very low | | | | | X | | | | | 1 | 10 |
| | | 3 | Low | x | | x | | x | X | X | | | 5 | 50 |
| | | 4 | Moderate | | | | x | | | | X | X | 3 | 30 |
| | | 5 | High | | x | | | | | | | | 1 | 10 |
| | Total | | | | | | | | | | | | 10 | 100 |
| | Extent of Domestication of treaty by government:- (c) Rotterdam | 1 | Not aware | x | | | | | X | | | | 2 | 20 |
| | | 2 | Very low | | | | | | | | | | | |
| | | 3 | Low | | | x | | | X | X | X | X | 5 | 50 |
| | | 4 | Moderate | | | | x | x | | | | | 2 | 20 |
| | | 5 | High | | X | | | | | | | | 1 | 10 |
| | Total | | | | | | | | | | | | 10 | 100 |
| | Extent of Domestication of treaty by government:- (d) Montreal Protocol | 1 | Not aware | x | | | | | X | | | | 2 | 20 |
| | | 2 | Very low | | | | | | | | | | | |
| | | 3 | Low | | | x | | | | X | X | X | 3 | 30 |
| | | 4 | Moderate | | | | x | x | | X | | | 3 | 30 |
| | | 5 | High | | X | | | | X | | | | 2 | 20 |
| | Total | | | | | | | | | | | | | 100 |
| 5.3 | Extent of Information sharing between your govt ant other govts on prevention and control of Illegal International Traffic Shared info | | | | | | | | | | | | | |
| | | 1 | Not aware | | | | | | X | | | X | 2 | 20 |
| | | 2 | Low | x | | | | x | | | | X | 3 | 30 |
| | | 3 | Moderate | | | x | x | | X | X | | | 4 | 40 |
| | | 4 | High | | x | | | | | | | | 1 | 10 |
| | Total | | | | | | | | | | | | | 100 |
| 5.4 | Awareness of role of chemicals and waste conventions on prevention of Illegal International Traffic | | | | | | | | | | | | | |
| | | 1 | Not aware | | | | | | | | | | | |
| | | 2 | Not much | | | | | | | | | | | |
| | | 3 | Moderate | | | | x | | X | | | | 2 | 20 |
| | | 4 | Considerable | | | x | | | | X | X | X | 4 | 40 |
| | | 5 | Very much | x | x | | | x | x | | | | 4 | 40 |
| | Total | | | | | | | | | | | | | 100 |

The Customs Department, the Kenya Ports Authority and the Public Health Department as well as KEBS are largely involved in the prevention of International traffic in toxic and dangerous goods at the ports of entry. Constraints faced by these institutions include:

- 1) The roles of the Basel and Stockholm conventions in combating illegal international traffic is well known compared to the Rotterdam and Montreal Protocol and hence the latter needs more attention.
- 2) Knowledge on the extent of domestication of these Conventions into local laws is far from adequate, attributed to lack of adequate information sharing among the focal points and the rest of the stakeholders.
- 3) Knowledge of the extent to which the Government shares information with other Governments is far from adequate. It is an area of concern as these institutions have to play an active role in the prevention of illegal International traffic.

CHAPTER 9. SUMMARY OF GAP ANALYSIS

The study has identified a number of areas of concern which have to be addressed in order to promote a non-toxic environment in Kenya within the SAICM thematic areas.

9.1 Risk Reduction

The following are the issues:

- (i) Knowledge on the impact of chemicals and wastes on humans and environment is inadequate.
- **This is a relatively new area which has to be developed to cater for the various stakeholders and hence institutions have to be made aware of these fundamentals.**
- (ii) Institutional knowledge of stoppage of production and use of risk chemicals.
- **This can largely be attributed to inadequate channels for dissemination of such information from the responsible institutions.**
- (iii) Application & Promotion of Pollution Prevention in own organizations (50/50).
- **This is at the borderline, these principles have to be taught and there has to be management commitment to institutionalize them.**
- (iv) Awareness on the Quantity, type and toxicity of hazardous waste generated in their own country.
- **This can largely be attributed to both inadequate information sharing and non-completion of the national inventory on these items, hence the need for capacity and resources to undertake this exercise.**
- (v) Lack of knowledge of institutions and local R&D producing new, safer chemical & biological materials.
- **This can largely be attributed to lack of effective and aggressive dissemination of knowledge from these institutions which generate this information. What might be needed is a national effort to compliment these institutional initiatives with resources and marketing skills.**
- (vi) Knowledge on the role of chemicals and waste conventions in risk reduction (50/50).
- **This shows that that more of such awareness programmes have to be mounted with clear demonstration projects which will market these conventions.**
- (vii) Training and awareness to deal with poisoning and chemical incidences.
- **This is an emerging area which has to be addressed as the country continues to grow economically.**
- (viii) Institutional awareness on risk assessment, management and communication. - **These are the fundamental building blocks for an effective risk reduction strategy in any country.**

- (ix) National capacity & readiness to tackle global concerns is considered to be low due to the following main problems:
- Inadequate financial resources
 - Low administrative capacity
 - Other poverty alleviation priorities
 - Poor linkage of environment issues to development
- This is the perception of the majority of the institutions including Government departments. What is important here is to ensure there are effective awareness programmes and to ensure that issues of environment and development are well understood and resulting into more resources to address the global concerns through national actions.**

9.2 Knowledge and Information

These are the areas of concern:

- (i) Information on chemical management throughout their life-cycle.
- This is an emerging issue which has to be addressed in languages that can be easily understood by the various stakeholders.
- (ii) Knowledge on the presence of national Laws ensuring confidentiality of commercial & industrial information.
- As the country continues to industrialize, the key players have to be equipped with this knowledge to enable them continue to protect the environment without jeopardizing economic development.
- (iii) Knowledge on the extent to which own local institutions generate scientific information on chemicals & waste management.
- This can largely be attributed to lack of effective and aggressive dissemination of knowledge from these institutions which generate this information. What might be needed is a national effort to compliment these institutional initiatives with resources and marketing skills.
- (iv) Extent of interface between local institutions and policy making bodies.
- This is important and existing working networks can be enhanced and institutions empowered to be active and constructive in these debates of national importance.
- (v) Awareness on information on hazard & risk assessments
- This is a relatively new area which has to be developed to cater for the various stakeholders and hence institutions have to be made aware of these fundamentals.
- (vi) Access to international database on chemical safety data to promote risk reduction strategies.
- This is where National institutions such as NEMA and the Government Chemist could be equipped to be the one stop resource centres for such information to serve the rest of the institutions in the country.

9.3 Governance

These are the issues of concern

- (i) Close working with other sectors in Government in promoting sound chemicals and waste management.
- This is essential and this can be built on the existing working relationship whether formal or informal between the various institutions and Government.
- (ii) Knowledge of “corporate environment & social responsibility” concept.
- Awareness on this subject is essential to ensure that the corporate sector and the rest of the stakeholders are active participants in the quest to protect the environment. The corporate sector can mount these programmes through projects and programmes which are visible.
- (iii) Improvement on the part of the corporate body on its public image and perception.
- As in (ii) above this is the perception of the institutions. It is important that actions as stated in (ii) above are designed and implemented by the corporate sector.
- (iv) Involvement of these institutions in setting up policies.
- This is important and existing working networks can be enhanced and institutions empowered to be active participants in these debates of national importance.
- (v) Involvement of women in decision making processes.
- Deliberate efforts have to continue to uplift the women at every available opportunity.
- (vi) Building of local capacity to train key players in priority setting as opposed to relying on international sources.
- It is essential to have local pool of trainers in this area.

9.4 Capacity Building and International Cooperation

From the study, it is apparent that these institutions’ capacity to train others on chemicals management is **limited** and has to be improved.

- This is an emerging area of concern, hence new programmes have to be developed and trainers trained to equip them with knowledge to undertake this new task.

9.5 Illegal International Traffic

- (i) The roles of the Basel and Stockholm conventions in combating illegal international traffic is well known compared to the Rotterdam and Montreal Protocol.
- Need for more training and awareness on the Rotterdam Convention and Montreal Protocol.
- (ii) Knowledge on the extent of domestication of these Conventions into local laws is far from adequate.

- This can be attributed to lack of adequate information sharing among the focal points and the rest of the stakeholders.

(iii) Knowledge of the extent to which the Government shares information with other Governments is far from adequate an area of concern if these institutions have to play an active role in the prevention of illegal International traffic.

- This can be attributed largely to inadequate mechanisms for dissemination of such information. The country can deliberately mount such awareness programmes through the popular media to ensure that the public and all key institutions continue to support such efforts.

CHAPTER 10. SUMMARY OF RELEVANT AREAS WHERE PROJECTS COULD BE DEVELOPED

as suggested by stakeholders from Questionnaire 3

Part 1: Statistical data:

| SAICM AREA | POSSIBLE PROJECTS | PREFERENCE | NO OF STAKEHOLDERS | % |
|----------------------------------|---|----------------------|--------------------|-------------|
| | | Not important | <u>2</u> | <u>20%</u> |
| <u>RISK REDUCTION</u> | <u>Building of capacities to deal with poisoning and chemical incidences</u> | Low | <u>3</u> | <u>30%</u> |
| | | Moderate | <u>3</u> | <u>30%</u> |
| | | High | <u>1</u> | <u>10%</u> |
| | | Very High | <u>1</u> | <u>10%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Occupational Health and Safety</u> | Not important | <u>1</u> | <u>10%</u> |
| | | Low | <u>2</u> | <u>20%</u> |
| | | Moderate | <u>5</u> | <u>50%</u> |
| | | High | <u>1</u> | <u>10%</u> |
| | | Very High | <u>1</u> | <u>10%</u> |
| | | TOTAL | <u>10</u> | <u>100</u> |
| | <u>Risk assessment, management and communication</u> | Not important | <u>0</u> | <u>0%</u> |
| | | Low | <u>2</u> | <u>20%</u> |
| | | Moderate | <u>5</u> | <u>50%</u> |
| | | High | <u>2</u> | <u>20%</u> |
| | | Very High | <u>1</u> | <u>10%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Chemicals of global concern</u> | Not important | <u>1</u> | <u>10%</u> |
| | | Low | <u>6</u> | <u>60%</u> |
| | | Moderate | <u>3</u> | <u>30%</u> |
| | | High | <u>0</u> | <u>0%</u> |
| | | Very High | <u>0</u> | <u>0%</u> |
| | | TOTAL | <u>10</u> | <u>100</u> |
| | <u>Highly toxic pesticides-risk management and reduction</u> | Not important | <u>0</u> | <u>0%</u> |
| | | Low | <u>7</u> | <u>70%</u> |
| | | Moderate | <u>2</u> | <u>20%</u> |
| | | High | <u>1</u> | <u>10%</u> |
| | | Very High | <u>0</u> | <u>0%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Waste management (minimization)</u> | Not important | <u>0</u> | <u>0%</u> |
| | | Low | <u>0</u> | <u>0%</u> |
| | | Moderate | <u>1</u> | <u>10%</u> |
| | | High | <u>7</u> | <u>70%</u> |
| | | Very High | <u>2</u> | <u>20%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Formulation of prevention and response measures to mitigate environmental and health impacts</u> | Not important | <u>0</u> | <u>0%</u> |
| | | Low | <u>1</u> | <u>10%</u> |
| | | Moderate | <u>2</u> | <u>20%</u> |
| | | High | <u>5</u> | <u>50%</u> |
| | | Very High | <u>2</u> | <u>20%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>The Role of GHS in risk Reduction</u> | Not important | <u>5</u> | <u>50%</u> |
| | | Low | <u>0</u> | <u>0%</u> |
| | | Moderate | <u>0</u> | <u>0%</u> |
| | | High | <u>5</u> | <u>50%</u> |
| | | Very High | <u>0</u> | <u>0%</u> |
| | | TOTAL | <u>10</u> | <u>100</u> |
| <u>KNOWLEDGE AND INFORMATION</u> | | Not important | <u>0</u> | <u>0%</u> |
| | <u>Research, monitoring and data</u> | Low | <u>0</u> | <u>0%</u> |

| <u>SAICM AREA</u> | <u>POSSIBLE PROJECTS</u> | <u>PREFERENCE</u> | <u>NO OF STAKEHOLDERS</u> | <u>%</u> |
|-------------------|--|------------------------|---------------------------|-------------|
| | <u>management</u> | | | |
| | | Moderate | <u>0</u> | <u>0%</u> |
| | | High | <u>7</u> | <u>70%</u> |
| | | Very High | <u>3</u> | <u>30%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Hazardous data generation and availability</u> | Not important | <u>0</u> | <u>0</u> |
| | | Low | <u>0</u> | <u>0</u> |
| | | Moderate | <u>0</u> | <u>0</u> |
| | | High | <u>7</u> | <u>70%</u> |
| | | Very High | <u>3</u> | <u>30%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Globally Harmonized System (GHS) of Classification and Labelling</u> | Not important | <u>0</u> | <u>0</u> |
| | | Low | <u>2</u> | <u>20%</u> |
| | | Moderate | <u>5</u> | <u>50%</u> |
| | | High | <u>3</u> | <u>30%</u> |
| | | Very High | <u>0</u> | <u>0</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Information management and dissemination</u> | 1 Not important | <u>0</u> | <u>0%</u> |
| | | 2 Low | <u>0</u> | <u>0%</u> |
| | | 3 Moderate | <u>0</u> | <u>0%</u> |
| | | 4 High | <u>8</u> | <u>80%</u> |
| | | 5 Very High | <u>2</u> | <u>20%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Highly toxic pesticides risk management and reduction</u> | 1 Not important | <u>0</u> | <u>0%</u> |
| | | 2 Low | <u>0</u> | <u>0%</u> |
| | | 3 Moderate | <u>0</u> | <u>0%</u> |
| | | 4 High | <u>10</u> | <u>100%</u> |
| | | 5 Very High | <u>0</u> | <u>0%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Life Cycle management</u> | 1 Not important | <u>0</u> | <u>0%</u> |
| | | 2 Low | <u>1</u> | <u>10%</u> |
| | | 3 Moderate | <u>5</u> | <u>50%</u> |
| | | 4 High | <u>3</u> | <u>30%</u> |
| | | 5 Very High | <u>1</u> | <u>10%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Creation of National and International Registers</u> | 1 Not important | <u>0</u> | |
| | | 2 Low | <u>8</u> | <u>80%</u> |
| | | 3 Moderate | <u>1</u> | <u>10%</u> |
| | | 4 High | <u>1</u> | <u>10%</u> |
| | | 5 Very High | <u>0</u> | <u>0%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Use of Indicators to monitor children's environmental health</u> | 1 Not important | <u>0</u> | <u>0%</u> |
| | | 2 Low | <u>0</u> | <u>0%</u> |
| | | 3 Moderate | <u>2</u> | <u>10%</u> |
| | | 4 High | <u>16</u> | <u>80%</u> |
| | | 5 Very High | <u>2</u> | <u>10%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | | | | |
| <u>GOVERNANCE</u> | <u>International Chemicals and waste conventions-promotion of ratification and synergies</u> | 1 Not important | <u>0</u> | <u>0%</u> |
| | | 2 Low | <u>2</u> | <u>20%</u> |
| | | 3 Moderate | <u>3</u> | <u>30%</u> |
| | | 4 High | <u>5</u> | <u>50%</u> |
| | | 5 Very High | <u>0</u> | <u>0%</u> |

| SAICM AREA | POSSIBLE PROJECTS | PREFERENCE | NO OF STAKEHOLDERS | % |
|--|---|-----------------|--------------------|------|
| | | TOTAL | 10 | 100% |
| | <u>Stakeholder participation in decision making processes</u> | 1 Not important | 0 | 0% |
| | | 2 Low | 0 | 0% |
| | | 3 Moderate | 0 | 0% |
| | | 4 High | 0 | 0% |
| | | 5 Very High | 10 | 100% |
| | | TOTAL | 10 | 100 |
| | <u>Assessment of national chemical management to identify gaps and prioritize action</u> | 1 Not important | 1 | 10% |
| | | 2 Low | 1 | 10% |
| | | 3 Moderate | 5 | 50% |
| | | 4 High | 3 | 30% |
| | | 5 Very High | 0 | 0% |
| | | TOTAL | 10 | 100% |
| | <u>Implementation of integrated national programmes for sound management of chemicals</u> | 1 Not important | 1 | 10% |
| | | 2 Low | 1 | 10% |
| | | 3 Moderate | 5 | 50% |
| | | 4 High | 3 | 30% |
| | | 5 Very High | 0 | 0% |
| | | TOTAL | 10 | 100% |
| | <u>GHS (review of national legislation and align with GHS requirements)</u> | 1 Not important | 1 | 10% |
| | | 2 Low | 1 | 10% |
| | | 3 Moderate | 4 | 40% |
| | | 4 High | 4 | 40% |
| | | 5 Very High | 0 | 0 |
| | | TOTAL | 10 | 100% |
| | <u>Social and economic considerations</u> | 1 Not important | 0 | 0% |
| | | 2 Low | 0 | 0% |
| | | 3 Moderate | 0 | 0% |
| | | 4 High | 5 | 50% |
| | | 5 Very High | 5 | 50% |
| | | TOTAL | 10 | 100% |
| | <u>Legal, Policy and institutional aspects</u> | 1 Not important | 0 | 0% |
| | | 2 Low | 0 | 0% |
| | | 3 Moderate | 2 | 20% |
| | | 4 High | 6 | 60% |
| | | 5 Very High | 2 | 20% |
| | | TOTAL | 20 | 100% |
| | <u>EIAs to include chemicals and hazardous waste</u> | 1 Not important | 0 | 0% |
| | | 2 Low | 0 | 0% |
| | | 3 Moderate | 2 | 20% |
| | | 4 High | 6 | 60% |
| | | 5 Very High | 2 | 20% |
| | | TOTAL | 10 | 100% |
| CAPACITY BUILDING AND TECHNICAL COOPERATION | <u>Capacity-building to support national actions</u> | 1 Not important | 0 | 0% |
| | | 2 Low | 0 | 0% |
| | | 3 Moderate | 2 | 20% |
| | | 4 High | 8 | 80% |
| | | 5 Very High | 0 | 0% |
| | | TOTAL | 10 | 100% |
| | <u>Formulation of preventive and response measures to mitigate</u> | 1 Not important | 0 | 0% |

| <u>SAICM AREA</u> | <u>POSSIBLE PROJECTS</u> | <u>PREFERENCE</u> | <u>NO OF STAKEHOLDERS</u> | <u>%</u> |
|--|--|-------------------|---------------------------|-------------|
| | <u>environmental and health impacts of emergencies involving chemicals</u> | | | |
| | | 2 Low | <u>1</u> | <u>10%</u> |
| | | 3 Moderate | <u>3</u> | <u>30%</u> |
| | | 4 High | <u>3</u> | <u>30%</u> |
| | | 5 Very High | <u>3</u> | <u>30%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Remediation of contaminated sites and poisoned individuals</u> | 1Not important | <u>1</u> | <u>10%</u> |
| | | 2 Low | <u>1</u> | <u>10%</u> |
| | | 3 Moderate | <u>2</u> | <u>20%</u> |
| | | 4 High | <u>3</u> | <u>30%</u> |
| | | 5 Very High | <u>3</u> | <u>30%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | <u>Capacity to implement GHS</u> | 1Not important | <u>2</u> | <u>20%</u> |
| | | 2 Low | <u>1</u> | <u>10%</u> |
| | | 3 Moderate | <u>3</u> | <u>30%</u> |
| | | 4 High | <u>1</u> | <u>10%</u> |
| | | 5 Very High | <u>3</u> | <u>30%</u> |
| | | TOTAL | <u>10</u> | <u>100</u> |
| | <u>Waste Management</u> | | | |
| | | 1Not important | <u>1</u> | <u>10%</u> |
| | | 2 Low | <u>1</u> | <u>10%</u> |
| | | 3 Moderate | <u>1</u> | <u>10%</u> |
| | | 4 High | <u>7</u> | <u>70%</u> |
| | | 5 Very High | <u>0</u> | <u>0</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |
| | | | | |
| <u>ILLEGAL AND INTERNATIONAL TRAFFIC</u> | <u>Prevention of illegal traffic in toxic and dangerous goods</u> | 1Not important | <u>3</u> | <u>30%</u> |
| | | 2 Low | <u>0</u> | <u>0%</u> |
| | | 3 Moderate | <u>2</u> | <u>20%</u> |
| | | 4 High | <u>5</u> | <u>50%</u> |
| | | 5 Very High | <u>0</u> | <u>0%</u> |
| | | TOTAL | <u>10</u> | <u>100%</u> |

Part 2: Summary of preferred projects

Present the scores in percentages for the **high** or **very high** % in each category

| SAICM AREA | POSSIBLE PROJECTS | VERY HIGH OR HIGH % |
|--|---|--|
| RISK REDUCTION | Building of capacities to deal with poisoning and chemical incidences | 20% |
| | Occupational Health and Safety | 20% |
| | Risk assessment, management and communication | 30% |
| | Chemicals of global concern | 0% |
| | Highly toxic pesticides-risk management and reduction | 10% |
| | Waste management (minimization) | 90% |
| | Formulation of prevention and response measures to mitigate environmental and health impacts | 70% |
| | The Role of GHS in risk Reduction | 50% |
| | KNOWLEDGE AND INFORMATION | Research, monitoring and data management |
| | Hazardous data generation and availability | 100% |
| | Globally Harmonized System (GHS) of Classification and Labelling | 30% |
| | Information management and dissemination | 100% |
| | Highly toxic pesticides risk management and reduction | 100% |
| | Life Cycle management | 40% |
| | Creation of National and International Registers | 10% |
| | Use of Indicators to monitor children's environmental health | 90% |
| GOVERNANCE | International Chemicals and waste conventions-promotion of ratification and synergies | 50% |
| | Stakeholder participation in decision making processes | 100% |
| | Assessment of national chemical management to identify gaps and prioritize action | 30% |
| | Implementation of integrated national programmes for sound management of chemicals | 30% |
| | GHS (review of national legislation and align with GHS requirements) | 40% |
| | Social and economic considerations | 100% |
| | Legal, Policy and institutional aspects | 80% |
| | EIAs to include chemicals and hazardous waste | 80% |
| CAPACITY BUILDING AND TECHNICAL COOPERATION | Capacity-building to support national actions | 80% |
| | Formulation of preventive and response measures to mitigate environmental and health impacts of emergencies involving Toxic chemicals | 60% |
| | Remediation of contaminated sites and poisoned individuals | 60% |
| | Capacity to implement GHS | 40% |
| | Waste management | 70% |
| ILLEGAL AND INTERNATIONAL TRAFFIC | Prevention of illegal traffic in toxic and dangerous goods | 50% |

CHAPTER 11. COMMENTS ON THE OUTLINE OF THE TRAINING FROM COUNTRY EXPERTS

Detailed Review of the training outline by Kenya

The training outline was reviewed and specific suggestions were given on each suggested topic for the benefit of the country and they appear in full in this study (See Annexes). These will be taken into account when training and awareness programme is developed.

(a) Trade and Environment

- Need to protect Africa from illegal dumping from banned chemicals and hazardous waste
- Senior management both in public and private sector should attend training to improve quality of decision making on chemical safety and their sustainable use
- Participants should be challenged to air views in an interactive way around practical cases in the countries or subregions
- Experts should be trained to design economic instruments and interpret those already designed

(b) Chemicals and waste agenda

- More cases studies should be presented on incidences, initiatives, failures derived from country experiences
- A regional database could be useful

(c) Global, Regional and National stakeholders

- Issues covered by some IGOs such as COMESA should be addressed, including impacts of Customs union, experience of implementing decisions of the World Customs Union
- Combining research done in the region on alternatives to toxic chemicals

(d) Chemicals and waste conventions

- More emphasis on the synergies to avoid duplication
- Training should be coupled with role playing
- Emphasis on how to access useful information on this subject beyond training by establishing networks

(e) National systems and Institutions for Chemicals and waste management in Africa

- ❖ Apart from individual country systems, it is ideal to group countries according to interaction in trading, ecosystems with a potential for harmonisation of procedures such as the Lake Victoria Environment Management Project covering three countries, Kenya, Uganda and Tanzania
- ❖ FIN returns back cases all focal points should be informed of such cases.

(f) Consideration of vulnerable groups

- ❖ Important to promote gender mainstreaming
- ❖ Men should also be included -the case of impacts to the productive systems of men due to environmental exposure to some chemicals
- ❖ Special consideration for leaders in informal groups and cooperatives

(g) Consideration of vulnerable eco-systems

- ❖ Select a few ecosystems to show impacts of chemicals to water, air, and soil such as Lake Naivasha or Lake Nakuru in Kenya
- ❖ Analyse effectiveness of measures taken for regional

(h) Risk Reduction

- ❖ Many cases go unreported due to lack of incentives or confidence that action be taken
- ❖ Important to factor the ratio of Environmental experts to population as a factor in millennium development goals
- ❖ GHS has not been understood properly, with a misconception that it is meant for those who attend meetings only-it should be tailored to cater for various key stakeholders such as the Ports authorities

(i) Capacity building and technical cooperation

- ❖ Need to create a pool of local experts
- ❖ Additional tools-Project development, financial mobilization

CHAPTER 12. ASSESSMENT OF COUNTRY POTENTIAL TRAINERS

There is training capacity in some of the institutions which responded to the questionnaires as shown in Tables 12.1 and 12.2. These are the institutions around the City of Nairobi and do not represent country wide institutions. This is due to limited time for the study. The same format can be used to establish other institutions which can conduct training as an on-going exercise.

Table 12.1 United States International University training capacity

| Category of qualification | Subject area | Training Experience in years | Availability as potential trainer in chemicals and wastes management |
|---|--|------------------------------|--|
| PhD (2) | Solid Waste Management -waste management Hazardous waste management Waste water management | Over 10years | Available on appropriate arrangements with teaching schedule |
| PhD | Urban transport management | Over 10 years | Available on appropriate arrangements with teaching schedule |
| | | | |
| MSc/ postgraduate Diplomas (2) | Solid Waste Management E-waste management Global Environmental policy on chemical waste management | Over 5 years | Same as above |
| MSc (1) | Waste and Entrepreneurship | | |
| | | | |
| | | | |
| First degree | 3 | 2 | Same as above |

Table 12.2 Kenya National Cleaner Production Centre training capacity

| Category of qualification | Subject area | Training Experience in years | Availability as potential trainer in chemicals and wastes management |
|------------------------------|--------------|------------------------------|--|
| PhD | 1 | Over 25years | Available when college is not in session |
| | | | |
| MSc/postgraduate Diplomas | 2 | Over 15years | Always available |
| | | | |
| | | | |
| First degree | 1 | 5months | Available |

CHAPTER 13. CONCLUSIONS & RECOMMENDATIONS

13.1 Conclusions

It is concluded as follows:

- (i) Kenya has not completed its detailed inventory of wastes as such it cannot fully monitor the movement or adequately advise transporters and entrepreneurs on waste reduction efforts. The envisaged broader project could assist in this specific area. Kenya is a large importer of chemicals. It does not produce a lot of chemicals but extracts many minerals used for chemicals production and recovers toxic chemicals from products. This and the activities of certain industries cause heavy environmental and health problems.
- (ii) Kenya is participating actively in international agreements and conventions in the environmental sector. Unfortunately, these commitments are not transmitted to a national level and converted into reality.
- (iii) Institutions and initiatives do exist. Kenya needs to strengthen them with financial, personnel and infrastructure (laboratories, computers, etc.). Regulations, frameworks, laws, standards, etc. need to be revised.
- (iv) The informal sector is a huge challenge. The chemicals and hazardous waste problems are especially urgent in this sector because non trained workers are exposed to many risks. The informal sector and SMEs have a bigger environmental impact than larger industries.
- (v) There is a lot of waste generation, especially in cities, where the environmental pollution is very high. Waste management in general is an unsolved problem that needs to be addressed. Basic arrangements like waste collection, waste transport, disposal sites, awareness of the population, etc. need to be tackled.
- (vi) Hazardous waste management does hardly exist and needs to be established.
- (vii) The trade liberalizations have weakened the capacity of the institutions to regulate and monitor the imports and exports of chemicals. This affects also data availability.
- (viii) Not many stakeholders (especially NGOs) participate actively in the SAICM process at the moment because most of them lack the necessary knowledge. On the other hand, they are very important for the creation of awareness and the organization of trainings.
- (ix) Key drivers at the national level, for the Chemicals and waste management process will be the National Chemicals Policy committee under the Ministry of Environment and Natural resources Headquarters which offers the national chemical governance framework for the country. It is important to ensure that issues of wastes are adequately articulated in this policy committee. That offers

the best opportunity for continued support to the aims and objectives of the follow-up capacity building phase of the BCRC-KemI project.

- (x) Kenya as a transit country faces challenges and has to build adequate surveillance and quick analytical capacity to fully implement controls of possible illegal traffic as well as investigating chemicals accidents.
- (xi) The Kenya Government has already invested heavily on the governance, data, monitoring and control of illegal trade in chemicals and hazardous waste.
- (xii) The study has demonstrated that more needs to be done to create and disseminate awareness and information on chemicals and waste including practical exercises on accessing this information.
- (xiii) This study recognizes that the respective institutions which manage chemicals need to re-evaluate their strategic plans in the light of SAICM to include chemicals risks management in those strategies and capacity built to these institutions to be able to tackle these emerging new challenges.
- (xiv) The country experts support strongly the idea of using alternatives to toxic chemicals and hence a call for more support in this direction to such pioneering organization the like of ICIPE.
- (xv) Ideally BCRC_KEMI should aim at training a pool of trainers through very selective criteria for the trainers. BCRC could assist in this since already it has held similar training in the past.

13.2 Recommendations

The following measures would be important

13.2.1 Training and awareness programmes to be developed address the following SAICM areas.

(a) Risk Reduction

The following are the issues to be addressed:

- (i) Knowledge on the impact of chemicals and wastes on humans and environment.
- **This is a relatively new area which has to be developed to cater for the various stakeholders and hence institutions have to be made aware of these fundamentals.**
- (ii) Knowledge and information on country measures to stop production and use of risk chemicals and promote the safer substitutes.
- **This can largely be attributed to inadequate channels for dissemination of such information from the responsible institutions. This should be a collaborative national effort with adequate resources to address this gap.**
- (iii) Application & promotion of pollution prevention in own organizations.

- **This is at the borderline, these principles have to be taught and there has to be management commitment to institutionalize them.**

- (iv) Awareness on the quantity, type and toxicity of hazardous waste generated in Kenya
- **This can largely be attributed to both inadequate information sharing and non-completion of the national inventory on these items, hence the need for capacity and resources to undertake this exercise.**
- (v) Lack of knowledge of institutions and local R&D producing new, safer chemical & biological materials.
-**This can largely be attributed to lack of effective and aggressive dissemination of knowledge from these institutions which generate this information. What might be needed is a national effort to compliment these institutional initiatives with resources and marketing skills.**
- (vi) Knowledge on the role of chemicals and waste conventions in risk reduction.
- **This shows that that more of such awareness programmes have to be mounted with clear demonstration projects which will market these conventions.**
- (vii) Training and awareness to deal with poisoning and chemical incidences.
- **This is an emerging area which has to be addressed as the country continues to grow economically.**
- (viii) Institutional awareness on risk assessment, management and communication. - **These are the fundamental building blocks for an effective risk reduction strategy in any country.**
- (ix) National capacity & readiness to tackle global concerns addressing the following:
- Inadequate financial resources
 - Low administrative capacity
 - Other poverty alleviation priorities
 - Poor linkage of environment issues to development
- **This is the perception of the majority of the institutions including Government departments. What is important here is to ensure there are effective awareness programmes to ensure that issues of environment and development are well understood resulting into more resources to address the global concerns through national actions.**

(b) Knowledge and Information

These are the areas of concern:

- (i) Information on chemical management throughout their life-cycle.
- **This is an emerging issue which has to be addressed in languages that can be easily understood by the various stakeholders.**

- (ii) Knowledge on the presence of national laws ensuring confidentiality of commercial & industrial information.
- **As the country continues to industrialise, the key players have to be equipped with this knowledge to enable them continue to protect the environment without jeopardising economic development.**
- (iii) Knowledge on the extent to which own local institutions generate scientific information on chemicals & waste management.
- **This can largely be attributed to lack of effective and aggressive dissemination of knowledge from these institutions which generate this information. What might be needed is a national effort to compliment these institutional initiatives with resources and marketing skills.**
- (iv) Extent of interface between local institutions and policy making bodies.
- **This is important and existing working networks can be enhanced and institutions empowered to be active and constructive in these debates of national importance.**
- (v) Awareness on information on hazard & risk assessments
- **This is a relatively new area which has to be developed to cater for the various stakeholders and hence institutions have to be made aware of these fundamentals.**
- (vi) Access to international database on chemical safety data to promote risk reduction strategies.
- **This is where national institutions such as NEMA and the Government Chemist could be equipped to be one stop resource centres for such information to benefit the rest of the institutions in the country.**

(c) Governance

These are the issues of concern

- (i) Close working with other sectors in Government in promoting sound chemicals and waste management.
- **This is essential and this can be built on the existing working relationship whether formal or informal between the various institutions and Government.**
- (ii) Knowledge of “corporate environment & social responsibility” concept.
- **Awareness on this subject is essential to ensure that the corporate sector and the rest of the stakeholders are active participants in the quest to protect the environment. The Corporate sector can mount these programmes through projects and programmes which are visible.**
- (iii) Improvement on the part of the corporate body on its public image and perception.

- As in (ii) above this is the perception of the institutions. It is important that actions as stated in (ii) above are designed and implemented by the corporate sector.

- (iv) Involvement of these institutions in setting up policies.
 - **This is important and existing working networks can be enhanced and institutions empowered to be active participants in these debates of national importance.**
- (v) Involvement of women in decision making processes.
 - **Deliberate efforts have to continue to uplift the women at every available opportunity through deliberate programmes to enhance their effectiveness.**
- (vi) Building of local capacity to train key players in priority setting as opposed to relying on international sources.
 - **It is essential to have local pool of trainers in this area.**

(d) Capacity Building and International Cooperation

From the study, it is apparent that these institutions' capacity to train others on chemicals management is **limited** and has to be improved.

-This is an emerging area of concern, hence new programmes have to be developed and trainers trained to equip them with knowledge to undertake this new task.

(e) Illegal International Traffic

- (i) The roles of the Basel and Stockholm conventions in combating illegal international traffic is well known compared to the Rotterdam and Montreal Protocol.
 - **There is need for more training and awareness on the Rotterdam Convention and Montreal Protocol.**
- (ii) Knowledge on the extent of domestication of these conventions into local laws.
 - **This can be attributed to lack of adequate information sharing among the focal points and the rest of the stakeholders and this has to be improved through awareness programmes**
- (iii) Knowledge of the extent to which the Government shares information with other Governments. Since it is far from adequate it is an area of concern if these institutions have to play an active role in the prevention of illegal International traffic.
 - **This can be attributed largely to inadequate mechanisms for dissemination of such information. The country can deliberately mount such awareness programmes through the popular media to ensure that the public and all key institutions continue to support such efforts.**

2 Training content

The proposed BCRC-KemI training content should take into account of the following when developing the various topics:

- (i) **Trade and Environment**
 - Need to protect Africa from illegal dumping from banned chemicals and hazardous waste.
 - Senior management both in public and private sector should attend training to improve quality of decision making on chemical safety and their sustainable use.
 - Participants should be challenged to air views in an interactive way around practical cases in the countries or subregions.
 - Experts should be trained to design economic instruments and interpret those already designed.

- (ii) **Chemicals and waste agenda**
 - More case studies should be presented –on incidences, initiatives, failures derived from country experiences.
 - A regional database could be useful.

- (iii) **Global, Regional and National stakeholders**
 - Issues covered by some IGOs such as COMESA should be addressed, including the impacts of the Customs union and experience of implementing decisions of the World Customs Union.
 - Regional collaboration in research done to develop alternatives to toxic chemicals.

- (iv) **Chemicals and waste conventions**
 - More emphasis on the synergies to avoid duplication.
 - Training should be coupled with role playing.
 - Emphasis on how to access useful information on this subject beyond training by establishing networks.

- (v) **National systems and Institutions for Chemicals and waste management in Africa**
 - Apart from individual country systems, it is ideal to group countries according to interaction in trading or ecosystems with a potential for harmonisation of procedures such as the Lake Victoria Environment Management Project covering three countries, Kenya, Uganda and Tanzania.
 - FIN returns back cases all focal points should be informed of such cases.

- (vi) **Consideration of vulnerable groups**
 - Important to promote gender mainstreaming.
 - Men should also be included considering the case of impacts to the productive systems of men due to environmental exposure to some chemicals.
 - Special consideration for leaders in informal groups and cooperatives.

- (vii) **Consideration of vulnerable eco-systems**
 - Select a few ecosystems to show impacts of chemicals to water, air, and soil such as Lake Naivasha or Lake Nakuru in Kenya.
 - Analyse effectiveness of measures taken for regional

- (viii) **Risk Reduction**
 - Many cases go unreported due to lack of incentives or confidence that action be taken.
 - Important to factor in the ratio of Environmental experts to population in the Millennium development goals
 - GHS has not been understood properly, with a misconception that it is meant for those who attend meetings only-it should be tailored to cater for various key stakeholders such as the Ports authorities.

- (ix) **Capacity building and technical cooperation**
 - Additional tools to be included such as project development and financial mobilization.

13.3 Training of trainers

It is quite essential that the programme creates a pool of local trainers who would reach the larger part of the country. The list of trainers can be developed and upgraded using the format provided in this study.

13.4 Areas where specific projects could be developed.

Table 13.1 Specific areas for future project development

| SAICM AREA | POSSIBLE PROJECTS |
|--|---|
| RISK REDUCTION | Waste management (minimization) |
| | Formulation of prevention and response measures to mitigate environmental and health impacts |
| | The Role of GHS in risk Reduction |
| KNOWLEDGE AND INFORMATION | Research, monitoring and data management |
| | Hazardous data generation and availability |
| | Information management and dissemination |
| | Highly toxic pesticides risk management and reduction |
| | Use of Indicators to monitor children's environmental health |
| GOVERNANCE | International Chemicals and waste conventions-promotion of ratification and synergies |
| | Stakeholder participation in decision making processes |
| | Social and economic considerations |
| | Legal, Policy and institutional aspects |
| | EIAs to include chemicals and hazardous waste |
| CAPACITY BUILDING AND TECHNICAL COOPERATION | Capacity-building to support national actions |
| | Formulation of preventive and response measures to mitigate environmental and health impacts of emergencies involving Toxic chemicals |
| | Remediation of contaminated sites and poisoned individuals |
| | Waste management |
| ILLEGAL AND INTERNATIONAL TRAFFIC | Prevention of illegal traffic in toxic and dangerous goods |

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