



**Promoting Chemical Safety
Management in Ports and
along Transport Routes of
Dangerous Goods:
Case Studies from Africa**

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Promoting Chemical Safety Management in Ports and along Transport Routes of Dangerous Goods

Case Studies from Africa



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List of Acronyms

APELL	Awareness and Preparedness for Emergencies at Local Level
BRIICS	Association of emerging national economies: Brazil, Russia, India, Indonesia, China and South Africa
CFS	Cargo Freight Station
CIQUIME	Argentinian Chemistry Information Centre for Emergencies (Centro de Información Química para Emergencias de Argentina)
CSR	Corporate Social Responsibility
EMP	Emergency Preparedness Plan
EPA	Ghana Environment Protection Agency
FEAT	Flash Environmental Assessment Tool
GCLA	Government Chemist Laboratory Agency of Tanzania
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
GNCPC	Ghana National Cleaner Production Centre
GPA	SAICM Global Plan of Action
GPHA	Ghana Ports and Harbours Authority
GPS	Global Product Strategy
HSE	Health, safety and environment
ICCA	International Council of Chemical Associations
ICCM	International Conference on Chemicals Management
ICD	Inland Clearance Depot
ICMM	International Council on Mining and Metals
KMA	Kenya Maritime Authority
KNCPC	Kenya National Cleaner Production Centre
KPA	Kenya Ports Authority
LRI	Long-Range Research Initiative
MoU	Memorandum of Understanding
NCPC	National Cleaner Production Centre
NEMA	National Environment Management Authority of Kenya
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Co-operation and Development
PHMSA	US Pipeline and Hazardous Materials Safety Administration
SAICM	Strategic Approach to International Chemicals Management
RECP	Resource Efficiency and Cleaner Production
SME	Small and Medium sized Enterprise
TBT	Tema Bonded Terminal (at Port of Tema)
UN	United Nations
UN Environment	United Nations Environment

Executive Summary

UN Environment and the International Council of Chemical Associations (ICCA) have collaborated since 2009 to build capacities in Small and Medium Sized Enterprises (SMEs) on implementing effective chemicals management approaches. As part of this partnership and within the context of a Memorandum of Understanding (MoU), UN Environment and ICCA implemented a project between 2013 and 2015, in collaboration with regional and national partners, entitled "Promoting Chemical Safety in the African Region". According to priorities identified in the region, the project aimed to promote safe handling of hazardous chemicals and appropriate emergency preparedness and response practices in ports and along cross-border transport routes.

The project was implemented in two main ports of Africa - as key entry points of imported chemicals to the region - and the cross-border transport routes to neighbouring land-locked countries. The two sites involved were the Port of Tema in Ghana and the transport routes serving Burkina Faso, Mali, and Niger in West Africa; and the Port of Mombasa in Kenya and the transport routes serving Burundi, DR Congo, Ethiopia, Kenya, Rwanda, Southern Sudan, Northern Tanzania, and Uganda in East Africa. Project activities included four capacity-building and training workshops on safe handling and transport of dangerous goods, a mapping of main stakeholders relevant to chemical safety practices in both sites, a mapping of hazards and hotspots in both ports and along cross-border transport routes, assessment of current emergency response plans, and two sub-regional events to disseminate project results and best practices.

Activities were implemented in collaboration with the National Cleaner Production Centres of Ghana and Kenya and involved environmental, port and maritime authorities, as well as specific SMEs providing services on storage and transport of chemicals in the demonstration sites. UN Environment and ICCA also collaborated with the Government Chemist Laboratory Agency of Tanzania to host a last sub-regional dissemination workshop in Dar es Salaam, as a further contribution to share lessons learned in the region.

Specific methodologies such as UN Environment Responsible Production and the Awareness and Preparedness for Emergencies at Local Level (APELL), as well as ICCA Responsible Care Framework and Global Product Strategy (GPS), were used as the main methodologies for capacity building throughout the project.

Outcomes of the project include a clear understanding of the chemical hazards present in the demonstration sites and transport routes and assessment of the current emergency response plans, enhanced capacities of national authorities and SMEs on handling and transport of dangerous goods, and promotion of regular improvements and stakeholder consultations on chemical safety and emergency preparedness in both ports.

This publication compiles case studies of the project's activities. It is complemented by a package of resource materials on improving chemical safety that were used in the context of the project. The publication aims at providing valuable insights and lessons learned that can be of use to other countries and regions when replicating capacity-building activities on chemical safety in port areas and transport practices. It also provides recommendations for potential future activities.

1. Introduction

1.1 BACKGROUND AND GLOBAL CONTEXT OF THE PROJECT

In today's economy, a variety of stakeholders along the value chain is affected by chemicals, from producers through transporters, distributors, and customers (companies using chemicals and end users). Presently, chemicals play an important role in every economic sector. More than 95 per cent of manufactured goods are directly involved with chemistry¹. The growing demand for chemicals from different sectors is reflected in the drastic growth of the chemical industry from US\$ 171 billion in 1970 to US\$ 4.12 trillion by 2010². Yet, despite the important contribution of chemicals to the economy and the society, many of these chemicals can pose potential adverse impacts to human health and the environment along the value chain. If not adequately managed, exposure to hazardous chemicals can occur and may even result in environmental emergencies with substantial social, environmental, and economic consequences. For example, in August 2014 a spill of copper sulphate, sulphuric acid, and heavy metals from a copper mine in Mexico into the Sonora River had an estimated cost of US\$133 million³.

A globalized economy has resulted in larger and more complex value chains, and in a shift of production from developed to developing countries. While the OECD's countries share of the world's chemical production decreased from 2000 to 2009, the share of the BRIICS countries (Brazil, Russia, India, Indonesia, China, and South Africa) in the same period increased from 13 to 28 per cent. As for the BRIICS countries, the chemical production in Africa is also expected to have an increasingly important role in coming years⁴.

Hazardous chemicals can be handled safely through the application of appropriate risk minimizing measures. However, in developing countries and fast-growing economies, chemicals are mainly manufactured, stored, transported, repackaged and used in SMEs that lack basic capacity, access to information and resources to address chemicals management and environmental emergencies appropriately. As a fast-growing sector of economy, it is therefore necessary to build capacities in these enterprises to promote safe handling and transport of chemicals, as well as appropriate preparedness and response to accidents and environmental emergencies.

At the global level, promotion of chemical safety and risk reduction in industry is at the core of the Strategic Approach to International Chemicals Management

(SAICM) (see **Box 1**). This international multi-stakeholder approach recognizes, among others, the key role of the industrial sector in reducing chemical risks and therefore, contributing to a sound management of chemicals to achieve the overall SAICM 2020 goal that chemicals are produced and used in ways that minimize significant adverse impacts on human health and the environment.

The SAICM Overall Orientation and Guidance for achieving the 2020 Goal of Sound Management of Chemicals, recently endorsed at the Fourth Meeting of the International Conference on Chemicals Management (ICCM4), makes emphasis on strengthening capacities to deal with chemical accidents and on industry participation to incorporate sound management of chemicals into corporate policies and practices as critical elements to the attainment of sound chemicals and waste management at the national and regional levels.

The global Sendai Framework for Disaster Risk Reduction 2015-2030 (see **Box 2**) also highlights the importance of preparedness for emergencies, including those related to technological hazards, in order to reduce vulnerability to disasters and strengthen resilience. Emphasis is made in a local level, people-centered preparedness planning.

Recognizing this global context, UN Environment and ICCA jointly organized an African Regional Workshop on Chemical Safety Management in October 2011 in Nairobi, Kenya, back-to-back with the 2nd Global Conference on Resource Efficiency and Cleaner Production (RECP). 45 SAICM Focal Points and National Cleaner Production Centres' (NCPCs) representatives from the region attended the workshop. The objective was to enhance their capacity to promote an effective management of chemical risks in industry through the following approaches⁵:

- Responsible Production - developed by UN Environment, in collaboration with Accountability, ICCA, and the International Council on Mining and Metals (ICMM); and
- Responsible Care and the Global Product Strategy (GPS) - developed by ICCA.

As an outcome from this workshop, **chemicals safety in transport operations and risks of cross-border transport of hazardous substances** were identified among the main concerns in the region related to chemicals management. UN Environment and ICCA, in consultation with regional

1 <http://www.icca-chem.org/ICCADocs/ICCA%20Roadmap%20Summary.pdf>

2 Global Chemicals Outlook, UN Environment, 2013

3 Federal Attorney for Environmental Protection (Profepa)

4 Global Chemicals Outlook, UN Environment, 2013

5 More details on these approaches are provided in the following section.

and national partners, consequently elaborated a project to address these challenges. The project proposed to address chemical safety in the Port of Tema in Ghana and the Port of Mombasa in Kenya as demonstration key entry points of imported chemicals and in the cross-border transport routes from those ports serving Burkina Faso, Mali, and Niger in West Africa; and Burundi, DR Congo, Ethiopia, Kenya, Rwanda, Southern Sudan, Northern Tanzania, and Uganda in East Africa respectively.

The project was implemented from 2013 to 2015, in collaboration with the National Cleaner Production Centres of Ghana and Kenya (GNPCPC and KNPCPC). UN Environment and ICCA also collaborated with the Government Chemist Laboratory Agency of Tanzania (GCLA) to host a last sub-regional dissemination workshop of the project in Dar es Salaam, as a further contribution to share lessons learned in the region.

BOX 1 SAICM – A goal to achieve a sound management of chemicals by 2020

The Strategic Approach to International Chemicals Management (SAICM) is a policy framework to promote chemical safety around the world, which was adopted by the International Conference on Chemicals Management (ICCM) on February 2006 in Dubai, United Arab Emirates. SAICM has as its overall objective the achievement of the sound management of chemicals throughout their life cycle so that, by 2020, chemicals are produced and used in ways that minimize significant adverse impacts on human health and the environment. This “2020 goal” was adopted by the World Summit on Sustainable Development in 2002 as part of the Johannesburg Plan of Implementation.

SAICM objectives are grouped under five themes: risk reduction; knowledge and information; governance; capacity-building and technical cooperation; and illegal international traffic. Its Global Plan of Action serves as a working tool and guidance document to support implementation of SAICM and other relevant international instruments and initiatives.

BOX 2 Sendai Framework – Promoting disaster risk reduction through improved resilience

The Sendai Framework for Disaster Risk Reduction 2015-2030 is an agreement of the 2030 sustainable development agenda that sets seven targets and four priorities for action as part of a strategic and systematic plan to substantially reduce disaster risk and losses caused by disasters. It was adopted in March 2015, at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan. This framework is the successor to the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters, adopted in 2005.

The Sendai Framework recognizes environmental degradation and technological hazards as hazards induced by human processes to which populations can be vulnerable. Therefore, building capacities at the community and national levels to manage and reduce risks from these hazards (including chemical hazards) is key to achieve the goal of the 2002 Johannesburg Plan of Implementation on vulnerability, risk assessment and disaster management.

1.2 UN ENVIRONMENT AND ICCA APPROACHES ON CHEMICAL SAFETY

UN Environment and ICCA have developed specific approaches to support the safe production and use of hazardous chemicals throughout the value chain of enterprises. Four of them were of particular interest for this project (see **Boxes 3 and 4** for detailed information) and were introduced as methodologies to encourage chemical safety practices in the Ports of Tema and Mombasa and relevant transport routes:

- › The Responsible Production Framework (UN Environment);
- › Awareness and Preparedness for Emergencies at the Local Level (UN Environment);
- › The Responsible Care Framework (ICCA); and
- › The Global Product Strategy (ICCA).

These approaches address different aspects of chemical hazard management. UN Environment and ICCA collaborated to adapt and integrate them into simple training material for the port stakeholders, authorities, and other sub-regional parties that were part of the project. A selection of these resource materials is compiled in **Annex 1**.

BOX 3 UN Environment approaches on chemical safety**The Responsible Production Framework**

UN Environment's Responsible Production Framework draws on existing guidance about chemical safety and emergency preparedness for industry and provides a simplified version for Small and Medium Sized Enterprises in developing countries and countries with transition economies. It provides guidance on understanding the present hazards and risks related to the company's operations, controlling and preventing exposure to hazardous substances, and reducing accident risks.

It brings together concepts from:

- › **APELL**: improved awareness of risks in communities, and integrated emergency preparedness and response through multi-stakeholder participation;
- › **Corporate Social Responsibility (CSR)**: improved understanding of social and environmental issues and impacts of businesses, emphasizing stakeholder engagement and credible public disclosure;
- › **Safer Production**: simplified process safety management, including operational and management systems.

This framework promotes the engagement of all the value chain (producers, distributors, transporters, traders and buyers) and proposes an open dialogue of industry with all stakeholders regarding chemical safety and emergency preparedness.

The Responsible Production Framework was developed in cooperation with Accountability, ICMM, and ICCA.

Awareness and Preparedness for Emergencies at Local Level (APELL)

In the late 1980's, UN Environment initiated the APELL Programme to provide guidance to communities that wish to be better prepared for major man-made and natural disasters where chemicals are involved. Its specific goals are to provide community members information on hazards in their neighborhood and measures to reduce risks, and to guide them on the development/update of an emergency preparedness plan through a multi-stakeholder process.

The long-lasting network of APELL initiatives has provided valuable experiences of APELL implementation in different sectors. As a result, specific APELL guidance has been prepared for the chemical, mining and transport sectors; port areas; coastal tourism destinations, and storage facilities. The guidance document *APELL for Port Areas* takes into account specificities such as the potential to ship collisions and spills, the conglomeration of warehouses, and the proximity to communities and environmentally important areas to promote development of coordinated emergency response plans. The *TransAPELL: Guidance for Dangerous Goods Transport Emergency Planning in a Local Community* focuses on the risks beyond fixed facilities to include those arising from shipping, distribution and transport of dangerous goods.

After the adoption of the Sendai Framework in March 2015, UN Environment launched the second edition of the *APELL Handbook: A process for improving community awareness and preparedness for technological hazards and environmental emergencies*. The second edition integrates practical experience, expertise and new knowledge for APELL implementation in communities.

BOX 4 ICCA approaches on chemical safety**Responsible Care Framework and Global Product Strategy**

ICCA's Responsible Care Global Charter and its associated tools provide a voluntary approach of the chemical industry aimed at reducing the risks associated with chemical products. It is a chemical industry's global initiative that drives continuous improvement in health, safety and environmental (HSE) performance, together with open communication with stakeholders. Responsible Care is implemented in more than 60 economies in 59 associations around the globe. More than 500 chemical companies have signed the Responsible Care Global Charter by the end of 2015.

The Responsible Care® framework reflects the concept of sustainable development and includes aspects such as environmental protection, product responsibility, occupational health and safety, plant safety, hazard avoidance and transportation safety. This initiative is part of ICCA's contribution to SAICM, to bring industry's commitment to the global objective of a sound management of chemicals. Amongst others, achievements of Responsible Care include a 24 per cent reduction in lost-time injuries and 36 per cent in chemical-related transportation incidents by Responsible Care member companies since 2006. ICCA is continuously reaching out to developing countries to implement Responsible Care associations, which then support local chemical companies to improve their performance with respect to the environment, health and safety.

Responsible Care® started as an initiative concentrated on enterprises in industrialized countries. However, ICCA collaborated with UN Environment on developing the Responsible Production Framework, which compiles existing guidance for enterprises such as Responsible Care® and provides it in an integrated and adapted framework for companies and Small and Medium Sized Enterprises in developing countries and countries with economies in transition.

Responsible Care® also fosters the Global Product Strategy (GPS), which aims at advancing the product stewardship performance by individual companies and the global chemical industry. Product stewardship is the industry's management of the health, safety and environmental aspects of a product throughout its total life cycle, working in cooperation with upstream and downstream users.

The Global Product Strategy is based on four essential pillars:

- › Develop a base-set of hazard and exposure information to conduct safety assessments for chemicals in commerce.
- › Undertake global GPS capacity building initiatives to implement best risk assessment practices and management procedures, especially with Small and Medium Sized Enterprises and in emerging and developing countries.
- › Provide transparent access to science-based product safety information for the public and throughout the value chain.
- › Promote a stakeholder dialogue on science- and risk-based chemicals management. Build the Long-Range Research Initiative (LRI), a global research program to identify and fill gaps in understanding of the hazards posed by some chemicals and to improve the methods available for risk assessment.

2. Project overview

2.1 DEMONSTRATION SITES

Major ports in the region are important entry sites for chemicals, given that the majority of chemicals used in Africa are imported. These substances are handled and stored in warehouses in the ports and later transported to different areas and neighboring land-locked countries. Small and Medium Sized Enterprises and workers involved with handling and transport of chemicals are frequently not well aware of the hazards posed by these substances, nor abreast of emergency prevention and preparedness. Therefore, improving safe chemicals management in main ports and along transport routes provides an essential opportunity to contribute to the improvement of chemical safety practices along the value chain.

The demonstration sites selected were Port of Tema in Ghana and the transport routes serving West Africa; and the Port of Mombasa in Kenya and the transport routes serving East Africa. A sub-regional workshop was held in the Port of Dar es Salaam, Tanzania at the end of the project, which allowed exchanging lessons learned and experiences among different stakeholders from the three Ports and other countries of the region.

Port of Tema - West Africa

The Port of Tema is one of the biggest ports and transport hubs of Ghana and the West African sub-region. Situated on the eastern coast of the country it stretches over 3.9 million square metres of land area. The port handled an average of 12 million metric tons of cargo traffic from 2013 to 2015, an average of 5.5% of which was transported to and from the landlocked countries.

Tema Port currently consists of 14 berths with draughts between 9.00 and 11.5 metres comprising:

- One oil jetty- for handling petroleum based liquid bulk
- One private facility for aluminum
- An existing dedicated berth for cement and clinker with an adjacent new jetty 99% complete
- Two berths comprising the dedicated container terminal
- Nine multipurpose berths including one for non-petroleum based liquid bulk

Tema Port is an autonomous public port managed by the Ghana Ports and Harbours Authority (GPHA), but works in collaboration with the private sector. Private services include Inland Clearance Depots (ICDs), warehouses, transport and haulage companies, freight forwarders, factories and related service centres.

85% of Ghana's trade is done through the port, which also serves the landlocked countries of Burkina Faso, Mali and Niger. Port developments, including enhancement in information technology, infrastructural expansion and strengthening stakeholder engagement, have been done over the past years to facilitate the efficient and safe movement of maritime traffic through Ghana and the sub region.

Port of Mombasa – East Africa

The Port of Mombasa is the key entry and exit point for cargoes belonging to a vast hinterland that includes Kenya, Burundi, Democratic Republic of Congo, Ethiopia, Rwanda, Somalia, South Sudan, Tanzania, and Uganda. As the major seaport in Africa's east coast between Tanzania and the Red Sea, it has a huge responsibility to provide effective, reliable and efficient maritime services. The Port of Mombasa has seen an increase of about 6.4 million metric tons in total cargo throughput from 15.9 million metric tons of cargo throughput in 2007 to 22.3 million metric tons handled in 2013. About 30 per cent of this throughput is for the transit market.

Similarly to the Port of Tema in Ghana, the Port of Mombasa is managed by a public entity, the Kenya Ports Authority (KPA). However, it has embraced Public Private Partnerships with other services being offered by private companies. There is more than twenty Cargo Freight Stations (CFS) doing business with the port since 2007 as well as sheds that are on lease to private organizations such as oil companies.

The Port of Mombasa has 17 deep-water berths with a total quay length of 3,844 m out of which two are Oil Terminals and dedicated berths for Soda Ash and cement/clinker handling.

The KPA has acted positively to ensure it can match the demands placed on its facilities by the ever growing African market and the maritime industry dynamics.

FIGURE 1 Map of Port of Tema, Ghana



Source: Ghana Ports and Harbours Authority

MPS Dedicated container terminal



Terminal one Multipurpose berths



FIGURE 2 Map of Port of Mombasa, Kenya



Source: Kenya Ports Authority

2.2 PROJECT OBJECTIVES, ACTIVITIES AND OUTCOMES

The project aimed at improving chemical safety and emergency preparedness in the demonstration sites and along transport routes by raising awareness and enhancing knowledge of local authorities (e.g. environmental authorities, port authorities) and private companies (e.g. distributors, warehouse operators) on specific chemical hazards, chemical safety practices, and emergency preparedness and response plans.

Specific activities of the project included:

1. Mapping of the main stakeholders involved on chemical safety issues in the ports and transport routes;
2. Holding a project launching workshop in Ghana and Kenya;
3. Mapping of the hazard hotspots in the ports of Tema and Mombasa and along the cross-border transport corridors to neighbouring land-locked countries;
4. Holding technical trainings in both ports on chemical safety management practices;
5. Reviewing and assessing current response plans in both ports;
6. Holding sub-regional dissemination workshops in Tema and Dar es Salaam to share results and best practices identified.

The activities were implemented in collaboration with the KNPC and the GNPC. The Tanzanian GCLA supported the dissemination of the results for the East African sub-region. Activities are described in detail in the following sections.

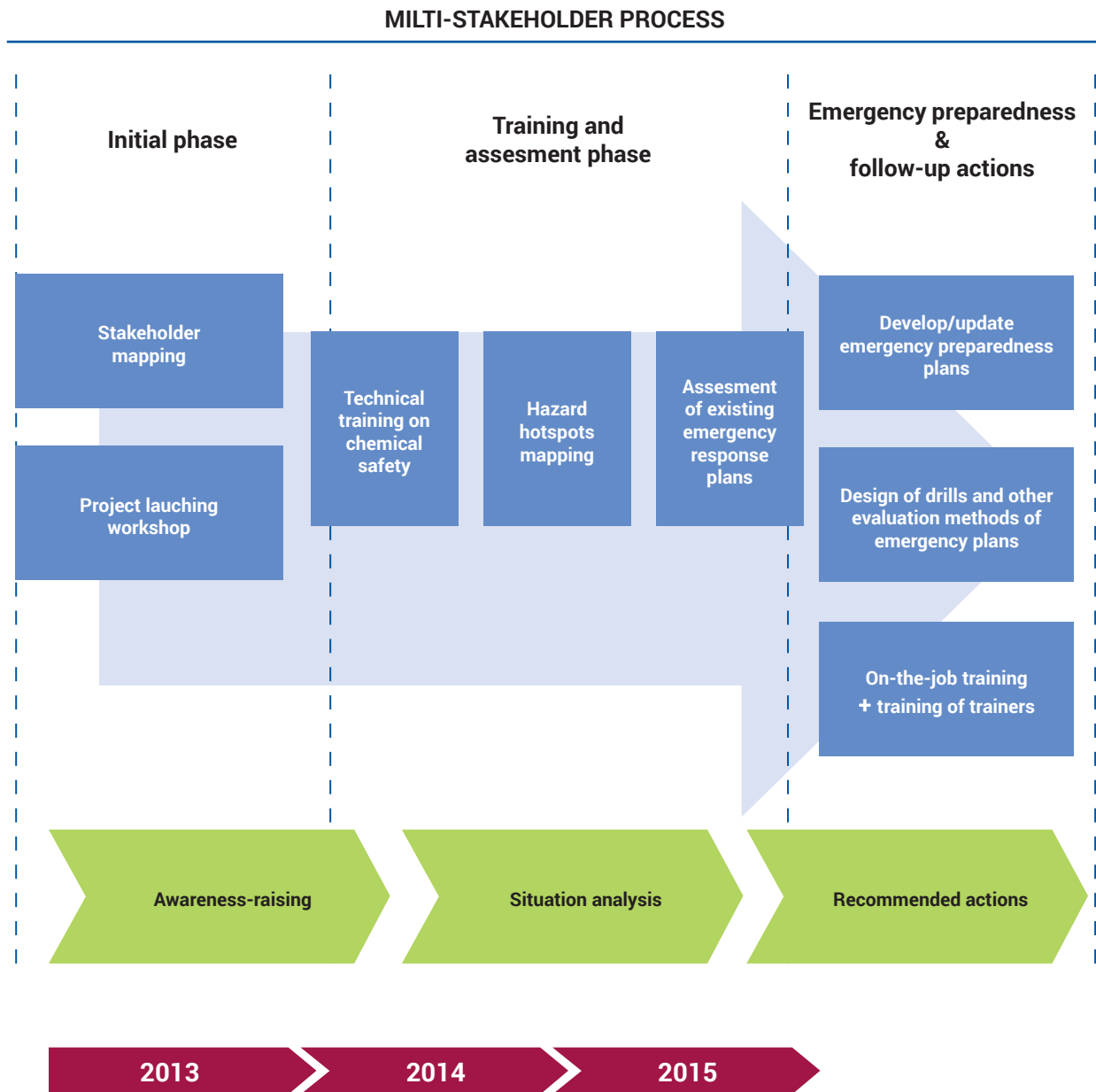
Project outcomes

The project allowed for the identification of stakeholder groups involved on chemical safety issues in the ports and transport routes and for an improved coordination on these matters. Stakeholders are now more aware about the present hazards and are familiarized with the appropriate tools to prevent and respond to potential chemical emergencies. In addition, resource materials on handling and transport of dangerous goods were compiled and tested and can be further used by other countries and regions (**Annex 1**).

Specific outcomes from the project include:

- Understanding of the current situation on chemical safety issues and identification of hazards hotspots;
- Enhanced capacities among the port and transport stakeholders for an improved chemical safety and emergency preparedness;
- Review and assessment of emergency response plans, and suggestions for further improvements;
- Regular stakeholder consultations and improvements on chemical safety and emergency preparedness and response plans in both ports;
- Sub-regional exchange of experiences, lessons learned, and best practices.

FIGURE 3 Project activities



Demonstration projects in Ghana and Kenya

3. Specific case studies from project activities

3.1 PREPARATORY WORK: IDENTIFICATION OF KEY STAKEHOLDERS

When considering chemical safety management it is important to take into account the value chain perspective and identify the different stakeholders involved on handling the chemicals in that value chain. Specifically in the port areas and related transport routes, the value chain stakeholders will include from stevedoring and dock labour, to import, warehousing, transport, and distribution, as well as the national, local and port authorities, maritime authorities, service providers such as fire services or hospitals, and finally the neighbouring community. All stakeholders along this value chain are to be key players when assessing risks, establishing chemical safety priorities and planning for any emergency preparedness and response. It is necessary to make sure that all these stakeholders are aware and adequately trained about chemical safety issues, at management and operation levels.

In the project main stakeholders were identified through desktop research and with support and information provided by various national and local authorities. The stakeholders identified were then invited to take part in consultations and training programmes under the project, which focused on raising awareness about chemical safety issues and chemical risks in the ports and along transport routes, as well as building capacities on the safe handling, warehousing, and transport of chemicals. This allowed for a targeted intervention to improve chemical safety across the value chain and with involvement of the most relevant stakeholders.

Case studies from implementation

Identifying key stakeholders in the Ports of Tema and Mombasa and transport routes

In order to identify the stakeholders that could be directly impacted by chemicals and should be therefore trained on chemical safety, project partners analyzed the value chain of chemicals starting from their arrival to the ports, through their transport, to the final delivery to consumers.

It was found that public authorities undertake the overall logistics and management of the ports of Tema and Mombasa – GPHA and KPA respectively. These entities work closely with several private companies (many of them SMEs), which provide diverse services such as stevedoring, warehousing and transport.

Once main stakeholder groups were identified in the value chain, project partners proceeded to identify the specific entities, institutions, and SMEs that were part of those groups. In addition, key focal points were identified for each entity, according to their ability to further disseminate chemical safety practices among peer groups.

Stakeholder groups identified in both ports are shown in Table 1 below. Note that these stakeholders are directly involved in hazardous chemicals handling, storage and transport. Additional stakeholders should be further identified for their potential role, such as service providers and the community living close to the ports.

TABLE 1 Different stakeholder groups potentially involved in chemicals handling, storage or transport in the Ports of Tema and Mombasa

	PORT OF TEMA	PORT OF MOMBASA
Regulators	Ghana Ports and Harbours Authority	Kenya Maritime Authority
Vessel handling	Ghana Ports and Harbours Authority	Kenya Ports Authority
Stevedoring	25% by Ghana Ports and Harbours Authority 75% by ten stevedoring companies	Kenya Ports Authority
Shore handling (receipt, storage and delivery services)	Ghana Ports and Harbours Authority Red Sea Maritime Services Ltd. Six private Inland Clearance Depots (ICD) since 2012, but only one handles the storage of chemicals in the port (Tema Bonded Terminal).	Four private cargo handling agents Seven freight forwarders Around 20 container freight stations
Bunkering and ship chandlery services	Aegean Bunkering Services Ltd. Private Bunkering services	4 bunker suppliers
Storage and warehousing services	GPHA manages a 77,200 m ² -paved area for the storage of containers and other conventional cargo. Only one ICD handles storage of chemicals in the port (Tema Bonded Terminal). There are also various private storage and warehousing facilities located around the port.	Around 20 container freight stations
Dispatch transport	26 registered chemical transport companies. 6 main companies. Around 30 bulk oil transporters	5 main transporters Kenya Railways

KEY GUIDANCE POINTS ON IDENTIFYING STAKEHOLDERS

- › As part of the Responsible Production Toolkit and Guidance in **Annex 1**, Tool 2.1 provides specific guidance on preparing a stakeholders map in a company. It can be adapted and used to map stakeholders in a larger context, such as a port community. Tool 2.2 can be used to build a profile for each stakeholder, which will be useful to understand their needs and background and therefore decide on how to engage with them in the process.
- › For the benefit of improving chemical safety practices in ports and along transport routes, the following categories of stakeholders should be considered along the value chain:
 - **Port stakeholders:** Ports authorities, warehouses, stevedoring, dock labor, importers, container inspectors, vessel handling companies, shore handling companies (including inland clearance depots)
 - **Consumers:** Industries, distributors, retailers, farmers, miners, metal finishers, fuel/gas stations, industrial associations, NGOs, community leaders
 - **Regulators:** Customs, environment authority, ports authorities, national security authority, roads and transport authority, industry and trade authority, disaster risk reduction office
 - **Transporters:** Road associations, private transport companies, oil refineries, gas companies, industrial associations
 - **Service providers:** Major hospitals, Red Cross, customs, disaster risk reduction office, road safety services, fire department
 - Additional identification and mapping of **communities** nearby port areas and transport routes is also very relevant for further work on emergency preparedness and response.

3.2 PROJECT LAUNCHING WORKSHOPS

Different stakeholder groups involved in the value chain of chemicals will have different roles to play in the implementation of sound chemical safety practices and will likely have different levels of knowledge on chemicals management. Once stakeholders are identified at a specific site, it is important to ensure a common understanding by all stakeholders of the actual situation of chemicals management at the site, what are the recommended chemical safety practices, and what is their role in ensuring a sound management of chemicals in the site and along the value chain. Starting or strengthening the multi-stakeholder dialogue and coordination in a launching workshop is valuable to ensure their engagement through the process.

For the project, launching workshops were organized to discuss the overall chemical safety practices in the ports and transport routes and assess the current situation with different stakeholders identified during the preparatory phase. These workshops provided a platform to strengthen cross-sectoral cooperation. Specific topics presented and discussed during the launching workshops were:

- i. The current situation on chemicals management
 - › Context of chemicals management: interest of safe handling of chemicals, fundamental principles of chemical safety, and available programmes and frameworks promoting chemical safety management
 - › Examples of existing warehousing and transport chemical safety practices by SMEs
 - › Existing regulatory frameworks at the regional, national and local levels for chemicals management
- ii. Best practices at the global level
 - › Examples of best practices by large companies
 - › UN Environment approaches to chemical safety (APELL, Responsible Production)
 - › ICCA approaches to chemical safety (Responsible Care and Global Product Strategy)
- iii. Priorities and next steps towards sound chemical safety management

The workshop in Ghana was held in the Tema Port on 23-24 September 2013, hosted by the GPHA. In Kenya, the workshop was held in Nairobi on 3-4 June 2013, hosted by the KNCPC. Although it is ideal to hold the workshop on-site, a strong engagement by the Kenya Ports and Maritime Authorities and participation of stakeholders from the Port of Mombasa ensured an effective discussion and prioritisation for sound chemical management on the port and transport routes.

A total of 90 stakeholders were part of the launching workshop at Tema and 35 of the workshop at Nairobi. Both workshops included participation from other countries of

the respective sub-regions, as to discuss elements of the project on improving chemical safety along the cross-border transport routes.

Case studies from implementation

Awareness raising and early engagement of top management in the Port Community of Mombasa

After the project launching workshop held in Nairobi in June 2013, the Kenya Maritime Authority (KMA) and the KPA, together with the KNCPC, concluded that engagement of top management from the Port Community of Mombasa was crucial to ensure a sustained process to improve chemical safety. KMA, KPA, and KNCPC therefore organized a second awareness-raising workshop in the Port of Mombasa, specifically targeted at the top management representatives from national and local authorities, warehousing and transport companies, and industrial associations.

This second workshop facilitated a transparent and rich dialogue about the main needs, concerns, opportunities, and way forward to implement chemical safety effectively. Some of the key points highlighted by participants were related to the need for:

- › Creating awareness far beyond to countries that the Port of Mombasa serves in the East African region (Burundi, Democratic Republic of Congo, Ethiopia, Rwanda, Somalia, South Sudan, Tanzania, and Uganda);
- › government presence in the chemical safety efforts in order to upscale activities;
- › training freight forwarders at border points, since there are important risks in these areas;
- › having licenses for clearing agents and transporters according to minimum standards of operation;
- › improving classification and labelling of chemicals by chemical manufacturers;
- › having a course on handling of dangerous goods in national technical universities, promoted by government;
- › creating road side stations along the Northern corridor to other neighbouring countries, for safe dangerous cargo trucks parking;
- › training first responders along the transportation routes on appropriate emergency response; and
- › better enforcement of existing legislation on chemicals management in Kenya.

This early effort with top management representatives helped building trust and ownership of the process among stakeholders, increased interest of the port community in the project activities, and ensured an effective multi-sectoral coordination. Beyond the completion of project activities, KPA and KMA now lead regular coordination meetings with more than 25 institutions from the Port

Community in order to exchange on chemical safety and emergency preparedness issues and incidents. Commitment and interest obtained at early stages of the project still endures after project completion.

Reviewing the current situation and chemical safety priorities during the launching workshops

The project launching workshops provided an opportunity to revisit and review the current practices and existing initiatives by authorities and industry in the demonstration sites. It is important for stakeholders to appreciate the policy and framework within which the chemical safety program takes place. Essential recommendations for the next steps of the project built on the existing framework in both sites.

For example, the Ghana Environment Protection Agency (EPA) and the National Environment Management Authority of Kenya (NEMA) presented the existing national regulatory framework for chemical safety during the launching workshops. A comprehensive regulatory framework exists in both countries for the management of pesticides and oil, as well to license different enterprises that handle and

transport chemicals. Nevertheless, enforcement of these regulations was identified as a challenge, together with the lack of specific national frameworks to regulate handling, storage and transportation of dangerous cargo within the corridors, and regulations for emergency preparedness and response planning. It is worth noting though that the Kenya National Disaster Operations Centre, in collaboration with the Joint UN Environment/OCHA Environment Unit, implemented the FEAT6 methodology in 2013 to identify main industrial hazards at the national level. This study included information on industrial hazards in Mombasa that was valuable to identify hazards at the Port.

Other presentations by the port authorities and specific transport companies introduced the specific challenges at the demonstration sites and the transport routes, as well as important existing voluntary initiatives by the private sector at the local level. The launching workshop in the Port of Tema included an on-site visit to the port installations, which provided insights regarding the operations at the port and the terminal that specifically handles dangerous goods (Tema Bonded Terminal). All this information fed into the discussions to identify main priorities, as shown in Table 2.

TABLE 2 Priority issues on chemical safety discussed during the launching workshops at the Ports of Tema and Mombasa

PORT OF TEMA AND TRANSPORT ROUTES TO WEST-AFRICA	PORT OF MOMBASA AND TRANSPORT ROUTES TO EAST AFRICA
<ul style="list-style-type: none"> › Non-compliant labeling was identified as significant challenge in the West African region. Often containers arrive at ports with no appropriate labeling which requires port operators to follow the manifest. Furthermore, there are containers with dangerous goods signage but no longer containing dangerous goods. › The issue of chemical diversion and unsafe handling of chemicals in the informal sectors, to be controlled by the Chemicals, Biological, Radioactive, and Nuclear Council. › Promoting interregional cooperation in West Africa and harmonizing practices and regulations, especially necessary at the transportation ministry level. › A key challenge is garnering political support. › Lack of tabletop exercises and simulation scenarios. 	<ul style="list-style-type: none"> › There are challenges related to the awareness of stakeholders, enforcement of rules and regulations, corruption, and infrastructure (for example, due to rapidly changing road conditions) › Risk assessment is highly dependent on the skills/ experience of those performing them and therefore it is necessary to ensure that the right people get the right training and skills to apply in carrying out their respective responsibilities. This shows the need for continuous training and development. › It is necessary to know the kind of capacity building that is needed at each level; to know how to quantify risk and how to address it; and to focus efforts on the most crucial parts of the road network. › At the company level, insufficient access to material safety data sheets, lack of awareness and knowledge on chemicals/labeling by storekeepers, inappropriate use of personal protective equipment, and lack of knowledge of drivers of the cargo they are dealing with. › Licensing of vehicles carrying chemicals and tracking them. › Extending safety management to Container Freight Stations and raising awareness among them. › There is no master database for hazardous cargo in the port except for explosives and inspections are just carried out for explosives. › Hazardous cargo other than explosives is handled and stored like any other cargo. › Need for training of personnel handling hazardous cargo and officers undertaking inspections.

3.3 CAPACITY-BUILDING: TECHNICAL TRAININGS ON HANDLING AND TRANSPORT OF DANGEROUS GOODS AND EMERGENCY PREPAREDNESS AND RESPONSE

Training is necessary in order to ensure that different stakeholders have the essential knowledge and skills to implement chemical safety practices. In this particular project, 70 stakeholders were trained in the Port of Tema on 16-19 June 2014 and 45 in the Port of Mombasa on 23-26 March 2015. The focus of the training was twofold: 1- chemicals handling (including hazard classification and labelling and placarding), transport, storage, loading and unloading in the port areas and cross-bordering transport routes, and 2- hazard mapping and emergency preparedness and response plans. Audience included mainly local authorities, and transport and warehousing SMEs.

The technical trainings also helped to set the ground for next steps of the project on hazard identification and review of local emergency response plans. In order to do so, the training program included exercises on hazard and risk assessment and a tabletop emergency drill.

An important lesson learned during this stage is that port communities are large and complex. The diversity of services and SMEs that work in coordination with the port authorities and the different levels of knowledge among these stakeholders present occasionally a challenge when holding single training events. The scope of the project could not cover in totality tailored training for the diverse types of stakeholders, such as workers of container freight stations or drivers of delivery trucks. Additional tailored training will be beneficial for these stakeholders and for communities along the transport corridors in both sub-regions. A train-the-trainers approach may prove to be a good alternative in future replication projects to cover all training needs in this kind of setting.

KEY GUIDANCE POINTS ON TECHNICAL TRAINING

- › **Annex 1** includes the agenda and training material used for the technical trainings. In addition, the Responsible Production Guidance and Toolkit in Annex 1 are accompanied by a training package that offers 18 thematic training sessions. These sessions include guidance on hazard identification, chemical inventorying, and emergency planning.
- › When addressing large communities in ports, a training-of-trainers approach may be more effective to reach all stakeholders in a long term.
- › When possible, multiple tailored trainings for each stakeholder group are very valuable to reach all stakeholders (e.g. tailored trainings for truck drivers)
- › Exercises are fundamental for stakeholders to understand chemical safety issues. Training on hazard mapping or emergency response can be enhanced with hands-on work on resolving specific case scenarios or drills. More guidance on designing a drill exercise can be found in the APELL Handbook also included in Annex 1.

Case studies from implementation

Building a training programme on chemical safety for the Ports of Tema and Mombasa and transport routes

The technical trainings under the project comprised various aspects of chemical safety, which were organized in two sessions. The first session dealt with all aspects of the handling and transport of dangerous goods, and the second session dealt with emergency preparedness and response. Both sessions are described below. Detailed elements of each session can be found in the example agenda of the technical trainings, in **Annex 1**.

SESSION 1 General awareness raising on handling of dangerous goods in ports

Designed to provide familiarity with the general hazards of the dangerous cargoes handled, the relevant legal requirements and best practices. This included a description of the classes of the dangerous goods and their marking, labeling, placarding, packing, storing and segregation and documentation. An exercise on hazard identification was also included to support future activity on hazard mapping.

GOAL: Raising awareness and gaining better understanding on dangerous goods management in ports and familiarization with international standards and best practices.

SESSION 2 Emergency preparedness and response

Aimed to provide guidance to assist port authorities and other relevant stakeholders in achieving preparedness for emergencies. This guidance addressed how to develop, implement, test, and update on-site emergency preparedness and response plans through a multi-stakeholder approach.

GOAL: Recognize type of hazards, relevant authorities and equipment for emergency preparedness and response planning. Outline the procedures to be followed in preventing, planning, preparing for and dealing with accidents and other emergencies involving dangerous goods.

3.4 IDENTIFYING HAZARDS: DEVELOPING HAZARD HOTSPOTS MAPS

Understanding the nature and source of hazards (type and class of chemicals, quantities), transport patterns and vulnerable areas (fresh water reservoir, residential areas, hospitals) lead to the identification of main hazards hotspots. This is a necessary step for stakeholders to prevent and prepare for potential accidents. A site-specific hazards assessment allows implementing tailored actions that will reduce the likelihood of accidents and adverse impacts of chemicals in human health and the environment, as well as related economic impacts. Hazard mapping is a highly detailed task that needs a clear understanding of the demonstration site and therefore a close coordination with different stakeholders.

Identification of hazards in the ports of Tema and Mombasa and along transport corridors was an important activity of the project. Findings provided key information for the subsequent assessment of the current emergency response plans and identification of areas for improvement. The following are specific situations found during the hazard mapping exercise:

In ports

- › Incompatible dangerous goods stored together
- › Re-use of chemical containers for other purposes
- › Non compliance with labeling and packaging standards
- › High number of distributors, re-packagers
- › Storage in buildings with low standards, and in second levels
- › Enclosed working conditions in warehouses
- › Incorrect practices and protection equipment to handle chemicals
- › Low awareness of local authorities and rescue services on hazardous chemicals, and low or absence of coordination in case of an accident
- › Main hotspots include inland container depots, chemical warehouses, petroleum and chemicals storage tanks, petroleum jetty and industrial enclaves.

Along transport routes

- › Re-use of chemical containers for other purposes
- › Overloading of trucks
- › High number of transporters
- › Low awareness of drivers about chemical hazards
- › Overspeeding by transporters
- › Fatigue of drivers, medical conditions of drivers
- › Poor road conditions
- › Speeding and reckless driving by informal passenger shuttle buses causing accidents
- › Non compliance with security measures specific to hazardous chemicals (such as minimum distance between trucks)

- › Light control and management of the quantity of hazardous chemicals in transit, which makes it difficult to implement appropriate risk reduction measures
- › Roads with steep curves and slopes
- › Presence of informal businesses (e.g. food) alongside the transport routes
- › Presence of many cyclists and children in the roads
- › Low and narrow bridges and tunnels along the transport routes
- › Roads with no containment area
- › Low awareness of local authorities and rescue services on hazardous chemicals, and low or absence of coordination in case of an accident

Case studies from implementation

Compiling information for hazard identification in the Ports of Tema and Mombasa and transport routes

During the identification of hazards, the GNCPC and the KNPC worked jointly with different national partners on:

- › Collecting data on chemicals imported through the ports to different destinations in the region;
- › Identifying the main transport routes of these chemicals from the ports to other parts of the country and other neighboring countries; and
- › Reviewing and analyzing past chemical accidents in the ports and transport routes.

Statistics of chemicals were obtained from different national authorities and licensing institutions. Hospitals and traffic authorities provided crucial information about past accidents along the routes. The transport routes were mapped with support of the Global Positioning System.

Main findings from the development of the hazards mapping are:

Information on chemicals: The studies found that agrochemicals (pesticides, nitrogenous fertilizers, phosphate fertilizers) and petroleum products are the chemicals imported in the largest quantities through both ports, followed by industrial and consumer products, such as cleansing products and synthetic plastic materials.

Information on mode and transport routes of these chemicals: Main transport routes from the Port of Tema to other landlocked countries in West Africa are road, pipelines and water transport. Approximately 98% of the chemicals are transported via road. Most goods imported through the Port of Mombasa are all transported to East Africa through the North Corridor, which is served by a combination of transport modes and infrastructure facilities that include: the Port of Mombasa, a road network, a rail network, a rail-lake transport, inland water routes, and an oil pipeline.

Approximately 70% of the total transit flow within this Northern Corridor is by road. Sometimes chemicals involve two or more transport methods, such as petroleum that is transported in pipelines from the port to other locations of the country and from there, transported through cross-bordering roads.

Information on transport patterns and vulnerable areas:

Information was complemented with reports from staff that traveled through the transport routes and cameras that were added in some vehicles to identify vulnerable areas and hazardous situations along the road. Satellite

services available in some national institutions were used when complementary information was needed. Hospitals, security services, and police departments were consulted about records and statistics of accidents.

Information from the port: As a second stage of the hazards mapping activity, the NCPCs and the port authorities made dedicated site visits in the ports to identify hazards hotspots. As for the transport routes, trackers were used on a sample of vehicles to follow the itinerary of chemicals transported from the port.

KEY GUIDANCE POINTS ON IDENTIFYING HAZARDS AND HOTSPOTS

- › **Annex 1** includes a guidance note on chemicals transport hazard mapping used in the project. In addition, Tools 1.2, 1.3, 1.4 and 1.5 of the Responsible Production Guidance and Toolkit provide guidance on identification, classification and mapping of hazards. ICCA Guidance on Chemical Risk Assessment and APELL Technical Report No. 12, also included in Annex 1, cover hazard classification and characterization and take it further into risk assessment.
- › When mapping hazards and hotspots in ports and transport routes make sure to analyse information on:
 - The different activities that entail chemicals handling in the site and the locations where these are practiced. Chemicals offloading, transport, loading, re-packaging, and warehousing are some examples.
 - Main types of chemicals present, including volumes and their hazard classification (the Globally Harmonized System of Classification and Labelling of Chemicals – GHS – and the Emergency Response Guidebook provide guidance on hazard classification. Both are included in Annex 1).
 - Location of major transportation routes to other parts of the country and to neighbouring countries, intermediary storage locations (e.g. oil depots) and destinations for the identified chemicals.
 - Records of past accidents in the ports and relevant transport routes.
 - Location of neighbouring communities and other vulnerable groups or areas alongside the transport routes (areas with high population density, where many workers handle chemicals, with schools and hospitals located nearby, areas which are prone to flooding, etc.).

The hazard mapping reports for both demonstration sites are included in **Annex 1**.

3.5 PREPARING FOR CHEMICAL ACCIDENTS: EMERGENCY PREPAREDNESS AND RESPONSE PLANNING

Once hazard hotspots are identified, the next step towards chemical safety is to prepare for any accident or emergency event that may arise from those hazards, and plan for response actions in case the accident occurs. Identification of hazards will lead to the realization of what are the gaps in capabilities at site to respond appropriately and will help on deciding about proper actions to fill in those gaps and improve preparedness. This capabilities assessment will be the baseline for the development of a new emergency plan, or the update of an existing one.

In the case of Ports of Tema and Mombasa, emergency response plans were already in place for port operations. Therefore, emphasis was given in the project on the revision of plans against identified hazards, and on providing the methodology and recommendations to periodically review and update these existing plans.

Emergency response and preparedness plans are maintained through continuous improvement. It is the method to keep these plans valid and effective. They need to be routinely revisited and evaluated through for example, exercises and drills, and updated as capabilities and circumstances change at site.

Case studies from implementation

Recommendations for review of emergency response plans for the Ports of Tema and Mombasa

The existing plans for the Ports of Tema and Mombasa were reviewed, based on key findings of the hazard mapping exercise and consultations with stakeholders during the technical trainings. The following initial recommendations for future updates of these plans resulted from the project:

- › Plans should be periodically updated, as capabilities change, as new dangerous goods are brought to the ports, and if any other change arises that could impact the applicability of the emergency plan.

- › The existing plans should be routinely evaluated. Effective drills and exercises need to be designed in this regard. Further training on designing and implementing drills would be beneficial in both ports communities.
- › Overall, both ports would benefit from updating their respective response plans to a broader preparedness plan. Current plans focus on the response actions and responsibilities once the accident occurs. An emergency preparedness plan will plan beyond response actions by specific responders and include for example a section on how to inform and prepare the whole port community on what measures they can take to prevent the accident, mitigate, and recover, as well as how to react in case of emergency.
- › Scope of the current plans could be enhanced by going beyond the port community, covering the neighbouring communities, residential areas, and nearby environmental vulnerable areas. In addition, the scope can be also extended to the transport operations and the transport routes of dangerous goods, going beyond the port operations.

Response actions could be more chemical-specific, taking into account the chemicals that were found during the hazard mapping and their specific properties. Actions currently proposed in the response plans are based on broad chemical hazard categories (explosives, flammable, oxidizing, corrosive, hazardous to the aquatic environment, etc.), which can be adequate but not comprehensive and specific enough to ensure a correct handling of the chemical during an accident. In this regard, the Emergency Response Guidebook⁷, developed jointly by the US Pipeline and Hazardous Materials Safety Administration (PHMSA), Transport Canada and the Secretariat of Transport and Communications of Mexico with collaboration of Centro de Información Química para Emergencias of Argentina (CIQUIME), was recommended as guidance on chemical-specific response.

KEY GUIDANCE POINTS ON EMERGENCY PREPAREDNESS AND RESPONSE

- › The APELL Handbook in Annex 1 includes guidance on emergency preparedness and response. It provides specific examples of the elements to be included in emergency plans and a 10-element methodology to develop/update emergency plans at the local level, through a multi-stakeholder approach.
- › The material used during the technical trainings on emergency preparedness and response is also included in **Annex 1**.

⁷ <http://www.phmsa.dot.gov/hazmat/outreach-training/erg>

3.6 DISSEMINATING AND SHARING EXPERIENCES: SUB-REGIONAL DISSEMINATION WORKSHOPS

Sub-regional training and dissemination workshops were organized in order to share results of the project, train neighbouring countries, and facilitate dialogue on chemical safety within the sub-regions. Participants shared about the handling and transport of dangerous goods practices from the ports to their destinations. Sub-regional needs and a way forward for improved emergency preparedness and response for accidents in Ports and routes were identified.

The sub-regional workshop for West Africa was held in Tema Port on 23-24 July 2015 and was attended by participants from Burkina Faso, Ghana, Kenya, Mali and Niger. The workshop for East Africa was held in

Dar es Salaam on 26-27 November 2015, in the spirit of cooperation in the sub-region on dangerous goods and to promote south-south cooperation between the Ports of Tema, Mombasa and Dar es Salaam. Participants from Burundi, Ghana, Kenya, Rwanda, Tanzania, and Uganda attended the workshop.

Participants to both workshops expressed willingness to join efforts on advancing chemical safety practices both nationally and as sub-regions, taking into account the different context and level of enforcement in each country.

The key outcome discussions and action points agreed during the workshops were:

SUB-REGIONAL WORKSHOP FOR WEST AFRICA

- › The emergency response plans of the Ports of Tema and Takoradi are to be revised according to the APELL methodology.
- › Technical trainings need to be replicated in Burkina Faso, Mali and Niger in French, with training material translated into French.
- › The training component on safe transport of chemicals should be delivered to all transport and driver groups in the sub-region.
- › The hazards map of the cross-bordering transport routes needs to be translated into French and further disseminated among all transporters and drivers involved in cross-border transport of chemicals.
- › Chemicals labelling and placarding, as well as driver licensing should be harmonized among the countries of the sub-region.
- › The experiences and lessons learned from the project should be shared with other ports of West Africa through Ports Forums.

SUB-REGIONAL WORKSHOP FOR EAST AFRICA

- › Chemicals management legislation should be strengthened and better enforced in all countries of the sub-region.
- › Coordination on safe handling and transport of dangerous goods needs to be strengthened in the sub-region.
- › Technical trainings and material would have to be translated into Swahili for countries in East Africa.
- › Emergency preparedness practices need to be strengthened and adapted to address the hotspots identified during the hazards mapping.
- › On-the-job training on safe handling and transport of chemicals for drivers, transporters, storage facilities, and operators is necessary.
- › More awareness raising and emergency drill exercises in the Ports (Tanzania and Kenya) are required, with support of the local authorities.

The agenda and detailed lists of participants of the sub-regional dissemination workshops are included in Annex 1.

Case study from implementation

South-South exchange between Ports in the African region

Similarly to Ghana and Kenya, Tanzania displays a major port for import and export of goods to other countries of the African region, including dangerous goods. The Port of Dar es Salaam is the largest of three ports in Tanzania. Goods are transported from the port to Burundi, the Democratic Republic of Congo, Malawi, Rwanda, Uganda, and Zambia.

As a contribution of this project to promote chemical safety in the region, the last dissemination workshop was held in the Port of Dar es Salaam. Representatives from the Ports of Tema and Mombasa were able to share their project experiences with diverse stakeholders from the Port of Dar es Salaam. The workshop supported the South-South cooperation, as well as the sharing of experiences and lessons learned between countries of the region.

KEY GUIDANCE POINTS ON SHARING EXPERIENCES BETWEEN COUNTRIES

- › **Annex 1** includes the agenda and detailed lists of participants to the sub-regional dissemination workshops as examples.
- › Promote sharing of experiences among different communities and countries, and identification of best practices that can be replicated by others, preventing to “re-invent the wheel” within the same region.
- › Prepare some points of discussion for regional events, such as a short roadmap or action points towards an improved chemical safety at the regional level, to make discussions richer and results-oriented.
- › Take into consideration the different language needs in the region when preparing this kind of event.

4. Success factors, challenges, lessons learned

4.1 SUCCESS FACTORS

Subregional upscaling

The project, which scope included the cross-border transport of dangerous goods, took into consideration the transboundary aspect of safe handling of chemicals in an inter-connected world. It promoted prioritization of sub-regional needs to improve chemical safety, therefore contributing to a regional integrated approach to improve chemicals management.

Active public-private collaboration

The project evidenced and supported the reinforcement of the collaboration between the public and the private sectors in ports. This dialogue provides the ports with the necessary structure and capacities to deliver an effective handling and transfer of goods. Such existing symbiosis at the port community helped on establishing a shared common goal on chemical safety among all port stakeholders from the beginning, which in turn facilitated coordination throughout the next stages of the process.

Strong political commitment

Local port authorities have a strong and active involvement in port operations and can influence port stakeholders. Strong political commitment from these authorities was a key factor to promote improved chemical safety and emergency preparedness in the ports' operations, as well as to ensure continuity and sustainability of the consultative process.

Multistakeholder collaboration

Activities in the ports and along the transport routes are undertaken by a numerous and diverse community of stakeholders that have specific knowledge on the local context and circumstances. Collaboration with different stakeholders was crucial throughout the project, as for example during the hazards mapping, which was developed thanks to collaborative work of ports' authorities, environmental authorities, NCPs, transporters, traffic police departments, and hospitals.

Information and experience sharing

Technical trainings benefited from the information shared by several international experts on the practical implementation of chemical safety in other countries. Furthermore, the sub-regional components of the project allowed for a rich exchange of information and experiences among countries of West and East Africa. This is a key factor to promote already proved best practices and avoids « re-inventing the wheel » on many aspects of chemical safety.

The promotion of an open dialogue and information exchange within the port communities resulted in a sustainable process that still endures after project completion. For example, the KPA and KMA keep having regular coordination meetings with several members of the Port Community on chemical safety issues.

4.2 CHALLENGES

Complexity of the port community

The port communities are large and complex, having the involvement of diverse organisations, including SMEs and types of workers. Although the project delivered common awareness raising and initial technical training that gathered several stakeholders in the ports, it could not cover all training needs. Follow-up tailored training for specific and large groups of stakeholders such as truck drivers was highlighted as a need for future activities on

chemical safety. Nevertheless, one of the project outcomes is a valuable compilation of training material on handling and transport of dangerous goods, which can be adapted and replicated for future trainings (see **Annex 1**). Tailored training needs to be simple and adaptable according to the different activities undertaken at the ports and the personnel rotation rate.

Low enforcement of chemicals management legislation in the region

An important challenge in the region is the lack of appropriate enforcement of chemicals management legislation, when it exists. Although there are specific regulations for some aspects of chemical safety, poor enforcement sometimes discourages the promotion of chemical safety initiatives and affects implementation of chemical safety practices.

Inter-operability of standards in the sub-regions

The lack of harmonization of labelling and placarding standards was identified as a challenge in both sub-regions. Issues such as wrong, non-understandable labelling, or even non-existent labelling of dangerous goods illustrate this. In addition, countries highlighted the problem of not having harmonized systems to license truck drivers who transport dangerous goods, which results in longer times at borders and difficulty to monitor drivers' actual awareness and technical knowledge on chemical safety.

Language barriers

In West Africa, the Tema Port serves various French-speaking countries, namely Burkina Faso, Mali, and Niger. This may present a language barrier at the time of delivering training and for specific joint sub-regional plans on risk reduction and emergency preparedness. In

East Africa, there can be also language barriers for some stakeholders such as workers and drivers, who will need to be trained in Swahili.

Complexity of preparing hazards maps

Preparing hazards maps is a highly detailed task that implies knowing in detail the actual status and circumstances of the ports areas and transport routes. A collaborative approach with main stakeholders, on-site visits and to travel through the routes is recommended in order to compile this information. Although this exercise results in clear and concrete information about hazards present in the site, it is a highly time-consuming exercise.

Continuity of activities

The project played a catalyst role by identifying key hazards hotspots and providing capacity building on chemical safety. There is now need to implement actions on-site, to mitigate any adverse effects linked to these hotspots and to improve chemical safety practices accordingly. A sustainability mechanism including commitment and support from national and local governments, and sustained technical training is needed. Recommendations are included below.

In addition, emergency preparedness and response plans need to be regularly updated in order to keep valid through time. This process will depend on continuity of activities by the ports communities in Tema and Mombasa.

4.3 LESSONS LEARNED

In order to complement the success factors and challenges that were described in the previous two paragraphs, and to inform any project focusing on Chemical Safety Management in Ports and along Transport Routes of Dangerous Goods, some lessons learned from this case study implementation are displayed below:

- › High-level commitment in the ports' community is important to sustain interest on chemical safety initiatives
- › Tailored training for each stakeholder group in ports and transport routes may be more effective, as a follow up after a first workshop gathering all stakeholders.
- › Emergency preparedness and response plans should include preventive actions the community can take

to avoid an accident, or reduce its impacts on life, the environment and the economy.

- › Emergency preparedness and response plans need to be regularly updated in order to be useful and effective. This should be ideally done through regular multi-stakeholder coordination meetings of representatives from the ports' communities.
- › When implementing chemical safety initiatives, it is important to build on the current situation and existing legislation/initiatives. Any new initiative or practice should be aligned with existing national and local legislation and infrastructure.

5. Recommendations

- › Further follow-up training in the Ports of Tema and Mombasa will be beneficial in order to reach stakeholders that could not take part of trainings in this project. Trainings of trainers could be helpful in this regard, in order to build skills of dedicated local trainers who remain on site and can therefore deliver multiple trainings to different stakeholder groups.
- › On-the-job training is needed for groups such as truck drivers and freight stations operators, who are directly handling chemicals and need specific technical skills.
- › Including trade unions and academia in the group of stakeholders can enhance the multi-stakeholder approach and widen the uptake of chemical safety practices.
- › Future updates of the existing emergency response plans at both ports can (i) include transport operations and transport routes beyond port operations, and (ii) up scale beyond response, into an integrated emergency preparedness plan, in order to improve preparedness and resilience throughout all the community. The APELL methodology, including TransAPELL, can be used as guidance to achieve this.
- › The material and exercises under the package compiled from this project can be adapted and used for future training activities in the Ports of Tema and Mombasa, as well as in other countries and regions when replicating capacity-building activities on chemical safety in port areas and transport practices.
- › Specific guidance such as TransAPELL, APELL for Storage of Hazardous Materials, and Responsible Production can be useful to design more specific on-the-job trainings and demonstration exercises.
- › The application of the APELL methodology into the broader community surrounding the port and transport sites and establishing an inclusive APELL Coordinating Group will improve risk communication between all stakeholders and reduce impacts from potential accidents.

6. Conclusion

The project was a collaborative effort between UN Environment and ICCA to strengthen chemical safety practices in Africa. During the period 2013-2015, the promotion of chemical safety in ports and transport routes in Kenya and Ghana, as well as neighbouring countries, proved to be an effective approach to contribute to the improvement of chemical safety practices along the value chain and at a sub-regional level, and resulted into a practical contribution to achieve the SAICM 2020 goal and to promote the Sendai Framework.

Through the exchange of information, experiences and lessons learned on chemical safety among countries of the sub-regions, common goals on chemical safety were promoted and discussions on further actions for the practical implementation were initiated.

This publication is sharing experience from the project implementation, as well as success factors, challenges and lessons learnt encountered during the project. This can pave the way for further actions to build capacities in Small and Medium Sized Enterprises (SMEs) on implementing effective chemicals management approaches, especially within the context of chemical safety in ports and transport routes.

Annex 1.

Resource materials on handling and transport of dangerous goods

Key documents on handling and transport of dangerous goods

- Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Rev.6
http://www.unece.org/trans/danger/publi/ghs/ghs_rev06/06files_e.html
- United Nations Recommendations on the Transport of Dangerous Goods, Model regulations, Rev.19
http://www.unece.org/trans/danger/publi/unrec/rev19/19files_e.html
- ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air, 2015/2016 edition
<http://www.icao.int/safety/dangerousgoods/pages/technical-instructions.aspx>
- IMO Recommendations on the Safe Transport of Dangerous Goods and Related Activities in Port Areas
IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code)
<http://www.unece.org/trans/wp24/guidelinespackingctus/intro.html>
- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)
http://www.unece.org/trans/danger/publi/adr/adr_e.html
- European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN)
http://www.unece.org/trans/danger/publi/adn/adn_e.html
- Regulation concerning the International Carriage of Dangerous Goods by Rail (RID)
- International Maritime Dangerous Goods Code (IMDG)
<http://www.imo.org/en/Publications/IMDGCode/Pages/Default.aspx>
- ICCA Guidance on Chemical Risk Assessment – Global Product Strategy
http://www.icca-chem.org/ICCADocs/ICCA_GPS%20July2011_LowResWEB.pdf
- Global Product Strategy: Case Studies
http://www.icca-chem.org/ICCADocs/ICCA_GPS2_Sound-Chemicals-Management-as-Global-Responsibility.pdf
- 2015 Responsible Care Status Report
<http://www.icca-chem.org/ICCADocs/RC%20report%202015%20FINAL%20LRspread.pdf>

Presentations on different aspects of handling and transport of dangerous goods

- | | |
|---|---|
| ▪ Overview of Chemical Safety and Risk Management | ▪ Hazard awareness |
| ▪ Overview of International Agreements and Land Transport of Hazardous Substances | ▪ Marking, labelling and placarding |
| ▪ Introduction to safe chemical management | ▪ Responsible Production toolkit and implementation |
| ▪ Dangerous goods and GHS classification system (Parts I, II and III) | ▪ Segregation of dangerous goods |
| | ▪ Handling of dangerous goods |
| | ▪ Handling of chemical incidents |

Key documents on emergency preparedness and response

- Responsible Production Booklet, Toolkit and Training Package
<http://www.unep.org/responsibleproduction/>
- Emergency Response Guidebook
<http://www.phmsa.dot.gov/hazmat/outreach-training/erg>
- APELL Brochure / APELL Handbook
<http://apell.eecentre.org/ResourceDetailInfo.aspx?ReadDetails/id=105>
- Hazard Identification and Evaluation in a Local Community (APELL Technical Report No.12)
<http://apell.eecentre.org/ResourceDetailInfo.aspx?ReadDetails/id=37>
- APELL for Port Areas: Preparedness and Response to Chemical Accidents in Ports
<http://apell.eecentre.org/ResourceDetailInfo.aspx?ReadDetails/id=38>
- Storage of Hazardous Materials: A Technical Guide for Safe Warehousing of Hazardous Materials
<http://apell.eecentre.org/ResourceDetailInfo.aspx?ReadDetails/id=42>
- TransAPELL: Guidance for Dangerous Goods Transport Emergency Planning in a Local Community
<http://apell.eecentre.org/ResourceDetailInfo.aspx?ReadDetails/id=43>
- APELL Multi-Hazard Training Kit For Local Authorities - For Community Vulnerability Reduction, Prevention, and Preparedness
<http://apell.eecentre.org/ResourceDetailInfo.aspx?ReadDetails/id=45>

Presentations on emergency preparedness and response

- Emergency response guidebook
- Rapid incident reporting and crisis management
- Emergency response planning
- Testing emergency response plans
- Overview of the APELL Programme
- TransAPELL
- Stakeholder and partner engagement
- Handling of chemical incidents

Tools and exercises

- Tool to map stakeholders to get involved on chemical safety issues (adapted from the Responsible Production Toolkit).
- Exercise: Responsible Production in practice – Hazard identification and Risk Assessment
- Exercise: Example of an Emergency Response Plan
- Example roadmap for chemical safety at the national level
- Guidance note on chemicals transport hazard mapping

Documents from the project implementation

- Example programme for a 2-day awareness raising workshop on chemical safety
- Example programme for a 4-day training workshop on handling and transport of dangerous goods and emergency preparedness
- Example programme for a 2-day regional dissemination workshop
- List of participants of the launching workshop at Port of Tema
- List of participants of the launching workshop at Nairobi
- List of participants of the training workshop at Port of Tema
- List of participants of the training workshop at Port of Mombasa
- List of participants of the regional dissemination workshop at Port of Tema
- List of participants of the regional dissemination workshop at Port of Dar es Salaam
- Hazard mapping report – Port of Tema and transport routes of dangerous goods
- Hazard mapping report – Port of Mombasa and transport routes of dangerous goods

Promoting Chemical Safety Management in Ports and along Transport Routes of Dangerous Goods:

Case Studies from Africa

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