Environmental Emergencies

Comoros

Report of Scoping Mission

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JOINT UNEP/OCHA ENVIRONMENT UNIT

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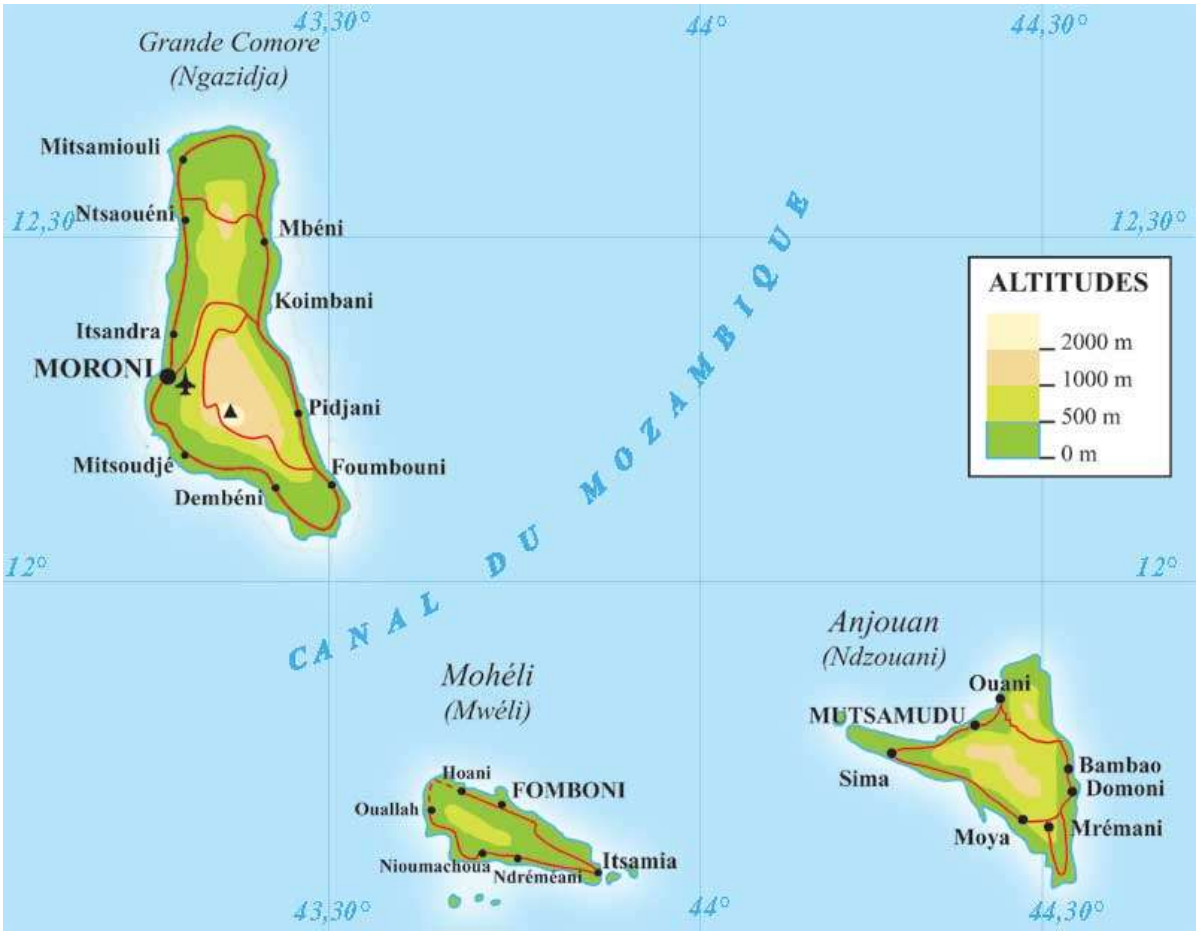
Joint UNEP/OCHA Environment Unit
Palais des Nations
CH-1211 Geneva 10
Switzerland
Tel. +41 (0) 22 917 4419
Fax +41 (0) 22 917 0257

Report editor: Wendy Cue, Joint UNEP/OCHA Environment Unit
Cover photo: Comoros (G. Carneiro)

Table of Contents

The Joint UNEP/OCHA Environment Unit (JEU) assists Member States in preparing for and responding to environmental emergencies by coordinating international efforts and mobilizing partners to aid affected countries requesting assistance. By pairing the environmental expertise of the United Nations Environment Programme (UNEP) and the humanitarian response network coordinated by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), the JEU ensures an integrated approach in responding to environmental emergencies. The Environmental Emergencies Centre (EEC) (www.eecentre.org) is an online tool designed to build the capacity of national responders to environmental emergencies developed by the JEU.

Map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44°
44,30°
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(Ngazidja)
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Ntsaouéni
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Koimbani
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ALTITUDES
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500 m
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Mohéli
(Mwéli)
Hoani
FOMBONI
Ouallah
Nioumachoua
Ndréméani
Itsamia
Anjouan
(Ndzouani)
Ouani
MUTSAMUDU
Sima
Bambao
Domoni
Moya
Mrémani

Executive Summary

In April 2012, torrential rains led to devastating floods and landslides in Comoros. The impact was acute in affected communities: destroyed homes, loss of agriculture lands, damaged infrastructure and loss of livelihoods and assets. The United Nations Resident Coordinator and the Government of Comoros requested the assistance of the Joint UN Environment Programme/Office for the Coordination of Humanitarian Affairs Environment Unit (JEU) to review the environmental impacts of the disaster on critical sectors, and to inform prevention and preparedness measures. These measures should contribute to increased resilience and to prevent potential secondary effects, including industrial or technological disasters, of future disasters.

The mission was comprised of the JEU, OCHA Regional Office for Southern Africa, UNDP Comoros, and a marine expert from the World Maritime University. The objective was to collect and document experiences and formulate a strategy and framework for better environmental stewardship during disaster response. During visits to the disaster-affected areas in the three islands of Comoros, the mission was joined by representatives of the Comoros Civil Protection Agency and Ministry of the Environment. The mission assessed potential environmental emergency risks from a multi-hazard perspective during field visits. Debriefings with disaster management focal points in relevant ministries and departments and in the UN Country Team helped to build awareness of preparedness actions to environmental emergencies.

Given the reliance of Comoros on the marine environment both for revenue generation and livelihoods, the mission focused on risks in coastal areas. Comorean marine waters are regularly trafficked by large tanker vessels on route from and to the Gulf region, but the country has so far failed to operationalize the POLMAR marine pollution contingency plan. The national fleet is restricted to a few small cargo and passenger vessels engaged in inter-island transport. There is very limited cargo handling and storage capacity in the country's three ports, which compromises not only port efficiency, but also health and safety of operations. Environmental management of ports, including of fuel handling facilities, is largely non-existing.

Adequate knowledge about the status of marine and coastal environments is constrained by the absence of a regular environmental monitoring programme. The coastal environments facing the greatest threats are sand beaches subject to uncontrolled sand extraction, rocky shores and mangrove forests exhibiting reasonably good conservation status. Coral reefs have recovered unevenly after past bleaching events, and are threatened today by climate-induced environmental changes and destructive fishing practices in certain places. Other anthropogenic pressures on these environments include the uncontrolled discharge of pollutants and especially solid waste to coastal waters, as well as changes to sediment balances due primarily to changes in land cover and the erection of hard artificial structures along the coast. The destruction of natural coastal and marine habitats, in particular around human settlements reduces their protective capacity against extreme weather events.

Given the limited industrial and urban development, there are as yet no heavy industries that pose significant risk of industrial accidents. The primary risk is from the transport, handling, and storage of hydrocarbons. During visits to oil storage facilities, a lack of preparedness and the need for improved protective gear and training were identified. More centralised baseline information on risks and vulnerabilities is also needed.

The mission's key findings will be incorporated in national contingency planning and provision of capacity building to civil protection focal points.

List of Acronyms

APELL	Awareness and Preparedness for Emergencies at Local Level
CADRI	Capacity for Disaster Reduction Initiative
CO2	Carbon Dioxide
EEC	Environmental Emergencies Centre
GMDSS	*Global Maritime Distress and Safety System*
HDI	Human Development Index
HDR	Human Development Report
JEU	Joint UNEP/OCHA Environment Unit
OCHA	UN Office for the Coordination of Humanitarian Affairs
POLMAR	*Plan National de Lutte contre les Déversements des Hydrocarbures en Mer* National Plan to Combat Oil Spills at Sea
ROSA	Bureau Régional de l'OCHA pour l'Afrique du sud
UNCT	UN Country Team
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP PCDMB	UNEP Post Conflict Disaster Management Branch
UNICEF	United Nations Children's Fund
WFP	World Food Programme

An environmental emergency is defined as a sudden onset disaster or accident resulting from natural, technological or human-induced factors, or a combination of these, that cause or threaten to cause severe environmental damage as well as harm to human health and/or livelihoods.
UNEP/GC.22/INF/5, 13 November 2002

1. Background and Context

In April 2012, torrential rains led to devastating floods and landslides in Comoros. The impact was acute in affected communities: destroyed homes, loss of agriculture lands, damaged infrastructure and loss of livelihoods and assets. The United Nations Resident Coordinator and the Government of Comoros requested the assistance of the Joint UNEP/OCHA Environment unit in assessing the environmental impacts of the disaster on critical sectors, and to inform prevention and preparedness measures. These measures should contribute to increased resilience and to prevent potential secondary effects, including industrial or technological disasters, of future disasters.

The Comoros consists of three small islands subject to high population pressure leading to intense exploitation of resources, stretching the limits of their carrying capacity. Demography is characterized by a very young population and a high population density of over 395 inhabitants/km^2, making it one of the most densely populated countries in Africa. In 2012, the Comorean population was estimated at 773,300 inhabitants[1] with an annual growth rate of 2.063%. The unemployment rate among 15 to 24 years reached 29.4% in 2004[2] and the proportion of the population living below the poverty line, 44.8%. Agriculture, including fishing and forestry, contributes to 40% of the GDP, employs 80% of the labour force, and provides most of the exports. The limited size of cultivable area constrains production capacity, preventing any economy of scale. From 1990 to 2010, the change in forest areas is -75%[3]. The country's small economic base, which relies solely on the products of three cash crops (vanilla, cloves, and ylang-ylang), its geographical isolation, the small size of domestic markets and the geographic dispersion of islands result in considerable additional costs in infrastructure, transport and communications.

Comoros has a high risk profile combined with acute vulnerability in key sectors. Comoros is considered a country of high focus under OCHA's 2013 Global Focus Model, based on analysis of data in four areas: hazards, vulnerability, capacity and the demand for humanitarian coordination support. In addition, Comoros is ranked 169 out of 187 countries on the ranking of Human Development Index (UNDP 2013). As a small island and least developed state, it is also highly vulnerable to the effects of climate change.

The scenarios in current national contingency planning include volcano eruption, outbreak of cholera, cyclones and flooding. The mission assessed possible impacts under these scenarios and recommends actions to prevent, prepare, and respond to environmental emergencies.

The impact of disasters cannot be disassociated from the vulnerability of communities, which include:

- Social vulnerability: illiteracy, access to improved water sources, sanitation coverage, unemployment, malaria prevalence
- Impact of floods, locations of risks

[1] UNDP, 2013 Human Development Report (HDR)
[2] Union des Comores, 2005. Stratégie de Croissance et de Réduction de la Pauvreté de l'Union des Comores. Document synthèse. 32 p.
[3] UNDP, 2013 Human Development Report (HDR)

Basic Humanitarian And Development Indicators for the Union of Comoros

Population	773,300 people (UNDP HDI 2013), 28.1% living in urban areas
Under 5 years mortality Maternal Mortality ratio	86 p/1,000 (UNICEF 2010) 280 deaths /100,000 live births (UNDP HDI 2013)
Adult morality Rate Life Expectancy	229 Male / 284 Female per 1000 (UNDP HDR 2011) 61.5 years in 2011 (UNDP Human Development Report 2013)
Under 5 years malnutrition	25% average 2000 to 2009 (UNDP HDR 2011)
Gross national income per capita	USD 1,079 for 2011 (UNDP Human Development Report for Africa 2012)
Percentage of population living on less than 1.25 USD per day Number and percentage of population living overseas (Diaspora)	46% (UNICEF 2012) 150,000 to 200,000 individuals or 20-25% of total population (WFP 2006)
Proportion of population with access to clean drinking water Access to primary health care	45% (UNDP HDR 2011) 40% overall (10% Anjouan) (WFP 2006)
Mean years of schooling Secondary schooling enrolment rate Tertiary schooling enrolment rate Adult literacy rate	2.08 years (UNDP 2008) 10% Male / 11% Female (UNICEF 2012) 4% (UNDP 2011) 74.9% of population above 15 years (UNDP HDR 2013)
Percentage of population living in extreme poverty	43.8% (UNDP HDR 2011)
Human Development Index (HDI Score and Ranking)	Score: 0.433; Ranking: 169 out of 187; Low human development (UNDP HDR 2013)

**Early Recovery Plan, 2012*

The mission comprised Wendy Cue from the Joint UNEP/OCHA Environment Unit, Narciso Rosa-Berlanga from the OCHA Regional Office for Southern Africa (ROSA), Goncalo Carneiro from the World Maritime University and Abou-Salam Saiidi from UNDP Comoros. The team was accompanied by representatives of the Comoros *Direction Générale de la Sécurité Civile* and the Department of the Environment during site visits to flood-affected sites and risk areas in Anjouan, Moheli, and Grand-Comore.

2. Main findings and recommendations

2.1 INDUSTRIAL AND TECHNOLOGICAL DISASTER PREVENTION AND PREPAREDNESS

Given the limited industrial and urban development, there are as yet no heavy industries that pose significant risk of industrial accidents. The primary risk is from the transport, handling, and storage of hydrocarbons. Hydrocarbons are the primary source of energy for the country: all three islands have central generators to provide power that rely on oil. The main public company, Comoros Hydrocarbures, imports leaded petrol, diesel, and kerosene (Jet1). The latter is used for domestic lighting and cooking.

Comoros Hydrocarbures storage facility, Moroni

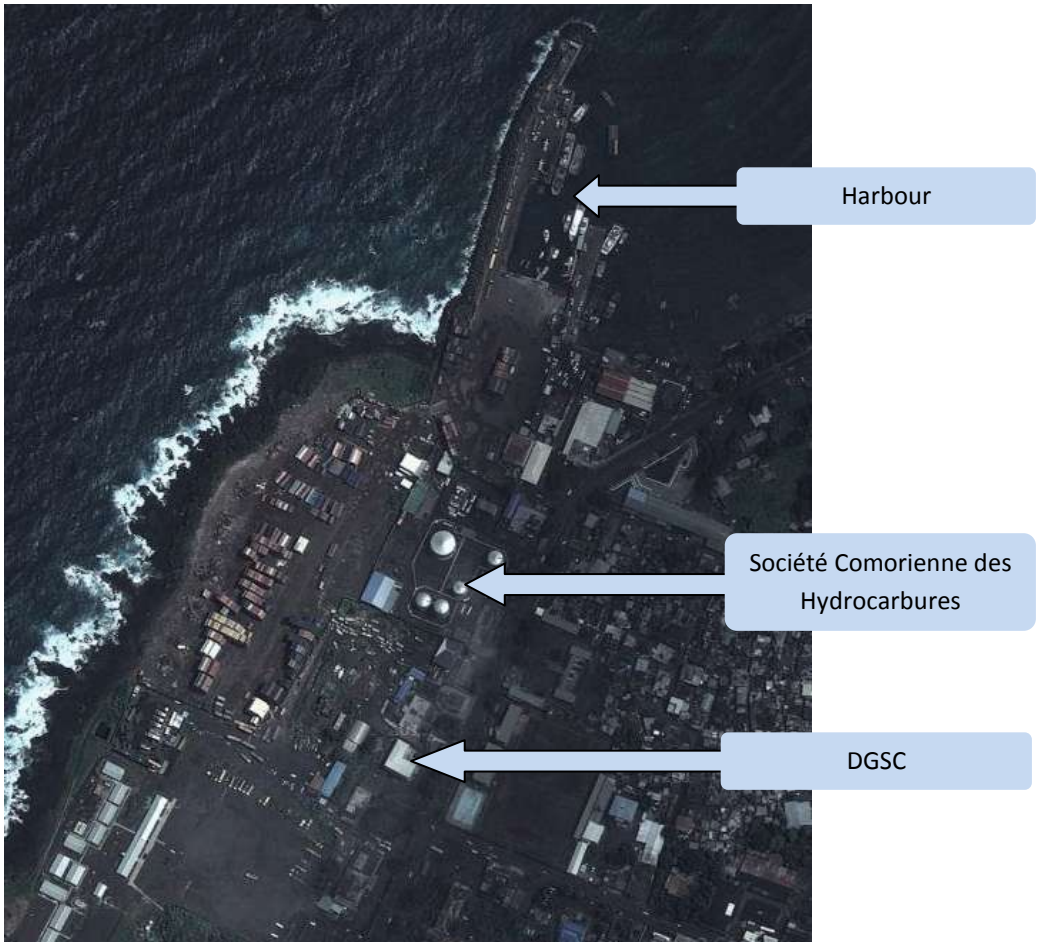
2.1.1 Land-based oil spill contingency planning

Comoros Hydrocarbures was very open about their level of preparedness. The mission visited their facilities on all three islands. The location of the depot in Moroni is of primary concern, as it is located in the centre of town, in close proximity to schools, the port, and the headquarters of the civil protection.

Primary storage capacity is located on the island of Anjouan, which can store 9200m^3 of refined petroleum products (diesel, petrol and kerosene) for 60-65 days of consumption. The first tank was installed in 1964 and the last one in 2003. Petroleum products arrive to Anjouan and, in lesser quantities to Moroni by international maritime transport. From Anjouan a portion is transferred to Mohéli by smaller company-chartered tanker vessels. At all hydrocarbon storage facilities' tanks are purged before replenishment, but no treatment is applied to the waste, which is placed in a pool before to be sent directly to the sea. No procedures are in place to control these emissions and there are no testing facilities to evaluate possible contamination in the ground-water or coastal areas near the storage facilities.

The mission was informed of potential developments that could constitute future areas of concern, given the lack of regulatory oversight, monitoring and capacity for environmental protection. These include: offshore gas exploration, import of heavy oil, and expansion of fuel imports, the latter two linked to the projected construction of a new thermal electricity generation plant. As a priority, the weaknesses in the current system should be addressed, and any new projects should be subject to environmental impact assessments. As the next national development plan intends to rely heavily on

environmental assets for development, the dangers that fossil fuels pose should be addressed. Concomitant investments in accident prevention and safety measures should be made to protect environmental assets.



Satellite view of the Moroni area - Source: Google Maps

Recommendations:

1. **Support plan** to re-locate Comoros Hydrocarbon fuel depot in Moroni outside of the centre , in a zoned area, with adequate security buffer zone
2. **Support preparedness** at all three locations to respond to a potential spill, fire or explosion
3. **Ensure oil spill contingencies** are cross-referenced in national contingency planning (in particular the management and coordination structure)
4. **Support site-specific contingency planning**.

2.1.2 Oil Spill Response at Sea

In the West Indian Ocean region, an estimated 700 million tons of raw petroleum products are transported annually through the Comoros waters, of which 350MT through the Mozambique channel to the west of Comoros. This represents 1,200 passages per year by large petrol ships (> 250,000 ton) and 4,000 passages of medium size ships (approx 60,000 tons). Given the number and size of ships that traverse Comoros waters, risk of oil spills and accidental pollution of coastal areas is very high.

The World Bank supported the development of oil spill contingency planning in the West Indian Ocean region, through support to the Indian Ocean Commission, with a five-year project that ended in 2003. The project included developing national legislation, contingency planning, and supplying oil spill response equipment and training. Some bilateral support in terms of equipment and training has been supplied in the intervening years, but awareness of these initiatives is scattered.

A National Plan to Combat Oil Spills at Sea (*Plan national de lutte contre les déversements des hydrocarbures en mer*), known as POLMAR, was elaborated in 2010. According to the Plan, responsibility for oil spill preparedness is under the Ministry of the Environment and response is under the lead of Civil Protection. However, key constituents of the plan, including concerned ministries, were either unaware of the status of the plan or its level of finalisation. Exercises and simulations based on the plan have not been conducted recently. According to a representative of Civil Protection, the mission was informed that equipment such as booms and dispersants were stored in Anjouan, but reliable information concerning inventory and maintenance of this equipment was not provided. In this regard, the port authority in Moroni mentioned that equipment used to respond to a spill in the port in 2007 had never been replaced.

Key components of the plan POLMAR have not been completed. Annexes to the plan are supposed to include an assessment of environmentally-sensitive areas, an inventory of oil spill response equipment, and a plan for its use and maintenance. These are missing both for the national plan and for the island-specific plans.

Not only is POLMAR largely non-operational, but also there is very limited capacity to detect and combat pollution at sea. This applies to accident as well as to operational pollution. Anecdotal reports of merchant vessels illegally discharging at sea were shared with the mission. So far the absence of surveillance at sea has precluded any action against polluters, a situation that might be reversed with the operationalization of the Coast Guard.

As an employee in the oil spill industry noted, 'it's not clear who is responsible for triggering the response, nor how it is triggered'.

Recommendations:

5. **Finalise national contingency plan** for oil spills at sea (POLMAR), including the island-specific plans and all Annexes.
6. **Regularly exercise** the plan POLMAR for oil spills at sea
7. **Promote regional cooperation** with the Indian Ocean Commission for oil pollution response
8. **Strengthen the surveillance** of and response to illegal and accidental pollution discharges at sea, mainly by reinforcing the presence of the Coast Guard at sea.

2.2 EMERGENCIES RELATED TO MARITIME ACTIVITIES

This section reviews the main environmental risks and vulnerabilities related to human activities that take place in the maritime areas of the Comoros, namely fishing and maritime transport. Each of these activities is briefly described; the risks and the known consequences of accidents are reviewed; the measures to minimise risk and respond to emergencies are discussed; and recommendations are made to improve these measures.

2.2.2 Fisheries

Fishing in Comorean waters is of two main types: small-scale artisanal fishing performed by local fishermen and industrial fishing carried out by large foreign vessels operating under bilateral fisheries agreements.

Artisanal fishing is carried out by an estimated 8,500 Comorean predominantly male fishermen on board either traditional wooden canoes propelled by oars, or larger 5-10m fibreglass "vedettes" with outboard engines. The total fleet is estimated at around 5,300 vessels, of which 45% and 49% in the islands of Anjouan and Grande-Comore, respectively, and the remainder in Mohéli. Average degree of motorisation is of approximately 30% (Toihir, 2011). Sails have traditionally not been used in Comorean fishing boats.

Of a total yearly catch of 18-20,000 tonnes, approximately 90% are small and large pelagic species caught by hook and line in the vicinity of fish aggregating devices anchored at 1-10km from the coast of all three islands. The remaining are demersal species of fish, crustaceans and molluscs caught by hook and line, nets and traps in shallow insular shelf areas, predominantly in the southern shores of the island of Mohéli, where fishermen from all three islands congregate. Artisanal fishing provides around 24,000 indirect jobs and contributes with 8-10% to the country's GDP. In addition, fishery products are the main source of animal protein for a large proportion of the population of the islands (Naji & Youssouf, 2007). Most of the fish is sold locally, prices varying between 250 and 2,500 KMF depending mainly on point of sale and season (Amoriggi, 2010). There is one processing unit for fishery products in the Grande Comore, producing salted and smoked products sold in the country and exported within the region.

Industrial fisheries agreements currently in force are limited to the 2012-2018 fisheries partnership agreement (FPA) with the European Union for the yearly capture of 4,850 MT of large migratory pelagic species in the Comorean exclusive economic zone. The threat posed by Somali piracy has led to underutilisation of fishing opportunities since 2005 (COFREPECHE et al, 2013).

Of primary concerns in the context of emergency preparedness and response is **loss of life at sea** in artisanal fisheries. In the absence of systematically compiled and reliable accident and casualty data, it is estimated that between 10 and 20 fishermen are lost at sea every year. Earlier externally-funded projects to purchase and distribute safety, navigation and communication equipment to fishermen have largely been unsuccessful (see De Lestange, 2007), and the use of such equipment is currently inexistent. This fact is made worse by the low level of formal education among fishermen, the fragility of much of the artisanal fishing fleet and the poor maintenance of fishing equipment, notably outboard engines. Regarding the first of these factors, it is worth highlighting that only one class graduated from the fisheries school in Anjouan – the only one in the country – in the late 1980s, a second class being expected to graduate in October 2013.

On another level, there appears to be very limited capacity to perform search and rescue at sea; so far, in case of accident it is mainly fishermen who, aided by their associations, perform all search and rescue, most often with very limited success. The recently inaugurated Comorean Coast Guard has so far not been involved in any search and rescue of fishermen at sea. The national search and rescue coordination centre operating in Moroni within the framework of the regional Global Maritime Distress and Safety System (GMDSS) only serves vessels >300 tonnes with specific radio

and satellite communication devices, following distress messages sent by the regional centre in South Africa. Hence it does not cover Comorean artisanal fishing vessels.

A vessel monitoring service (VMS) centre is in operation at the Directorate-General for Fisheries Resources in Moroni since 2010. It is the result of an Indian Ocean Commission project to integrate the Comoros in the regional fisheries monitoring, control and surveillance initiative, having been financed by the European Union within the framework of the FPA. It is capable of following any vessel equipped with a satellite signal transponder, which artisanal fishing vessels currently do not carry. Such transponders have been priced at approximately 400 Euros, a value that has earlier been considered too high for Comorean fishermen to bear (De Lestange, 2007). There is currently no collaboration between the Comorean SAR centre and the VMS centre, despite the fact that both operate from Moroni.

Finally, acknowledging the lack of enforcement capacity, government has refrained from adopting any legislation mandating the carriage of safety, navigation or communication equipment on board fishing vessels.

With respect to **environmental impacts**, current artisanal fishing activities are not believed to pose any significant pollution risks, even in case of accident. Environmental issues linked to overfishing and damage to coral reefs are discussed in section 2.3 au-dessous.

Recommendations:

9. Promote the use of safety and communication equipment on board artisanal fishing vessels, involving the raising and strengthening of awareness among fishermen for the safety relevance of this equipment and the strengthening of safety-related modules in all education and training for the fisheries sector.

10. Strengthen the regulatory framework and enforcement capacity with respect to safety on board fishing vessels, involving drafting and adoption of legislation concerning the carriage of safety, navigation and communication equipment on board fishing vessels, and tasking the Comorean Coast Guard with enforcing this legislation.

11. Install VMS signal transponders and means for communicating distress signal on board artisanal fishing vessels, making use of the existing VMS centre and enabling distressed fishing vessels to communicate with the national search and rescue system. Given the high costs of installation of such equipment, priority should be awarded to fishing vessels operating at greater distances from the coast. The possibility of establishing a collaboration between the VMS and the SAR centres should be investigated.

12. Strengthen the response capacity of the Coast Guard, to be able to actively take part in search and rescue efforts at sea, including of artisanal fishing vessels and fishermen.

2.2.3 Marine Transport of Cargo

Maritime transport is responsible for close to 99% of all international and inter-island transport of cargo in the Comoros. The archipelago counts three ports, in the cities of Moroni in Grande Comore, Mutsamudu in Anjouan and Fomboni in Mohéli. With a draught of around 9m, the port of Anjouan is the only one capable of accepting larger vessels at berth, which render it the most important in the country. It handles mainly containerised cargo, movements in 2011 amounting to 125 vessel calls

and close to 35,200 TEU. Cargo is stored in the premises of the port located close to the city centre. The fuel deposit of Anjouan located 5km to the east of Mutsamudu has an own berth and offloading facility for refined fuels.

The port in the capital city of Moroni is limited by a maximum draught of less than 5m, making it necessary for larger vessels to anchor at a distance of 50-100m from the port. Barges ensure the transport of cargo between vessels and the shore. Most of the cargo is containerised, the port having received 111 vessel calls and handled a total of 11,231 TEU – corresponding to close to 270,000 tonnes of cargo – in 2010. There is no handling of solid bulk cargoes. Refined fuels in bulk are discharged through a flexible line directly to the fuel deposit adjacent to the port. Container storage takes place in an area adjacent to the port, whereas general cargo is stored in warehouses near the port offices. Other than liquefied fuels, compressed gas is the most common hazardous cargo discharged at the port. No specific handling and storage procedures are in place for hazardous cargoes.

The port of Mohéli is at present only used by small general cargo vessels engaged in inter-island cabotage. Its facilities are very rudimentary and there is no cargo handling equipment, with all on- and offloading performed by hand. A berthing pontoon is currently being planned for direct supply to the Fomboni fuel storage facility, which currently is supplied by means of a flexible line. The mission was unable to collect information about cargo and passenger movements at the port of Fomboni.

Inter-island transport and all cargo to and from Mohéli is general cargo transported on board small Comoros-registered vessels. The exception is the transport of refined fuels, carried on board small tanker vessels.

The way cargo is handled in the ports of Moroni and Fomboni poses considerable health and safety risks. In the former case, these result from the lack of a stable berth for ocean-going vessels, all loading and off-loading taking place with the vessels at anchor and subject to instability cause by wind and waves. A 2012 mission by the UN WFP reported that cargo operations might be impossible in severe weather conditions, and that for this reason vessels show reluctance in calling at the port of Moroni.[4] An incident where two containers fell to sea while being offloaded onto a barge was reported to the mission. No human casualties resulted from this incident, but the lost containers still remain on the sea-bottom at the anchorage point, constituting an added risk for anchored vessels. Depending on the cargo, its loss during loading and offloading operations might pose environmental risks from release of noxious substances. The port authority in Moroni has proposed the construction of two fixed berthing points at sea approximately 400m from the coast.

In the case of the port of Fomboni, the handling of cargo by hand entails potential health and safety risk for port workers. The mission did not observe any handling operations, and thus cannot assess this risk in greater detail.

[4] World Food Programme Logistics Capacity Assessment, online at http://dlca.logcluster.org/COM/index.html. The port movement data reported in this section were extracted from this assessment report.

All ports lack adequate environmental management procedures, both for operational and accidental discharges. There is a generalised lack of preparedness to deal with environmental accidents in the area of the port, with lack of clarity regarding coordination and communication with other stakeholders involved in emergency response, and uncertainty relative to the availability of pollution response equipment. The procedures contained in the POLMAR are poorly known and barely exercised, if at all. Having observed this, it is also true that the quantity of noxious substances passing through Comorean ports is small at present. In all three ports, the main threat is posed by liquid fuels, the long-lasting environmental impacts of which are believed to be small, given the fact that they are primarily refined products that evaporate with relative ease.

Finally, as is the case with artisanal fishing boats, the capacity to assist vessels in distress in Comorean or adjacent waters is largely inexistent at present.

Recommendations:

13. **Support the construction** of the fixed offshore berthing points in the port of Moroni, in order to enable stable loading and off-loading of ocean-going vessels.

14. **Support the acquisition of cargo handling equipment** for the port of Fomboni, to reduce health and safety risks associated with manual handling as performed today.

15. **Develop and operationalise environmental management and contingency plans** for all Comorean ports, integrating them in the national emergency planning system.

2.2.4 Marine Transport of Passengers

Regular inter-island **transport of passengers** is ensured by small passenger vessels linking the ports of Moroni, Mutsamudu and Fomboni. The mission was unable to collect data on the number of passengers transiting these ports. New and faster vessels are currently being put into service, leading to a probable increase in these figures in the near future. There are no reliable data concerning accidents with passenger vessels. The safety conditions of passenger vessels were not observed by the mission. The mission did not identify any particularly salient risks associated with this activity.

The phenomenon of illicit transport of people between the islands of Anjouan and Mayotte (under French Administration) is of great concern. The crossing of the roughly 60km separating the islands is performed on board overcrowded fishing vessels, locally known as *kwasa-kwasa*. As with the remainder of the artisanal fishing fleet, these vessels carry no safety, navigation or communication equipment. Accidents are frequent, with a death toll of 10-20 persons per month, as communicated to the mission. Given the illegal nature of this activity, one might expect that it will be prioritised by the Comorean Coast Guard given adequate means and resources. So far, the Coast Guard has not had any action related to this activity.

Recommendations:

16. **Strengthen surveillance of illegal passenger transport both on land and at sea,** involving the relevant police forces and strengthening the capacity of the Coast Guard to take part in search and rescue efforts at sea.

2.3 MARINE AND COASTAL ENVIRONMENTS: STATUS AND THREATS

This section describes those elements of coastal and marine ecosystems of the Comoros that play a role in protecting the coastal zone against natural disasters. The characteristics, status and threats to these ecosystems are reviewed; the measures for their protection are discussed; and proposals are made for improving these measures.

It is instructive to note at the outset that no **monitoring programme** exists to systematically collect and analyse data on the status of terrestrial and marine coastal environments in the Comoros. This is true also for those zones susceptible of greater human pressure, such as in the vicinity of human settlements, seaports and industrial installations, the most important of which are the fuel deposits in all three islands. Several investigations have been published in the last two decades, reporting on specific components of these environments (mainly coral reefs). The number of experts on marine and coastal science is small and the capacity of the University of the Comoros to undertake sustained research and monitoring programmes is very reduced. Studies in marine science are not being offered at the University at this moment. There have been several collaborations with research institutions in the region and abroad in the last couple of decades, notably with the CORDIO programme following the 1998 and 2002 coral bleaching events, WWF for the initial stages of the establishment of the Mohéli Marine Park and, in recent years, Turin University in efforts related to biodiversity conservation. The need to adapt monitoring and evaluation methodologies to the resources and capacity available locally has been highlighted before (Jones, 2010) and should be observed when proposing any new monitoring programmes.

There are three main types of natural **terrestrial coastal environments** in the Comoros: rocky shores, sand beaches and mangrove forests. High and difficult to access rocky shores are found along the west coast of Grande Comore, whereas in the remainder of this island and in both Anjouan and Mohéli they are low-lying and alternate with sand beaches. In general they are in good status of conservation (DNEF, 2010). Sand beaches are found on all three islands, comprising beaches of fine white (coral) and black (basalt) sand, gravel and mud, totalling 15 in Grande Comore (mainly in the northern and southern shores), 10 in western coast of Anjouan, and 15 in Mohéli, predominantly in the south (DNEF, 2010). Widespread sand extraction has led to the disappearance of a large number of beaches in the course of the last three decades, most notably in Grande Comore and Anjouan. Mangrove forests are not extensive in the Comoros, estimated total cover amounting to around 90ha in Mohéli and 10ha in each of the two other islands (DNEF, 2010). Comorean mangroves have not been subject to significant exploitation by humans, and can be said to be in a reasonable status of conservation. They are, however, vulnerable to the consequences of other changes to marine and coastal ecosystems, notably those affecting sediment flows and saltwater-freshwater balances. The mission was informed that mangroves in the area of the Mohéli Marine Park have expanded in recent years.

Natural **marine coastal environments** include hard substrate environments of rock or coral; and soft sandy bottoms, occasionally covered by seagrasses. An estimated 60% of the coast line of Grande Comore, 80% of that of Anjouan and 100% of that of Mohéli is lined with coral reefs, mainly fringing reefs occupying the upper metres of the steep shelf slope (Ahmada, 2000). Barrier reef complexes with extensive reef lagoons are found in the NW tip of Anjouan and especially along the south coast of Mohéli.[5] Comorian reefs have been severely affected by bleaching following the 1997/8 El Niño, with an estimated 60% of bleaching and up to 80% of mortality (DNEF, 2010; Ahmada, 2000). Recovery has varied between sites, with faster rates observed in reefs less exposed to human pressures (Ahmada et al., 2004; Payet, 2005). Sea-bottoms of sand, in particular in coral reef lagoons in the NW and SE edges of Grande Comore, in the NW tip of Anjouan and along most of the southern shores of Mohéli, are covered by seagrasses. Subject to significant seasonal variability, seagrass meadows have been reported to be on the increase in Anjouan, while shrinking in the other two islands (DNEF, 2010).

Artificial structures have been built along the coast of all three islands to support or protect human settlements and different kinds of infrastructure, most notably seaports. Protection walls have been raised in several locations primarily to protect roads and settlements vulnerable to damage by high tides and waves. High population density and the mountainous relief of the islands, in particular of Anjouan, imply a large concentration of human activities in the narrow coastal zone, which renders the protection of its natural features both difficult and urgent.

The paragraphs that follow review the main threats to the marine and coastal environments described above. The recommendations below follow from these threats and the measures to address them already in place.

Climate change is expected to affect marine and coastal ecosystems in several different ways. First, it will lead to an increase in both air and seawater temperature, potentially affecting marine flora and fauna, in particular coral reefs. A direct effect of increased temperature is a rise in average sea level, leading to changes in coastal hydrodynamics and morphology, and hence in coastal habitat structure. Changes in rainfall patterns are also to be expected, although the exact direction of these changes has so far remained difficult to predict. Finally, a higher atmospheric CO2 concentration is leading to acidification of the ocean, which, among others, impacts calcifying species such as corals negatively. In view of the many uncertainties concerning the future impacts of climate change, one fundamental principle is to **reduce anthropogenic disturbances** to marine and coastal ecosystems to the minimum, in view of not eroding further their resilience to withstand the stresses imposed by a rapidly changing climate. Enhancing ecosystem resilience should be regarded as a central objective of all environmental management in the Comoros, including in the context of emergency preparedness and response, from the short- to the long-term.

Indiscriminate and uncontrolled **extraction of sand** from beaches and river beds constitutes the main threat to the integrity of coastal areas in several locations, most notably in the island of Anjouan. The practice is widespread and has been going on for decades (Abdoulhalik & Ali, 1998; DNEF, 2010), propelled by a growing emphasis on cement-based constructions for an ever-increasing population. Poverty and lack of alternative income-generating activities for the poor are often cited factors that make the activity difficult to curb, in spite of long-standing legislation prohibiting it. However, the exact dependence of poor coastal populations on income derived from the sale of

5 <http://www.acclimate-oi.net/sites/default/files/articlesdoc/ftp/20110713_Carto_Comoros.pdf>

sand has been questioned (Abdoulhalik & Ali, 1998), as reported to the mission. Cases of severe coastal erosion are many, in particular in the island of Anjouan, where houses and roads are currently in danger of being washed to sea, this having already occurred at sites in the eastern part of Mutsamudu. While extraction from beach sand poses the greatest immediate threat, extraction from river beds reduces the input of sediments to the coast, hampering the replenishment of the sand that is naturally removed by wave action.

There have been several campaigns to raise awareness among coastal populations for the importance of preserving sand beaches, having in some instances led coastal communities to enforce some sort of impediment to sand extraction. In the absence of such community actions, and in view of the almost complete absence of enforcement capacity by the state, many other sites continue to witness an alarming rate of erosion. The loss of coastal sand also threatens marine habitats such as seagrass meadows, which not only support a number of important marine species, but also stabilise underwater sediments, thus contributing to the integrity of the coast.

A second threat to the quality and integrity of coastal ecosystems is that posed by the uncontrolled **discharge of pollutants** to coastal waters. At present there is neither treatment of urban sewage nor of industrial effluents. More fundamentally, there are no mechanisms to measure the amount and composition of such discharges. One may reasonably argue that given the small size of the sewage network and the reduced number of industrial installations those discharges are not very sizeable. However, these may have significant impacts locally – most often at sites of greatest human concentration – and, more importantly, discharges can be expected to increase as population continues to grow and society to develop. Sampling and analysis of coastal marine waters is not conducted at present, impairing the development of measures to adequately address current and future pollution sources. The lack of control over pollutants entering the marine environment extends to operational discharges, both licit and illicit, by vessels trafficking Comorean waters. Controlling such activities is one of the upcoming tasks of the Coast Guard.

Sessile marine organisms, such as corals, are particularly threatened by chronic pollution and may disappear from affected areas.

A further issue of concern is the indiscriminate **dumping of litter** along the coast. In the absence of centralised waste collection and treatment systems, a large part of the population in all three islands disposes of its garbage directly at the shore. The results are large portions of the coast near human settlements entirely covered by solid waste. Despite the lack of systematic underwater surveys, it is very likely that marine habitats will also be affected. The mission was able to observe large amounts of solid waste in mangrove forests at low tide in Bimbini, Anjouan, despite the existence of a community marine conservation programme in the area. Marine litter constitutes a threat to all marine life, either through ingestion, suffocation or physical damage, as in the case of corals. The presence of garbage on the coast reduces its attractiveness for tourists, limiting the prospects of tourism-based income-generating activities for coastal communities.

Any durable solution to the problem of solid wastes in the Comoros involves the creation of several disposal sites. Disputes over the placement of such sites have so far prevented their designation. The country also lacks an adequate policy and legal framework addressing the different facets of solid waste management.

Coral reefs in particular have been threatened by **destructive fishing practices**. While the use of explosives is rarely observed today, problems persist with the use of toxic substances to kill reef fishes, as well as physical damage from trampling and seining over the corals. Several communities

have established their own mechanisms to reduce such practices. Many areas of coral reef, however, remain beyond any form of control and are susceptible to such damages. Regrettably, some areas around the islets inside the Mohéli Marine Park show signs of damage, as observed by the mission and earlier reported (DNEF, 2010).

Curbing illegal destructive fishing practices requires the commitment of coastal communities to the preservation of coral reefs or, in its absence, of surveillance and control by state organs, namely the Coast Guard.

Finally, both coral reefs and seagrass beds, as well as associated flora and fauna, are at risk of **smothering** by large amounts of terrestrial sediments carried during floods. The exact dimension of this problem remains uncertain, but the progressive deforestation and concomitant erosion of soils is often assumed to lead to increased siltation and resulting degradation of coral reefs and seagrasses. Several initiatives have been put in place to improve land use practices and halt deforestation in the contexts of agricultural development, water resources management, and climate change adaptation. The importance of such initiatives for the preservation of essential coastal structures should be highlighted.

Recommendations:

17. Establish a monitoring programme for marine and coastal environments, to enable status and trends analyses of their key components, involving the building of local capacity to undertake data collection and analysis, and adapting monitoring and evaluation methods to the resources available locally.

18. Develop a multi-tiered programme to halt the extraction of sediments from beaches and river beds, involving 1. an assessment of the actual economic relevance of this activity for the coastal poor; 2. an assessment of past and current experiences with the creation of alternative livelihoods for coastal communities, and assistance in the implementation of sustainable ones; 3. assess and disseminate experiences with alternative methods of construction that do not require sand, from the country and the region; and 4. based on this information work with coastal communities to strengthen awareness, including about the importance of coastal sediments to protect against high tides and waves, and establish mechanisms at local level to limit sand extraction.

19. Develop and operationalise environment management and contingency plans for all major sources of point pollution, including ports (see rec. 7 above), hydrocarbon depots and thermoelectric plants, and linking to the coastal and marine monitoring programme (see rec.11).

20. Expand and accelerate ongoing measures to dispose of and treat solid wastes, based on high-level political commitment and including 1. the development of adequate policy and legal instruments; 2. the development of suitable collection systems, based on earlier experiences and involving local populations; 3. incentives for reducing the consumption of packaged goods; and 4. sustained community awareness campaigns to reduce indiscriminate dumping and promote coastal clean-up events.

21. Support the establishment of community-level mechanisms to control destructive reef fishing practices, building on the experiences of communities where these already have been created.

22. Establish water quality analysis capacity at regional level

2.4 ENVIRONMENT AND HUMANITARIAN ACTION

In April 2012, Comoros experienced intense torrential rains, receiving 72 per cent of its average annual rainfall in a 5-day period, which caused massive flooding across the island archipelago. Around 65,000 people were directly affected (9 per cent of the total population). Another 80,000 people in Moroni and 3,900 in Mitsoudje were indirectly affected by broken water pumps. The total damages reached US$20 million. On 25 April 2012 a state of national disaster was declared by the President, followed by a request for international assistance.

The sectors of greatest humanitarian need were Water and Sanitation, Health, Nutrition, non-food items and Education. Sectors deemed most vulnerable in terms of environmental impact are assessed to be water and cooking fuel.

There is a lack of baseline data informing the availability of clean water. The mission was unable to locate source information regarding water sources and quality. Currently, main water sources, in particular those in proximity to urban areas, are not protected and vulnerable to extreme climate events. There is no water treatment in Comoros, and no sanitation facilities on the outlying islands. The lack of waste management facilities is exacerbated during disasters. However, this can also be an opportunity to raise awareness about the need to separate and dispose waste properly, and should lead to longer term solutions for waste management. Designation of a landfill site on Anjouan island was under discussion at the time of the mission. In rural areas, wood is the primary source of domestic energy, putting additional pressure on fragile forest resources.

The impact of any disaster is in direct correlation with community vulnerability. Degradation of the environment is increasing vulnerability by its direct impact on livelihoods.

Recommendations:

23. **Integrate environmental risk analysis in emergency preparedness and response planning** in-country, at national and island levels.
24. **Disseminate principles of disaster waste management** and the separation of waste.
25. **Strengthen integrated early warning systems** regarding rains, river water levels and floods, including an analysis of historical cycles, mapping of the most disaster-prone areas.
26. **Raise awareness** to develop land planning at urban and rural levels, including the classification of land according to their required use.
27. **Establish strategic partnership** and synergy with DRR project / initiatives already in place, i.e. World Bank.
28. **Develop actions to mitigate the effects of new watercourses** in a holistic way, giving clear instructions to flood-prone communities.
29. **Ensure specific budget lines** within the regular line-ministry budgets for emergency preparedness and response (including environmental and industrial risks), as well as reinforce a specific budget line in the national budget for emergency preparedness and response.

3. CONCLUSIONS

The findings of the mission point to a need to centralise information on vulnerability and risk, and to ensure coordination around different initiatives for disaster risk reduction and disaster management. There has been increased support to the newly reformed Civil Protection Agency, as well as the Coast Guard, these initiatives should be coordinated under a national framework.

As Comoros is highly dependent on natural resources for basic livelihoods as well as income generation, there is a need to ensure environmental risks and considerations are taken into account during disasters. Guidelines on resource management during disasters should be made context specific to Comoros, tailored to the community level and disseminated.

The country is ill-prepared to deal with large accidental pollutant discharges in coastal and marine waters. The POLMAR plan elaborated in 2010 lacks as of today most of its operational components and it is doubtful that it can be properly activated in case of an emergency. Surveillance as well as search and rescue at sea have so far been largely inexistent, the recently established Comorian Coast Guard expected to play a key role in both of these domains. Safety of artisanal fishing activities requires additional measures with fishermen towards the adoption of a safety culture and the installation of navigation, communicating and tracking equipment. Loss of life at sea is a particularly serious problem in relation to the unregulated *kwasa-kwasa* transport of passengers to Mayotte, a situation requiring combined police action on land and at sea.

Cargo handling in ports poses important health and safety, as well as efficiency concerns, requiring the upgrade of installations and equipment, in particular in the port of Moroni and Fomboni. Cargo storage is inadequate from an environmental, as well as safety point of view in all ports. Environmental management in ports and in the fuel storage facilities is non-existent; it should be developed and integrated into national contingency and emergency planning.

Targeted marine environmental management will require that a system is put in place for regular and representative monitoring of environmental status. Collaborations with regional and international research organisations should be explored for this purpose. The indiscriminate and largely uncontrolled extraction of beach sand poses currently the largest threat to the integrity of marine and coastal habitats along important stretches of the coast, threatening not only natural ecosystems, but also societal structures and functions vulnerable to extreme weather events. Measures to enhance the resilience of other important habitats, notably coral reefs but also mangrove forests and seagrass beds, should be considered, in particular in view of the anticipated negative impacts of climate change. Finally, in addition to measures targeting specific sources of marine pollution, a society-wide effort is required to curb the problem of solid waste disposal, the accumulation of litter constituting today a serious threat to the integrity and attractiveness of many of the country's coastal areas.

ANNEX 1. MISSION TERMS OF REFERENCE

Background

The Joint UNEP/OCHA Environment Unit is a partnership between the United Nations Environment Programme (UNEP) and the UN Office for the Coordination of Humanitarian Affairs (OCHA). It is the integrated UN emergency response mechanism to provide international assistance to countries facing environmental emergencies.

In 2005, as part of the Humanitarian Reform Agenda, environment was established as a cross cutting issue in the humanitarian cluster approach with UNEP as its focal point. However, recent IASC cluster approach evaluations has found that cross-cutting and multidimensional issues often are neglected, and that in reality there is little integration of cross-cutting issues. Insufficient attention to environmental considerations can trigger significant negative secondary impacts for affected populations as well as counter resilience-building efforts. For instance, if environmental standards for latrines and building materials are not met, this affects the quality of humanitarian response. In addition, environmentally friendly innovations can improve the quality of humanitarian assistance. This can be done for example through rainwater harvesting techniques and solar powered handpumps in drought prone areas, and the use of alternative energy NFI's in areas vulnerable to excessive deforestation. However, although ample anecdotal evidence supports the need for increased integration of environmental considerations in humanitarian action, documented country assessments are warranted (i.e. a more evidence-based approach). In addition to grounding messages to the needs and reality of the field, this approach would serve as a foundation for ownership at the country level, among those who have the contextual knowledge and will eventually implement the proposed actions.

Comoros Context

Protecting environmental resources in humanitarian programming is imperative, particularly in the context of Comoros where floods that hit the three islands of Grande-Comore, Anjouan and Moheli in April 2012. The President of the Union of Comoros declared a "State of National Disaster" and followed by a request for international assistance. Overall, the material and infrastructure damage and losses have been calculated by the World Bank to amount to USD 20 million. Short to long term impact on the national economy and household earnings was more difficult to quantify (as the local economy is driven mostly by the informal sector) but the impact was very probably considerable given that agriculture accounts for 70% of the population's activity and is the only export sector.

The government of the Union of the Comoros, with the close collaboration with the national actors and partners has developed an Early Recovery Plan (September 2012-June 2013), for the flood-affected areas. The nine month long Early Recovery Plan not only documents the most urgent strategies and actions to restore the living conditions of the affected populations, but also identified the need of strengthening the national mechanisms for prevention and managing the natural disasters. While the Early Recovery Plan has not explicitly considered environment as a cross cutting issue, the government has shown its firm commitment for the necessary institutional reform in order to strengthen the capacity of the actors to implement the plan and to increase the culture of prevention. In addition, the early recovery plan has also recognizes the Ministry of Environment as focal agency for the issues related to Agriculture, Livelihood, Food Security and Water, Sanitation and Hygiene (WASH).

The Comoros is particularly vulnerable to varied disaster risk such as volcanic eruptions, hurricanes, floods, tsunamis and is among the 48 least-developed countries particularly vulnerable to the effects of climate change. The national contingency plan was revised by the government together with the international humanitarian partners in 2008 had considered three scenarios: 1) Volcanic phenomenon, 2) Cholera and 3) Tropical phenomenon including cyclones and depression. The vulnerability assessment of climate and geological hazards in Comoros[6] 2011 underlines that increased vulnerability is due to insufficient preparation and awareness of environmental emergencies as well as a lack of contingency and response plans.

The Government of the Union of the Comoros is planning to revise the national contingency plan in June 2013, the proposed mission should ensure appropriate integration of environmental issues in the national contingency plan including in the relevant sectoral plans.

To increase resilience to disasters and their secondary impacts to the environment, the proposed scoping mission will assess the degree to which environmental emergencies are integrated into preparedness and contingency planning of the national authorities; identify the needs and requirements to improve environmental emergency preparedness and contingency planning; and identify opportunities for improved cooperation between the JEU and the UNCT and the government of the Union of the Comoros.

1. Mission Objective

The objective of the mission is to collect and document experiences to date and formulate a strategy and framework for further operationalization of environment as a cross-cutting issue.

The mission will particularly:

1. assess potential environmental emergency risks from a multi-hazard perspective
2. build awareness and capacity of local and national disaster management authorities as well as the UNCT to be better prepared to respond to environmental emergencies
3. outline a plan of action for better integration of environmental issues in humanitarian assistance scenarios.

In addition, discussions with national authorities regarding environmental emergency needs as well as services and tools available via the JEU/UNEP, such as Awareness and Preparedness for Emergencies at Local Level (APELL), Capacity Development for Disaster Risk Reduction Initiative (CADRI) and the Environmental Emergencies Centre (EEC) will be conducted. In addition, integration of industrial accident scenarios into contingency planning could be discussed.

2. Mission Composition:

The team includes:

- Wendy Cue, Chief, Joint UNEP/OCHA Environment Unit (JEU)
- Goncalo Carneiro, Expert on Marine Environment, World Maritime University (WMU)
- Narciso Rosa-Berlango, Humanitarian Affairs Officer, OCHA Regional Office for Southern Africa
- Abdou-Salam Saadi, Disaster Management focal point and Programme Officer-Governance, UNDP Comoros

[6] Etude de vulnérabilité aux aléas climatiques et géologiques en Union des Comores, Pnud-Cosep 2011

3. Activities:

The mission will undertake the following activities:

- Briefing meetings and interviews with e.g. RC/HC, ROSA, OCHA, UNEP, UNCT, Cluster leads, relief officials, donors), national and regional government, as well as site visits to identify on-going and planned activities in the area of environmental mainstreaming including the environmental projects currently implemented by UNDP (jointly by Joint UNEP/OCHA and UNCT) as well as environmental emergency contingency planning, where they exist, and collect relevant materials (Joint UNEP/OCHA only).

The scoping mission will:

- identify what actions have been taken so far, what programmes and activities are planned; review capacities, weaknesses and gaps.
- identify needs that may be required to build local environmental emergency capacity
- identify needs in order to facilitate leverage of UNEPs environmental mainstreaming efforts to other missions and regions
- identify the potential role that JEU, UNEP PCDMB, OCHA ROSA, UNCT and UNEP offices respectively can play in this
- identify any further studies that might be warranted
- Preparation of draft environmental action plan

4. Output of the Mission:

The mission will provide a detailed report with an analysis of lessons learned and needs to be widely shared, including draft action plan.

5. Duration and Dates

The mission is expected to spend 8 to 10 days in Comoros beginning 27 May 2013.

6. Budget

The costs related to the field visit will be borne by JEU.

ANNEX 2. MISSION TIMETABLE AND STAKEHOLDERS MET

Mission de l'Unité Conjointe Environnement UNEP / OCHA - Union des Comores

Du 27 mai au 7 juin 2013

Agenda tentative

Lundi, le 27 mai 2013	
	Arrivée à l'Aéroport Prince Said Ibrahim / Installation à l'Hôtel
15h00	Initial briefing sur la mission avec le CR, Douglas Coutts
Mardi, le 28 mai 2013	
09h00	Réunion avec - Direction de planning et urbanisme (aménagement du territoire) - Direction national de l'environnement - Direction national de l'agriculture et la pêche - Direction Nationale de la Météorologie - Observatoire Volcanologique du Karthala (OVK) - Département de recherche de l'Université des Comores - Programmes des Nations Unies liés à la réduction du risque de catastrophes.
14h00	Départ pour Anjouan
16h00	Visite de courtoisie au Gouverneur
Mercredi, le 29 mai 2013	
09h00	Rencontre avec la Direction Régionale de la Sécurité Civile et la Direction Régionale de l'Environnement à Anjouan
10h00	Visites des zones affectées par les inondations de 2012 à Anjouan Visite à la zone de stockage de carburant et aux lieux de gestion / décharge des déchets
Jeudi, le 30 mai 2013	
08h30	Visite des sites d'intervention des projets environnement du PNUD - Gestion Durable des Terres - *Small Grant Programme* - Mangroves à Bimbini - Adaptation de la gestion des ressources en eau aux changements climatiques

14h00	Retour à Moroni
Vendredi, le 31 mai 2013	
08h30	Départ pour Mohéli
10h00	Visite de courtoisie au Gouverneur
11h00	Rencontre avec le Directeur de la Direction Régionale de la Sécurité Civile et la Direction Régional de l'Environnement à Mohéli
14h00	Visites des zones affectées par les inondations à Mohéli et des projets environnements du PNUD. - Gestion Durable des Terres - *Small Grant Programme* - Adaptation de la gestion des ressources en eau aux changements climatiques
Samedi, le 1er juin 2013	
08h00	Visite du Parc Marin de Mohéli Rencontre avec les Direction du Parc, PNUD, universitaire
Dimanche, le 2 juin 2013	
9h00	Retour à Moroni
14h00	Visite des lieux affectés par les inondations en 2012 et 2013 (Vouvouni) Travail interne: consolidation du rapport de mission
Lundi, le 3 juin 2013	
8h30	Rencontre avec l'Hydrocarbure
9h30	Rencontre avec le Commandant de la Garde Cote
10h30	Rencontre avec le délégué chargé de la Pêche
13h00	Réunion de restitution de la mission UNEP/OCHA aux points focaux :
16h00	Rencontre avec le Coordinateur Résident Réunion de restitution avec le SNU
17h00	Réunion de restitution avec le SNU

18h00	Réunion de travail avec la DGSC : préparation de l'atelier de révision du Plan national de préparation et réponse aux catastrophes
Mardi, le 4 juin 2013 / Mercredi, le 5 juin 2013	
09h00	Exercice de leçons apprises pour les partenaires du Système des Nations Unies
14h00	Réunion de travail avec la DGSC : préparation de l'atelier de révision du Plan national de préparation et réponse aux catastrophes
Mercredi, le 5 juin 2013, Jeudi 06 juin – Vendredi, le 7 juin 2013 (matin)	
	Atelier de révision du Plan national de de Contingence
Samedi, le 8 juin 2013	
12h20	Départ de la mission

ANNEX 3. BACKGROUND DOCUMENTS REVIEWED

Studies, Tools and Guidelines

- *Volcanic risks Mapping in Grande Comore*, prepared by Hamidi Soule, for the Centre National de Documentation et de Recherche Scientifique (CNDRS) July 2008
- *Student and Teacher Guidance for environment,* by NGO Ulanga Ngazidja, 2009
- *Knowledge to better understand and protect the marine and coastal environment Ngazidja Island (Comoros) Guidance,* by NGO Ulanga Ngazidja, 2009
- *Environmental Communication Plan For The Management Of Marine And Coastal Resources of Island Ngazidja (Comoros), NGO Ulanga Ngazidja,* 2009
- *Study of vulnerability to climatic and geological hazards in the Union of Comoros,* February 2011
- *Project Identification Form (PIF),* GEF Trust Fund, November 2011
- *Comoros and FEM Fact Sheet*, by Global Environment Facility September 2012
- *Materials from Training and Awareness Raising Workshop on Emergencies*, October 2012
- *UE and Comoros*, 2012
- *Comoros Country Update*, April 2013
- *Comoros Country Preparedness Table*, April 2013
- *Management of specific coastal biodiversity, marine and coastal islands states of Eastern and Southern Africa Indian Ocean*

- *FEAT (Flash Environment Assessment Tool)*
- *DWM Guidelines (Disaster Waste Management Guidelines)*

Reports

- *Mission Report Comoros -Preparedness to disaster response,* UNDAC/OCHA, March 2010
- *Mission Report - Technical assistance for the final assessment of the project of Capacity Development for natural and climate risks management in Comoros*, UNDP BCPR, March 2012
- *Final Version of End of Mission Report Comoros, Flash Floods,* UNDAC, May 2012
- *Summary assessment of the effects of floods*, World Bank, May 2012
- *Mission Report –For strengthening disaster management capacities*, OCHA, October 2012

Plans and Strategies

- *National Contingency Plan*, 2011
- *Early Recovery Plan – Comoros Flooding*, by the Union of Comoros' Directorate-General of Civil Security (DGSC) and the UN Resident Coordinator's Office. August 2012
- *Management and Development Plan for the Marine Park of Mohéli*, 2011-2015
- *Interagency Contingency Plan for Comoros (IASC)*, April 2010
- *National Contingency Plan Comoros*, December 2008
- *Comoros Preparedness Strategy*, April 2013
- *Comoros Emergency Preparedness Strategy,* April 2013
- *Plan ORSEC, Regional emergency response plan,* 2013

Legislation

- *Décret n°01-052 CE Relatif aux Etudes d'Impact sur l'Environnement,* République Fédérale Islamique Des Comores, April 2001
- *Décret n°06-019 PR Relatif à l'Exploitation des Carrières,* République Fédérale Islamique Des Comores, February 2005

Marine Expertise

- Abdoulhalik, F. & Ali, M., 1998. Analyse des phénomènes d'érosion côtière au niveau des sites litores de la Grande Comore. Moroni: A.I.D.E., 30p.
- Ahmada, S., 2000. Suivi de l'état de santé des coralliens aux Comores. Ya Mkobe, 6-7, p.139-141.
- Ahmada, S., Bijoux, J., et al., 2004. Status of th coral reefs in the South West Indian Ocean Island States. In: C.R. Wilkinson (ed.), 2004. Status of of coral reefs in the world: 2004. Vol.1. GCRMN Report. Townsville: Australian Institute of Marine Science; p.189-211.
- Amoriggi, G., 2010. Appui au développement de la transformation des produits agricoles aux Comores. Rome: IFAD, 32p.
- COFREPECHE, MRAG, NFDS & POSEIDON, 2013. Évaluation rétrospective et prospective du protocole de l'accord de partenariat dans le secteur de la pêche entre l'Union européenne et l'Union des Comores, Contrat cadre MARE/2011/01 - Lot 3, contrat spécifique n° 4. Rapport Final. Bruxelles: DG MARE, 111 p.
- De Lestang, J., 2007. Study on safety at sea for small-scale fisheries. 1. South West Indian Ocean. Rome: FAO, 71p.
- DNEF, 2010. Rapport national sur l'environnement marin et côtier. Moroni: Ministère de l'Agriculture, de la Pêche et de l'Environnement, Direction Nationale de l'Environnement et des Fôrets, 39p.
- Jones, O., 2010. Artisanal fishing in the Comoros. Undergraduate dissertation. Norwich: University of East Anglia, 59p.
- Naji, M. & Youssouf , A., 2007. Etude diagnostique de l'intégration du commerce au titre de l'initiative du cadre intégré pour l'assistance technique liée au commerce en faveur des pays moins avancés. Rapport sectoriel sur la pêche pour la FAO. Rome: FAO, 82p.
- Payet, R., 2005. Indian Ocean islands – summary. In: D. Souter & O. Lindén (eds.) Coral reef degradation in the Indian Ocean. Status report 2005. Kalmar: CORDIO, p.128-131.
- Toihir, I., 2011. Census of the artisanal fishing fleet in the Union of the Comoros. Moroni: Direction-Générale des Ressources Halieutiques, 17p.

Others

- *JEU Mission – Temptative Agenda (2013)*
- *Terms Of Reference Marine Expert, The Government Of The Union Of Comoros,* 2013
- *Terms Of Reference Joint UNEP/OCHA (JEU) Scoping Mission To Comoros,* 2013