Asian Journal of Environment and Disaster Management
Vol. 6, No. 2 (2014) 175–190

doi:10.3850/S1793924014003459

The International Environmental Emergencies Response System: A Case Study of Supertyphoon Haiyan (Yolanda), The Philippines

Rene Nijenhuis

Joint UNEP/OCHA Environment Unit, Emergency Preparedness and Environment Section, United Nations Office for the Coordination of Humanitarian Affairs, Palais des Nations, CH- 1211 Geneva 10, Switzerland
E-mail: nijenhuis@un.org

Since 1994, the United Nations Office for the Coordination of Humanitarian Affairs and the United Nations Environment Programme have been working together to support countries affected by environmental emergencies. Over this period of 20 years, an international system has evolved and has provided humanitarian assistance to 84 countries in response to a range of environmental emergencies. Notably, the system utilizes the assets of Member States, and operates without a multilateral convention or a written agreement as its foundation. The international response to Super Typhoon Haiyan (locally known as Yolanda) in the Philippines is used herewith to explain and describe the tools and services available for the provision of international environmental emergency assistance. In the Philippines, the national and regional authorities, were supported by the United Nations Disaster Assessment and Coordination team (better known by its acronym UNDAC), in undertaking a rapid environmental assessments using the Flash Environmental Assessment Tool. As a result, specialized expertise was deployed to work with the regional environment authorities in managing the oil spill off the coast of the Western Visayas region that, at one point,had displaced more people into evacuation centers than the typhoon itself. Finally, an Environmental Field Advisor was deployed to provide technical advice to government and humanitarian partners as to the integration of environmental considerations into the humanitarian programmes. The main challenges associated with the environmental response, set against the disaster time line, are reviewed here, and the initial lessons learned are identified so as to provide recommendations for the improvement of the multilateral system.

Keywords: Philippines, Super Typhoon Haiyan (Yolanda), environmental emergencies, disaster response, multilateral response, international environmental governance.

1. Purpose and Methodology

The purpose of this paper is to review the multilateral response system for environmental emergencies, using,as a case study, the response to Super Typhoon Haiyan as conducted by the United Nations Environment Programme (UNEP) and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). This

paper aims to highlight a number of strategic challenges that should be addressed so as to increase the effectiveness of the response. This paper is based on the author's personal perceptions and experiences, and also draws on other publications on this topic.

2. What are Environmental Emergencies?

UNEP defines environmental emergencies as "sudden-onset disasters or accidents 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 loss of human lives and property."[1] It is important to note that this definition refers to both the *cause* and the *impact* of the emergency.

In terms of administering international emergency assistance, the cause of a technological accident is subordinate to whether or not there is a need, and a request, for assistance. Even in extreme instances as terrorist attacks, the environmental consequences should be considered an environmental emergency. This notion was considered at a meeting of the international Advisory Group on Environmental Emergencies in 2001, and it was decided "that the environmental consequences of terrorism, should not be addressed independently, but should be planned for and managed in an integrated manner (…) to develop appropriate preparedness and response strategies."[2] Thus, environmental emergencies should be fully integrated in the overall humanitarian response planning, rather than seeing a parallel response system developed.

According to the International Disasters Database,[3] 790 technological disasters were reported worldwide between 2010 and 2013, of which 106 were classified as industrial accidents.[4] The database classifies three different groups of technological accidents: i) industrial accidents (chemical spills, collapse of industrial infrastructure, explosions, fires, gas leaks, poisoning, and radiation); ii) transport accidents (transport by air, rail, road or water); and iii), miscellaneous accidents (collapse of domestic/non-industrial structures, explosions, fires). Whether, and how, technological disasters that are caused by a natural disaster are included in these statistics is not clear.

Currently, the primary global actor in the coordination and mobilization of international assistance to environmental emergencies is the Joint UNEP/OCHA Environment Unit (JEU). The JEU was established upon the recommendations of governments in 1994, and combines the complementary technical environmental expertise of UNEP with the response coordination tools and services of OCHA. Over this period of 20 years, OCHA and UNEP have been involved in 84 countries, providing support to addressing the impacts of both industrial accidents and natural disasters (see Fig. 1).

Figure 1 Overview of activities (source: Joint UNEP/OCHA Environment Unit).

3. Multilateral Humanitarian Response

Katoch[5] outlined the specific challenges of international response to sudden-onset large-scale natural disasters. He examined the high-pressure situation in which responders find themselves at a disaster site. Katoch further noted, amongst other challenges, the presence of sudden and overwhelming needs, such as damaged infrastructure and communications, and the reduction of the local capacity due to casualties and stress, as factors that characterize the international response to natural disasters, making it a unique environment compared to other disasters.

Natechs (Natural Hazard Triggering Technological Disasters) and other secondary environmental impacts bring additional pressure to bear on the setting of priorities and the decision-making process during the life-saving phase, and can even alter or halt entire humanitarian response operations. For example, a major secondary environmental risk following the South Asia Earthquake of October 2005 was the numerous landslides in Pakistan that hampered humanitarian access by road to the victims. Entire valleys were rendered accessible only by helicopter, altering the entire emergency response operation.[6] Research, following hurricanes Rita and Katrina, identified over 600 hazardous materials (HazMats)released from offshore platforms and pipelines,[7] while also in large earthquake situations, such as the Wenchuan Earthquake in China in 2008[8] and the Great East Japan Earthquake,[9] there were in numerous secondary environmental emergencies. While very little information is usually available to international responders at the onset of a disaster, the need for early identification of potential environmental emergencies – preferably based on a rapidly produced scientific methodology, and as an integrated part of the overall humanitarian assessments – is critical.

The United Nations (UN) provides humanitarian assistance to affected countries following their request for assistance. The sovereignty of countries, and in particular their responsibility to "first and foremost take care of the victims of natural events and other emergencies occurring on its territory" is stated explicitly in General Assembly resolutions.[10,11] International response experience has shown, however, that a major distinction can be drawn between technological accidents triggered by natural hazards and those that are "human-triggered." Natural events are often perceived as unpreventable, with little or no liability issues associated to the casualties and impacts caused. In other words, no one is to blame. Technological accidents, however, are often associated with at least a degree of liability and accountability, and are perceived to be preventable. This leads to a much lower incidence of countries actually requesting specific international assistance for technological accidents, while Natechs can often be addressed as part of the overall requested international humanitarian assistance.

Lastly, there is a need to address the challenges in coordinating international emergency assistance. These needs are no different from the coordination needs during large-scale natural disasters, as described by Katoch (2006),[12] and focus on on-site coordination, as well as the synchronization of national and international actors. For example, during the Lebanon crisis in July 2006, the Lebanese Ministry of Environment requested international assistance, which then came from over 70 individual countries and organizations,in response to the bombing of fuel storage tanks at a power station which resulted in the spill of an estimated 15,000 tons of heavy fuel oil into the Mediterranean Sea.[13] This appeal led to a large number of individual countries, including Kuwait, Italy and Norway, and intergovernmental organizations, such as the European Union (EU), the Organization of the Petroleum Exporting Countries (OPEC) and the UN, to provide technical and financial assistance. The need for coordination so as to avoid the duplication of efforts and a waste of resources is crucial in such instances. In the case of Lebanon, OCHA and UNEP supported the setting-up an Oil Spill Operations and Coordination Centre, which came under the Ministry of Environment, and included representatives of both the UN and the EU, to coordinate international assistance needs.[14]

4. Environmental Emergency Response to Super Typhoon Haiyan

The multilateral response to Super Typhoon Haiyan will be described by using the environmental emergency response model, which has been developed by the JEU, drawing on many years of response experience (see Fig. 3). The model illustrates three distinct phases in environmental emergency response activities, based on the information available and the type of assistance required.

Super Typhoon Haiyan struck the Philippines on 8 November 2013 and left a trail of death and destruction behind it as it moved westwards through the central Philippines. Millions of people across several regions were affected by the Super

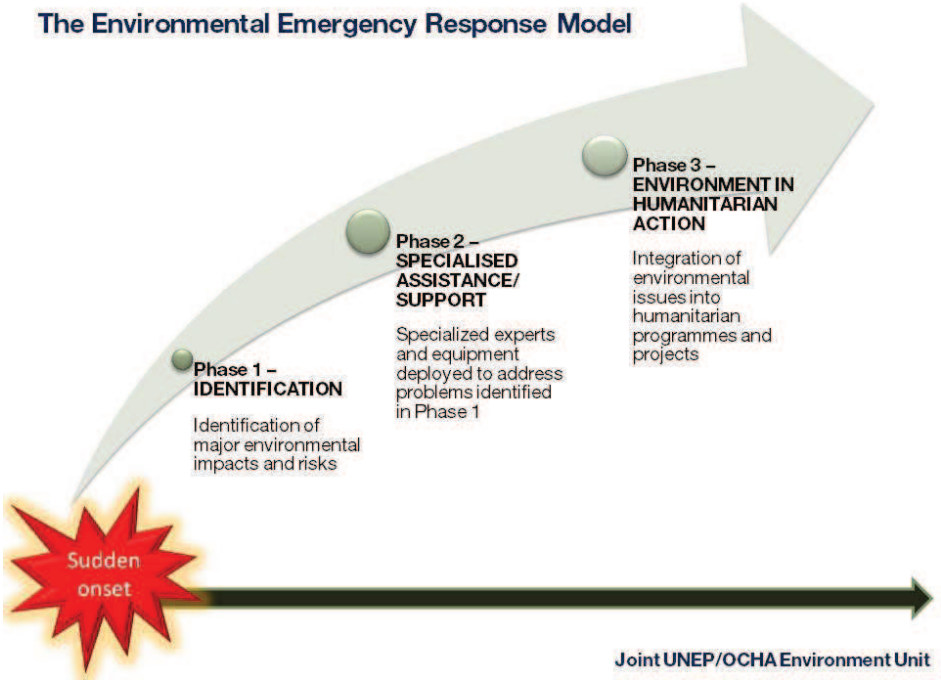

Figure 2 The Environmental Emergency Response Model(Source: Joint UNEP/OCHA Environment Unit).

Typhoon. On 14 March 2014, the death toll stood at 6,268 people with another 1,061 missing.[15] The typhoon made landfall six times and moved from Guiuan (Eastern Samar) across Tolosa (Leyte Province) via Daanbantayan (Cebu Province) and Concepcio (Iloilo Province) and left the Philippines after making its last landfall at Busunanga (Palawan Province) (see Fig. 2). A large response operation, locally, nationally and internationally, was initiated. According to the National Disaster Risk Reduction and Management Council a total of 35, 489 personnel, 1,351 vehicles, 118 seacraft and 163 aircraft were prepositioned and deployed. Supertyphoon Haiyan became ranked as the 6th most costly insured natural catastrophe losses of 2013[16] with 1,5 bn USD in insured losses and 12.5 bn USD economic losses.

Phase 1 – Identification:When international assistance is requested for a sudden-onset natural disaster, the situation on the ground is often chaotic and overwhelming. Little information is usually available as to how many people have been affected, what are the most affected areas, who is leading the local response, and the scope of the national capacity that is available and still operational. Numerous questions need to be addressed, and the urgency of the situation makes the taking of well-informed decisions all the more challenging. It is during this phase that the information needs are greatest; in particular, it is important to establish whether or not there are any potential sites in the affected area where a technolog-

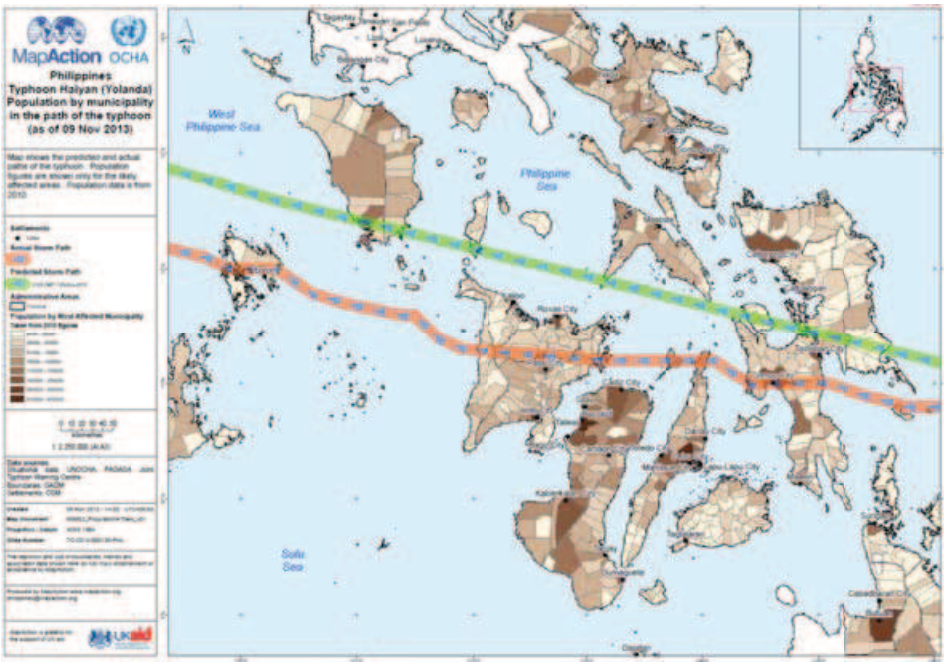

Figure 3 Super Typhoon Haiyan trajectory (Source: MapAction, OCHA).

ical accident might have taken place. The identification phase is the most challenging phase of the response for the international responders. Often, humanitarian aid workers, including those on Urban Search and Rescue Teams, are deployed within hours of a disaster striking, with little or no knowledge nor information on the affected area to which are being deployed, possibly putting them at risk of being affected by a Natech. The identification phase therefore concentrates on rapidly identifying the "big and obvious" Natech sites that could cause a life-threatening situation for the already affected population and/or emergency responders.

The core UN rapid response tool, the United Nations Disaster Assessment and Coordination (UNDAC) team was mobilized before Super Typhoon Haiyan made landfall in the Philippines. The UNDAC team is a stand-by team of emergency management professionals who are nominated and funded by member governments, and operational humanitarian UN Agencies.[17] UNEP, as a normative organization (that is, non-operational), is also part of the UNDAC system, through its integration with OCHA. Upon the request of a disaster-stricken country, an UNDAC team can be deployed within hours to carry out a rapid assessment of the priority needs, and to support the national authorities and the UN Resident Coordinator in the administration of the international emergency response on-site. Members of the UNDAC team are constantly on stand-by to be deployed on missions following disasters and humanitarian emergencies anywhere in the world.

The UNDAC team is responsible for providing first-hand information on the emergency situation, and for communicating the priority needs of the affected people to the international community through OCHA. A senior UNDAC-trained environmental expert from Denmark was deployed to undertake a rapid environmental assessment to identify the "big and obvious" potential environmental emergencies, and to identify any further needs for international emergency assistance so as to mitigate the impacts.

The rapid environmental assessment conducted by the UNDAC environmental expert is undertaken using the Flash Environmental Assessment Tool (FEAT). The FEAT is a science-based, pragmatic tool, which makes an integrated analysis for three valued receptor types, which are likely affected in the aftermath of Natech disasters and chemical emission incidents. The FEAT is frequently used and formally adopted by UNDAC; it is considered that the FEAT generates useful outputs and has been positively evaluated with some suggestions for improvement.[18] The FEAT has been specifically developed for use by field teams that are deployed in the case of large-scale sudden-onset natural disasters.[19] Its primary aim is to facilitate the identification of existing or potential acute environmental impacts that pose risks for humans and the environment following the release of chemical compounds. The FEAT prioritizes disaster-stricken facilities on the basis of potential high risk scenarios in order to prevent further impacts. It is specifically designed to be used in the immediate aftermath of a disaster (hours and days) and can be used on location. The FEAT translates large quantities of scientific information on compounds, their environmental behavior and their toxicity into three basic effect types: i) direct effects on humans; ii) direct effect on nature and life support functions (such as drinking water, agriculture and fisheries); and iii) long-term effects on humans and the environment.

Based on discussions with the Philippines' Department of Environment and Natural Resources, and the Environment Management Bureau (EMB), using the FEAT as a basis, the following four industrial sites were identified for further on-site investigations:

- Pepsi Cola Products Philippines Inc. in Tanauan, Batangas Province (possible storage of liquid ammonia);
- New Leyte Edible Oil Manufacturing Corporation in Tanauan (possible storage of oil);
- Petroban Oil Storage in Tacloban (Leyte Province) (possible storage of oil); and
- Shell Oil Storage in Tacloban (possible storage of oil)

The aerial and on-site FEAT assessments revealed that all four sites escaped the SuperTyphoon, including the storm surge that affected Tacloban, without any major damage to the tank parks and/or releases of toxic substances. Nonetheless, some risks of potential future releases did exist and specific site-level recommendations were provided to minimize potential impacts.[20]

Figure 4 Damaged oil tanks in Tacloban (phot credit: UNDAC/D.Bruhn).

The UNDAC FEAT assessment was remotely supported, free-of-charge, with satellite imagery and analysis of industrial sites, provided and analyzed by UNOSAT through the UN Space Charter. The Space Charter is a unique initiative by using private, national and international satellite assets during natural and technological disasters.

The UNDAC environmental expert further supported the environment authorities in undertaking site assessments for resettlements around Tacloban, in particular focusing on geohazards (landslides).

Phase 2 – Specialized assistance:Once the situation becomes clearer, following the onset of the natural disaster, a shift takes place from generic humanitarian assistance to a need for and/or provision of specialized assistance in specific domains. It is in this second phase that specialists (e.g. chemists, disaster waste managers, engineers) are often needed to undertake very specific site assessments. The time difference between these two phases can vary from hours to days, depending on the circumstances in the field. The experts that are qualified to undertake specific assessments should be fully independent and self-sufficient as most lifelines would not yet have been restored, such as communications, electricity and food.

As discussed above, the type of expertise required for Phase 2 is very difficult to define in advance, and differs from one disaster to the next. In the international emergency assistance administered to date, countries have made requests

Figure 5 Satelite imagery of damaged industrial facility in Tacloban (credit: UNOSAT).

for experts in a broad array of fields: mining tailings, pesticides, hydropower dam stability, cyanide, oil spills, disaster waste management, collapsed waste dumps, amongst others. This underscores the need for a diverse and robust network of experts in order to meet the many and varied requirements of an environmental emergency response.

In the Philippines, one major secondary environmental emergency struck the town of Estancia, along the east coast of Iloilo Province in the Western Visayasregion. A power barge broke loose from its moors at the height of the Super Typhoon and penetrated six of its seven tanks containing bunker oil when it beached not far from its mooring point.[21] An estimated 500,000 to 900,000 liters were subsequently spilled.[22] Parts of the oil could be contained using booms while a stretch of coastline of approximately ten kilometers south of the vessel was contaminated. Subsequently, the Philippines Department of Health ordered the evacuation of those families living closest to the shore which were affected by the odors stemming from the oil spill.

The evacuation took place while the humanitarian response operations to Super Typhoon Haiyan were already at full pace, thus creating an "emergency within the emergency."[23] A herculean effort, under provincial and municipal leadership, was undertaken to create a dedicated evacuation shelter at the Iloilo Polytechnic Northern Campus. Humanitarian partners, including Action Contre la Faim, Médecins sans Frontières, UNICEF, the International Organization for Migration,

Figure 6 The secondary environmental emergency displaced hundreds of people whom had already survived supertyphoon Haiyan (photo credit: Cpl. Montambeault).

the International Federation for the Red Cross and Red Crescent Societies and the Canadian Military Disaster Assessment and Response Team ensured that, within 24 hours, facilities were prepared to house almost 500 displaced families. At that point, the oil spill had displaced more people into the evacuation center than the entire Super Typhoon displaced in the Western Visayas region.

As part of the UNDAC rapid environmental assessment, a visit was made to the area affected by the oil spill in Iloilo province. On 22 November 2013, the EMB requested specialized expertise in marine oil spills and oil spill clean-up. Upon receipt of this official request for specialized assistance, the JEU circulated this to their network of providers. The European Union Civil Protection Mechanism (EU-CPM) rapidly identified a qualified senior expert from France's Centre of Documentation, Research and Experimentation on Accidental Water Pollution, who was subsequently deployed on 27 November for four weeks and provided technical support to the EMB and its partners. As part of the shoreline assessments, the expert determined that three impact zones could be distinguished:

- A heavily oiled area of approximately two kilometres of shoreline in the town of Estancia and Barangay Botongon;
- Several medium polluted areas in inhabited areas (in Dan Banua and Jolog), and;

- Lightly polluted areas made up of continuous or discontinuous scattered oil patches already in advanced stages of weathering on rocks and cobble beaches, or as an oil film on roots and trunks of mangrove trees.

Towards the end of December 2013, most of the free phase (floating) oil had been collected and shipped for treatment. Challenges remained for the treatment of the oiled debris and remaining recovered oil which could be classified as HazMat. Detailed recommendations for waste management solutions were provided by the marine oil spill expert.

Affected countries have access to two more response assets, which were not used in the response to Super Typhoon Haiyan. Singapore Civil Defense Force has developed a dedicated HazMat team which can be deployed in the Asia Pacific region upon request from countries and/or through the JEU. The HazMat teams can deploy with hand-held measurement equipment to assist national response teams to identify the Hazmat in air. In addition, the Netherlands has developed the Environmental Assessment Module (EAM). The EAM is a mobile laboratory consisting of two fully equipped off-road vehicles that can be used in emergencies involving HazMat. It is designed to obtain information about environmental contamination and related health effects due to exposure to toxic chemical compounds caused by an environmental or natural disaster.

Phase 3 – Environment in humanitarian action: Once immediate life-saving emergency assistance has been provided in the first hours and days following a sudden-onset natural disaster, there are still enormous humanitarian needs to be met in terms of food, drinking water and shelter. It is during this phase that medium and long term environmental concerns, in particular the use of natural resources such as water and wood, but also disaster waste management should be considered in the programs of humanitarian actors.

In January 2014, following a request from the OCHA Country Office, the JEU deployed an Environmental Field Advisor provided by Sweden to support the humanitarian activities in the Philippines with technical environmental advise. Environmental considerations included the re-use of coconut lumber, the risk of fires due to the large number of fallen trees, disaster waste management and environmental hazards at relocation sites.[24]

4.1. *Network of Providers*

The support to the Government of the Philippines could be provided through the JEU only because of a solid response network of providing countries and the EU. Currently, the JEU benefits from excellent collaboration, bilaterally with several countries, most notably the Netherlands, Norway, Sweden and Switzerland, and multilaterally through the EU-CPM. The EU-CPM acts like a regional multiplier by alerting its 32 participating states following a request that has been made to the JEU. It is most remarkable that, for almost 20 years, experts and assets have been

provided to affected countries without fail, and this cooperation is not based on any legally binding agreement between the JEU and its network of providers.

In order to effectively provide environmental expertise and equipment through the multilateral system, potential providers should establish internal systems for the management of at least three interdependent resources:

- A pool of environmental experts: Such experts may, for example, be found among government agencies, or private sector companies, dealing with environmental emergencies at the national level;
- Sources of funding: Should be available for international emergency response operations deployments on a 24/7 basis through the ministry of foreign affairs or through the government's international development agency;
- A mobilization procedure: To manage their roster of experts; to liaise with other governmental bodies (where applicable); to receive and process requests for assistance from the JEU; to identify and deploy required experts/equipment; and to mobilise required funds.

To support the work of the providers, voluntary guidelines for requesting, receiving, offering and providing assistance in international environmental emergencies have been developed by the JEU.[25] This guidance material is intended to assist countries in ensuring that their internal systems are better geared towards supporting the international response system. This includes the designation of a National Focal Point to serve as the JEU's first point of contact and primary interlocutor.

5. Way Forward

The multilateral response to environmental emergencies, as outlined above in the case of Super Typhoon Haiyan, has, for 20 years, provided experts, advice and assets to countries affected by environmental emergencies. A wide range of tools and services have been developed to meet the needs of affected countries, which is supported through a loyal network of supporting countries. The benefits of integrating environmental expertise into the natural disaster rapid response system has benefits of integrating environmental expertise into the natural disaster rapid response system have been demonstrated through its ability to address environmental issues in a wide range of emergencies.

The response system to environmental emergencies also has areas for improvement. When taking a closer look at the system, and in particular the network of providers, it becomes apparent that it lacks diversity in terms of geographical representation. With the exception of Singapore, all other providing countries are in Europe or North America. In the case of Super Typhoon Haiyan, environmental experts were made available from France, Denmark and Sweden. At the same time, a greater role for non-governmental organizations, as well as the private sector, could be envisioned, notwithstanding the need to meet all three require-

ments (experts, resources and procedures). A greater role for regional organizations, such as the Association of South East Asian Nations (ASEAN) and the South Asian Association for Cooperation could also be explored. First steps were made in 2012 when ASEAN hosted its first dedicated workshop on Environmental Emergencies. A more diverse network of providers will also mean a more sustainable and effective response by reducing response times, language and cultural barriers. In 2015, the Guidelines for Environmental Emergencies will be updated to better cater for "non-traditional" providers, such as NGO's and private sector. The elements of the Guidelines pertaining to preparedness will also be strengthened in order to make better use of the existing network of providers for preparedness and capacity-development activities. In addition, the Advisory Group on Environmental Emergencies will continue to advocate for countries, ngo's and private sector entities to join the network of providers.

One can question the extent the humanitarian system will can continue to be "fit for purpose" for the coming ten to 20 years when considering the challenges that the mega trends of human-induced climate change and urbanization are posing to the future of humanitarian assistance. With half of world's population now living in cities, and a further three million people per week migrating to cities in the developing world,[26] global urbanization levels are expected to rise to 70 percent over the next 40 years. The Intergovernmental Panel on Climate Change, in its special report on managing the risks of extreme events and disasters so as to advance climate change adaptation, established that "climate change leads to changes in the frequency, intensity, spatial extent, duration and timing of extreme weather and climate events, and can result in unprecedented extreme weather and climate events."[27]

Calls are being made for a shift towards a more anticipatory and preventative approach to humanitarian crises.[28] For environmental emergencies this means greater investment in preparedness and capacity development.[29] In particular, industrial hazards will need to be identified at the country-level and better integrated into national contingency and disaster management and risk reduction plans,[30] while simultaneously, the capacities of countries to respond to environmental emergencies needs to be strengthened. OCHA and UNEP, in cooperation with its partners, have initiated a modest attempt in providing capacity development activities, such as online training and country-level Industrial Hazard Identification through its online Environmental Emergencies Centre.[31] A revision of the FEAT methodology is also under way, allowing for its better use in planning and preparedness for environmental emergencies.[32]

In addition, a considerable upscaling of resources and efforts, especially at the regional level, is needed to provide countries with sufficient support as to keep up with the megatrends. At the 3rd World Conference on Disaster Risk Reduction, to be held in Sendai, Japan, in March 2015 a multi-stakeholder discussion on "Technological Hazards: From Risk Reduction to Recovery"[33] is foreseen. In addition, the first-ever Environmental Emergencies Forum[34] will take place from 1-3 June

2015, in Oslo, Norway. Both global events will draw greater attention to environmental emergencies and provide for detailed recommendations to shift attention from response to a more industrial risk management approach to environmental emergencies.

The overarching coordination and response to environmental emergencies, as described above, rests with OCHA and UNEP and its network of providers. However, over time, a fragmented array of regional and thematic response systems has been developed. For example, a dedicated global response system for marine oil spills is managed by the International Maritime Organization and similarly, a global system for nuclear and radiological accidents is managed by the International Atomic Energy Agency.Examples of regional and thematic response systems include the haze pollution agreement for the ASEAN region,and for trans boundary effects of industrial accidents for the region covered by the UN Economic Commission for Europe.[35,36] UNEP's Governing Council acknowledged this challenging situation and asked UNEP subsequently to identify the main international stakeholders in environmental emergency response, and initiate a three-year process "to ensure that key organizations involved in responding to environmental emergencies have a clear and mutually agreed understanding of their respective roles and responsibilities in various scenarios".[37]

The response to the Estancia oil spill shows that the international environmental emergencies response system has developed an extensive and agile suite of tools and services, able to support governments in moments when needs are at their highest. In addition to tools having developed over time to changing needs, the system now needs greater diversity in its network of providers to ensure the right experts can be deployed at the right time - in the most efficient and effective manner. Simultaneously, governments and regional organizations should step up their efforts to fully integrate environmental emergencies as part of their disaster risk reduction and prevention activities.

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