J. ENVIRONMENTAL EMERGENCIES

J.1. Introduction

Major disasters have negative environmental impacts, some of which may threaten human life and welfare. An important part of effective humanitarian response is ensuring that these environmental impacts are identified and steps taken to mitigate them.

Some impacts are acute and must be addressed immediately; others are longer-term and may be addressed during the recovery and rehabilitation phases. During UNDAC missions, the focus is on identifying those impacts that present the most immediate risk to human life and welfare so that action may be taken. Environmental impacts from natural disasters typically include those related to infrastructure such as industrial facilities and/or those related to the natural environment. Complex emergencies present a unique set of environmental challenges. This chapter, however, focuses only on acute environmental impacts related to natural disasters.

The Joint UNEP/OCHA Environment Unit is the United Nations emergency response mechanism to provide and mobilise international assistance to countries dealing with environment impacts and is integrated into OCHA's Emergency Services Branch (ESB).

J.2. Scope and role of the UNDAC team

All UNDAC team members have an important role to play in identifying environmental impacts. Some UNDAC missions may include environmental experts who will undertake a rapid environmental assessment. If other team members become aware of acute environmental impacts, it is important to share that information with the environmental expert. Some missions, however, will not have an environmental expert participating.

This chapter is targeted at UNDAC teams on missions without an assigned environmental expert, during which the UNDAC team will have to gather information on acute environmental impacts and relay it to the Joint Environment Unit.

An UNDAC team member is not responsible for providing technical environmental advice or implementing solutions to environmental impacts. His/her role is only to identify acute environmental impacts so that follow-up actions may be taken.

It is also important to note that nuclear and radiological accidents are not within the scope of an UNDAC member identifying environmental impacts. Those types of accidents are the responsibility of the International Atomic Energy Agency (IAEA).

J.3. Definitions

- **Environmental emergency –** is defined as a sudden-onset disaster or accident resulting from natural or human-made factors (or a combination of both) that cause or threaten to cause severe environmental damage as well as loss of human lives and property.
- **Hazardous Materials (HAZMAT) -** are substances that pose or have the potential to pose a threat to the community (human health, property, and environment) due to their characteristics such as toxicity, and physical and chemical properties.
- **Acute impacts -** are those that pose existing or imminent risk to human life and welfare and need to be addressed within the initial response to the disaster.

J.4. Identifying impacts

An UNDAC team without an environmental expert will be looking primarily for acute environmental impacts arising from environmental emergencies. These impacts may be grouped into two categories:

- **Impacts arising from damaged infrastructure -** During earthquakes, hurricanes, tsunamis and other natural disasters, industrial infrastructure is as vulnerable as residential and commercial infrastructure. Impacts related to industrial infrastructure such as damaged industrial or chemical facilities may be divided into fires, explosions and chemical leakages. Dams are another type of infrastructure that may be damaged during earthquakes and other natural disasters.
- **Impacts related to the physical environment -** Such impacts may include landslides due to flooding or earthquakes, avalanches, and ash and lava from volcanoes.

The following table lists typical environmental impacts that may arise in natural disasters.

Type of disaster	Potential environmental impacts
Earthquake.	Natural gas leaks, household and industrial chemical releases from damaged containers. Damage to industrial facilities resulting in a toxic release.
Flood, tsunamis, storms, hurricanes, typhoons, and cyclones.	Sewage overflow and chemical releases from roads, farms and factories; water-damaged household chemicals (paint, pesticides, solvents); unsafe water supplies.
Forest fires.	Loss of biodiversity and ecologically sensitive habitat. Air pollution from smoke and haze.
Droughts.	Habitat and crop destruction.
Volcanic eruptions.	Toxic chemicals from eruption.
Landslides.	Damage to habitat.

In most environmental emergencies, like the release or potential release of HAZMAT into the environment, immediate action is required to minimize or mitigate the impact to air, land, water, and population.

J.5. Gathering information

Asking the right people the right questions is the most important method of identifying acute environmental impacts arising from an environmental emergency. The right people are often local emergency management authorities like police services and fire brigades, local governors, municipals authorities and environmental officials. They will have the most detailed knowledge of the area and often will have been there when the disaster happened and the response began. Valuable information may also be obtained from national and international environmental non-governmental organizations (NGOs), as well as from scientists present in the area. National government officials and UN staff may also provide information.

Below is a list of questions to ask local officials:

1. Are there secondary impacts such as fires, explosions, spills, leaks, or landslides resulting from the disaster?

2. Are there industrial facilities, factories, plants, pipelines, dumping sites, chemical/pesticide depots, etc. in or near the affected area? (For a more detailed list, please refer to the annex.)

3. Have they been inspected? If yes, what is the result?

4. Are there reports of spills, leakages, industrial fires, releases of toxic substances, etc.?

5. Are there reports of casualties whose injuries are inconsistent with other injuries directly resulting from the natural disaster?

6. Are there serious landslides, mudslides, secondary floods or

wildfires reported?

7. Are there retention dams, or power generating dams in the area of the disaster?

8. Have they been inspected? If yes, what is the result?

If, through these questions, an existing or potential acute environmental impact is identified the following information should be gathered:

1. What is the acute environmental impact?

2. When did it happen?

3. Where is it? Be as specific as possible, e.g., city/village/town, state/province, GPS coordinates, urban, rural.

4. How many people are affected?

5. Are there any local or national authorities responsible for the situation and is there a specific person from that organization who has been assigned to the situation that the Joint Environment Unit can contact? What are this person's contact details?

This information should then be forwarded to the Joint Environment Unit.

J.6. How to contact the Joint Environment Unit

The Joint Environment Unit is available 24 hours a day, 7 days a week, year round to mobilize assistance. It works closely with the other sections from ESB and will take action based on the information provided by the team.

Contact details:

Monday to Friday during office hours:
Telephone: +41 22 917 3484,
Facsimile: +41 22 917 02 57,
ochaunep@un.org

After hours (available 24/7):
OCHA Emergency telephone: +41 22 917 20 10.
OCHA Emergency facsimile: +41 22 917 00 23

J.7. Personal safety

The safety of UNDAC team members is the paramount concern on any mission. Remember, the role of the team member responsible for environmental emergencies is to identify whether there is an existing or potential acute environmental risk and inform the Joint Environment Unit, not to solve or mitigate the problem. Attempts to do so could put oneself and/or the entire team at risk.

All environmental emergencies are dangerous situations and must be dealt with by trained experts. HAZMAT incidents, in particular, should be treated very carefully.

If you find yourself in the area of an environmental emergency DO NOT WALK INTO or TOUCH SPILLED MATERIALS.

- Stay away from fumes, smoke and vapours and remain upwind even if there is no smell.
- Be aware of changing weather conditions and changing wind directions.
- Do not operate radios, mobile phones or other electronic devices within a distance of 500 meters.
- Leave the area immediately.
- Notify local emergency officials or community leaders of the emergency so that they may isolate the scene.

Annex

Categories of HAZMAT by industry

Facility/Industry	HAZMAT	Hazard
Adhesives.	Solvents, isocyanides, cyanoacrylates, epoxies.	Flammable, may also be toxic and/or corrosive.
Agriculture.	Pesticides, herbicides, ammonia.	Pesticides are highly toxic. Ammonia is highly corrosive.
Automobile body shops.	Hydrocarbons, acids, paints, epoxies, polymers, acetylene, oxygen, acetone, ammonia, carbon tetrachloride, nitrous oxide, halogenated hydrocarbons, solvents.	Flammable, toxic, and corrosive liquids and gases.
Battery reclamation facilities.	Sulphuric acid, metals.	Highly corrosive.
Buildings, mining, construction sites.	Asbestos, acids, solvents, fuel.	Flammable and corrosive.
Cargo containers.	Pesticides.	Highly toxic.
Cosmetics/ personal care.	Benzoic acid, methyl hexyl ketone, benzyl alcohol, stearic acid, glycerine.	Flammable, corrosive and toxic substances.
Dry cleaning.	Halogenated hydrocarbons.	Highly toxic and oxidizing substances.

Electronics.	Solvents, alkalis, acids, hydrogen fluoride, epoxies, metals, surfactants, silanes, compressed gases.	All categories of hazard including flammable, corrosive, toxic liquids and oxidizing, solids, liquids and gases.
Electroplating.	Cyanide compounds, acids, hydrofluoric acid, metals.	Highly toxic and corrosive substances.
Explosives/ ordnances.	Nitro- solvents, acids, mercury, ethylene glycol, solvents, ammoniated compounds, and sodium hydroxide.	Explosive, flammable, toxic and corrosive.
Foam manufacturing.	Isocyanides, solvents.	Flammable and toxic.
Food industry, refrigeration industry.	Ammonia, freons, sulphur dioxide.	Corrosive, toxic.
Fragrance/flavour.	Weak acids, phosphates, glycerine, salts, alcohol.	Flammable.
Gas stations and automotive service.	Hydrocarbons, lead compounds, acids, acetylene, oxygen, ethylene glycol, oils, solvents, fuels, greases.	Flammable.
Hospitals.	Mercury, radioactive sources, solvents, compressed gases, infectious substances.	Toxic, radioactive, flammable, infectious substances.
Illegal drug laboratories.	Acids, peroxide, ammonia, solvents.	Corrosive, flammable, oxidizers.
Machine shops.	Solvents, halogenated hydrocarbons, acids, alkalis, metals.	Flammable, toxic, corrosive.
Metal finishing.	Acids, cyanides, metals.	Corrosive, toxic, flammable.
Military bases.	Hydrocarbons, explosives, acids.	Flammable, explosive, corrosive.

Nuclear power plant.	Nuclear fuel (unirradiated and spent fuel).	Radioactive.
Paint and pigments.	Solvents, lead, titanium dioxide, metals.	Flammable.
Pesticide.	Ammonia, solvents, carbon tetrachloride, hydrogen cyanide, mercury, acids, phosgene.	Highly toxic, corrosive.
Petroleum refineries, pipelines, storage tanks.	Petroleum hydrocarbons, hydrogen sulphide, metals, polychlorinated biphenyls (PCB), acids and alkalis.	Flammable, toxic, corrosive, spontaneously combustible.
Pharmaceuticals.	Solvents.	Flammable.
Plastics, polymers, rubber, resins, and elastomers.	Hydrocarbons, halogenated hydrocarbons, acrylonitrile, styrene, vinyl acetate, vinyl chloride, epoxies, silicones.	Flammable, toxic, corrosive.
Print shops.	Solvents, alkalis.	Flammable, corrosive.
Pulp and paper mills.	Acids and alkalis, chlorine.	Corrosive, oxidizer.
Quarry and mining sites.	Fuels, explosives, metals, ammonium nitrate.	Flammable, explosive, toxic.
Sanitation and cleaning products.	Hypochlorite, acids, alkalis, solvents.	Corrosive, flammable.
Schools, university and research centres, laboratories.	Wide variety of chemicals including solvents, oxidizers, halogenated hydrocarbons, metals, acids/bases.	All hazards.
Soap and detergent.	Solvents, alkalis, phosphates.	Flammable, corrosive.
Glass etching.	Hydrogen fluoride.	Highly toxic.
Tanning industry (hides).	Trivalent chromium sulphate, sodium salts, arsenic, cyanide, ammonium sulphate, sulphuric acid, lime, aniline.	Toxic, corrosive.

Textile industry (dyes).	Benzene, naphthalene, acids, alkalis, chlorine, bromine, sodium nitrite, ammonia, sodium sulphide, metals.	Flammable, toxic, corrosive, and oxidizing substances.
Textile industry (manufacturing).	Polymers and resins.	Flammable, corrosive.
Water treatment plants, swimming pools.	Chlorine, hypochlorite solutions, acids.	Corrosive, toxic, oxidizing substances.
Wood treating.	Coal tar creosote, pentachlorophenol, chromium copper arsenic (CCA).	Highly toxic, corrosive.

Weather conditions

Weather conditions and weather forecasts are important information for reasons of personal safety. Below are some conditions you may want to be aware of:

- Wind direction.
- Wind speed.
- Type of precipitation.
- Temperature.
- Cloud cover.

Weather may be a significant element in any emergency. For example:

- On a warm day, chemical substances will tend to evaporate more quickly than on a cold day.
- High winds will disperse gases, vapours and powders.
- Precipitation may be problematic if a water-reactive substance is released but may also be a benefit as they slow down the dispersion of air-borne materials and reduce the area of impact.

Information tools

In the UNDAC mission software, a number of reference materials are included to assist the team in identifying environmental threats and impacts and in assessing the environmental dimension of emergencies. These include:

- The Emergency Notification/Request for International Assistance (ENRA) form to be used as a tool for formally requesting specialized environmental assistance. The form is not only an official request for assistance, but also will help in specifying the nature of expertise and specialized equipment required to respond to the threat. In the face of such a situation, the form should be filled out and forwarded

to the Joint Environment Unit through the identified contact points. It may also be found online at ;http: 77ochaonline.un.org/webpage.asp?Page= 645.

- The Emergency Response Guide (ERG) which will assist the team in identifying chemical hazards and taking appropriate measures to isolate the area and mitigate the threat. Though conceived and developed in North America, it is now used worldwide and provides information that may be used in the initial phase of an emergency involving HAZMAT, while awaiting assistance from specialists. It may be found online at; http://hazmat.dot.gov/pubs/erg/gydebook.htm

If an UNDAC team requires specialized environmental information, the Joint Environment Unit is the first point of contact to provide the necessary information. They can provide guidelines on a range of situations which an UNDAC team could confront during a mission.

Environmental impacts

Three main areas are affected by HAZMAT releases:

- **Air -** Contamination by air may be difficult to observe visually and impossible to contain. Substances are rapidly dispersed by weather conditions. This type of pollution is cumulative and may cause serious long-term problems such as respiratory illnesses.
- **Water -** Water pollution may be critical in situations when drinking water supplies are affected. Aquatic life may also be at risk during pollution of water bodies. Human and animal population are also at risk in the medium to long term since they often consume types of fish that are known to accumulate toxic substances.
- **Soil -** Contamination of soil and vegetation often does not pose an immediate threat to the population and the environment. It may, however, spoil food supplies and impact underground water supplies if it seeps deeply enough into the soil.

Short and long-term impacts

Although not immediately noticeable during the response phase of disasters, long-term environmental impacts will eventually be indicated by changes in the ecosystems. Specific types of vegetation may stop growing, insects and animals may leave the area, aquatic life may be threatened, and wetlands, crucial to the maintenance of groundwater and fish and wildlife habitat, may be destroyed.

UN transportation symbols.

Below is a list of UN transportation symbols of dangerous goods. They may be visible on vehicles and containers.

UN Transport Symbols


RED

Class: Explosives.
Hazard: May burn and/or detonate.
Examples: Ammunition, fireworks, picric acid, rocket motors, trinitrotoluene (TNT).


GREEN

Class: Non-inflammable (or flammable) gases.
Hazard: Vessels may explode when heated.
Examples: Nitrogen, carbon dioxide, helium.


WHITE

Class: Poisonous substances.
Hazard: Vessels may explode when heated. Vapours of liquefied gases are initially heavier than air.
Examples: Hydrogen chloride, sulphur dioxide, chlorine & Methanol, sodium cyanide, carbon tetrachloride, nicotine, pesticides.


RED

Class: Inflammable gases or liquids (also referred to as flammable in some countries).
Hazard: Vessels may explode when heated, i.e., vapours of liquefied gases are initially heavier than air and may form explosive mixtures with air.
Examples: Gases: propane, butane, acetylene. Liquids: benzene, gasoline, ether, isobutyl alcohol, acetone.


RED/
WHITE

Class: Inflammable (or flammable) solids.
Hazard: Material may be easily ignited and burn.
Examples: Matches, wet hay or straw, sulphur, red phosphorus.


WHITE
RED

Class: Substances liable to spontaneous combustion.
Hazard: Material may spontaneously ignite and burn.
Examples: Diethyl zinc, activated carbon, scrap celluloid.

BLUE

Class: Substances which, in contact with water, emit inflammable gases (or inflammable gases).
Hazard: Upon contact with water, material may generate gases that ignite easily.
Examples: Sodium, potassium, magnesium powder.

ORANGE

Class: Oxidizing substances & organic peroxides.
Hazard: Material contributes to the combustion of other material.
Examples: Hydrogen peroxide, potassium permanganate, sodium chlorite. Acetyl acetone peroxide, peroxyacetic acid.

WHITE

Class: Infectious substances.
Hazard: Organisms that are infectious.
Examples: Ebola virus, salmonella enterica, hepatitis B virus, infectious hospital waste.

WHITE

Class: Radioactive substances.
Hazard: May induce damage by radioactivity.
Examples: Uranium, plutonium nitrate solution, caesium, iodine, cobalt (often as industrial gauges and medical sources).

Class: Radioactive substances.
Hazard: May induce damage by radioactivity.
Examples: Uranium, plutonium nitrate solution, thorium.

WHITE
BLACK

Class: Corrosive substances.
Hazard: May cause irreversible damage to skin tissue.
Examples: Sulphuric acid, hydrochloric acid, sodium hydroxide.

BLACK/
WHITE

Class: Miscellaneous. (Not UN but found in several countries.)
Hazard: Usually environmental hazard.
Examples: Environmentally hazardous substances, toxic waste.

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