



**Governing Council  
of the United Nations  
Environment Programme**

Distr.  
GENERAL

UNEP/GC.22/INF/5  
13 November 2002



ENGLISH ONLY

---

**Twenty-second session of the Governing Council/  
Global Ministerial Environment Forum**

Nairobi, 3-7 February 2003

Item 4 (b) of the provisional agenda\*

**Policy issues: Emerging policy issues**

**FURTHER IMPROVEMENT OF ENVIRONMENTAL EMERGENCY PREVENTION,  
PREPAREDNESS, ASSESSMENT, RESPONSE AND MITIGATION**

**Note by the Executive Director**

Introduction

1. At its twenty-first session, the Governing Council of the United Nations Environment Programme (UNEP) discussed issues related to environmental emergencies and the role of UNEP in that field. The outcome of that discussion was decision 21/17, by which the Council requested the Executive Director to bring forward an analysis of the causes and long-term environmental effects of emergencies that it had worked on and the possible policy implications for national Governments and the international community, for consideration by the Council at its twenty-second session.
2. The present report has been prepared in response to that decision. The report is based on a review of documentation and of UNEP files, in particular those held by the Joint UNEP/Office for the Coordination of Humanitarian Affairs (OCHA) Environment Unit concerning responses to past environmental emergencies, combined with interviews of a number of key personnel who have been involved in the response efforts, as well as input from a selected number of countries that have been affected by these same events. At the same time, the report provides an opportunity to review the role of UNEP with respect to environmental emergencies and provides recommendations for future work.
3. As set out in the 2001 UNEP Strategic Framework on Emergency Prevention, Preparedness, Assessment, Mitigation and Response, environmental emergencies are defined 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.

---

\* UNEP/GC.22/1.

K0263253 291102

For reasons of economy, this document is printed in a limited number. Delegates are kindly requested to bring their copies to meetings and not to request additional copies.

4. The present report focuses on the role of UNEP with regard to urgent and immediate assistance in responding to environmental emergencies, including events such as industrial accidents (chemical releases, oil spills) and natural disasters (earthquakes, floods), as well as forest fires.

5. Since this report focuses on the role of UNEP with regard to immediate assistance in the event of an emergency, it will not include extensive discussion of the Programme's continuing activities in areas related to awareness-raising, prevention, early warning and vulnerability assessment, preparedness, recovery, or capacity-building. It does, however, recognize that prevention and capacity-building are critical components for reducing the likelihood, or adverse effects, of future environmental emergencies and recommends further attention to these subjects by UNEP, other international organizations and national Governments.

## I. BACKGROUND

### A. Recurrence of emergencies

6. Experience has shown that, despite extensive efforts to improve prevention and preparedness, environmental emergencies continue to occur. There also appears to be an increasing number of natural disasters, including floods, hurricanes, and earthquakes, that have environmental dimensions and that, in many cases, lead to environmental emergencies. Furthermore, industrial and technological accidents with severe environmental impacts continue to occur throughout the world: as examples we may cite the ammunition dump explosion in Nigeria in January 2002, the ammonium nitrate explosion in France in September 2001, and the cyanide mine tailings spill in Romania in January 2000. The number and complexity of emergencies involving a combination of natural and technological elements also appears to be on the increase.

7. A number of factors have contributed to the increasing severity of environmental emergencies:

(a) High rates of population growth and urbanization are placing a growing number of individuals at risk during disasters;

(b) Environmental legislation and arrangements for effective environmental emergency management are either altogether lacking or poorly enforced;

(c) The earth's defences against environmental emergencies are steadily weakening;

(d) Early warning, preparedness and response systems are either deficient or altogether absent, particularly in developing countries and, to an even greater extent, the least developed countries;

(e) Rapid industrialization with increased use of chemicals is under way in countries that have not yet developed a corresponding capacity for the safe handling of these chemicals.

8. Furthermore, as noted in the UNEP Strategic Framework, there is increasing global attention to emergencies, reflecting a complex interplay of economic, social, political and environmental conditions. Actions can be taken by countries to reduce risks and mitigate the adverse effects of emergencies, such as avoiding the siting of industrial sites near population centres, improved preparedness planning and training of emergency response personnel, and establishing systems for obtaining assistance in the event of an emergency. With support from the international community, actions are being taken by a number of international organizations, including UNEP, to address these issues.

### B. Role of UNEP in the response to environmental emergencies

9. Historically, international assistance in responding to emergencies has focused on humanitarian action. The United Nations has been a leader in mobilizing resources to meet the immediate needs of stricken populations.

10. The major chemical incidents of Seveso, Italy (1976), Bhopal, India (1984), Basel, Switzerland (1986), Chernobyl, Ukraine (1986), and further such accidents in the 1990s provided an impetus for developing a United Nations mechanism to facilitate the establishment of a prevention and preparedness programme, as well as the provision of assistance in the event that these events became an environmental emergency. In 1988, UNEP initiated its awareness and preparedness for emergencies at the local level (APELL) programme as a process for responding to technological accidents through increasing awareness and preparedness for emergencies at the local level. In 1992, UNEP established, on an experimental basis, the United Nations Centre for Urgent Environmental Assistance (UNCUEA), in order to facilitate response to environmental emergencies.

11. In 1994, UNEP and OCHA established their Joint UNEP/OCHA Environment Unit, which replaced UNCUEA and became the new focal point within the United Nations for the mobilization and coordination of assistance to countries facing environmental emergencies. This new arrangement effectively took advantage of the emergency infrastructure that already existed within OCHA and paired it with the technical and scientific expertise available within UNEP to provide a more comprehensive response to environmental emergencies that maximized the use of resources, and minimized duplication of efforts. Over time, the scope of the Unit's work has expanded beyond chemical accidents to include the environmental dimensions of natural disasters and other types of environmental emergency events such as forest fires.

12. The broader role of UNEP in environmental emergencies has expanded considerably in recent years, necessitating the establishment of new structures and better integration between various UNEP divisions to address all aspects of environmental emergency management.

13. Since 1988, six senior-level international APELL meetings have been held to bring together national focal points and experts in industrial accident preparedness. In 1995, UNEP and OCHA established an International Advisory Group on Environmental Emergencies (AGEE) as an important partnership and support mechanism. AGEE is an international forum that brings together international experts to share information, expertise and lessons learned for improved response to environmental emergencies and in particular to developing countries. It provides specific guidance to the activities of the Joint Unit and practical recommendations on activities, areas for development and potential projects to improve international response to environmental emergency events. AGEE meets periodically and, since its establishment, has held four meetings and one meeting of its core group on terrorist-related matters. The fifth meeting is scheduled for the spring of 2003. In recent years, the APELL and AGEE meetings have combined, with a view to ensuring better integration of the programmes and harnessing the potential synergies of previously disparate networks.

14. To support the implementation plan in the area of disaster and vulnerability reduction adopted by the World Summit on Sustainable Development, UNEP and OCHA have launched the Partnership on an Integrated Approach to Prevention, Preparedness, Response to Environmental Emergencies in Support of Sustainable Development, with the following objectives:

(a) To promote integration of environmental emergency preparedness and response activities into strategies and assistance programmes relevant to sustainable development;

(b) To assist countries in developing their own capabilities to deal with environmental emergencies and to facilitate information exchange, training and technological cooperation;

(c) To improve dialogue between public authorities, the private sector and the public in general on issues of emergency prevention, preparedness and response.

## II. ANALYSIS

15. UNEP has been involved in a wide range of events since it first became actively involved with environmental emergencies in the early 1990s. The present chapter gives an overview of the different emergencies that UNEP has worked on, summarized in the table below, and identifies the salient features of the environmental impacts of these emergencies. It also presents three case studies providing a synopsis of UNEP activities in three very different emergencies. These cases provide a good illustration of the role played by UNEP in responding to environmental emergencies and demonstrate how that role has evolved.

A. Overview of emergency response activities

16. As at March 2002, UNEP, primarily through the Joint Unit with OCHA, has coordinated responses to more than 30 environmental emergencies including industrial accidents, natural disasters with environmental impacts, and combinations of natural and technological disasters. These have included incidents such as chemical, fuel and oil spills, mine tailing spills, forest and bush fires, river pollution incidents, severe floods, dumping of hazardous wastes, an earthquake resulting in a chemical emergency, and other sudden-onset events that damaged or threatened the environment, human health and property. Natural disasters have also resulted in chemical releases, thus providing a direct interface with programmes concerned with technological accidents. UNEP has provided support to such events by mobilizing assistance upon request by countries, and by providing information and guidance related to environmental emergencies. Specific activities undertaken in mobilizing and coordinating emergency assistance to countries have involved:

(a) Arranging for expert assessment missions to identify the environmental implications of an emergency and to develop conclusions and recommendations for national authorities that are also shared with potential donors. This type of assistance was provided in the cases of the river pollution incident in Chile, dumping of hazardous substances in Somalia, an aviation fuel spill in Kenya, and a dumpsite and landfill collapse in the Philippines;

(b) Activating, through its collaborative partnership with OCHA, United Nations disaster assessment and coordination (UNDAC) teams to conduct assessments, prepare recommendations and coordinate assistance to a number of events. This mechanism has been used increasingly in recent years as a function of the increased integration between UNEP and OCHA in disaster response, with UNDAC missions successfully deployed in a number of cases, including forest fires in Indonesia, a cyanide mine tailings spill in Romania and a chemical spill in the port of Djibouti;

(c) Brokering assistance from Governments, other international organizations, and non-governmental organizations and, in some cases, arranging for OCHA emergency cash grants. For example, in 2000 the Joint Unit helped to mobilize urgent assistance to Venezuela in connection with a chemical emergency in the port of La Guaira caused by floods and mudslides facilitating the deployment of Swedish and German experts and equipment to support the response efforts. The Joint Unit also mobilized and facilitated targeted bilateral assistance in connection with a chemical spill in Kosovo;

(d) Facilitating the exchange of information between affected countries, donor countries, UNEP units and other international partners.

17. The nature and scope of UNEP work in environmental emergency response has evolved over time. When first established, the mandate for the Joint Unit emphasized the response to chemical emergencies, primarily industrial accidents and oil spills. After several years, the Unit's area of responsibility was expanded to address severe environmental impacts arising from natural disasters. For example, since the major forest fires in Indonesia and the Russian Federation in 1998, UNEP has taken a more active role in mobilizing and coordinating international relief and has implemented collaborative agreements for addressing these types of events in the light of the significant environmental threats that they pose. In addition, forest fires often have an international dimension with transboundary pollution and large-scale destruction of important natural resources.

18. Through the Joint Unit, UNEP has positively influenced the mainstreaming of environmental considerations into the broader disaster response activities conducted by OCHA. Thus, the Joint Unit, in recent times with the additional support of the Disaster Management Branch/Emergency Coordination Unit, has increasingly been called on to provide input and assistance in a variety of natural disasters and complex emergencies, as OCHA has begun to consider the environmental impacts of all types of emergencies.

19. This more extended profile of the environmental aspects of emergencies has resulted in efforts to increase the number of UNEP environmental experts available from within UNEP and from donor countries to participate in emergency missions to address the environmental aspects of all types of disasters.

Table. Summary of significant emergencies tackled by UNEP

Month/Year	Event	Location	Environmental impacts
<b>2002</b>			
January	Volcano eruption	Democratic Republic of the Congo	Immediate damage to flora and fauna from lava. Water pollution due to contamination from lava, debris and ash. Soil erosion. Loss of biodiversity caused by burning of ecosystems. Damage due to mass population displacement.
January/February	Munitions dump explosion	Nigeria	Immediate release of toxic gas following explosion. Thermal and chemical pollution from components of bombs and other ammunition. Land degradation and water pollution resulting from explosions and decaying bodies (of those who tried to flee the explosion through the river and drowned). Threats from unexploded ordnance.
February/March	Chemical spill in the port	Djibouti	Varying levels of soil contamination to six sites within the port areas situated in close proximity (within 1km) of a densely inhabited area. Concerns regarding possible marine contamination from run-off if rains should come. Immediate concerns regarding health of those who were exposed and concerns about chronic health effects to population from airborne contaminated dust particles.
April	Peat and wildland fire	Viet Nam	Massive loss (nearly 30 per cent) of one of the few remaining – and one of the most important – peat forests in the world, resulting in loss of habitat for wildlife and protected bird species. Salt contamination of freshwater canals from fire suppression efforts with impacts to drinking water, as well as to the aquatic environment.
<b>2001</b>			
September (follow-up to 2000 mission)	Dumpsite collapse	Philippines	
October	Floods	Islamic Republic of Iran	

<b>Month/Year</b>	<b>Event</b>	<b>Location</b>	<b>Environmental impacts</b>
<b>2000</b>			
February/March	Cyanide spill (Baia Mare)	Romania, Hungary, Yugoslavia	Serious contamination of the Tiza river from cyanide and heavy metals from mine tailings resulting in transboundary impacts. Fish kill from cyanide. Impacts to drinking water. Long term impacts to aquatic environment from heavy metal contamination. Concerns regarding loss of or impact on biodiversity.
March	Waste spill (Baia Borsa)	Hungary and Romania	Polluting and contamination of the Viseu and Vaser rivers, involving mostly minerals, but with some heavy metals.
September	Acid spill	Yugoslavia (Kosovo)	Soil and water contamination from acid leak from large storage installation that flowed into local river resulting in a major fish kill and impacts to aquatic environment. Loss of vegetation and soil contamination. Potential impacts on groundwater.
<b>1999</b>			
March	Aviation fuel spill	Kenya	Contamination of soil and concerns regarding flammability risk from aviation fuel spill.
August/September	Earthquake resulting in petroleum spill and fire	Turkey	Impact on major industrial facilities, resulting in a major oil spill into the harbour and subsequent fire arising from the spill. Pollution of the marine environment and shoreline contamination. Airborne pollution from burning oil slick. Impacts on wildlife. Soil and freshwater pollution from ash and particles resulting from the fire. Potential contamination of drinking water.
December/January 2000	Floods and mudslides resulting in chemical spill in port	Venezuela	Chemical contamination of the port area from drums of chemicals that were washed into the water from mudslides hitting a chemical storage warehouse. Impacts on marine environment. Impacts on drinking water supply. Shoreline soil contamination.

<b>Month/Year</b>	<b>Event</b>	<b>Location</b>	<b>Environmental impacts</b>
<b>1998</b>			
March/April	Forest fires	Brazil	Loss of important forest resources and impact on biodiversity in ecologically rich tropical forest. Air pollution and possible water pollution from ash and haze from fire.
March/April	Forest fires	Indonesia	Forest fires affecting the area of East Kalimantan, resulting in loss of biodiversity and habitat, with significant impacts on the rainforest and bushland in the area. Transboundary air pollution and haze resulted from the fires but on a significantly reduced scale in comparison to the 1997 fires (see below).
June	Cyanide spill	Kyrgyzstan	Transportation accident resulting in escape of cyanide into the river, impacts were immediate, with no long-term environmental impacts expected. These included: fish kill, and immediate but short-term loss of drinking water supply. Hundreds of individuals reported to be ill, showing symptoms of intoxication from drinking the water during the critical period.
September/October	Forest fires	Russian Federation	Significant loss of woodland and forest resources and biodiversity. Air pollution from haze and smoke from fire.
October 1998 to May 2001	Drought*	Kenya	A continuous failure of rainfall between October 1998 and May 2001 was so severe that the Government of Kenya declared a national disaster on 13 June 2000. In the water sector, the direct impact was a shortage of water resources for all uses. The drought had an impact on wildlife, fisheries and wetlands. The movement of animals in search of water and pasture contributed to land degradation and increased wind and water erosion when the rains did finally come.
<b>1997</b>			
May-June	Dumping of hazardous substances	Somalia	Alleged dumping of toxic wastes containing hazardous materials to the sea and other debris coming ashore causing pollution. Contamination of the shoreline. Extensive contamination of the marine environment was suspected but not confirmed.

<b>Month/Year</b>	<b>Event</b>	<b>Location</b>	<b>Environmental impacts</b>
May/June	River pollution	Chile	Visible pollution and fish kill from an undetermined source into the river system. Neither the exact product nor the sources were identified, thus making it impossible to identify possible long-term impacts.
October/November	Forest fires	Indonesia	Massive forest fires that burned uncontrollably, causing major loss of woodland, habitats and biodiversity in the area and air pollution in the form of a thick black haze that affected not only Indonesia but also neighbouring countries of Malaysia and Singapore.
<b>1996</b> April-May	Mine tailings spill	Philippines	Contamination of the Makulapnit and Boac river systems by 2-3 million cubic metres of tailings, covering most of the river bottom, causing a disruption of the aquatic environment, due to a smothering effect by the massive quantity of solid tailings released. Loss of agricultural land.
<b>1994</b> December	Pipeline oil spill	Russian Federation (Komi Republic)	Impacts on the natural environment and threat to the Arctic Ocean. Arctic conditions render work to clean up the oil spill particularly challenging. The area is virtually uninhabited, therefore no impacts on population.

\* Drought does not fall in the category of an “environmental emergency” as defined in paragraph 3 of the present report. It has been included in the table, however, since it is categorized as a hydrological hazard and often the response approach to drought is similar to that adopted in other environmental emergencies.

## B. Case studies

### Case 1 – Chemical Spill in the port of Djibouti - 2002

#### **Incident details**

In January 2002, 15 freight containers representing approximately 200 tonnes of chromated copper arsenate (highly toxic and corrosive wood preservative and fungicide) were discovered to be leaking in the port area of Djibouti, as the cargo had been packed in unsuitable plastic containers instead of steel drums. The cargo was sent from England, shipped to Ethiopia via Djibouti.

In order to secure the situation, port authorities moved the containers to a number of different sites, resulting in the contamination of six sites within the port area. Eventually, the containers were relocated to a final isolation zone that had been cleared to accommodate the leaking containers.

Interviews with local authorities and port workers indicated that 500 port authorities and local residents had possibly been subjected to exposure. There was widespread panic in the community concerning exposure to the product through air, water, or consumption of local fish.

#### **Role of UNEP**

On 26 February 2002, the government of Djibouti requested international assistance in conducting an assessment of the situation and coordination response efforts. A four-member UNDAC team was deployed to conduct an independent assessment of the situation and resulting contamination (including the environmental and human health implications), to develop recommendations for future action, and to coordinate international response efforts.

The mission included a member of the Joint Unit and two other OCHA disaster-response specialists. Early in the assessment process, the team recognized the need for more specialized expertise and requested the assistance of a Swiss ecotoxicologist to provide guidance on the more technical elements, such as clean-up, remediation, and exposure aspects. The expert also provided basic training to local staff and managed operations to secure the situation in the short term until an international appeal could be launched.

On 30 April, the Joint Unit learned that the steel trays constructed as an interim containment measure for the CCA freight containers were again leaking. As a result, the expert from Geneva, with the support of the Joint Unit, put together a second mission comprising four colleagues, to try to resolve the problem.

#### **Environmental impacts**

There was significant concern in the community regarding the possible contamination of water used by local water and soft-drink bottling facilities, the consumption of local fish and the safety of the water for bathing. Port workers were fearful about the immediate and longer-term health effects from exposure.

During the course of the assessment, it was determined that virtually no product had been lost to sea, and there had not been any evidence of a fish kill. The product that had been absorbed to the soil surface would be carried on airborne dust particles, potentially causing long term exposure problems if the sites were not properly decontaminated. An additional cause of concern is the possible exposure of both humans and flora and fauna through rain and wind.

## Case 2 – Baia Mare cyanide tailings spill in Romania – 2000

**Incident details**

On 30 January, a dam failure in a tailings pond near Baia Mare, Romania, resulted in a spill of 100,000 cubic metres of liquid and suspended waste containing about 50-100 tons of cyanide, as well as copper and other heavy metals. The solution spilled into the Sasur, Lapus, Somes, Tisza and Danube rivers (finally reaching the Black Sea).

The affected facility was a company jointly owned by Australian and Romanian interests that mined the area for gold and silver. The process and technologies used at this mine were considered to be the most modern and efficient in the region. The company was operating in line with government permits.

The dam break is believed to have been caused by a combination of inherent design deficiencies, inadequate permit and inspection procedures, operating practices that did not include sufficient safety and emergency procedures and poor weather (heavy rains and melting snow). It is also believed that the dam was not engineered to cope with a rise in water or to catch overflow wastewater.

The spill resulted in interruptions to water supply, sanitation plants and industry in Romania, as well as fish kills in Romania, Hungary and Yugoslavia. Prior to the tailings spill, the affected area had been subject to years of chronic pollution.

**Role of UNEP**

UNEP and OCHA were requested by the Governments of Romania, Hungary and Yugoslavia to carry out an urgent independent assessment of the environmental impact of the cyanide spill, to provide advice on response activities and on better prevention and preparedness, and make recommendations to the international community on possible assistance.

A joint UNEP/OCHA assessment mission, consisting of a four-member UNDAC team along with 16 experts from 7 countries was mobilized. The mission was led by the Director of the UNEP Regional Office for Europe (a press officer and scientific coordinator from UNEP also participated). UNEP mining specialists provided technical advice. Consultations were held with experts from other international organizations, non-governmental organizations, donor countries and others.

To carry out its tasks, members of the mission travelled to affected areas in the three countries. In each country, meetings were held with a variety of stakeholders including government and industry officials, non-governmental organizations and local communities. In each country, samples at strategic sites were taken from the rivers which were then forwarded to laboratories in Finland, Germany and Switzerland for chemical analysis.

Other UNEP activities included the provision of specialized advice on mining issue to the UNDAC assessment team and the establishment of a dedicated web site for the incident by the Division of Technology, Industry and Economics (DTIE). Subsequently, a new technical report, entitled *APELL for Mining*, was published with the assistance of the International Council on Metals and the Environment (ICME) to encourage mining companies and ministries to focus more strongly on prevention and preparedness aspects for mining operations.

**Environmental impacts**

The cyanide spill caused immediate contamination of the Tiza river, affecting drinking water and causing major concerns for human and animal health. Since cyanide is completely soluble in water and has a short half-life in solution, it was swiftly washed away through the river system and

therefore did not present a long-term environmental impact. The heavy metals in the mine tailings caused massive heavy metal pollution in the Tiza river and raised concerns regarding the immediate and longer term impacts on the aquatic environment and, ultimately, fish consumption by the population. The experts on the mission noted that chronic contamination by the heavy metals would need to be monitored and that potential long-term effects on biodiversity would require further investigation. They also noted that the spill had occurred in an area already contaminated with heavy metals and other pollutants from a long history of mining and metal processing in the area.

## Case 3 – Forest fires in Indonesia 1997-1998

**Incident details**

Forest fires in Indonesia are a major concern and are almost always human-induced. In 1997, world attention was focused on the massive forest fires ravaging Indonesia, as the haze from these fires covered the South-East Asian region for weeks, causing health problems, disruption of shipping and aviation, and culminating in the closure of international airports. The 1997 fires raged uncontrollably and were eventually alleviated by the arrival of the monsoons, but with a limited wet season the fires resurged in January 1998.

The 1998 fires were considerably smaller in scale and more localized than those in 1997, this time affecting only East Kalimantan. These forest fires involved more than 1,000 “hot spots”, destroying more than 200,000 hectares. The situation was again of international significance, because of the severe transboundary air pollution, though on a much smaller scale than the 1997 blazes. In addition, there was concern about the destruction of a considerable portion of important biologically diverse resources.

According to the reports of the UNDAC teams deployed to both incidents, the fires were attributable to slash-and-burn agriculture and the use of fire as a cost-effective clearing method for converting land from primary forest to plantations.

**Role of UNEP**

The Joint Unit closely monitored the situation in Indonesia and was in contact with national authorities. At the request of the affected country via the local UNDP office, an UNDAC mission, including a member of the Joint Unit and two UNEP staff-members, was deployed and tasked with assessing the impact of the fires, including the regional and global environmental concerns, and with evaluating needs for complementary international assistance.

During the 1998 fires, the Executive Director of UNEP was approached by the United Nations Secretary-General to coordinate the United Nations response. In addition to the field assessments, the Executive Director travelled to the region and met the President of Indonesia as well as the ministers of the environment and forestry, to discuss the international response.

A UNEP/GEF project on the emergency response to combat forest fires in Indonesia to prevent haze in South-East Asia has been implemented, to assist countries of the region in taking specific steps to avoid forest fires in the future.

**Environmental impacts**

Indonesia is known as one of the most biologically diverse countries of the world. The burning of rainforest in East Kalimantan will result in continuing loss of biodiversity and increased health risks. Any significant losses of Indonesia’s biological diversity also significantly reduce regional and global biological diversity.

Environmental damage was significant in 1997, with fires in all regions of the country, including East Kalimantan, causing significant air pollution throughout Indonesia, and spreading to neighbouring Malaysia and Singapore, bringing worldwide attention to the incident. Other impacts included serious loss of forestry resources, habitat and biodiversity.

The fires in 1998 were considerably smaller, affecting only East Kalimantan, which still suffered significant damage, but on a reduced scale.

### III. POLICY IMPLICATIONS AND RECOMMENDATIONS

20. The resulting policy recommendations take into account a number of factors, including a review of the emergencies on which UNEP has worked, consideration of its traditional role in responding to chemical incidents and the way this role must evolve to meet new challenges, the need to tackle natural disasters in a more comprehensive way, and ways of ensuring that an environmental dimension is fully integrated into the overall management of natural disasters.

#### A. UNEP

21. Where UNEP is concerned, the following steps are recommended:

- (a) Improved awareness by countries of the assistance available through UNEP and OCHA in their partnering arrangement, for response to environmental emergencies;
- (b) Extending the roster of environmental experts and improve experience and training of experts through:
  - (i) Targeted training programmes focusing on the environmental dimensions of disasters;
  - (ii) Partnership with the private sector;
- (c) Improved mechanisms for sharing experience and lessons learned;
- (d) Improved cooperation with United Nations agencies and bodies, international organizations and non-governmental organizations in providing assistance to countries, particularly developing countries, and countries with economies in transition, to prevent, prepare for and respond to environmental emergencies;
- (e) Development and implementation of arrangements to improve sharing of experiences and lessons learned from those involved in response missions and from countries receiving assistance following emergency events;
- (f) Establishment of a mechanism to monitor whether recommendations made following assessment missions are given appropriate consideration by recipient countries and donors;
- (g) Improved advocacy aimed at donor Governments for increased support to environmental emergency response activities and for prevention of and preparedness for future emergencies;
- (h) Assistance to countries in developing and improving their ability to prevent, prepare for, respond to and recover from environmental emergencies, reducing reliance on external assistance;
- (i) Expansion of mutual assistance arrangements, allowing neighbouring countries to support one another in the event of an environmental emergency.

#### B. National Governments

22. Where the Governments of recipient countries are concerned, the following steps are recommended:

- (a) Development and setting in place of arrangements to support the prevention of environmental emergencies;
- (b) Extensive efforts to ensure an appropriate level of preparedness for a timely and effective response in the event of an environmental emergency;

- (c) Development of joint contingency arrangements and mutual assistance plans at a regional, subregional or on a bilateral basis;
- (d) Appropriate coordination and communication among all relevant authorities;
- (e) Prompt submission of requests for international assistance for the mitigation of long-term environmental impacts of environmental emergencies;
- (f) Arrangements to facilitate the work of international emergency assessment missions in response to environmental events.

23. Where donor countries are concerned, it is recommended that additional support in the form of experts, equipment and grants be provided to assist UNEP and OCHA in their efforts to respond to environmental emergencies, as well as for activities aimed at helping countries in improving prevention, preparedness and response.

### C. Future direction for UNEP

24. Based on the findings of the report, and the emerging trends identified, and in addition to the recommendations noted in the previous section, two key areas might be suggested on which UNEP should focus its future work in the area of environmental emergencies:

- (a) Increased visibility for environmental issues. As noted above, since UNEP has made great efforts to sensitize disaster managers, and OCHA management, on the environmental dimensions of disasters, it is likely that environmental issues will continue to be further integrated into the regular activities of OCHA. This is likely to mean that environmental concerns will be given higher priority in response efforts as well as in follow-up activities, including requests to donors. It will also mean that OCHA may seek advice, expertise and information from UNEP on a more regular basis. Consequently, UNEP must prepare itself for such requests, so that it can effectively meet these increased expectations;
- (b) Addressing the full safety continuum. It is inevitable that natural disasters, as well as technological accidents will continue to occur. Consequently, there is a need to prevent and mitigate adverse consequences of environmental emergencies.

25. An examination of the causes of emergencies, particularly technological accidents, will demonstrate that many disasters and their consequences are the result of a lack of prevention, preparedness and contingency planning, and inadequate disaster management systems at the local and national levels. This is one of the primary findings in a large number of assessment mission reports that suggest that the affected countries need to take further action to implement improved prevention strategies, early warning and vulnerability assessments, preparedness and response policies and programmes.

26. Many countries, in particular developing countries, have indicated a need for capacity-building in order to establish appropriate policies and procedures for effective prevention, preparedness and response.

27. UNEP and other international organizations, as well as non-governmental organizations, have a role to play in building capacity at the local, national, regional and subregional levels for the implementation of prevention strategies, the conduct of early warning and vulnerability assessments, and the development of preparedness and response measures.

-----