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DEVELOPMENT AND
INTERNATIONAL ECONOMIC
COOPERATION

International cooperation to mitigate the environmental consequences on Kuwait and other countries in the region resulting from the situation between Iraq and Kuwait

Report of the Secretary-General

INTRODUCTION

1. Pursuant to decision SS II/8 adopted at the second special session of the Governing Council of the United Nations Environment Programme (UNEP), held at Nairobi from 1 to 3 August 1990, on the situation in the Middle East, UNEP took an initiative to intensify cooperation within the United Nations system for optimum use of the diverse capabilities of the system to respond rapidly to the environmental crisis resulting from the hostilities in the area. To this end, the United Nations Inter-agency Plan of Action was developed in cooperation with the Regional Organization for the Protection of the Marine Environment (ROPME) 1/ and a number of United Nations specialized agencies and was adopted at the Second United Nations Inter-agency Consultation held at Geneva on 15 March 1991. This was followed by the adoption of a decision by the Governing Council of the United Nations Development Programme (UNDP) in

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* A/47/50.

** E/1992/100.

June 1991 (decision 91/21), and a resolution of the General Assembly at its forty-sixth session on 20 December 1991 (resolution 46/216). Furthermore, decision SS III/3.II on the state of the environment resulting from the situation between Iraq and Kuwait was adopted at the third special session of the UNEP Governing Council held from 3 to 5 February 1992.

2. The present report summarizes the results of the United Nations inter-agency effort in responding to this environmental crisis. It provides up-to-date information on the environmental situation in the region and briefly describes the United Nations initiatives regarding the mitigation of the adverse effects of the conflict, and the rehabilitation of the environment in the region. It is intended for submission to the General Assembly at its forty-seventh session through the Economic and Social Council in fulfilment of the requirements of resolution 46/216.

I. UNITED NATIONS INTER-AGENCY PLAN OF ACTION

3. The United Nations family of agencies, led by UNEP and in cooperation with ROPME, developed the United Nations Inter-agency Plan of Action soon after the liberation of Kuwait. The main objectives of the Plan were:

(a) To assess the environmental consequences of the war on the marine and coastal areas, atmosphere, terrestrial ecosystems and the hazardous waste situation in the region;

(b) To propose a programme for the mitigation of the adverse effects, rehabilitation and protection of the environment affected by the conflict.

4. The specific objectives of the first phase of the Plan of Action were:

(a) To conduct a multidisciplinary initial survey and preliminary assessment of the marine and coastal environment, the atmospheric environment, the inland terrestrial environment and hazardous waste management in the war-impacted areas;

(b) To identify priority areas at risk and resources threatened in these areas;

(c) To formulate a proposal for the mitigation of the adverse effects, rehabilitaion and protection of the environment in the area, to be submitted to the Governments of the region through ROPME for the necessary follow-up;

(d) To develop, establish and operate a computerized data system for storage, retrieval and processing of all data and information gathered through the Plan of Action;

(e) To provide relevant training to ROPME experts on the system's operations and data management.

5. Coinciding with both the Second United Nations Inter-agency Consultation and the Informal Ministerial Consultation held at Nairobi from 11 to 13 March 1991, UNEP's Executive Director established a Special Trust Fund devoted exclusively to the financing of the United Nations Inter-agency Plan of Action (except for the activities of the International Maritime Organization (IMO), which were to be funded by a special IMO Persian Gulf Oil Pollution Disaster Fund). A total of US$ 2.61 million was donated to the Trust Fund by the Governments of Japan, Norway and the Netherlands, also for the Commission of European Communities, as follows: Japan (general purpose): US$ 1.11 million, received on 26 March 1991; Norway (atmospheric components): US$ 1 million, received on 1 June 1991; the Netherlands (computerized data system): US$ 0.5 million received in September 1991.

6. The first phase of the United Nations Inter-agency Plan of Action was completed in 90 days, i.e., on 20 July 1991. It involved initial surveys and a preliminary assessment of the environmental damage in the region in the aftermath of the conflict. The activities under the Plan of Action were coordinated by UNEP and ROPME and implemented by some 50 experts from 12 United Nations agencies and international organizations, including UNEP, IMO, the World Health Organization (WHO), the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Industrial Development Organization (UNIDO), the United Nations Centre for Human Settlements (UNCHS), the International Atomic Energy Agency (IAEA), the Food and Agriculture Organization of the United Nations (FAO), the World Conservation Union (IUCN), the World Wildlife Fund (WWF) and ROPME as well as about 20 institutions from within and outside the region.

7. Each of the cooperating agencies was responsible for the implementation of the component(s) of the Plan of Action relevant to its specific mandate (see table 1). However, all agencies worked in concert in order to ensure the maximum coherence of results and recommendations.

Table 1

Activities of the United Nations Inter-agency Plan of Action and the responsible organizations/agencies

Areas/activities	Responsibility
Coastal and marine environment:	
Oil pollution response and clean-up operations	IMO
Oil pollution assessment and monitoring water quality	IOC/IAEA
Oceanographic observations and data support	ROPME/IOC
Coastal/marine ecological assessment	IUCN/WWF/IOC
Living marine resources	IUCN/FAO/IOC
Coastal infrastructure	UNCHS
Remote sensing/data-base support	ROPME/UNEP
Atmosphere:	
Air quality/effects on human health	WMO/WHO/IAEA
Air/sea exchange	IOC
Meteorology and long-range air pollution	WMO
Terrestrial:	
Food, soil, agriculture	FAO/IOC
Terrestrial ecosystem/desertification	UNEP Regional Office for West Asia
Food safety, drinking water	WHO
Shelter/welfare	UNCHS/WHO
Hazardous waste management:	
Assessment of damage to industrial sector and risk of release of hazardous wastes	UNIDO/WHO/UNCHS
Industrial safety	UNEP Industry and Environment Office/UNIDO

II. STATE OF THE ENVIRONMENT

8. The results of the Plan of Action were published by UNEP in a report 2/ which was submitted to and endorsed by the fourth extraordinary session of the Council of ROPME held in Kuwait on 16 and 17 October 1991. The following are some of the initial findings of the Plan of Action and of more recent observations after the capping of the last oil-well fire on 6 November 1991.

A. Marine and coastal environment

9. As a result of the massive oil spill in the Persian Gulf waters, the total amount of which is estimated at between 6 million and 8 million barrels, the most heavily affected marine area is along the Saudi coastline, particularly from south of Khafgi to Abu Ali Island. A total of about 600 kilometres of coastline, including islands, embayments and salt marshes, were severely damaged, although estimates of the extent of damage to the marine habitats vary.

10. Data available so far indicate that at least 30,000 marine birds perished as a result of exposure (excluding those trapped in oil pools formed in the desert). Approximately 20 per cent of the mangroves on the eastern coast of Saudi Arabia have been oiled and about 50 per cent of the coral reefs have been affected. Hundreds of square kilometres of sea-grass beds (feeding grounds for dugongs and turtles) as well as tidal mud flats have been inundated by oil. The Iranian coast north of Bandar Khomeyni was also affected but to a lesser extent, while the Iraqi coast was only slightly affected. The Kuwaiti coast suffered only relatively light damage, while the three coral-reef islands off the Kuwaiti coast did not show any significant degree of ecological damage. However, the scale of impact of the massive oil spill on the marine ecosystem, particularly the sensitive habitats, as well as on the fisheries (fish and shrimp) resources of the region as a whole would have to be determined by intensive and extensive monitoring and research.

11. Oil pollution in the marine environment was not limited to oil spills. Fallout from the burning oil formed clicks on the surface of the water, releasing polycyclic aromatic hydrocarbons (PAHs) and heavy metal-laden soot particles into the water column. Hundreds of small boats and tens of military ships have been sunk in the area, many loaded with ordnance. The physical destruction of beaches by digging trenches, laying mines, barbed wire and other defence installations has not only damaged the intertidal zone but poses great danger for human life as well as turtles nesting on islands. The destruction of sewage treatment plants in Kuwait resulted in the release of over 50,000 cubic metres/day of raw sewage into Kuwait Bay, threatening the intertidal ecosystem, downgrading the quality of sea water used for desalination and polluting public beaches.

12. The intensive United Nations effort to assess the state of the marine environment culminated in the launching, in late February 1992, of a 100-day

cruise in the ROPME sea area by the fully equipped 231-foot research vessel Mount Mitchell of the National Oceanic and Atmospheric Administration (NOAA) of the United States of America in cooperation with ROPME and IOC. The results of this international expedition are now being analysed and will provide a solid scientific basis for the rehabilitation of the marine and coastal environment.

B. Atmospheric pollution including long-term effects on human health

13. Air pollution resulting from the burning oil wells in Kuwait represented a potential hazard to human health. Excluding the initial few days in which storage tanks and oil wells were put ablaze, about 6 million barrels of oil were being burnt daily along with about 70 million-100 million cubic metres of gas from over 600 burning oil wells.

14. Measurements taken from aircraft indicated that the combustion process is relatively efficient. Ninety-five per cent of the carbon emitted by the oil well fires is in the form of carbon dioxide. About 1 million to 2 million metric tons of carbon dioxide was being formed by the plume each day. The remaining carbon emissions were in the form of non-methane organic vapours (2.4 per cent), carbon monoxide (1 per cent), organic particles (0.65 per cent), and soot (0.45 per cent). About 2 per cent of the mass of the fuel burned is emitted as sulfur (mainly in the form of sulfur dioxide). The following typical values were reported for various chemical constituents observed at about 100 kilometres downwind: sulfur dioxide (SO_2): 100 to 500 parts per billion (ppb); carbon monoxide (CO): 0.1 to 0.5 parts per million (ppm); ozone: 20 to 45 ppb; oxides of nitrogen (NOx): 10 to 30 ppb; carbon dioxide (CO_2): 400 to 460 ppm.

15. Measurements taken at the ground level showed that instantaneous values for sulfur dioxide were as nigh as 0.68 ppm near the burning wells. However, limited sampling in populated areas in the path of the oil plumes did not reveal concentrations of concern. As for PAHs, the United States Inter-agency Team concluded that most of the PAHs in the air particulate samples in Kuwait and Saudi Arabia were below detectable levels, i.e., below 2.0-4.6 ppb.

16. The last of the 613 burning wells in Kuwait, which were the main source of concern with regard to air pollution and risk to human health, was put out on 6 November 1991. It is therefore expected that the atmospheric conditions and air quality in Kuwait and the adjacent areas downwind will significantly improve. Consequently, the risk to human health is now considerably reduced and the possible long-term effects are still uncertain.

17. The future human health implications from the pollutants emitted from the oil well fires will require long-term, detailed studies of the pollutants themselves and of the exposed population.

18. At a recent meeting of experts to assess the atmospheric effects of the Kuwait oil fires, organized by WMO in cooperation with UNEP (Geneva, 25-29 May 1992), the results of extensive aerial reconnaissance surveys of the fire plumes, carried out by various teams of investigators, were analysed together with surface meteorological and air pollution measurements in and around the source region, with a view to obtaining a better understanding of the atmospheric effects of the oil well fires. Further insights on the plume behaviour and its long range transport were provided by the modelling efforts. The main findings on atmospheric impacts and their possible consequences could be summarized as follows:

(a) The smoke did not have any attributable effect on the weather or climate outside the Persian Gulf region because of its relatively low altitude and short residence time owing to capture by water vapour. There has also been no demonstrable influence on the Indian monsoon;

(b) The carbon dioxide and nitrous oxide emissions have steadily diminished as the burning wells were brought under control. They are not likely to have a detectable impact on global climate;

(c) The smoke plume widths ranged from 15 to 150 kilometres for distances of up to 1,000 kilometres from the fires. The smoke plume substantially reduced the ground-level sunlight, visibility, and temperature beneath the plume. However, it is still unclear whether these characteristics of the plume were detrimental or beneficial to the region;

(d) The plume was not photochemically active until it had travelled over 600 kilometres. Inside the plume 1,000 kilometres downwind of Kuwait, the ozone concentration exceeded the United States National Ambient Air Quality Standard (NAAQS) of 120 ppb. However, there is no indication of regional oxidant episodes resulting from the fires. Regional ozone concentrations were not abnormal y high and the region's population was not affected;

(e) The concentrations of total suspended particulates (TSP) and particulate matter (PM-10) often exceeded the United States NAAQS 24-hour standard in the region. These concentrations were often higher at Daharan than at Kuwait City. However, occurrences of high concentrations of particulate matter are historically common in the region, making it difficult to attribute the high concentrations to the oil well fires. Initially, there was concern that the increased TSP and PM-10 concentrations would severely impact health but levels were not high enough to cause observed acute health effects. Active irritating agents were significantly absent from the particles;

(f) The ground-level concentrations in Kuwait and Saudi Arabia of sulfur dioxide, nitrogen dioxide, nitrogen oxides, carbon monoxide and ozone did not exceed United States NAAQS. Initially, there was concern that pollutant gases from the fires would cause acute health effects. However, generally the population was not exposed to high concentrations, and reports on widespread increased acute health effects were not substantiated;

(g) Both aircraft and ground-level sampling data show that hydrogen sulfide was present only in very low concentrations, below internationally recognized health threat levels;

(h) In-plume and ambient air concentrations of PAHs and metals such as nickel, chromium, vanadium, and lead from the fires are comparable to those in urban-industrial areas in the United States, Western Europe and Japan. The samples are not very mutagenic;

(i) Soot and oil mist covered the soil surface and vegetation in large areas, with the soot-affected area extending into Saudi Arabia. Most of the native vegetation in the soot-affected areas was adversely affected. The annual flora failed to set seed. Only some perennial vegetation with food-reserve in the roots survived the summer of 1991. The long-term impact is unclear, but there are indications that vegetation is being re-established effectively. However, there might be a change in the distribution of species.

C. Terrestrial ecosystem including hazardous wastes

19. The destruction of terrestrial ecosystems was very extensive, particularly in Kuwait, Iraq and Saudi Arabia.

20. In Kuwait, the impact on soil and vegetation is very serious owing to the formation of huge oil pools resulting from the oil gushing from the damaged and burning oil wells. Some of these lakes extend over vast areas of the desert, in some cases with depths of up to 1 metre or more. Furthermore, a layer of oil droplets and soot covers hundreds of square kilometers (estimates are as high as 30 per cent of the area of Kuwait). In most areas, the coating with oil droplets and soot has totally eliminated the already limited plant cover, reducing further the possibility of bloom in their short growth cycle associated with the scarce rainfall. In some areas, pulverization of the surface soil by off-road military vehicles has destabilized the soil, increasing its vulnerability to wind erosion. In addition, the presence of land mines and unexploded ordnance and munitions still presents a serious hazard to human life and the environment in the country.

21. In Iraq, the military activities devastated large areas of the land and adversely affected the agricultural production and livestock of the country.

22. In Saudi Arabia, the main terrestrial impact was due to the fallout of soot, particularly south of the Saudi/Kuwaiti border.

23. The above findings of the initial surveys conducted under the United Nations Plan of Action were confirmed by a recent study carried out by the Environmental Protection Department of the Ministry of Public Health of Kuwait. The study showed that from the 76 gushing oil wells, over 100 oil pools were formed covering a total area of about 16 square kilometres. The areas between the pools were also soaked by oil. The depth of the oil pools

varied according to the local topography of the areas and was generally between 30 and 50 centimetres with a few as deep as 1 metre. Estimates of the quantity of oil accumulated in these pools range between 25 million and 50 million barrels.

24. The effect of the oil pools on the quality of air was indicated by a much higher level of methane and non-methane hydrocarbons detected by the air quality monitoring system run by the Environmental Protection Department. Of particular concern, especially with respect to the health impacts, was the level of toxic chemicals and PAHs. However, investigations showed that most of PAHs in the air particulate samples in Kuwait and Saudi Arabia were in general below detectable levels.

25. Deep and surface soil samples were collected from within and outside the oil fields by the Environmental Protection Department. The samples were analysed to determine the level of total removable organic matter, petroleum hydrocarbons and chrysence equivalents. As expected, much higher levels were detected in the surface samples collected from the oil fields, with much lower levels in the deep samples.

26. With respect to hazardous wastes, the initial survey indicated that the risk to the environment and human health will remain fairly acute until plans are designed and implemented to assess and clean-up the disposal sites both in Kuwait and Iraq, each according to its particular characteristics.

D. Socio-economic aspects

27. The Iraq-Kuwait conflict, the associated hostilities and the resulting environmental damage have had serious socio-economic impacts on the countries of the region and beyond. The implications of the war on societies in the affected countries range from loss of job opportunities, particularly in the fisheries, agricultural and industrial sectors to threat to human life by the presence of unexploded ordnance and sea and land mines.

28. In an effort by UNDP, following decision 91/21 adapted at the thirty-eighth session of its Governing Council, a funding strategy meeting was convened to consider a draft proposal for the socio-economic and environmental recovery of countries affected by the Persian Gulf crisis, with a view to establishing a funding strategy. In this connection, UNEP presented to the meeting its Consolidated Rehabilitation Programme containing a proposed programme for the environmental rehabilitation of the region, the implementation of which would assist in the alleviation of the above socio-economic problems.

III. UNITED NATIONS FOLLOW-UP INITIATIVES

29. While all the above United Nations inter-agency efforts were being undertaken at the technical level, further attention was being paid to the political and financial aspects of the environmental crisis. In this context, and following a request from the Government of Kuwait, the first visit to Kuwait was undertaken by the Personal Representative of the Secretary-General in early October 1991.

30. Since then, a Consolidated Rehabilitation Programme for the environment of the ROPME region, including costed and targeted project proposals covering the three environmental components, the technical cooperation aspects as well as the needs of the countries of the region for oil clean-up, recovery and restoration. The Programme, as well as a priority action programme, was prepared by UNEP in cooperation with ROPME. The Programme was presented by UNEP to a funding strategy meeting organized by UNDP on 16 December 1991. At this meeting, the urgent need for the rehabilitation of the environmental destruction in the region was brought to the attention of some 70 States members of the United Nations, including major potential donors.

31. The issue was later brought up at the third special session of the Governing Council of UNEP, where it was also made clear that dealing with the environmental catastrophe went beyond the capabilities of the countries of the region, and thus required strengthened international cooperation.

32. Furthermore, and in order to keep the issue of this environmental crisis at the forefront of the international political arena, the Secretary-General requested his Special Representative, Mr. Joseph Verner Reed, to visit Kuwait during March 1992 and, later, the other countries of the region to reassess the situation after the capping of the burning oil wells, which was accomplished in record time. The visit to Kuwait was carried out from 29 to 31 March 1992, during which Special Representative Reed held talks at the highest possible level, including the Amir of Kuwait. He reassured His Highness and his Government of the continued support of the United Nations and all its organizations to finding adequate measures to redress the environmental damage in Kuwait and the region.

33. Recognizing that the task of environmental rehabilitation is challenging and that the financial resources needed are very large, the Special Representative, during his visit, discussed various options for rehabilitation strategies and funding possibilities. The outcome of this visit has been brought to the attention of the Secretary-General and the Executive Director of UNEP in order that an acceptable strategy be formulated and carried out as soon as adequate resources become available.

34. In addition to the required mitigation of the adverse effects, the rehabilitation of the environment and the building up of national response capabilities, there is also an obvious need to develop an effective international mechanism to guide and coordinate the response to future

large-scale environmental crises. This should be based on a predetermined procedure to initiate immediate action and criteria to be used to trigger international response. The experience from dealing with the situation between Iraq and Kuwait, with the complexity of its environmental consequences, showed that the United Nations family of agencies can work together effectively if the objectives of the joint action are set up, the distribution of responsibilities is clearly defined and a strategy for coordination, communication and data management is developed and implemented from the outset.

Notes

1/ Member States: Bahrain, Iran (Islamic Republic of), Iraq, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates.

2/ Report on the United Nations Inter-agency Plan of Action for the ROPME Region - Phase I: Initial Surveys and Preliminary Assessment, UNEP, 12 October 1991.