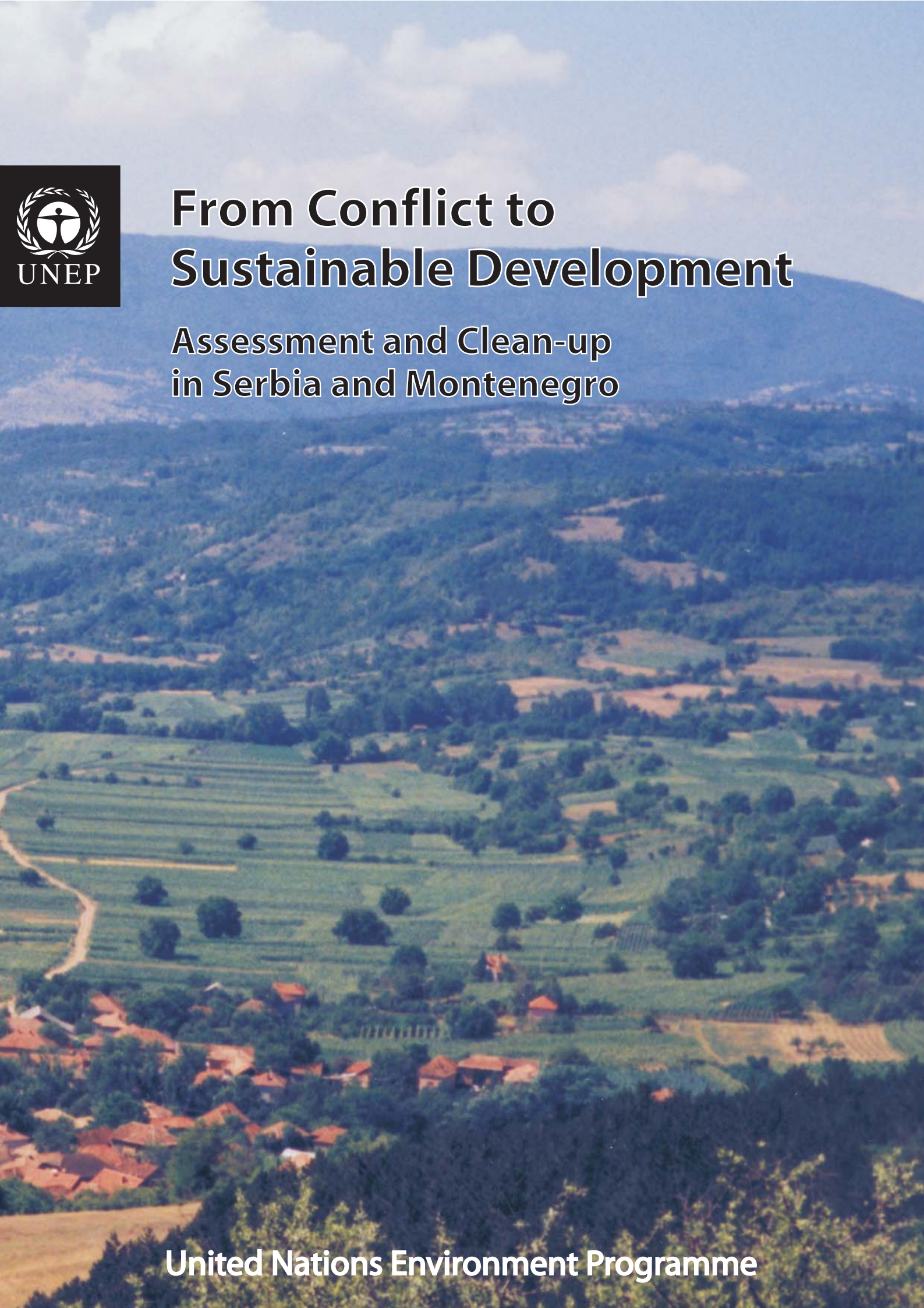

From Conflict to Sustainable Development

Assessment and Clean-up in Serbia and Montenegro

United Nations Environment Programme

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Foreword

As the smoke and dust settled and peace was re-established in what was then the Federal Republic of Yugoslavia in the summer of 1999, it was evident that not only had people been through untold pain and suffering but that the environment had suffered as well. However, the extent and nature of the conflict-related damage to the environment and the threats these might pose were unknown.

In response to widely voiced concerns, the United Nations Environment Programme established a task force (the Balkans Task Force) with a mandate to assess objectively and scientifically immediate threats to human health and the environment arising from the conflict. This was the first time that environmental issues had been recognized and integrated as a central part of the immediate United Nations post-conflict humanitarian effort.

In October 1999 UNEP presented its findings in the report entitled *The Kosovo Conflict – Consequences for the Environment and Human Settlements*. This drew a number of important conclusions on the post-conflict situation in the region and – in particular – singled out four heavily polluted environmental 'hot spots' (Pancevo, Kragujevac, Novi Sad and Bor), for immediate humanitarian assistance.

Early in 2000, in response to encouraging reactions from several governments, the European Union and international organizations, UNEP carried out a detailed feasibility study, to define the exact scientific and financial requirements for urgent clean-up projects at the four hot spots. In March 2000, clean-up measures for the four hot spots were included in the list of priority projects at the funding conference organized under the auspices of the Stability Pact for South-Eastern Europe. By the late summer of 2000, following positive initial responses from many governments, and pledges from several European countries to support additional activities, UNEP was in charge of a major environmental clean-up project in the Federal Republic of Yugoslavia.

This report documents in detail how, during a period of four-and-a-half years (mid-1999 to December 2003) UNEP went about assessing the environmental consequences of the war and implementing a pioneering clean-up project to address serious conflict-related environmental damage.

These efforts have helped to secure fresh drinking water for tens of thousands people, remediated contaminated soil and groundwater, removed and transported for final treatment hundreds of tons of hazardous waste, rehabilitated wastewater treatment capacities at industrial sites, installed water and air quality monitoring stations and strengthened na-

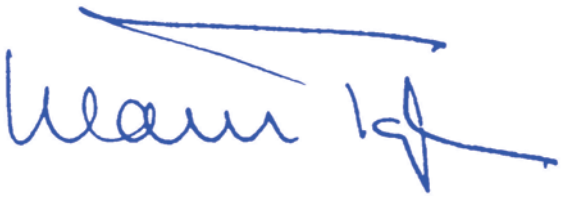
tional and local environmental management capacities in several important areas. This publication signals the completion of UNEP's post-conflict activities in Serbia and Montenegro and the handover of the clean-up programme to the national authorities.

UNEP was able to rise to the challenges of this task thanks to close cooperation with the environmental authorities of Serbia and Montenegro. In addition, the relevant municipalities, factory and site owners at the environmental hot spots, and universities and environmental institutes within the region provided valuable advice and support. The European Commission and its European Agency for Reconstruction was a supportive and strong partner throughout this process. Moreover, the activities were supported by all our UN partners based in Belgrade. In particular, I would like to single out the United Nations Office for Project Services (UNOPS), which acted efficiently as our implementing agency.

I am especially grateful to the governments of Denmark, Finland, France, Germany, Ireland, Luxembourg, The Netherlands, Norway, Sweden, and Switzerland for having provided generous financial support for the environmental clean-up project, and to all the environmental experts, both local and international, that made the environmental clean-up in Serbia and Montenegro a success. This proven model – for post-conflict assessment followed by concrete actions on the ground – has since been initiated by UNEP in Afghanistan, Iraq, the Occupied Palestinian Territories, and most recently in Liberia. The environment is now an established component of all United Nations post-conflict activities.

Of course, whenever possible the United Nations' first priority is to prevent conflict from happening in the first place and to promote the conditions under which peace and stability can flourish. However, if and when conflict does break out, there is a clear duty to provide urgent assistance. Environmental conditions – from the air that people breathe and the water they drink, to the ecosystems that support forestry, farming and fishing – have a crucial influence on the success of efforts to rebuild shattered communities and livelihoods. Only by ensuring environmental security can the wider goals of post-conflict reconstruction and human development be sustained.

The closure of UNEP's post-conflict activities in the Balkans is a positive signal. It demonstrates that, overall, South Eastern Europe is progressing from conflict to peace. I am pleased that UNEP has been a part of this process. In keeping with the rest of Europe, our Regional Office will now coordinate UNEP's activities in the region.



Klaus Töpfer
United Nations Under-Secretary General
Executive Director of the United Nations Environment Programme

1 Introduction

1.1 The Kosovo conflict

The 1999 armed conflict in the Balkans was triggered by the collapse of efforts to find a diplomatic solution to the Kosovo crisis. The Rambouillet peace negotiations failed and NATO initiated air strikes on targets within the then Federal Republic of Yugoslavia (FRY) a few days later, on 24 March 1999. Although the conflict was relatively short-lived, with NATO suspending its campaign on 10 June 1999, severe damage was inflicted on strategic infrastructure in the Republics of Serbia and Montenegro. The civilian population endured fear and hardship, while the displacement of thousands of families precipitated an additional humanitarian crisis affecting the whole region. In the wake of the conflict, it was clear to all parties that meeting urgent humanitarian needs had to be the paramount concern.

➤ Map 1. The Balkan Region and the Danube Basin

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

1.2 UNEP's post-conflict assessment work

The intensity of the air strikes, the targeting of industrial and military facilities, and dramatic television pictures combined to fuel claims that an environmental disaster had resulted from massive pollution of air, land and water. At the same time, NATO was underlining its policy of selective, precision targeting and rejecting reports of environmental crisis. As is generally the case in times in war, it became hard to separate fact from rumour and propaganda. It was for this reason that UNEP and the UN Centre for Human Settlements (UNCHS/Habitat) initiated a neutral, independent, scientific assessment of the environmental situation in the FRY.

The assessment was conducted between July and October 1999 and consisted of both field missions and desk study components. The findings from this work were published in October 1999 in *The Kosovo Conflict – Consequences for the Environment and Human Settlements*. This report concluded that there had been no generalized environmental catastrophe as a result of the conflict, but that more localized impacts – combined in some cases with a long-term legacy of poor environmental management – gave cause for concern. In particular, the environmental situation at four 'hot spot' locations in Serbia was so severe that urgent clean-up action was recommended on humanitarian grounds.

These findings were complemented by subsequent UNEP field research into possible environmental risks from the use of depleted uranium (DU) weapons during the conflict. This work resulted in two further reports, *Depleted Uranium in Kosovo: Post-Conflict Environmental Assessment* (2001) and *Depleted Uranium in Serbia and Montenegro: Post-Conflict Environmental Assessment in the Federal Republic of Yugoslavia* (2002), which contained clear recommendations for a precautionary approach to addressing possible risks to the environment and human health.

This series of post-conflict environmental assessments was the first of its kind. The overarching objectives were: first, to provide clear, objective information to local communities and authorities concerning the environmental situation at specific sites; and secondly, to recommend technical measures for avoiding or minimizing damage to the environment and human health. While these recommendations were addressed first and foremost to the authorities in Serbia and Montenegro, it was evident that international assistance would be needed for implementing the required measures.

Indeed, environment has been one of the success stories of the new regional architecture in the Balkans, and there is a strong environmental component within the Stability Pact for South Eastern Europe – the principal political and financial framework for international co-operation in the region. In Kosovo itself, the results of UNEP's assessment work were used to assist UNMIK (the United Nations Mission in Kosovo) to establish an environment office and to identify environmental priorities for UNMIK follow up.

1.3 From assessment to clean-up

Following publication of the 1999 report on the Kosovo conflict, UNEP vigorously promoted the provision of immediate environmental clean-up and capacity-building measures, notably through international humanitarian assistance to the FRY. However, owing to a lack of any formal international response mechanism, UNEP had to work largely on its own initiative.

A major step was the publication in April 2000 of UNEP's *Feasibility Study* report setting out in detail 27 technical project proposals for the four environmental hot spots of Bor, Kragujevac, Novi Sad and Pancevo. This not only drew the attention of the local authorities and international community to the specific measures needed, but also provided a technically sound basis for UNEP to liaise with potential donors.

During consultations with the wider international community, UNEP was urged and encouraged to coordinate implementation of environmental remediation work. Sufficient funding was eventually secured for a UNEP Clean-up Programme to be launched at the end of 2000, running until December 2003 (with some follow-up activities continuing into early 2004). The aim of the Clean-up Programme was to address the problems identified at the four environmental hot spots, building on the general findings of the environmental assessment work and the much more detailed technical proposals contained in the Feasibility Study.

1

A combination of fund-raising efforts, rigorous project prioritization and thorough technical preparation resulted in implementation by UNEP of 16 physical works projects at the four hot spot sites. In addition, other international partners provided bilateral support for a further six projects from the Feasibility Study portfolio, meaning that 22 projects in all were able to go ahead. All of these projects have improved the environmental situation and significantly reduced risks to human health and well-being. While the main focus has been the physical works needed to mitigate environmental problems and associated health risks, institutional strengthening and capacity building has been a major theme running throughout the Clean-up Programme. Stronger environmental management is needed to ensure that short-term economic gains are not detrimental to the longer-term prospects for environmentally sustainable development. To this end, numerous training courses, workshops and awareness-raising events were organized in parallel with the clean-up operations.

Summary of Clean-up Programme achievements at the four 'hot spots'

As an integral part of the hand over of the Clean-up Programme to the Serbian government, the environmental authorities in Serbia and Montenegro worked together with UNEP on a joint final assessment of the environmental conditions at the four hot spot sites. The key findings are summarized below. This report also provided clear recommendations for required follow-up and identified overall priorities for the future. In view of the progress made with site remediation, the report concluded that both Kragujevac and Novi Sad are no longer considered as 'environmental hot spots'.

Pancevo

While conflict-related concerns have been significantly reduced, important environmental problems have yet to be addressed. Among the four environmental hot spots, Pancevo was the one to suffer most damage during the Kosovo conflict. Consequently, more than half of the Clean-up Programme funds were used for projects at this site.

Novi Sad

The risk of serious contamination affecting drinking-water supplies have been substantially reduced and conflict-related environmental impacts are being systematically monitored.

Kragujevac

The environmental impacts arising from the conflict have been mitigated successfully.

Bor

The conflict-related environmental consequences have largely been dealt with but were relatively minor in comparison with the wider, pre-existing environmental problems affecting the area.

Implementation of the UNEP Clean-up Programme was made possible by the generous contributions of the governments of Denmark, Finland, France, Germany, Ireland, Luxembourg, The Netherlands, Norway, Sweden, and Switzerland.

➤ Map 2. Locations of UNEP clean-up activities at environmental hot spots

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Summary Conclusions from UNEP's Clean-Up Programme in Serbia and Montenegro

- The Clean-up Programme has been a notable success, especially when taking into account the available funding (approximately US$ 12.5 million, or some 60% of the budget identified in the Feasibility Study) and limited timeframe.
- The conflict-related impacts at the four hot spots have been significantly reduced.
- Environmental management institutions have been strengthened and the Clean-up Programme has contributed towards the resumption and strengthening of international and regional environmental cooperation.
- At most locations, however, the conflict-related impacts represented only a part of the environmental and health challenges present. This means that considerable environmental problems remain at several sites.
- Ongoing efforts are required to further strengthen national and local environmental management capacities, to integrate environment into the national development agenda and to promote preventive and precautionary approaches to environmental management. There are real opportunities for accomplishing these goals, given that Serbia and Montenegro benefits from a rich natural-resource base and a skilled workforce.
- The role of partnership with donors, with the wider international community, within the UN system, and with local counterparts and experts, was fundamental to the programme's success.
- A faster start to the programme, enabled by more immediate availability of financial resources, would have seen even greater environmental benefits. In responding to a post-conflict situation the time factor is crucial. The international community needs to consider ways and means of providing much more rapid environmental assistance under similar circumstances in the future.

1.4 From conflict to sustainable development

Five years on from the Kosovo conflict, the political landscape has changed dramatically. The State Union of Serbia and Montenegro has come into being and the country's efforts to pursue a path based on democratic governance, economic reform and active international and regional cooperation are bearing fruit. The European Union (EU) has made it clear that it regards Serbia and Montenegro, alongside other countries of the Western Balkans, as a future Member State. An EU summit meeting held in June 2003 agreed an agenda for integrating the Western Balkan countries into the EU, and set out a plan for ensuring that all the related criteria and conditions of accession are fulfilled. Negotiations between the EU and Serbia and Montenegro are ongoing, and the process of approximating national and republican legislation to EU norms and standards is underway.

The key government institutions are the Serbian Ministry for Science and Environmental Protection and the Montenegrin Ministry of Environmental Protection and Physical Planning. These already have some important powers but must be further equipped with policy and legal tools. In July 2002, the two environment ministries agreed to cooperate on environmental protection and to establish a body to coordinate environmental activities requiring a

unified state response. Close cooperation has also been established with the European Environment Agency (EEA) and with certain multilateral environmental agreements.

Back in the middle of 1999, the environmental situation in locations such as Pancevo and Novi Sad was looking critical. Now there are more encouraging developments to report. Industries have been rebuilt and local and regional economies have started on the road to recovery, representing sources of hope for future livelihoods. The country's physical beauty and remarkably rich biodiversity – as evidenced by an extensive network of protected areas – remain.

Nevertheless, environmental issues have not been to the fore of post-conflict national priorities. Understandably, these focused on the reforms needed to strengthen security, to rebuild the economy and to improve general living conditions. As a result, much-needed investment in environmental infrastructure such as wastewater treatment, air-pollution abatement and monitoring, and industrial and communal waste management are still waiting their turn. Clearly, this is a situation that itself brings humanitarian, social, economic and environmental costs.

Economic regeneration has to be achieved without triggering new threats to the environment, which ultimately supplies the building blocks of human health and well-being. Investing in environmental security must remain high on the agenda in Serbia and Montenegro and in the wider Balkan region. Further clean-up of contaminated areas, investment in cleaner technologies to reduce waste, wastewater and air pollution, as well as sound natural resource management must be combined with stronger environmental policies and cross-border cooperation.

1.5 The fruits of partnership

While recognizing that it is the people and governments of Serbia and Montenegro who bear the responsibility for setting and pursuing their own environmental agenda, UNEP warmly encourages the forging of new partnerships – especially with neighbouring countries – in the field of environmental security to build on the peaceful and promising progress made in recent years. A shared approach to problem solving and information exchange will be to the benefit of all.

The very real achievements on the ground set out in this report would not have been possible without the generous support of the ten donor governments. Moreover, the success of the Clean-up Programme has been largely dependent on the exceptional commitment of local partners. While the political situation demanded UNEP's complete independence, the contribution made by Serbian environmental experts and other specialists has been invaluable. Indeed, the implementation of solutions to complex environmental problems has only been possible as a result of continuous and constructive interaction among all partners at all stages of the work.

Given the generally positive trends now emerging, UNEP is concluding its post-conflict activities in Serbia and Montenegro. However, UNEP calls on the government of Serbia, together with its local partners, to continue striving to reduce environmental risks from contaminated sites and unsustainable consumption and production patterns. UNEP expects and encourages the international community to maintain its partnership with Serbia and Montenegro and to provide further environmental assistance as reconstruction and development gather pace.

UNEP will play its part in this broad-based approach and will continue offering support through its Regional Office for Europe, paying special attention to environmental security, cleaner production initiatives and facilitating the participation of Serbia and Montenegro in multi-lateral environmental agreements.

2 Country context

2.1 Geographical background information

The State Union of Serbia and Montenegro, comprising the Republic of Serbia (capital city Belgrade) and the Republic of Montenegro (capital city Podgorica), is located in the Western Balkans region of south-east Europe. The Adriatic coastline extends for almost 200km and there are land borders with seven other countries (Bosnia & Herzegovina and Croatia to the west, Hungary, Romania and Bulgaria to the north and east, and the Former Yugoslav Republic of Macedonia and Albania to the south). The Danube, which at approximately 2,850 km is the second longest river in Europe, is one of the region's principal transport arteries and most of the country lies within the Danube drainage basin.

■ Landscape regions

The Republic of Serbia includes four major regions. In the north lies the Province of Vojvodina – part of the Pannonian Plain, a fertile area drained by the Danube, Sava, Tisza, and Morava rivers. The central Serbian Sumadija area is hilly and heavily populated, while to the south east are the Balkan Mountains. In the south is the UNMIK-administered Province of Kosovo and Metohija, a mountainous area dominated by the Dinaric Alps.

The Republic of Montenegro, situated on the eastern shore of the southern Adriatic Sea, can be divided into three geographically distinct regions: the coastal lowlands, a central plain, and the highlands of the interior.

■ Climate

The northern part of Serbia and Montenegro has a moderately continental climate, while Mediterranean-Adriatic conditions prevail along the coast. Rainfall increases with distance inland, from about 1,000 mm on the coast to 5,000 mm or more on the higher mountain peaks. The average inland temperature ranges from 18 C in July to 2 C in January, while corresponding figures for coastal areas are around 25 C in July and 5 C in January.

■ Biodiversity

In terms of natural diversity, Serbia and Montenegro is one of the most important areas in Europe, supporting a wealth of plant and animal species that is matched by few other European nations. Protected areas cover a total of more than 338,000 hectares, including ten National Parks.

■ Population

In 2002 the population of Serbia and Montenegro, excluding Kosovo, was estimated at approximately 8 million, or approximately 10 million including Kosovo. The most recent census data available is for the Republic of Serbia, which in 2002 recorded a population of 7.5 million (excluding Kosovo). The population of Montenegro was estimated at 650,000 in 2002.

2.2 The 1990s – a period of conflict and suffering

During the early 1990s, Slovenia, Croatia, Bosnia and Herzegovina, and the FYR of Macedonia all gained independence from the former Socialist Federal Republic of Yugoslavia (SFRY); some at the cost of massive human suffering. In April 1992, Serbia and Montenegro agreed to constitute the Federal Republic of Yugoslavia (FRY).

➤ Map 3. Natural World Heritage Sites, National Parks and Ramsar Sites

NATIONAL PARKS		
Name	IUCN Cat.	Area (hectares)
Biogradska Gora	II	5400
Djerdap	IV	63500
Durmitor	II	32100
Fruska Gora	V	25000
Kopaonik	V	11800
Lovcen	II	6400
Sar-Planina	II	39000
Skadarsko jezero	II	40000
Tara	II	19200
Shara mountains	Unset	-

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Between 1991 and 1996 the UN Security Council adopted resolutions imposing sanctions against the FRY. These were lifted following the conclusion of the Dayton Peace Accord, which marked the end of the conflict in Bosnia and Herzegovina and imposed a series of obligations on the FRY. However, in 1998 a new conflict erupted, this time within the FRY itself, in the Province of Kosovo.

Crisis point was reached in March 1999 when the Rambouillet peace negotiations collapsed, leading NATO to initiate a three-month campaign of air strikes against targets in the FRY. Hostilities ceased in June 1999 but the FRY remained isolated internationally until the fall of the Milosevic regime in October 2000.

2.3 A new beginning

The FRY was officially dissolved on 4 February 2003 when the Federal Parliament adopted a new Constitutional Charter and proclaimed the establishment of the State Union of Serbia and Montenegro. The new State Union was designed to increase cooperation between the two republics, to create a single market and to ensure a more equitable balance of power and responsibility. Since the change of government in October 2000, the key priorities for Serbia and Montenegro have been to work for membership of the European Union and of NATO and to rebuild political, social and economic cooperation within the wider south-east European region.

Tara Mountain, western Serbia

In June 2003, Serbia and Montenegro finalized an Action Plan to harmonize the economic and customs systems of the two republics, in line with requirements for the EU to conduct a feasibility study for the country's participation in the Stabilization and Association Process – the first step towards EU accession. In a further significant development, Serbia and Montenegro joined the Council of Europe in March 2003.

■ Kosovo

After June 1999, Kosovo became a UN protectorate under the administration of the United Nations Mission in Kosovo (UNMIK), with security the responsibility of NATO's Kosovo Force (KFOR). From early 2001, UNMIK has been working with representatives of the Serbian and Federal/State Union governments to re-establish a stable situation in the region. Kosovars elected a new assembly in November 2001, which formed a government and chose a president early in 2002. In 2003, UNMIK transferred certain governing competencies to bodies formed as part of the region's provisional institutions for self-government. However, renewed unrest in March 2004 showed that the situation remains fragile.

2.4 The economic situation

Key economic sectors include machine building, metallurgy, mining, and the manufacture of consumer goods, electronics, petroleum products, chemicals and pharmaceuticals.

The policies pursued by the former government, the disintegration of the common market of the former Socialist Federal Republic of Yugoslavia and the sanctions imposed by the UN during the 1990s led to a dramatic decrease in economic output, a situation seriously exacerbated by the Kosovo conflict and its aftermath.

Since the fall of the Milosevic regime in October 2000, the coalition government has implemented economic stabilization measures and embarked on an aggressive market reform programme. These steps have yielded some encouraging results, with both inflation and growth rates showing positive trends. However, the transition costs are high, with significant levels of unemployment and large numbers of people living below the poverty line. After renewing membership of the International Monetary Fund in December 2000, Serbia and Montenegro has continued its reintegration with the international fiscal community by rejoining the World Bank and the European Bank for Reconstruction and Development (EBRD). The country's estimated Gross Domestic Product (GDP) in 2002 was estimated at just over US$ 23 billion, equating to a per capita figure of around US$ 2,200 (compared with corresponding figures for Greece of US$ 203 billion and US$ 19,100).

2.5 Environmental protection and management

Under Serbia and Montenegro's Constitutional Charter, the State Union conducts international relations on such matters as foreign affairs, defence, trade and economic relations, human rights and minority rights. Responsibility for domestic matters, including environmental issues, is delegated to the republic level and handled by ministries in the Republic of Serbia and the Republic of Montenegro, respectively. As environmental protection is principally under the jurisdiction of the two republics, local governments cannot, at present, adopt their own laws or regulations. Instead, they are responsible for enforcing state environmental legislation and for providing services such as water supply, sewerage, sanitation, and the collection and disposal of municipal solid waste.

The constitutions of the Serbian and Montenegrin republics provide for the right to a "healthy environment and timely information on the state of the environment", while environmental framework legislation establishes the right of access to information on the environment. Although a new environmental framework law is pending, public participation is not granted explicitly under the Serbian Law on Environmental Protection or in the regulations on environmental impact assessment. By contrast, the Montenegrin Law on Environment and the republic's Regulation on Impact Assessment each contains several provisions relevant to public participation in the decision-making process.

Serbia and Montenegro has inherited a reasonably well-developed environmental protection and management system. Until the end of the 1980s, around 1% of the former SFRY's GDP was invested in environmental protection. However, the events of the 1990s meant that the environmental management system was disrupted for almost ten years. At the same time, the country experienced:

- A lack of investment in cleaner technologies and in environmental protection, management and monitoring;
- Uncontrolled or poorly controlled exploitation of natural resources;
- A drive for industrial and energy output with little regard to resulting pollution.

2

As described in Chapter 3, air strikes during the 1999 Kosovo conflict inflicted severe damage on military and industrial installations, with consequent pollution of ground, air and water. UNEP's post-conflict assessment work drew particular attention to four environmental hot spots in Serbia.

Since 2000, there have been more encouraging signs. A National Environmental Action Plan (NEAP) is currently under development with funding from the European Agency for Reconstruction, and an Environmental Performance Review has been undertaken by the United Nations Economic Commission for Europe (UNECE) in the framework of the 'Environment for Europe' process. The Serbian authorities have prepared a new environmental framework law and established an Environmental Protection Agency. This is expected to lead to more systematic monitoring, enhanced environmental information, and stricter inspections and enforcement. A Sustainable Development Council was convened by Serbia in December 2003 and there are plans to revive a similar structure that was established by the Republic of Montenegro in the early 1990s.

Environmental impact assessment

In Serbia, a preliminary Environmental Impact Assessment (EIA) is required to meet initial planning requirements, whereas a detailed EIA is required before a construction permit can be issued. Regulations governing EIAs were introduced in 1992, meaning that facilities constructed prior to that year have not required EIAs. Because of notable shortcomings under existing EIA legislation, the pending environmental framework law foresees changes that will bring consistency with EU norms. In the Republic of Montenegro, EIA regulations define only general categories of activities with few details relating to size, impact or precise type of proposed activity.

Environmental inspection

Environmental inspections are carried out at republican and municipal levels, as well as at provincial level in Vojvodina. The republican inspectors are authorized to enforce environmental protection regulations, although their powers are generally rather limited in practice. Furthermore, because of the fragmentation of legal competence among different public bodies, inspectors frequently lack the authority needed to conduct a full environmental investigation and have little or no interaction with the other relevant services.

The Municipal level

The Republics of Serbia and Montenegro are in the process of enacting laws on local self-governance that should decentralize competences and financial resources. The transfer of responsibilities to local level should highlight both institutional weaknesses and opportunities for improving local capacities for environmental management. A very significant and positive development at municipal level in Serbia is the widespread production of Local Environmental Action Plans (LEAPs). The LEAP process, which has evolved in more than ten municipalities, has enabled a broad spectrum of local stakeholders to identify local environmental priorities and associated fundable projects. With the exception of one municipality, LEAPs have not yet been developed in Montenegro.

National and international cooperation

In July 2002, the Serbian and Montenegrin environment ministries agreed to cooperate on environmental protection and to establish a coordinating body to carry out joint environmen-

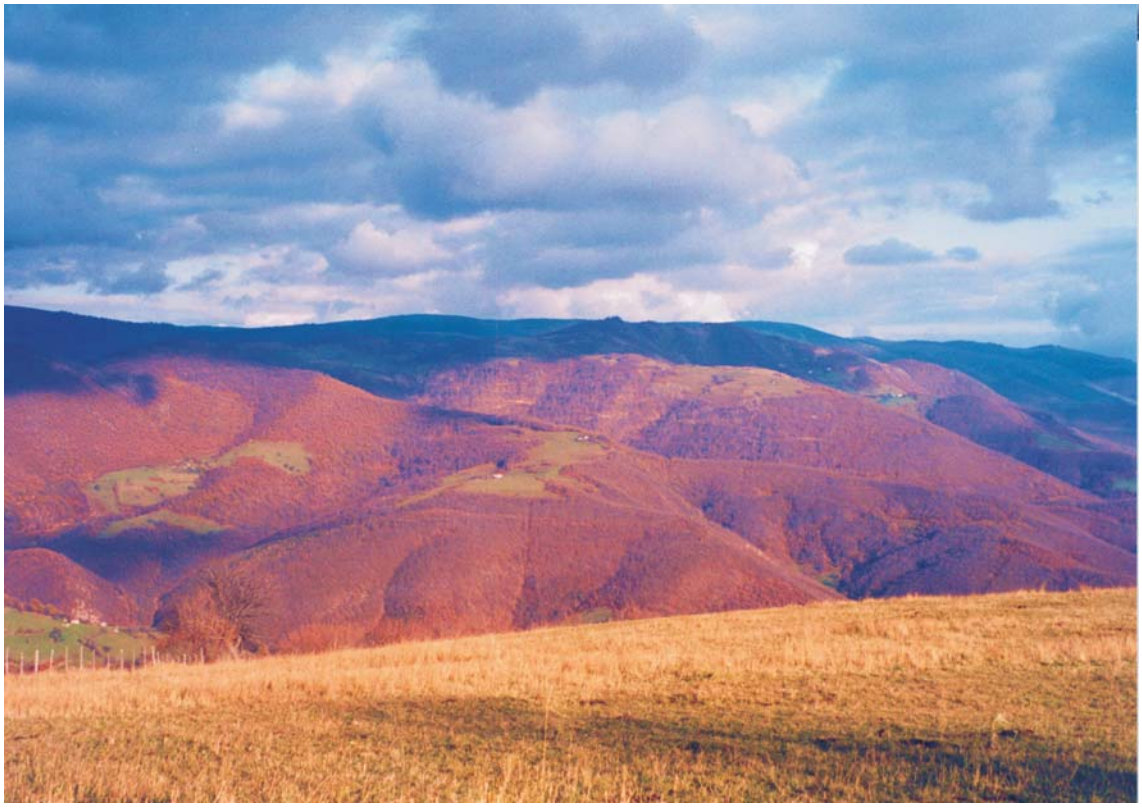
tal activities. This should help to enhance the implementation of international agreements on environmental protection and has already led to an increased level of cooperation with the European Environment Agency (EEA) and other international organizations.

In line with requirements to prepare for EU accession, Serbia and Montenegro will need to ratify a number of key international environmental agreements and to begin the process for approximating its environmental legislation, regulation and monitoring to EU norms and standards. Serbia and Montenegro is a party to – among others – the 'Basel' Convention on Transboundary Movements of Hazardous Waste, the UN Framework Convention on Climate Change and the 'Ramsar' Convention on Wetlands. The country has signed, but not yet ratified, the Convention on Biological Diversity.

■ Key environmental challenges

Presently, most environmental pressure in Serbia and Montenegro comes from urban areas and associated industries, with the collection, treatment and disposal of hazardous waste of all kinds, non-hazardous solid waste, and wastewater being among the most challenging issues. Building of environmental management capacity among government agencies, municipalities, and the private sector is also a priority.

Serbia and Montenegro's industrial facilities today face the dual challenge of re-establishing themselves at the same time as addressing the legacy of past pollution. There is an urgency to prevent further environmental degradation and to initiate new environmental and industrial management practices. For example, the implementation of cleaner production methods would improve industrial competitiveness, especially among small and medium-sized enterprises, at the same time strengthening adherence to international environmental standards and trade requirements, as well as ability to attract international investment.



Sjenica Visovaran, south-western Serbia

3 UNEP's Post-Conflict Environmental Assessment work in Serbia and Montenegro

3.1 Background

When the Rambouillet peace talks failed and NATO air strikes commenced on 24 March 1999, alarming reports began to appear in the media about the environmental damage caused by the bombing. These were accompanied by compelling images of Pancevo and Novi Sad oil refineries on fire, toxic chemicals leaking into the River Danube, and bomb craters in protected areas.

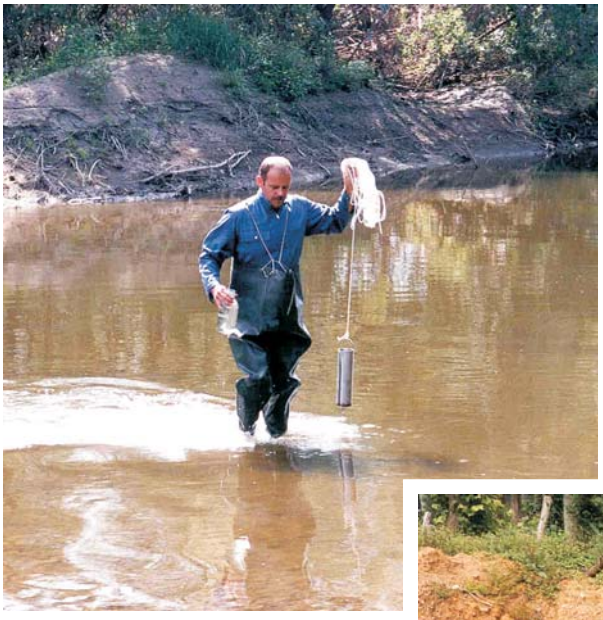
Pancevo, fires at petrochemical complex, Serbia and Montenegro

Raduse refugee camp in the Former Yugoslav Republic of Macedonia

While the immediate humanitarian consequences of the conflict were graphically illustrated by pictures of thousands of refugees fleeing Kosovo, public opinion was more divided over the possible consequences for the environment. On one hand, there were fears of widespread ecological damage in the then Federal Republic of Yugoslavia and possible transboundary impacts on neighbouring countries (especially from air pollution and contamination of the Danube). On the other hand, NATO argued that its use of sophisticated weapons against carefully selected targets would minimize environmental and other 'collateral' damage.

3.2 Scientific field missions

Within weeks of the suspension of NATO air strikes, UNEP had assembled a representative and independent team of international scientific experts and initiated a programme of field missions (see panel on page 21).



Danube river, UNEP water sampling

The sites visited were selected after systematic review of information from a wide range of sources, including the findings of a preliminary field assessment conducted in June 1999. In essence, the sites selected were considered by UNEP as being the locations most likely to have suffered environmental impacts as a consequence of the conflict. However, it is important to underline that it was not feasible for UNEP to undertake a comprehensive field assessment of every targeted location and this was never the intention.

Fruska Gora National Park, bomb crater

Summary of 1999 UNEP/UNCHS (Habitat) expert missions

- UNEP's first expert field mission visited mainly **industrial sites** in the following areas: Pancevo, Novi Sad, Kragujevac, Bor, Pristina, Nis, Novi Beograd, Obrenovac, Kraljevo and Prahovo. Soil, air and groundwater samples were taken and analysed either on-the-spot, using mobile laboratory facilities, or sent to laboratories in Denmark and Germany.
- A second mission to examine **environmental impacts along the Danube River** was organized in close cooperation with the International Commission for the Protection of the Danube River (ICPDR). The principal sites visited were Novi Sad, Pancevo, the 'Iron Gate' Reservoir and the Lepenica and Morava rivers, tributaries of the Danube close to Kragujevac. The scientific work focused mainly on sampling river water, bank and bottom sediments, and freshwater mussels and other invertebrate fauna. For comparison, samples were taken both upstream and downstream of industrial sites damaged during the conflict.
- A third UNEP team investigated the **consequences of the conflict for biodiversity**, especially in protected areas, and visited Fruska Gora National Park, Kopaonik National Park, Zlatibor in Serbia and Lake Skadar in Montenegro.
- The UNCHS expert team, working in Kosovo, conducted studies of municipal administration, regularization of housing and property rights and development of a cadastral information system. An analysis of the **environmental policy and institutional framework** for the Province of Kosovo was also completed.

➤ Map 4. Sites visited by UNEP Balkans Task Force in 1999

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

As part of the field mission programme, UNEP organized stakeholder meetings in Belgrade, Pancevo, Novi Sad, and Nis with representatives of local NGOs, environmental experts, and local authorities.

3.3 Key conclusions from the post-conflict environmental assessment

Based on rigorous assessment of the results from scientific fieldwork, UNEP concluded that the Kosovo conflict had not caused an environmental catastrophe affecting either the wider Balkans region as a whole, or the entire territory of the then FRY. Nevertheless, severe pollution was detected at some sites, presenting risks to the environment and human health.

UNEP identified environmental 'hot spots' in four areas (see panel below) where urgent action was needed. The assessment concluded that it was important to conduct immediate environmental clean-up work in these areas to minimize risks to human health and to avoid long-term ecological damage. The measures identified included, among others, cleaning of the wastewater canal to the Danube in Pancevo, cleaning of mercury from the ground in Pancevo, the decontamination of dioxin and polychlorinated biphenyl (PCB) 'hot spots' in Kragujevac, protecting drinking water wells in Novi Sad, and reducing sulphur dioxide emissions from the copper mine in Bor.

Summary of conflict-related environmental impacts at the four 'hot spots'

Environmental contamination due to the consequences of the Kosovo conflict was identified at all four of the hot spots listed below. However, part of the contamination identified at some sites clearly pre-dated the Kosovo conflict, and there was evidence of long-term deficiencies in the treatment and storage of hazardous waste. During UNEP's investigations, it was occasionally difficult to separate some of the earlier environmental problems from those caused as a result of the then still-recent conflict. In these cases, UNEP took a pragmatic and precautionary approach to making recommendations, with the main concern being to prevent further risks to human health and the environment. As a result, certain problems were considered worthy of urgent remedial action, irrespective of their cause.

Pancevo

Three facilities within Pancevo's extensive industrial complex were assessed:

- The main environmental concerns identified at Pancevo petrochemical plant were serious spills of ethylene dichloride (EDC) and mercury. These had contaminated soil, groundwater and the complex's wastewater canal, which leads to the Danube River. The wastewater treatment plant, though not directly hit during the air strikes, was also damaged, causing untreated wastewater from various units of the petrochemical plant and oil refinery (see below) to flow into the canal.
- At the heavily targeted Pancevo oil refinery approximately 80,000 tonnes of oil products and crude oil burned, releasing sulphur dioxide and other noxious gases. In addition, an estimated 5,000 tonnes of oil and oil products leaked into the soil and the sewer system, aggravating pre-existing soil and groundwater contamination at the refinery.
- At Pancevo fertilizer plant the nitrogen-phosphorous-potassium (NPK) plant and fuel-oil tanks were destroyed, and the ammonia plant was damaged. Large quantities of hazardous substances from the whole complex reached the wastewater canal and the Danube River.

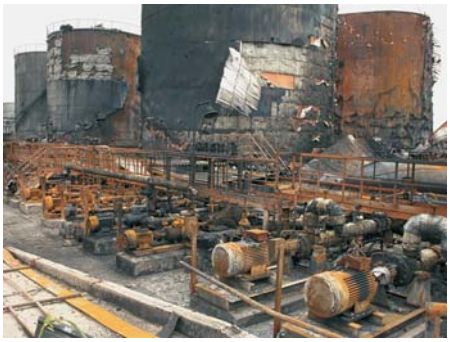
Pancevo, chlorine storage tanks

Pancevo, UNEP soil sampling at oil refinery

Pancevo wastewater canal, 1999

Novi Sad

During the conflict, several storage tanks and pipelines at Novi Sad oil refinery were damaged and in excess of 70,000 tonnes of crude oil and oil products reportedly burned or leaked into the wastewater collection system and the ground, causing contamination of soil and groundwater.



Novi Sad, bomb damage at oil refinery

Kragujevac

The key concerns identified at the Zastava industrial complex, heavily damaged by bombing, were the high concentrations of polychlorinated biphenyls (PCBs) and dioxins detected on the paint hall floor, in the power plant's transformer station and in the sediments of the Lepenica River. It was estimated that approximately 2,500 kg of PCB oil had leaked from damaged transformers.

Kragujevac, bomb damage to Zastava factory

Bor

At the Bor mining and smelting complex, which had also been targeted by air strikes, the UNEP post-conflict assessment identified localized PCB contamination at the site of a destroyed transformer station but also raised concerns about severe and chronic air pollution in the Bor region as a result of the plant's long-term operations.

Bor, UNEP assessing contamination risks at transformer station

The assessment work was financed by twelve European governments and conducted in close cooperation with the European Commission.

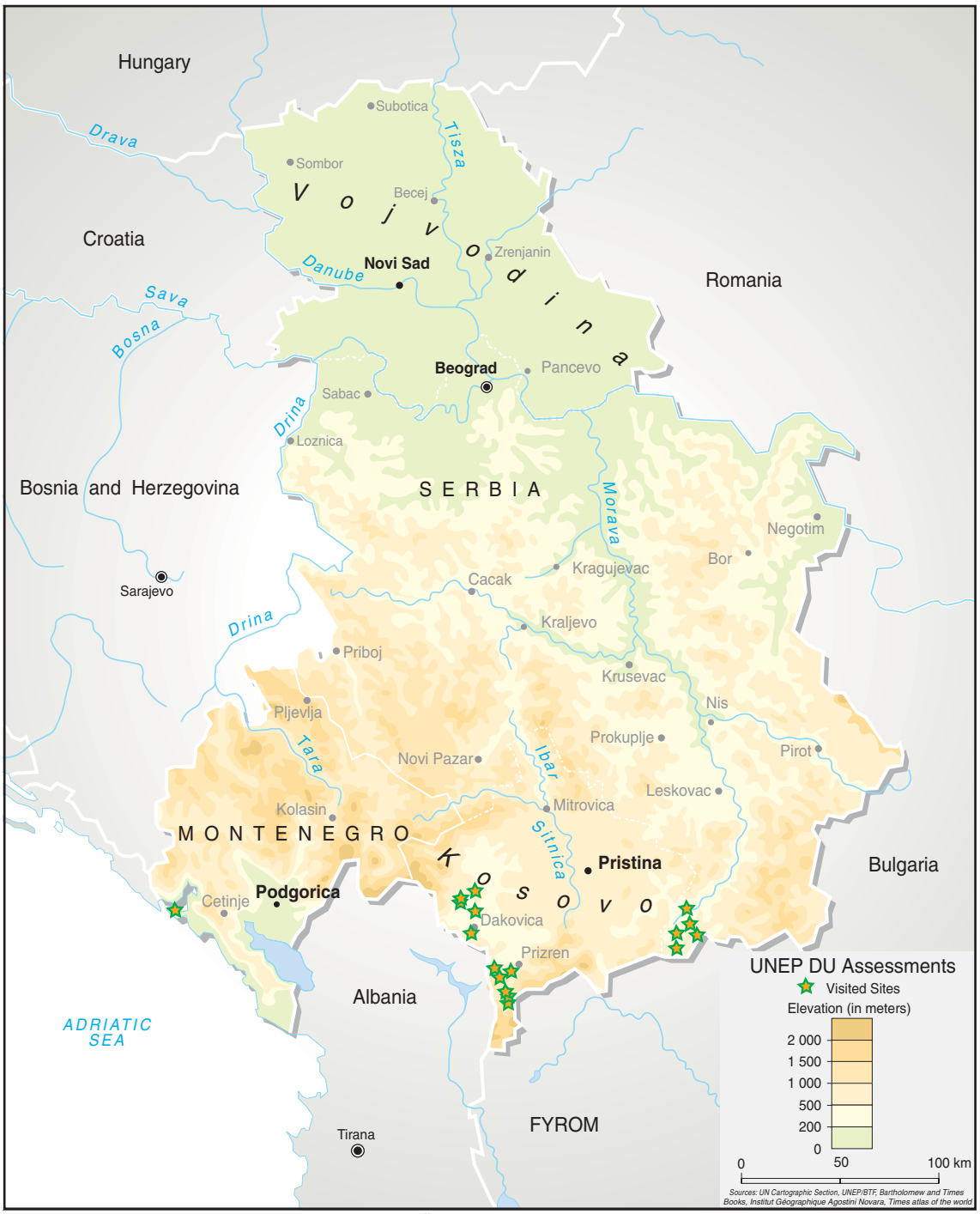
3.4 UNEP's work on depleted uranium and the Kosovo conflict

During the Kosovo conflict NATO had reportedly deployed weapons containing depleted uranium (DU). Responding to widespread public and media concern about the possible environmental and health-related impacts of DU, UNEP immediately launched a desk assessment in partnership with the International Atomic Energy Agency (IAEA) and the World Health Organization (WHO). The aim of this work was to produce an independent, scientific summary of current knowledge about the potential effects of DU and to draw preliminary conclusions concerning general precautionary measures at sites that may have been targeted with DU. The assessment team conducted one fact-finding mission to Kosovo in 1999 and took measurements at a few randomly selected bomb sites, although at that time it was not known whether DU munitions had been used at the locations visited.

Conscious of the limitations of such generic findings and the impossibility of conducting more meaningful field investigations in the absence of location data, UNEP formally requested NATO to provide the coordinates of sites targeted with DU munitions.

As soon as this information was provided by NATO, in July 2000, UNEP began organizing a scientific field mission to DU-targeted sites in Kosovo. This mission took place in November 2000 and was complemented by a further field mission in October 2001 to DU-targeted sites in Serbia and Montenegro. UNEP's findings from this work – which, like the other components of the post-conflict assessment, was unique in its scope and implementation – were published in two reports: *Depleted Uranium in Kosovo: Post-Conflict Environmental Assessment* (2001) and *Depleted Uranium in Serbia and Montenegro: Post-Conflict Environmental Assessment in the Federal Republic of Yugoslavia* (2002). UNEP ensured that the key findings were communicated directly to the relevant authorities, to the international community, and to the wider public. Some of the main conclusions and recommendations are summarized in the panel on the next page.

➤ Map 5. UNEP depleted uranium assessments



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

3

Summary of UNEP's key conclusions and recommendations concerning sites targeted with depleted uranium weapons during the Kosovo conflict

- There was no significant, widespread contamination of the ground surface found at any of the sites visited. Detectable contamination was typically limited to areas within 1-2 metres of either any remaining DU fragments on the ground, or the actual points of impact of DU munitions.
- There was no significant environmental risk related to these localized points of surface contamination ('contamination points').
- There was a possible health risk to anyone handling either DU fragments or soil/debris from contamination points. While the corresponding radiological risk would be insignificant, ingestion by accidental transfer from hand to mouth might be significant toxicologically.
- It was probable that the majority of DU penetrators remained buried below the ground surface, gradually corroding. This constituted a potential risk of future DU contamination of groundwater and hence of some drinking water supplies. While corresponding radiation doses would be very low, the uranium concentration close to heavily targeted sites might, at some point in the future, exceed WHO health standards for drinking water.

In view of the above, UNEP recommended a **precautionary approach** to site management, aimed at **avoiding and/or minimizing any radiological or toxicological risks to the environment or human health**:

- At all sites in Serbia and Montenegro where DU has been used, the appropriate authorities should undertake complementary field searches for ground surface contamination. At the same time, the feasibility of any necessary clean-up and decontamination measures should be assessed.
- Points of localized DU contamination should be decontaminated where feasible and justified. Until this work is complete, affected sites should be fenced off and equipped with warning signs to minimize any unnecessary risk to the public.
- Even at decontaminated sites signs should be retained indicating that:
  - the site has been subject to an attack using DU ammunition; but
  - following decontamination, there is no radiological or toxicological risk of concern;
  - if, nevertheless, any DU fragment should be found, it should not be picked up, but the local police or health authority should be informed.
- Contaminated material should be disposed of safely, as determined by the relevant competent authorities. If decontamination is not possible, contamination points should be covered by some durable material, or the area isolated.
- Within, and adjacent to, areas where DU has been used, groundwater used for drinking should be monitored by the appropriate authorities for possible DU contamination.
- The competent authorities should ensure that adequate records are maintained for each site and that appropriate mechanisms are in place to avoid unnecessary risks in the future (e.g. through disturbance of sub-surface DU contamination as a result of construction work).

(for detailed conclusions and recommendations see the full reports downloadable from http://postconflict.unep.ch)

The remainder of this report focuses on UNEP's subsequent follow-up work at Pancevo, Novi Sad, Kragujevac and Bor, beginning with initiation of a Feasibility Study (Chapter 4) to prepare detailed technical proposals, and culminating in implementation of an environmental Clean-up Programme (Chapter 5) funded by ten governments.

UNEP depleted uranium assessment mission near Bukurevac, Serbia and Montenegro

4 UNEP's Feasibility Study

4.1 Environmental remediation priorities

As described in Chapter 3, the October 1999 report *The Kosovo Conflict – Consequences for the Environment and Human Settlements* singled out four heavily polluted environmental 'hot spots' (Pancevo, Novi Sad, Kragujevac, and Bor), where immediate remedial action was needed.

As the situation at the hot spots had important implications for human health and welfare, UNEP suggested that these should be addressed within the framework of humanitarian post-conflict assistance. Subsequently, in November 1999, the four hot spots were included by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) in its 2000 *Consolidated inter-agency appeal for funding humanitarian assistance*.

In order to promote the required action, by national as well as international stakeholders, and to bridge the gap from assessment to implementation, UNEP conducted a Feasibility Study to define in more detail the scientific and associated financial requirements required for clean-up of the hot spots. Thus, the original UNEP post-conflict assessment report was followed by a Feasibility Study report, finalized in April 2000, that identified a total of 27 clean-up projects for the four sites. These were designed to address the post-conflict environmental problems – and linked humanitarian concerns – and had a combined cost estimate of approximately US$ 20 million[1]. Based on the key issues identified during the post-conflict assessment and in particular on the more detailed site-based investigations accomplished during the Feasibility Study, the main objectives were clarified and priority project proposals elaborated for each hot spot, as summarized below.

4.2 Technical project proposals at four 'hot spots'

Pancevo

In order to reduce health risks to factory workers, and to protect both groundwater and the Danube River system from significant pollution, the Feasibility Study recommended 14 remediation and monitoring projects for immediate action at Pancevo industrial complex. Particular priority was given to groundwater and soil remediation projects (with complementary monitoring programmes), rehabilitation of wastewater treatment and pre-treatment facilities, and remediation of the wastewater canal.

Novi Sad

In order to protect groundwater – particularly the nearby abstraction zone for Novi Sad's drinking water, to prevent pollution from reaching the Danube system, and to reduce health risks to refinery workers, the Feasibility Study set out seven projects for immediate action. Priority project proposals covered groundwater protection, remediation, and monitoring, soil remediation, and repairs to damaged sewerage systems.

Kragujevac

To reduce risks to the health of factory workers, to prevent risks from the storage of hazardous waste and to avoid pollution entering the nearby river system, the Feasibility Study detailed five remediation projects, dealing primarily with PCB contamination within the Zastava industrial complex.

Bor

To reduce the exposure of factory workers to health risks and to prevent further immediate risks from the inappropriate storage of hazardous waste the Feasibility Study presented a project designed to deal with PCB contamination at the destroyed transformer station.

The Feasibility Study project proposals provided clear guidance to international and local stakeholders with regard to priorities and immediately required actions at the four sites. The Study also set the baseline for further technical preparations prior to actual project implementation.

Pancevo petrochemical plant, sampling at wastewater treatment plant

5 UNEP's Clean-up Programme - implementation of environmental remediation projects, 2000–2003

5.1 Strategic and institutional framework

As described in Chapter 4, the findings of the Feasibility Study were addressed in spring and summer 2000 to all interested parties, especially potential donors within the international community. It was not UNEP's original intention to itself undertake a major programme of remedial actions in Serbia and Montenegro. However, UNEP was strongly urged to fulfil such a role when it became clear that there was no obvious alternative coordinating body that would be broadly acceptable to all parties.

It was against this background that UNEP began preparation of a Clean-up Programme, which was launched in the second half of 2000. At that time – when no international environmental assistance programmes were operating and institutional and other enabling frameworks were lacking – the logistical and institutional assistance provided by the UN and UN Development Programme (UNDP) Liaison Offices in Belgrade proved instrumental.

In November 2000, UNEP and the UN Office for Project Services (UNOPS) entered into a partnership whereby UNEP took responsibility for the strategic direction, technical coordination of external relations, and fund mobilization for the Clean-up Programme, while UNOPS provided management expertise, complementing UNEP's environmental and technical know-how.

Following the change of government in October 2000, UNEP and the new national authorities concluded a Technical Cooperation Framework for the Clean-up Programme. The Federal Department of Environment of the Secretariat of Health, Labour and Social Care acted as the national counterpart to the Programme until February 2003, when the Union of Serbia and Montenegro came into being. Subsequently, the Ministry for Protection of Natural Resources and the Environment of the Republic of Serbia (MPNRE/RoS) was assigned the counterpart function. As part of this function, stakeholder coordination meetings were organized to ensure transparency of the Programme, to report on progress with implementation and to take note of any other issues raised. Altogether, four such meetings took place during the period 2001 to 2003. In March 2004, following establishment of a new Serbian government, the MPNRE was integrated into the Serbian Ministry for Science and Environmental Protection, which constitutes the Programme's official hand-over partner.

In order to establish an institutional framework for programme implementation at the local level, UNEP established Memoranda of Understanding (MoUs) for the hot spots of Pancevo, Novi Sad, and Kragujevac in April 2001. In addition, a Memorandum of Agreement with the Municipality of Bor was established as a cooperation framework for environmental capacity-building activities. The MoUs were signed by local stakeholder groups including the relevant municipalities and site owners, and set out general principles and objectives as well as respective roles and responsibilities. These then provided the basis for UNOPS to enter into a Project Specific Agreement (PSA) for each clean-up project with the respective site owner(s). This aimed at defining the scope and timeframe of clean-up works to be undertaken, the

procurement strategy to followed, and the allocation of tasks, responsibilities, liabilities, and reporting requirements.

With regard to international partners in the field, UNEP signed an MoU with the Swiss Agency for Development and Cooperation (SDC) in early 2001 with a view to ensuring coordination and exchange of information between parallel UNEP and SDC clean-up initiatives in Novi Sad and Pancevo. The MoU promoted the establishment of regular coordination meetings and formed the basis for UNEP to benefit from SDC field expertise and monitoring results.

Whereas the main focus was to address immediate environmental risks to human health, the Programme also undertook to build local capacities in support of project implementation. As a result, a series of workshops, training courses and/or seminars was organized – see *Capacity-building activities* on page 46.

5.2 Programme management framework

With the aim of maximizing delivery on-the-ground in the most cost-effective manner, a Project Implementation Office (PIO) was established in Belgrade. This was headed by a Programme Manager who was authorized to award contracts in line with established UN procedures for procurement of goods, services and/or works, thereby ensuring open and transparent tendering processes. The PIO comprised of a technical expert team and an administrative/logistical support unit, all recruited locally, and undertook the coordination of project design, tendering and implementation. The PIO was supported and guided as appropriate by UNEP and its extensive expert network.

Partnerships with national and local stakeholders and corresponding coordination mechanisms were developed and maintained throughout the Programme, so as to ensure local ownership and cost-effective implementation.

The Programme maintained relations with the donor community and national authorities on strategic, institutional and/or funding issues. Donor briefings were organized in Belgrade on a regular basis to report on the progress of the Clean-up Programme, to invite comments, and to exchange information on environmental initiatives. This was especially valuable as there were – at that time – no well-established donor coordination mechanisms for the environmental sector. In addition, visits to the four sites were arranged as required by individual embassies.

With the first funds becoming available in the second half of 2000, the programme began operations in Serbia and Montenegro with preparatory UNEP missions to set up the strategic and institutional framework. However, it was not until the arrival of the Programme Manager and the establishment of the PIO, in December 2000 and January 2001 respectively, that the implementation phase of the Clean-up Programme could really begin.

Given the level of funding secured by the end of 2000, namely US$ 5 million, the project was forced to make an additional selection among the 27 priority projects identified in the Feasibility Study, which had a combined total budget of US$ 20 million. The following selection criteria were therefore applied by UNEP:

- Urgency of impact/risk mitigation;
- Relevance to a large number of people and/or a large geographical area;
- Long-term importance for human communities and/or the environment;
- Extent of expected environmental benefit/return; and
- Future sustainability.

As a result, the project's initial focus was on the implementation of a first series of ten projects in three of the four hot spots, i.e. Pancevo, Novi Sad, and Kragujevac. Later, with more funding secured, the Programme extended the clean-up works to cover 16 projects, at all of the four sites.

Meanwhile, the Clean-up Programme encouraged parallel remediation initiatives. In this regard, SDC and the Czech Government focused on other projects included in the original portfolio of 27 priority projects. These are summarized in the relevant site-specific sections below.

The project summaries from the Feasibility Study served as an excellent starting point for the preparation of project implementation. However, initial budgets and/or time schedules needed to be modified in a number of instances due to factors such as the specific conditions encountered at project sites, technological complexities, legal/procedural requirements, reliance on in-kind contributions by site owners, participatory stakeholder group processes, and/or the specific characteristics of bidding processes.

Special efforts were made to ensure that remediation activities:

- Conformed to international standards while respecting national and local legislation;
- Promoted the principles of 'cleaner technology';
- Strengthened local and national capacities;
- Encouraged local solutions; and
- Contributed to raising environmental awareness.

The Clean-up Programme aimed to make use of local capacities as far as possible for the implementation of works. In reality, this meant that most civil and hydraulic works, as well as standard environmental impact and risk assessments, were contracted locally, whereas specialized remediation expertise was outsourced to international companies. Of a total of nearly 400 contracts, some 300 were awarded to local companies or institutions accounting for over 50% of the total value of all contracts. This contributed to local capacity building and provided important inputs to the generation of local income and employment.

A number of local institutions played instrumental roles during the Programme's implementation. Noteworthy in this respect is the Institute of Public Health – Belgrade, the designated national institute for the classification of hazardous waste under the Basel Convention, which provided professional, flexible, value-for-money cooperation. In addition, the highly professional services of the Jaroslav Cerni Institute in Belgrade were used for water-flow modelling, hydraulic designs, and complex technical designs for key industrial infrastructure.

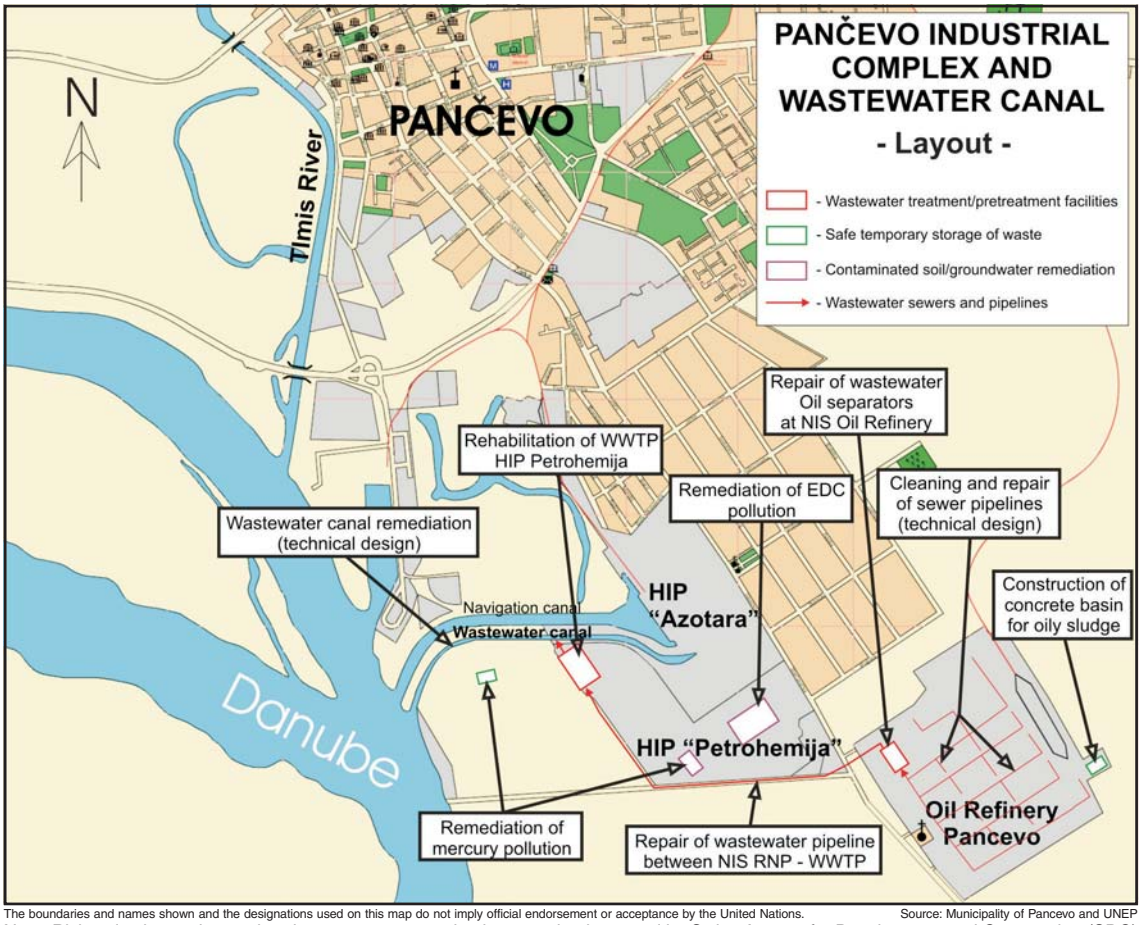
5.3 Implementation of the Clean-up Programme at each 'hot spot'

PANCEVO

The UNEP Feasibility Study report identified 14 priority projects in Pancevo industrial zone, aiming to reduce risks to factory workers, to downstream water resources and to the Danube River. However, as for the other hot spots, the financial situation required further prioritization among project proposals. It was clear from the outset that the remediation needs in Pancevo were greater than for the other three sites and that therefore a larger portion of Clean-up Programme resources would be allocated there. Efforts concentrated on dealing with the causes of more immediate risks to the environment and human health, with clean-up measures focusing on:

- Remediation of soil and groundwater contamination at the petrochemical plant;
- Rehabilitation of wastewater treatment facilities to stop the continuous discharge of untreated industrial wastewater into the wastewater canal and the Danube River;
- Remediation of the wastewater canal. (In spite of a lack of funds for actual implementation of this project, preparation of technical designs proceeded while other funding options were explored).

➤ Map 6. UNEP Clean-up Projects at Pancevo industrial complex



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Source: Municipality of Pancevo and UNEP

Note: Risk reduction projects related to mercury contamination were implemented by Swiss Agency for Development and Cooperation (SDC)

■ Remediation of ethylene dichloride (EDC) pollution

The 1999 air strikes damaged ethylene dichloride (EDC) storage tanks and some 2,100 tons of EDC were spilled, half of which had reportedly entered the soil and half of which had flowed into the wastewater canal. UNEP sought to decrease health risks for factory workers and to protect groundwater resources and the Danube River by reducing EDC contamination in both groundwater and soil.

Destroyed VCM storage tank at petrochemical plant

5

Working in close cooperation with the petrochemical plant, as well as Czech partners, comprehensive works on subsurface characterization and pilot tests were performed in order to select the best-available technology for soil and groundwater remediation at the vinyl chloride monomer (VCM) plant. With the contamination plume in the upper aquifer delineated and the pump-and-treat technology selected and specified, the actual remediation system was established. With a view to ensuring sustainability of operations, UNEP funded the upgrade and optimization of existing treatment facilities at the VCM plant.

Groundwater remediation, pilot testing

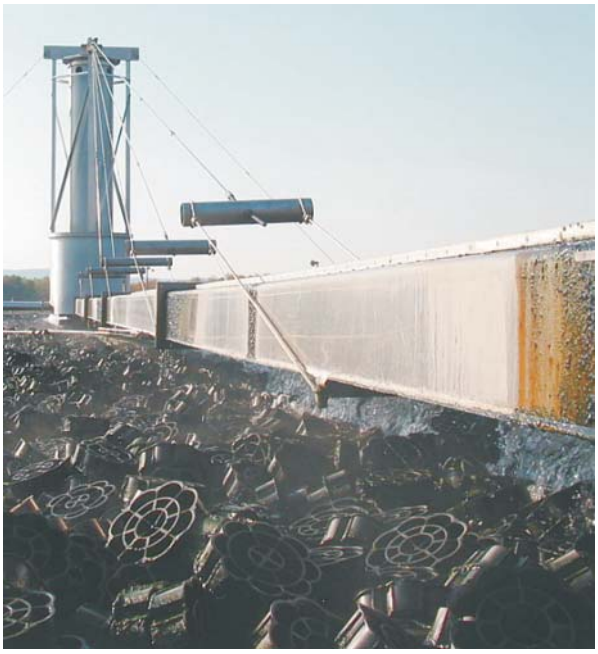
Groundwater remediation, discharge of treated water

By January 2004, the system had recovered and treated over 400 tonnes of EDC. Following the training of local partners and the development of clear recommendations for required follow-up measures, the UNEP Clean-up Programme handed over the full-scale remediation system to the site owner in April 2004. The petrochemical plant – HIP PetroHemija – has taken over responsibility for operating and further optimizing the system until clean-up targets, to be regularly reviewed with the national environmental authorities, have been met.

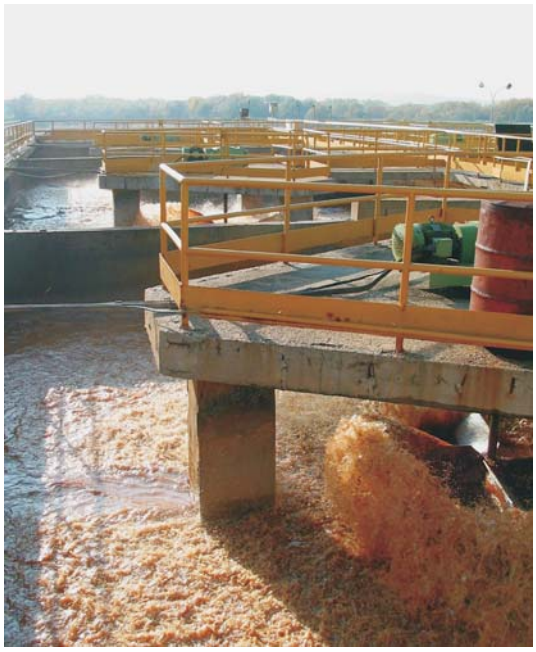
■ Rehabilitation of the wastewater treatment plant

The wastewater treatment plant (WWTP) at Pancevo petrochemical plant was not directly targeted during the 1999 bombing. However, damage to the VCM and chloro-alkali plants, and to the oil refinery resulted in the discharge of approximately 170,000 m^3 of raw materials, products and fire-fighting water. This flow overloaded the WWTP's capacity, damaged process equipment, clogged the units with contaminated sludge, and cracked or otherwise damaged concrete retaining structures.

Trickling filter reconstruction



Refurbished trickling filter in operation



Former activated sludge plant

In order to protect the Danube River system and downstream water supplies, the project involved replacing mechanical and instrumental equipment, repairing of the trickling filter and pH regulation facilities, and rehabilitation of the activated sludge unit. This allowed the WWTP to resume treatment of wastewater from the petrochemical plant and Pancevo oil refinery. Consequently, the WWTP's hydraulic and treatment capacity has been restored, and, following the scheduled completion of further work in June 2004, significantly improved when compared with pre-conflict levels. The loading of pollutants entering the Danube River and the associated risks to downstream water supplies and ecology have been significantly reduced.

Repaired activated sludge basin interior

■ Rehabilitation of wastewater pre-treatment facilities

During the 1999 conflict, large quantities of oil, debris and other materials clogged and partly damaged the sewer pipes, oil separators and discharge pipelines at Pancevo oil refinery. Since then, all of the refinery's wastewater has been discharged directly into the canal and the Danube River without final treatment of oily wastewater at the petrochemical plant's integrated WWTP.

Oil separators prior to rehabilitation

Damaged section of the pipeline from oil refinery

5

The wastewater pre-treatment facilities at Pancevo oil refinery – including the oil separators – have been repaired and upgraded, and new mechanical and instrumental equipment has been supplied. The repair of the wastewater pipeline between the refinery and the petrochemical plant enables pre-treated wastewater to be transported from the refinery to the WWTP before discharge to the wastewater canal. As an integral precondition to this project, UNEP funded the construction of an additional 1,700 m^3 of oil-sludge storage capacity for the removal and safe disposal of spilled oil and oil products that would otherwise hamper the rehabilitation of pre-treatment facilities.

Reconstruction of oil separator's structure at Pancevo oil refinery

Installation of new equipment

Test run of rehabilitated oil separators

In addition to outlining a strategy for rehabilitation and priority repairs, the Clean-up Programme assessed the refinery's sewer network and provided a technical design for its rehabilitation. Consequently, Pancevo oil refinery was able to undertake a number of urgent repairs and modifications. As part of its capacity-building efforts UNEP also delivered a study of integrated wastewater management, which recommended technical solutions for improved management and emergency control systems.

Pancevo oil refinery and the petrochemical plant are in the process of concluding a new agreement on the terms and conditions for the receipt and treatment of oil wastewaters. Improved efficiency in the operation of the pre-treatment facilities, combined with redirection of pre-treated oily wastewater through the repaired pipeline to the WWTP for final treatment, significantly reduces pollution in the area and in the Danube River.

■ Wastewater Canal Remediation (Preparation of technical documentation and design)

UNEP investigations confirmed that high concentrations of industrial wastewater pollution, in part due to the Kosovo conflict, were present the canal. In order to prevent the discharge of dissolved and sediment-associated pollutants and to protect downstream drinking-water resources and the Danube River system itself, UNEP undertook remediation design activities.

Upper part of Pancevo wastewater canal, 2002

The sediments present at the site have been comprehensively characterized. Investigations confirmed that the canal held 41,000 m^3 of sediment containing significant concentrations of mercury and mineral oils. However, results also revealed a notable reduction in EDC concentration compared with levels immediately after the conflict and that free-phase EDC was no longer present in the canal. Mercury and mineral oil concentrations, however, remain high, with an estimated 550 tonnes of mineral oils and 260 kg of mercury present in the canal sediment. However, the pollutants are primarily bound to solid particles. This means that it is only possible for small portions of the pollutants to be dissolved and washed out.

Middle part of Pancevo wastewater canal, fertilizer plant visible in the background, 2003

Due to the lack of an adequate legal framework in Serbia, UNEP itself initiated a comprehensive stakeholder process to identify suitable options, to build consensus and to raise additional funds. Under the leadership of the Serbian Ministry, local and national stakeholders asked UNEP to develop preliminary environmental impact assessments (EIAs) and general designs for two remedial options: (i) dredging the sediment and depositing it in a new landfill; and (ii) dredging and dewatering the sediment and treating it with thermal desorption. Through a step-by-step consensus-building effort, stakeholders in Pancevo and the national environmental authorities expressed their commitment to meeting technical preconditions for sustainable remediation measures (i.e. no further contamination to enter the canal). In addition, fund-raising efforts by UNEP and the Serbian authorities led to the European Commission's European Agency for Reconstruction earmarking resources to support implementation. The parties concerned have therefore shown their readiness, in principle, to begin implementing the recommendations put forward by UNEP.

The UNEP Clean-up Programme enabled seven of the fourteen Feasibility Study projects for Pancevo industrial complex to go ahead. With the Swiss Agency for Development and Cooperation (SDC) taking on groundwater monitoring projects and remediation measures related to mercury contamination at the petrochemical plant, only projects dealing with oil-contaminated soil and groundwater at Pancevo oil refinery, and risk-reduction measures at an unsafe sludge lagoon, remain to be dealt with.

It is evident at Pancevo industrial complex that some conflict-related environmental problems persist, though these have been considerably reduced in extent and magnitude. At the same time, chronic environmental problems, such as industrial air pollution and improper waste management, remain significant and solving these problems will require investment and improvements to management practices. The privatization processes in Serbia and Montenegro may provide some opportunities for attracting the required re-investments for effective follow-up to UNEP's Clean-up Programme and for addressing the evident overall and longer-term environmental challenges.[2]

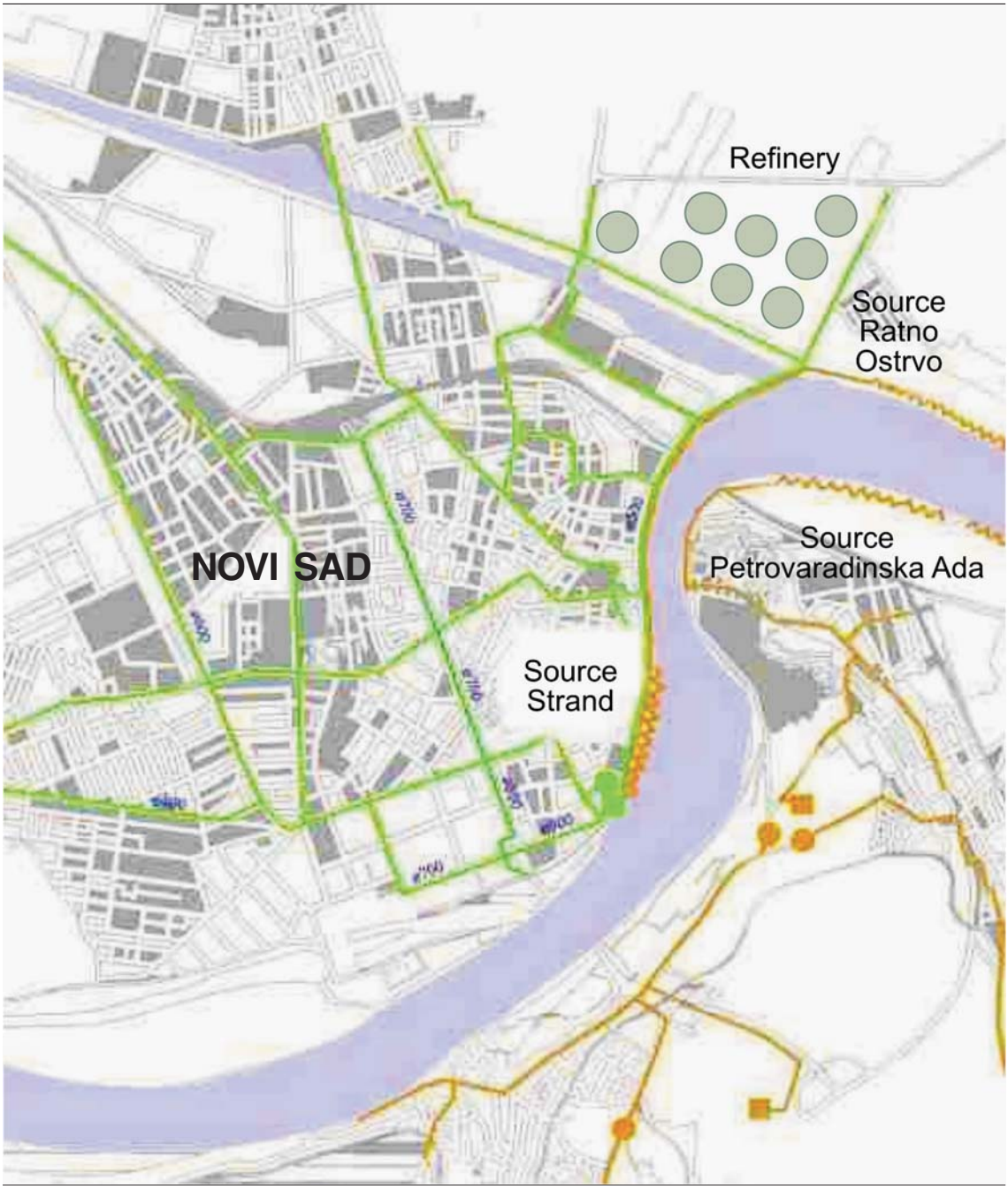
5

NOVI SAD

Building on the seven projects identified during the UNEP Feasibility Study, and following further prioritization due to budget constraints, the Clean-up Programme concentrated on:

- Protecting the Ratno Ostrvo drinking-water wells in the area between Novi Sad oil refinery and the Danube River (the wells constitute approximately 40% of the water supply intake for the city of Novi Sad which does not have alternative water intake sources for equivalent volumes);
- Comprehensive monitoring of the area's groundwater resources;
- Initiating efforts to address the contamination source zone within the oil refinery.

➤ Map 7. Outline map of Novi Sad showing location of refinery and groundwater sources for municipal water supply

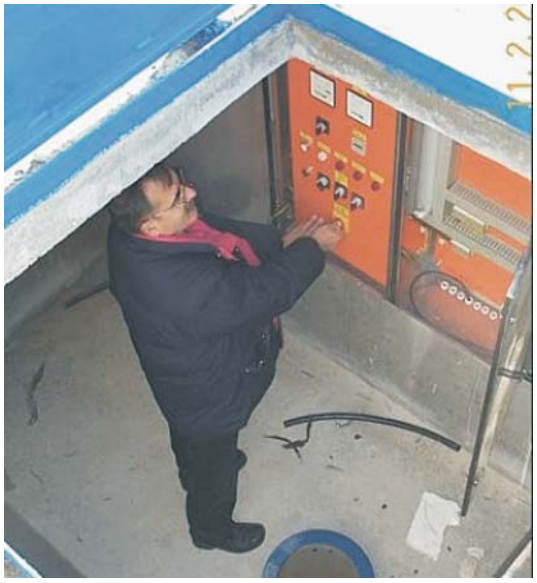


The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Source: Municipality of Novi Sad and UNEP

■ Protecting drinking water wells from oil contamination

In addition to the spillage of large quantities of oil caused by the 1999 conflict, Novi Sad oil refinery has been a source of longer-term and ongoing pollution. Consequently, the entire refinery area was considered a potential source from which contamination could migrate. As the refinery is constructed on back-filled sand, spilled oil easily reaches the shallow groundwater table. Because the Ratno Ostrvo wells are located downstream, in the vicinity of the refinery, immediate measures for protecting the wells were seen as Novi Sad's highest priority.

Protection of groundwater resources at Ratno Ostrvo



Handover of the hydraulic barrier to the Municipality of Novi Sad

Working in close cooperation with Novi Sad Waterworks, UNEP applied a precautionary approach and immediately initiated construction of a hydraulic barrier to prevent the migration of contaminated groundwater from the refinery area towards the drinking-water wells. Work on this project started in mid-2001 and the completed barrier was handed over to the authorities of Novi Sad in April 2002. Since then, Novi Sad Waterworks has tested the equipment on a regular basis. Continuous monitoring (see below) has shown that polluted groundwater has not yet reached the line of the barrier, so its deployment has not so far been needed. While the Clean-up Programme has therefore successfully implemented an effective mechanism to prevent contamination of drinking water, additional measures are needed in the longer term to deal with the actual sources of pollution within the refinery complex.

Since November 2000, monitoring of groundwater quality has been carried out by a partnership between UNEP, Novi Sad Waterworks, the oil refinery, the University of Novi Sad/ Institute of Chemistry and SDC. The extent of groundwater pollution from spills at Novi Sad refinery has been determined. The samples collected have not shown any consistent trend of increasing contaminant concentrations between the refinery and the wells. However, the long-term risk to the wells has been proven. Ongoing monitoring will provide an early warning of any imminent threat to the well field and this will trigger operation of the hydraulic barrier. Hand-over of the monitoring programme to local partners took place in February 2004.

■ Repair of main wastewater collector

An approximately two-kilometre long, buried concrete collector conveys wastewater from the refinery, across the Ratno Ostrvo drinking-water wells, to the Danube. The 1999 air strikes may have further damaged the collector, which was reportedly in poor condition prior to the conflict. Severe leakage from the damaged collector has been polluting groundwater and threatening the nearby wells.

Inside of the collector prior to repair works

Repairs to the collector began once a temporary bypass had been installed to carry the wastewater from the refinery. This connected the outlet of the oil refinery's pre-treatment facility with the Danube through a network of canals. The main collector was then cleaned and, following mapping of required repairs, the actual remedial works were completed in April 2003. The extension of the collector outlet, taking it downstream of the Ratno Ostrvo well field, will further reduce immediate risks to drinking-water resources.[3]

■ Initiating remediation of groundwater contamination at refinery

Working in close cooperation with Novi Sad refinery, and building on complementary studies by Czech partners, UNEP delineated areas within the refinery compound where free-phase oil is present in the groundwater table. Remediation options were reviewed and potential techniques pilot tested. It was decided to commence implementation using a mobile abstraction and separation unit.

By January 2004, approximately 4.5 tonnes of free-phase oil had been recovered. However, this work has provided only a limited solution to the refinery's historic and more recent pollution problems. Following the completion of training activities and provision of follow-up recommendations, operation of the mobile abstraction and separation unit was handed over to the refinery in February 2004.

Remediation of free-phase oil overlying the groundwater table at Novi Sad refinery

In summary, the UNEP Clean-up Programme enabled three of the seven priority projects identified in the Feasibility Study to be fully addressed. With the Swiss Agency for Development and Cooperation (SDC) taking on a groundwater monitoring project, the projects that have not yet been dealt with are: rehabilitation of the oil refinery's sewage system and additional groundwater and soil remediation work. While urgent risk-reduction projects undertaken through the Clean-up Programme have achieved the immediate objective of protecting drinking-water resources at Ratno Ostrvo, the contamination sources within the refinery should be addressed as soon as possible.[4]

Throughout the Clean-up Programme, UNEP has encouraged national stakeholders and international partners to provide additional inputs to risk-reduction efforts. It is therefore encouraging that the refinery, working in cooperation with the national authorities and Czech partners, has initiated efforts to rehabilitate the refinery's sewage system.

KRAGUJEVAC

The UNEP Feasibility Study identified five priority projects at the Zastava industrial complex, all designed to reduce risks to the environment and human health arising from PCB contamination. Although it was originally reported that PCBs (and possibly dioxins and furans) had leaked into the Lepenica River, subsequent sampling by UNEP was unable to confirm these findings. As a result, the Clean-up Programme focused on:

- Remediation within the Zastava complex to reduce risks to factory workers, to prevent further soil and groundwater contamination, and to enable work within the affected production facilities to be resumed.

■ Remediation of PCB-contaminated concrete floor at the paint hall

During the 1999 conflict, two transformers containing PCB oil were damaged in the paint hall. Some 2.2 tonnes of PCB oil leaked from the transformers and flowed onto the concrete floor and in the direction of nearby wastewater pits. Analyses of samples taken by UNEP in 1999 and 2000 showed high levels of PCBs, dioxins and furans in the debris covering the floor surface.

Zastava paint hall after bombing

Covering the restored paint hall floor with fresh concrete

The UNEP Clean-up Programme, working in close cooperation with the Zastava car factory and Kragujevac University's Institute of Chemistry, removed contaminated layers of concrete and soil, packaging the hazardous waste for later final treatment. New soil and concrete base layers were laid and an anti-static epoxy resin was placed over the concrete. A total of 135 tonnes of hazardous waste resulting from the clean-up work was characterized, properly packed, labelled, temporarily stored and later transported and incinerated abroad. This part of the clean-up was completed in August 2002 and enabled industrial use of the paint hall to recommence.

■ Cleaning of the wastewater pits and decontamination of wastewater in the paint hall

PCBs leaking from the two bomb-damaged transformers reached open wastewater pits in the Zastava paint hall and became mixed with water, paint sludge, and debris. The total quantity of PCB-contaminated wastewater in the pits was 6,000 m^3.

To reduce health risks to factory workers, to avoid further cross-contamination, and to protect water resources from additional pollution (in particular through uncontrolled sewerage discharges to the Zdraljica River and the Lepenica River), the PCB-contaminated wastewater was removed from the pits and treated using a remediation method developed by national experts and reviewed by international specialists.

PCB-contaminated wastewater pit in Zastava paint hall

Equipment for treatment of PCB-contaminated wastewater from paint hall pits

In total, 120 tonnes of contaminated debris and bottom sediment were removed. An additional 10 tonnes of equipment from the pits was dismantled, decontaminated and disposed of. The resulting hazardous waste was characterized, properly packed, labelled and later transported and incinerated abroad. This project was completed in April 2002.

■ Remediation of PCB-contaminated site at transformer station

Damage sustained during the 1999 conflict caused a leakage of oil containing PCBs from a transformer at the sub-station close to the headquarters of 'Zastava-Energetika'. UNEP missions in 1999 and 2000 found high concentrations of PCBs and dioxins and furans in concrete surfaces and in a nearby rainwater gully. The contaminated concrete area was estimated as being in the range 150-200 m^2.

Clean-up works under protective tent at Zastava transformer station

Remediated transformer station at 'Zastava Energetika'

The transformer was removed and temporarily stored in an on-site restricted area designated for used equipment containing PCBs. After the removal and replacement of contaminated concrete and soil layers from the transformer pit and the adjacent concrete surface, a replacement transformer free from PCB oil was installed. Approximately 50 tonnes of hazardous waste was characterized, properly packed, labelled and later transported and incinerated abroad (see below). In addition to protecting workers and improving the environment, the project has enabled the transformer station to begin operating again.

■ Transportation and treatment abroad of hazardous waste generated by Kragujevac remediation projects

A total of 315 tonnes of hazardous waste resulting from all of the remediation projects at Kragujevac was packed and temporarily stored on the factory premises as there is no approved facility in Serbia and Montenegro for the environmentally sound disposal of such waste.

Repacking of hazardous waste at Zastava complex

Loading of hazardous waste drums into containers, ready for transport

Transporting of hazardous waste stored in containers to disposal facility abroad

Unloading of damaged PCB-transformer at disposal facility

Therefore, in order to treat and finally dispose of the hazardous waste in accordance with environmentally sound management requirements, the material was transported abroad. UNEP successfully completed this phase of the project in October 2003, working in close cooperation with the Zastava factory and the competent national authorities, and in accordance with the Basel Convention on the Control of Trans-Boundary Movements of Hazardous Wastes and their Disposal.

Four of the five priority projects for the Zastava complex, as identified in the Feasibility Study, were completed in the framework of the Clean-up Programme. The national environmental authorities undertook implementation of the fifth project, concerning monitoring of the Lepenica River, meaning that all five projects have now been addressed. Local and national stakeholders provided strong inputs to successful implementation of all these activities. Indeed, the work carried out at Kragujevac may serve as a case study to assist the strengthening of hazardous waste management capacity elsewhere in Serbia and Montenegro. In view of these positive developments, the joint final assessment mission, conducted by the national authorities and UNEP, concluded that the term 'environmental hot spot' is no longer applicable to Kragujevac.[5]

BOR

While raising overall concerns about severe and chronic air pollution in the Bor region, the UNEP Feasibility Study identified one priority project at Bor mining and smelting complex (RTB Bor) transformer station. UNEP missions in 1999 and 2000 had obtained soil and sand samples from the site of the transformer station that indicated the presence of PCBs. However, by the time the Clean-up Programme commenced, local stakeholders had already taken the initiative to move PCB-contaminated debris and material, including approximately 120 capacitors, from the transformer station to the RTB Bor dump site. Consequently, and taking note of the significant wider environmental problems in the Bor region, activities under the Clean-up Programme focused on:

- Assessment and reduction of remaining PCB-related risks at the transformer station and the dump site;
- Strengthening the overall environmental management capacities of local stakeholders.

Assessment and reduction of risks caused by PCB contamination

In order to identify and reduce potential health risks to workers, and to enable redevelopment of the transformer station area, UNEP conducted a risk assessment in this part of the site. On the basis of this work it was concluded that no further remediation measures were needed. In 2002/2003 a new transformer station was erected with funding from the Norwegian government.

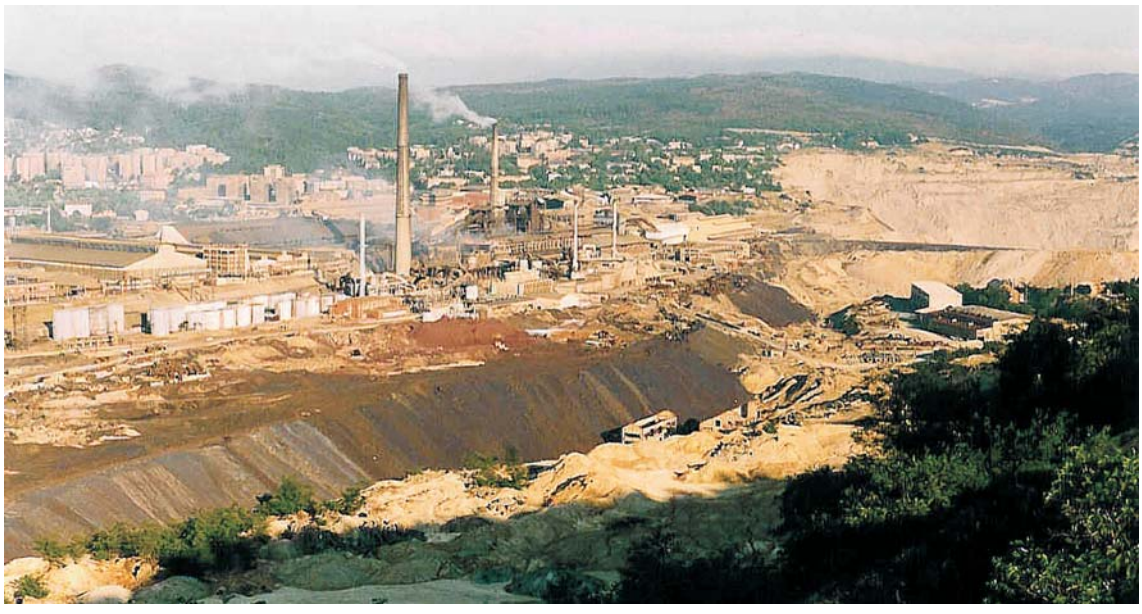
UNEP's risk assessment of the RTB Bor dumpsite, where the PCB-contaminated debris had been placed, was finalized in February 2003. No immediate risks to groundwater were identified, but measures to minimize future risks and to protect workers' health were recommended. In addition, UNEP removed, packed and transported abroad for final treatment some 40 PCB-containing capacitors, which had been removed from the transformer station and stored in the vicinity of the dumpsite.

Strengthening local environmental monitoring and management capacities

Given the serious environmental challenges in Bor, and at the request of the local authorities, the UNEP Clean-up Programme provided further support to enhancing local capacities in the fields of environmental planning and monitoring.

Environmental monitoring capacities were assessed in May 2002 by a joint mission consisting of national environmental inspectors, national experts and UNEP. This team covered air pollution, industrial and municipal wastewater, and soil contamination, concluding that capacities were generally insufficient. It was recommended that immediate priority – given the serious and direct risks to human health – should be given to strengthening capacities for monitoring of air pollution.

An air monitoring system, comprising both fixed and mobile stations was procured, installed in May 2003 and inaugurated in October 2003. Official reporting began in January 2004. Quarterly reports will be used in an effort to clarify the relationship between health and pollution data.



Bor region, the mining complex with the city of Bor visible in the background ***Source: SRIF Bor***

Copper Smelter Complex, RTB Bor, the city's economic centre

Installation and handover of monitoring equipment in Bor city centre

The other UNEP-assisted capacity-building component consisted of enhancing local environmental planning capabilities by supporting formulation of the first Local Environmental Action Plan (LEAP) for Bor. These efforts built on existing initiatives and previous commitments of local NGOs, local government, university and major polluters.

A draft LEAP summary was presented at the Kiev 'Environment for Europe' conference in May 2003, with the final document approved in mid-2003 and published early in 2004. The elaboration of detailed project proposals – to enable implementation of the Action Plan – remains a priority next step for the LEAP stakeholders.

Draft LEAP summary presented at Kiev 'Environment for Europe' conference, May 2003

The rich biodiversity of Bor region offers opportunities for sustainable development ***Source: Bor LEAP***

However, progress towards LEAP implementation remains severely challenged by the financial limitations facing the Municipality of Bor and other local stakeholders, which are highly dependent on the economic performance of the RTB Bor industrial complex. Furthermore, development of a National Environmental Action Plan (NEAP) could greatly assist LEAP implementation in Bor (and elsewhere) by setting out national policies and measures to support regional or local actions for environmental protection.

5.4 Capacity-building activities

While the primary aim of the UNEP Clean-up Programme was to reduce the environmental risks at the 'hot spots', the clean-up efforts were complemented by a range of capacity-building activities. The training courses, seminars and workshops organized through the Programme were chosen in consultation with the national authorities and local partners with a view to supporting efficient implementation of, and follow-up to, clean-up activities.

An additional objective was to strengthen national and local capacities for identifying, prioritizing and addressing environmental concerns. Activities were also designed with the aim of supporting resumption of international environmental cooperation, while stressing the importance of keeping environment (and related health issues) on the national reconstruction and reform agenda.

Training and workshop activities covered areas such as hazardous waste management, Local Environmental Action Plans, cleaner production and sustainable consumption, foreign direct investments, and Multilateral Environmental Agreements.

As part of the hand-over arrangements in 2004, UNEP working in cooperation with the environmental authorities in Serbia and Montenegro, conducted a joint environmental assess-

Hazardous waste management - training workshop, Kragujevac

ment to review progress at the hot spots. The assessment also looked beyond the question of industrial pollution to provide priority recommendations for further strengthening of local capacities for environmental management.

Although UNEP's post-conflict activities have come to an end, UNEP, through its Regional Office for Europe, will continue its traditional environmental cooperation with Serbia and Montenegro.

National workshop on Sustainable Consumption opportunities, Belgrade

6 Conclusions

From 1999 to early 2004 UNEP worked in Serbia and Montenegro to help the country deal with major post-conflict environmental challenges. Rapid and neutral assessment of the environmental situation immediately after the cessation of hostilities aimed at establishing a credible action plan, catalysing action and mobilizing resources for environmental reconstruction. The findings and recommendations of this assessment work gained widespread support and enabled UNEP to initiate a Clean-up Programme for the four environmental 'hot spots'.

The Clean-up Programme, which ran from 2000 until the end of 2003 and successfully reduced conflict-related environmental risks, has now come to an end. Specific clean-up measures and more general capacity-building work have enabled environmental challenges – in some cases including an adverse environmental management legacy from before the conflict – to be tackled and integrated into wider reconstruction efforts supported by the international community.

The success of these efforts relies on timing and partnership. Clearly, in order to be truly effective, post-conflict environmental assessment and clean-up work must start as rapidly as possible following the cessation of hostilities. The earlier that action is taken, the better the outcomes are likely to be in terms of protecting the environment and human health from further, unnecessary impacts. Secondly, commitment and partnership with national and local stakeholders is required. Finally, without the tangible assistance of the international community the achievements of the Clean-up Programme would not have been possible.

UNEP has helped to bring environmental issues to the forefront of post-conflict rehabilitation in Serbia and Montenegro. Highlighting the immediate environmental needs, and matching these needs with the interests of partners and existing expertise, has resulted in reduced environmental risks and strengthened environmental governance.

As a result of its work in Serbia and Montenegro over a period of almost five years, UNEP has drawn the following overall conclusions regarding post-conflict environmental assistance:

- Time is of the essence. In the case of potentially severe environmental damage arising from a conflict situation, neutral assessment must take place immediately the security situation allows. Similarly, urgently needed clean-up efforts must not be delayed by a long start-up phase.
- Efforts will be in vain without sustained engagement with and by national and local stakeholders. The role of the United Nations and the wider international community is limited to assisting and advising. Nevertheless, the international community must show commitment and readiness to take initiatives, to persuade, to encourage and to intervene with tangible assistance (financial and technical), particularly where environmental degradation causes or exacerbates human suffering in a post-conflict situation.
- The initial independent and neutral assessment work, and all potential follow-up measures, must be designed to enhance in-country partnerships, to strengthen environmental management institutions and to build related capacity. Such an approach will help to ensure the long-term sustainability of clean-up actions.

6.1 Specific conclusions from the Clean-up Programme

- The UNEP Clean-up Programme has successfully implemented 16 of the 27 projects contained in the April 2000 Feasibility Study portfolio.

- The conflict-related impacts at the four 'hot spots' have been significantly reduced. However, at most locations, these impacts represented only a part of the environmental and health challenges present, as serious contamination also pre-dated the Kosovo conflict, and there were long-term deficiencies in the storage and treatment of hazardous waste.

- Environmental management institutions in Serbia and Montenegro have been strengthened and the Clean-up Programme has contributed towards the resumption and strengthening of international and regional environmental cooperation.

- Additional funding commitments and a faster start to the programme would have led to even greater environmental benefits. In an immediate post-conflict situation, timely intervention is absolutely crucial and the international community needs to find ways of providing more rapid environmental assistance.

- Whereas the Feasibility Study provided a sound basis for action, the indicative budgets and/or time schedules required revision in many instances. This was due to a combination of factors, including specific site conditions, the need to use complex technologies, legal/procedural requirements, the time needed for meaningful interaction with site owners and participatory stakeholder processes, and delays in the bidding/tendering process.

- The Programme chose to follow national legislation in terms of project design and preparations. This may have caused some delays in actual implementation but, on the other hand, increased the acceptance and sustainability of the results.

- In situations where national policies and norms have not met international standards, the Programme has aimed to provide information on current 'best practice' solutions and to assist building of capacity through relevant training opportunities.

- The role of partnership with donors, with the wider international community, within the UN system and with local counterparts and experts was fundamental to the Programme's success.

- The effective coordination of Clean-up Programme activities (within the Programme itself, but also with other bodies implementing post-conflict environmental projects in the region) helped to avoid duplication of effort and to ensure positive results through the sharing of information, aims, objectives and methods.

- The inclusion of many projects under a single umbrella Programme resulted in significant resource efficiencies. Furthermore, the basing of all projects on thorough technical preparation and consultation with local stakeholders and experts has helped to generate sustainable solutions appropriate to local conditions.

- The Clean-up Programme established an effective framework for successful partnership and coordination with site owners, with other local stakeholders and with the competent authorities. A Memorandum of Understanding was signed with the Government of Serbia and Montenegro for the overall programme, while additional agreements were signed at local level.

- All key documentation relating to the Clean-up Programme has been made publicly available in the interests of transparency, but also as a means of sharing information and experience and therefore contributing towards capacity building in the widest sense.

- Whenever and wherever available and appropriate, local expertise and capacities were used for project design and implementation. This not only provided income generation and employment opportunities within Serbia and Montenegro, but also strengthened local capacities in new and emerging areas of environmental management such as hazardous waste treatment, and groundwater remediation.

6

6.2 Hand-over and next steps

Of equal importance to speed and partnership in implementing clean-up actions, is the safeguarding and sustainable transfer of on-the-ground investment, know-how, and institutional capacities. From the beginning, therefore, UNEP has worked with national and local stakeholders with the aim of ensuring a smooth and controlled hand-over to the respective partners. The required follow-up measures at each of the four hot spots have already been carefully assessed and specified in the joint final assessment report. Formal legal arrangements have been made with the Serbian government and with the site owners to transfer overall responsibility for implementation and monitoring of follow-up activities to the government and its environmental authorities. Detailed tasks have been transferred in separate legal documents to the site owners under the auspices of the environmental authorities and local governments.

Programme hand-over

- Each site-specific project has been handed over to the relevant site owner. Most site owners are state enterprises in the process of restructuring and/or privatization, and face uncertainties in terms of their economic viability.
- The Clean-up Programme as a whole was handed over in 2004 to the Serbian authorities, represented by the Ministry for Science and Environmental Protection, which have committed to monitoring the operations of site owners in relation to project investments, and to coordinating follow-up to other environmental clean-up needs identified but yet to be implemented.

In spite of recent successes, considerable environmental problems remain at several sites and ongoing efforts are required to strengthen national and local environmental management capacities, to integrate environment into the national development agenda, to promote preventive and precautionary approaches to environmental management, and to build an economic foundation for the country based on the principles of sustainable development. The opportunities exist and the country benefits from a rich natural resource base and a skilled workforce. The ongoing privatization process may offer important new opportunities for investment in environmentally friendlier technologies. The environmental authorities in Serbia and in Montenegro and UNEP have outlined the main environmental challenges at both national and local levels in their *Assessment of Environmental 'hot spots'* (April 2004). UNEP encourages both the national and local authorities, as well as the industrial sector, to find means of implementing the recommendations contained in that report.

While the responsibility for ensuring a sound and healthy environment rests within the country, strengthening environmental authorities and policies will be important while striving to fulfil these obligations. The international community should continue to provide Serbia and Montenegro with environmental assistance and support.

Although its post-conflict activities and environmental Clean-up Programme in Serbia and Montenegro are now reaching a conclusion, UNEP looks forward to continuing its cooperation with Serbia and Montenegro, though the UNEP Regional Office for Europe. The focus for the ongoing partnership will be on policy areas such as multilateral nvironmental agreements and environmental security.

Appendix A

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3. Extension of the NIS-RNS wastewater collector has been addressed through a European Bank of Reconstruction and Development (EBRD) soft loan to the City of Novi Sad. Construction works are to be completed in spring 2004.

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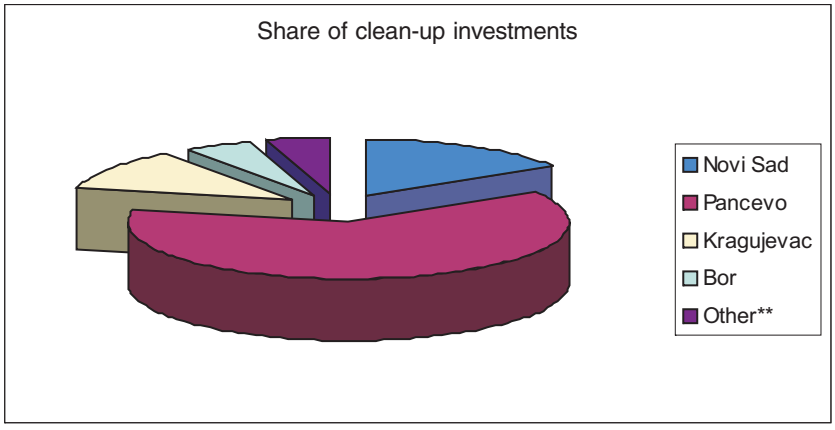
Appendix B

Financial Information

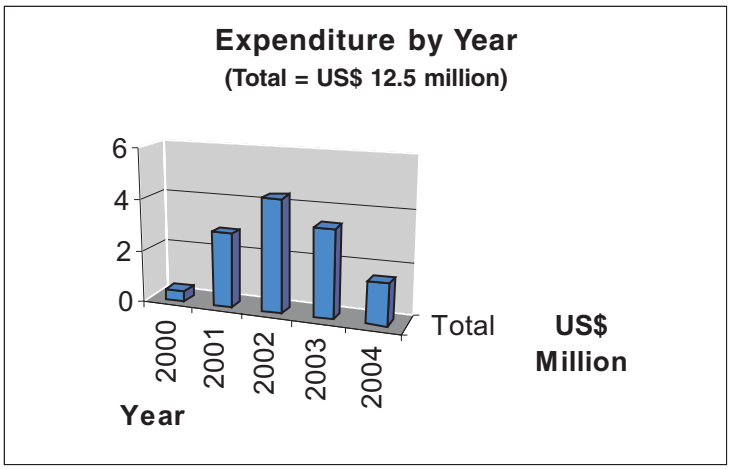
Table 1. Ten donors supported UNEP's Clean-up Programme with a total of US$ 12.5 million

Country	Commitment in USD (approximate)
Denmark	2 730. 000
Finland	1 500.000
France	20. 000
Germany	870.000
Ireland	580.000
Luxembourg	360.000
The Netherlands	2 940.000
Norway	2 558.000
Sweden	970.000
Switzerland	57.000
Total (Commitments paid in several instalments during 2000-2003)	**12.5 million**

Note: In addition, in 2000-2003 SDC (Swiss Agency for Development and Cooperation) directly implemented monitoring and remediation projects at the 'hot spots'. Furthermore, certain donors (e.g. the Czech Republic), the national authorities in Serbia and Montenegro, and site owners, directly implemented and financed some clean-up activities at the four hot spots. These activities were complementary to the UNEP Clean-up Programme.



**Includes capacity-building workshops



Appendix C

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UNEP

During the last four-and-a-half years UNEP has assessed the environmental consequences of the 1999 Kosovo conflict and implemented a clean-up project to address serious conflict-related environmental damage in Serbia and Montenegro.

These efforts have helped to secure fresh drinking water, remediated contaminated soil and groundwater, removed and treated hazardous waste, rehabilitated wastewater treatment capacities, installed environmental monitoring stations and strengthened national and local environmental management capacities.

This model has since been successfully replicated by UNEP in other conflict areas including Afghanistan, Iraq, the Occupied Palestinian Territories and Liberia. The environment is now an established component of all United Nations post-conflict activities.

Whilst the international community and the United Nations remains committed to providing rapid humanitarian assistance in the wake of conflicts, the main objective is to prevent conflict and promote the conditions under which peace and stability can flourish.

The environment around us from the air that people breathe, the water they drink, and the ecosystems that support forestry, farming and fishing are central to the rebuilding of shattered communities and livelihoods. Only by ensuring environment security can the wider goals of post-conflict reconstruction, peace and development be fully achieved and sustained.