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Environmental Issues in the Federal Republic of Yugoslavia

Introduction

Present-day Yugoslavia covers the territory of what was left of the Socialist Federal Republic of Yugoslavia *Socialistička Federativna Republika Jugoslavija* (SFRJ) following the secession, from late 1991, first of Slovenia, then, successively, of Croatia, Bosnia and Hercegovina, and finally, Macedonia. This 'rump' - the Federal Republic of Yugoslavia *Savezna Republika Jugoslavija* (SRJ) consists constitutionally of two sovereign republics, Serbia and Montenegro. Each has a separate government, legal and administrative system within the Federal constitution. They are often separately represented at international fora: within SRJ their relationship is uneasy and its future uncertain. Serbia today includes the former (SFRJ) 'autonomous provinces' of Vojvodina to the North and Kosovo to the south. Since 1987, both were progressively assimilated - administratively and politically - into the Republic of Serbia and were formally stripped of their autonomy under a new constitution adopted by Serbia in September 1990. Both SRJ and its constituent entities have uncertain status in international law. The declaration in April 1992 by Serbia and Montenegro that SRJ was the legal successor of the SFRJ was a *de facto* recognition of the secession of the other four republics. However, the United Nations ruled in September of that year that this could not automatically be the case and excluded SRJ from the General Assembly; subsequently the recognition of SRJ by other nations has been uncertain. Kosovo is presently under military control of NATO (and Russian) armed forces (KFOR), its administration in the hands of a United Nations mission (UNMIK); its future can only be a matter of conjecture.

Examination of environmental issues in Yugoslavia must be informed by two principal considerations:

- The physical and ecological characteristics of the region, and its social and economic development up to and including the collapse of the former Yugoslavia in 1991
- Events since 1991, including socioeconomic changes, the effect of external sanctions consequent on Yugoslavia's involvement in the civil war in neighbouring Bosnia and Hercegovina (1992-95) and, most recently, the civil war in Kosovo and the intervention of NATO.

The latter, in particular, cast a shadow over any analysis of Yugoslavia and its future, including the matters dealt with in this chapter, which therefore includes an assessment of environmental damage and prospects for environmental remediation against the backdrop of an analysis of the pre-1999 situation in the region.

Physical and ecological features

At a little over 102,000 km², SRJ covers less than half the size of the former Yugoslavia. Serbia, covers 88,361 km², is the larger of the two states and is landlocked; the Danube (whose catchment covers almost 80% of the country) provides navigable access through Romania to the Black Sea. Montenegro covers 13812 km² and possesses some 200 km of coastline, including the Bay of Kotor, on the Adriatic. SRJ's terrestrial borders to the west are with Bosnia-Hercegovina and Croatia, Hungary to the north, Romania (north-west), Bulgaria (south-west) and with Macedonia and Albania to the south.

Figure 1. Map of Yugoslavia

Much of the north of the country is comprised of rich and fertile plains, derived to significant degree from anthropogenic drainage, and which is characterised by a continental climatic regime. Limestone ranges characterise the east and central parts of the area. Older mountains rise from coastal plains in the south-east, dominated by Mediterranean climate. Vegetation patterns are based on this geomorphological and climatic variation and fall broadly into three major biogeographical regions; Pannonian, montane and coastal. The Balkans as a whole have long been recognised as of exceptional value for biodiversity; within this SRJ is one of the richest components, home to over a third of European angiosperm species, two thirds of its birds and mammals and half of its fish species. Endemic species comprise over 9% of the flora.

Economic and social background

The total population of SRJ in the 1991 census was 10.6 million. Some two-thirds of the people of Serbia (9.8 million) have Serb ancestry, the remainder reporting Croat, Hungarian, Montenegrin, Romanian and Slovak nationality. Some two-thirds of the population of Montenegro (0.8 million) are Montenegrins, with other groups including Albanians, Muslim Slavs and Serbs. Differential birth rates and the departure of Kosovan Serbs mean that the ethnic Albanian population of Kosovo has grown from under 60% in 1945 to between 70 – 80% just prior to NATO bombing. Kosovo's population remains the youngest (with around 50% below the age of 20) and most rapidly growing (with a crude birth rate of 20 per thousand) in Europe. Vojvodina is comprised of a mixture of all ethnic groups with Hungarians and Serbs being in the majority, As in other parts of Yugoslavia, nationalism has for centuries been an ever present undercurrent of political life. However it was largely quiescent within the SFRJ with the exception of Kosovo, where periodic eruptions of Albanian nationalism and Serb nationalist reaction led in the late 1980s to events which precipitated the collapse of socialist Yugoslavia.

As with other former Republics, the territory of SRJ prior to 1945 was underdeveloped and primarily agricultural. From the 1950s to 1970s enormous development and economic growth produced rates of industrialisation and urbanisation amongst the highest in the world. This growth was based on energy and materials intensive industrialisation accompanied, in low lying areas by the rationalisation and intensification of agricultural production. During the 1980s economic stagnation led to reductions in growth rates (but also to severe limitations on environmental maintenance); as elsewhere in SFRJ such economic difficulties were critical in precipitating the radical institutional reforms of 1989 which were followed by the disintegration of SFRJ itself. Loss of markets elsewhere in former SFRJ led to dramatic reductions in SRJ economic performance: this was considerably exacerbated by UN sanctions imposed on SRJ in 1992 for its role in the war in Bosnia-Herzegovina. A partial recovery consequent upon a stabilisation programme in 1994 proved short lived. Further sanctions followed by the NATO attack in 1999 have led economic activity to plummet further. In general such economic decline has led to reduced emissions of industrial and agricultural effluent to air and water. However, any consequent environmental improvements have at least to some degree been offset by increased use of low quality fuels and by reduced investment in environmental protection (REC 1999a, b). In any such general account the existence of great regional variations should be noted. For example Kosovo, which occupies some 11% (10,887 km²) of SRJ's land area but has over 20% (2.2 million) of its people received, within SFRJ, disproportionately high inward investment. This was partly focused on exploitation of its mineral resources, partly on the modernisation of highly traditional and backward social structures, and partly on relieving the relative poverty which remains a consequence of the latter.

Sanctions, civil war, and NATO bombing

This chapter is not the place to examine the origins of the conflict in Kosovo. These go back well before pre- 1991 Yugoslavia to the troubled relations of the Serbs with the Ottoman Empire. Their antiquity is symbolised by Kosovo Polje, the 'field of blackbirds' on which, in 1389, Serb armies were defeated and virtually the whole of present- day Yugoslavia passed into Turkish control, under which it remained until the Balkan wars of 1912/13. The date, June 28, remains the most celebrated anniversary in Serb history. From the end of World War II (during which Kosovo was incorporated by the Italians into a greater Albania, and Serb and Montenegrin civilians were massacred by Albanian fascists) it has continued to be a focus of civil conflict. In 1989 Serb suppression of Kosovo Albanian demands for autonomy and secession precipitated the break up of SFRJ. A strategy of provocation by ethnic Albanian paramilitaries and Yugoslav army retaliation led, a decade later, to foreign intervention. For 78 days, between March 24 and June 9, 1999 Yugoslavia was subject to intense aerial bombardment. In 10,484 sorties, NATO forces dropped 23,614 bombs (of which 1,011 were British, including 531 cluster bombs dropped by the RAF)

Most attacks were directed against Serbia (including Vojvodina and Kosovo) although a number of sorties also involved targets in Montenegro. Initially, only military targets were attacked, but sorties were soon launched against any targets seen as having a strategic importance, including power stations, agricultural installations, a tobacco factory, bridges and housing estates. The initial declared aim of the NATO bombardment was to force the Serb government to accept a political settlement in Kosovo that would give its Albanian majority a referendum to decide their own future. The consequence of bombing was to precipitate a mass exodus of that population as Serb Kosovans reacted against those they saw as responsible for it. In turn, NATO's aims had to be redefined as being to allow the Albanians (most of whom were in their homes when the attack began) to return home. That latter aim has now been partially achieved. However as Albanian Kosovans have returned home, Serbs – and other non-Albanians - have in turn been driven out, with the consequence that less than 50% remain of the Serb population that was there prior to the bombing. The peace agreement that ended the war quietly dropped any reference to a referendum (or to independence) for Kosovo, and the corresponding UN Security Council resolution 1244, affirms its continuing formal status as part of Yugoslavia. Its future remains uncertain, however. In parallel with UNMIK and KFOR, what civil administration that exists in most of Kosovo is controlled by a new ruling class of the former Kosovo Liberation Army (KLA) itself rent by internecine struggles for power, money and patronage, united only around the goal of securing an independent state of Kosova . However, the northern part of the province has always been ethnically Serb, and from a line through Mitrovica north of the Ibar river, is effectively controlled from Belgrade. The situation is complicated even further by the demands of Albanian communities in 'Eastern Kosovo' inside Serbia proper, for unification with Kosova. The consequences of the war - political and social as well as environmental, and for the whole of SRJ, not just Kosovo, have yet to be evaluated and in many cases will remain (like the political future of the region) unpredictable. Little monitoring is taking place: what factual data is available is often unreliable and objectivity has been as one of the 'casualties' of the conflict.

Assessments of the environmental consequences of NATO bombing vary from 'ecocide' (see, e.g. Lausevic 1999) to the dismissive unconcern of NATO spokespeople during the conflict for such 'collateral' damage. Two independent studies on the environmental impact of the bombing of Yugoslavia provide the only objective assessment to date. The first, in June 1999, was conducted by a team of expert staff from the Regional Environmental Centre for Central and Eastern Europe (REC) assisted by a variety of

specialist contracted experts (REC 1999a). The second, by a United Nations 'Balkan Task Force', was initiated in May 1999 to carry out an assessment of the impact of the Kosovo conflict on the whole Balkan region, under the auspices of the UN Environment Programme (UNEP) and the UN Centre for Human Settlements (UNHCS).

The BTF exercise involved a series of sectoral visits by specialist teams in August and September 1999 (Balkans Task Force 1999). One independent scientific team studied the environmental impact on human settlements in Kosovo itself. Another, comprising 16 experts and two mobile laboratories, the impact on targeted industrial sites in Serbia and Vojvodina. A third team examined the Danube river and associated pollution sources and a fourth studied the effects of the conflict for biodiversity in protected areas. In addition to these field missions, a fifth team (comprised of representatives from the World Health Organisation, the International Atomic Energy Authority and the Swedish radiation Protection Institute, as well as UNEP), reported on possible consequences for the environment and human health, of depleted uranium (DU) weapons used in the conflict.

The conclusion of both the REC and BTF studies is that predictions made during the conflict of a major environmental catastrophe affecting the Balkans region (or indeed, Yugoslavia) as a whole have proved unfounded, but that locally there are serious threats to environmental quality and human health. "At these sites... immediate clean-up action, which should be seen as a part of humanitarian assistance to the region, is called for" (United Nations Environment Programme 1999: 1).

It should be noted, however, that these analyses have themselves been criticised for defining the 'environment' in narrow and reductionist terms (Staddon 1999). In this 'Cartesian' view (Merchant 1992) the environment is seen as an objective physical and biological externality rather than (as Staddon would argue) a complex of biophysical and social relations. Irrespective of these criticisms, it should be noted that both the REC and the BTF studies, and this chapter, exclude the geographically wider impacts of the conflict. Such impacts include the unknown ecological consequences of more than 100 bombs jettisoned into the Adriatic sea by NATO aircraft returning to bases in Italy (some 93 of which have been located and detonated by NATO forces, the remainder lie still in deep water) and the dumping by KFOR of unexploded ordnance and other waste into lake Prespa in FYR Macedonia. They also include the environmental effects caused by the influx of huge numbers of refugees from Kosovo into both Macedonia and Albania.

Legislation, policy and planning

As noted above, SRJ regards itself as the legitimate successor to the former, larger SFRJ; both Serbia and Montenegro adopted their current 'new' (1990) constitutions before the secession of the other former Yugoslav republics and have therefore not subsequently seen so great a need for formal constitutional changes. One of the features of socialist Yugoslavia was its unique system of workers' self-management, with enterprise autonomy (and a degree of market discipline) superimposed on an essentially socialist economic base. This was coupled with a high degree of decentralisation, a high level of political awareness and debate, and openness to 'western' ideas, influence (and investment).

In all but the most essentially federal matters (such as defence), legislation and policy-making was devolved to the constituent republics. Within each republic, implementation and decision-making was often further devolved to a local level. Day - to - day environmental regulation and management was generally the responsibility of municipalities or individual enterprises, subject to general policy guidance (and funding) from the responsible ministries, together with advice and/or regulation via a parallel system

of semi - autonomous institutes. Under the broad direction of the responsible Ministry these Institutes maintained a policy and regulatory oversight of matters such as water management, wildlife protection, archaeological and cultural heritage protection and urban planning. The April 1992 constitution of SRJ left the republic structures of legislation and administration largely intact. More than any other former Yugoslav republic therefore (possibly excepting Bosnia-Herzegovina, where continuing territorial divisions have inhibited environmental legislation) environmental legislation, policy and planning is derived from that of the pre-1991 Yugoslavia.

One of the unfortunate consequences of this situation is that no systematic and internationally comparable State of the Environment reporting exists. Neighbouring countries (with the exception of Croatia) currently participate in an European Environment Agency (EEA) and UNEP EU Phare funded programme to establish accessible, up-to-date and comparable data regarding the state of the environment. In SRJ however such information must be gleaned from a number of official and unofficial government reports and from statistical data derived from individual studies and organisations. There is however an awareness of the growing importance of publicly available information and participation. An integrated environmental reporting system for Yugoslavia has been proposed by the Federal Government (Federal Ministry for Development 1997b) but is not yet in place.

At Federal level there is constitutional recognition of the right to a healthy environment, manifest in Resolutions on Environmental Protection and on Saving Biodiversity. However the SRJ Constitution prescribes that only basic principles of environmental protection lie within the competence of the federation; as a consequence a draft Law on the Principles of Environmental Protection has not yet been adopted. Both states (as well as SRJ itself) have their own Ministries of Environment. At the 1992 Rio conference, Montenegro declared itself the world's first 'environmental state', pledged to develop a harmonious relationship to nature. However at the formal level legislation in Serbia is probably the more advanced. Both Serbia (1991) and Montenegro (1996) have framework environmental legislation which is manifest in statutes on air, water, soil, chemical and toxic waste, natural and cultural heritage protection, and spatial planning; in Serbia the last includes a requirement for environmental impact assessment of certain categories of development.

In both countries the major deficiencies concern the degree to which such policy instruments are implemented and enforced (Balkans Task Force 1999). This is not just a matter of administrative efficiency but of public perceptions. Within SFRJ all natural resources with the exception of private holdings of up to 10ha were defined as social property. Whatever the advantages of social ownership in principle, its practical consequences were often that 'what is everyone's is no-one's' and financial mechanisms for securing environmental objectives could not be applied. Moreover, environmental costs (for example, of air and water pollution) were, even when recognised, perceived as 'externalities' and were often disregarded in policy decisions.

Kosovo faces particular environmental problems, especially in respect of **industry and mineral extraction**, which predate the recent armed conflicts. As elsewhere in SRJ, large-scale exploitation of mineral resources after 1945 has produced massive landscape destruction. Related industrial development has compounded this with significant air and water pollution. Particular problem areas are Kosovska Mitrovica (lead and zinc mines) and Glogovac (ferro-nickel mines), both areas with major metallurgical plant. Large-scale energy production at Obilić is associated with open cast lignite mines; Đeneral Janković/ Elez Han is characterised by limestone quarries and cement production. Production in all these areas

has virtually ceased subsequent to NATO bombing but the evidence of environmental damage remains. Future developments are contingent on the resolution of political conflicts. For example, along the boundary between Albanian held Kosova and Serb dominated northern Kosovo, the main shaft of the Trepča mining complex is in Albanian, but the processing facilities in Serb hands.

In respect of the **urban environment** it is clear that beyond the enormous direct damage to infrastructure and housing caused by the NATO attack and the subsequent systematic emptying and destruction of towns and villages, first by Serbian forces and then by returning ethnic Albanian paramilitaries, the major problem is the collapse of municipal administrative systems (including the destruction or loss of all cadastral records). The inability to reestablish in the province any effective legislative or policy framework on housing and property (which is an essential precondition for any significant improvement in the urban infrastructure including the operation of utilities) is the biggest problem faced in Kosovo. The one environmental consequence of the conflict that Kosovo is free from, but which exists elsewhere in SRJ (and even more so in neighbouring Macedonia and Albania) are the problems associated with local concentrations of masses of displaced people. These include the pressure on sanitation and drinking water supplies in overcrowded refugee camps.

Within the **service sector** most environmental issues pre 1991 were associated with tourism. In general these were less significant in the territory of SRJ than in other areas of the former Yugoslavia, but impacts were nevertheless significant in some locations particularly in coastal areas of Montenegro. Tourism in SRJ plummeted following the disintegration of SFRJ and fell even further following the imposition of sanctions in 1992 (Savezno Ministarstvo za Razvoj Nauku i Zivotnu Sredinu 1996). Following NATO bombing, external tourism in SRJ is now non-existent and any attempts to regenerate income from this source await a resolution of the current political situation.

The ambient environment

Environmental quality is related to the level of economic activity in complex ways. It seems likely that as the latter has declined, levels of ambient pollution may have improved (REC 1999a), however financial restrictions and institutional and infrastructural disruption have reduced capacities for environmental protection and monitoring. The consequences of the war have been both mixed and geographically uneven. In some places damage to processing and storage facilities has produced pockets of intense local pollution. The BTF study identified at least four environmental 'hot spots' where urgent action is necessary.

One of the most seriously affected areas is Pančevo, an industrial complex near Belgrade. Here, NATO targeted first the 'Lola Utva' aircraft factory then the 'HIP Petrohemija' petrochemical complex, then the 'HIP Azotara' fertiliser plant and finally launched seven separate attacks on the 'NIS' oil refinery. The consequences at one stage were so serious that most of the town's inhabitants had to be evacuated.

The consequences of this bombing and of similar action in other areas, have been serious. At Pančevo, over 2,000 tonnes of 1,2 dichloroethane (EDC) and 8 tonnes of metallic mercury were released producing serious contamination of a wastewater canal which is leaking into the Danube. This was in addition to the release of 460 tonnes of vinyl chloride monomer (VCM) 80,000 tonnes of oil and oil products, and c. 250 tonnes of liquid ammonia. Destruction of the Zastava car plant at Kragujevac has resulted in major ground contamination with polychlorinated biphenyls (PCB) and dioxins. The attack on the oil refinery at Novi Sad released very large quantities of oil, much of which found its way

directly into the Danube, but which has also contaminated groundwaters and may cause hazards to drinking water supplies. At the Bor ironworks, very large quantities of sulphur dioxide gas were released into the atmosphere, and major stocks of PCB oils remain unsecured. It is likely that such documented effects have been replicated on a smaller scale in other areas such as in Čačak, following the bombing of the 'Sloboda' household appliance factory (March 28),

With regard to **water pollution, waterways and water cycle management** little general data is available. It is clear that in addition to 'domestic' pollution from industry, agriculture and human settlements, a significant amount of pollution is brought in upstream by rivers, so that FRY is part of a surface water system that extends well beyond its own borders. Since the late 1960s river water quality has fallen significantly and most rivers have dropped by one or two classes in the four class water quality system adopted in 1968. However, recent improvements have been recorded subsequent to the decline in economic activity caused by UN sanctions (Balkans Task Force 1999: 24). Most monitoring focuses on the Danube and its tributaries.

Air pollution SFRJ prior to 1989 was considerable but mainly concentrated in urban areas, and has since tracked the fortunes of the economy. Principal sources include thermal power stations, industrial processes, domestic heating and automobile exhausts. As elsewhere in former SFRJ, inefficient energy utilisation and low technical efficiency of manufacturing and other plant have made the situation worse, and have offset the otherwise positive consequences (for air quality) of economic decline. A major problem in SRJ (as elsewhere) is incompatibility in datasets. Table 1 shows major disparities between SO₂ emission data released by the Ministry of Environment and estimates prepared for the UN under a 1994 major review under the Convention on Long-range Transboundary Air Pollution (Economic Commission for Europe 1995; it is likely that following NATO action projections for 2000 need to be revised downwards). Data for ambient concentrations, by contrast is more reliable.

Table 1: Atmospheric emissions in SRJ (10³ tonnes p.a.)

	1985	1990	1992	1994	2000 (projected)
<i>SO₂ emissions</i>	239 (478)	254 (508)	198 (395)	212 (401)	(680)
NO₂ emissions	58 (58)	66 (66)	49 (49)	52 (55)	(88)

Source: Savezno Ministarstvo za Razvoj Nauke i Životne Sredine, 1996: *Izveštaj o Stanju Životne Sredine u Saveznoj Republici Jugoslaviji za 1994 Godinu* Belgrade: Savezno Ministarstvo za Razvoj Nauke i Životne Sredine: 36; (Figures in parenthesis from Economic Commission for Europe, 1995: *Strategies and Policies for Air Pollution Abatement*. Geneva: United Nations).

Well documented consequences of attacks on chemical plants, most particularly the petrochemical and nitrate fertiliser plants in Pančevo, have included dense clouds of toxic chemicals including vinyl chloride monomer, ethylene dichloride, chlorine, phosgene and ammonia. Bombing of electricity transformer stations has resulted in leaks of pyralen and other compounds. The health and environmental consequences of such emissions have yet to be evaluated, but all these compounds are extremely toxic. Several are environmentally persistent and accumulate in the food chain; several are carcinogenic and mutagenic. It is certain that at least some effects extend beyond Yugoslavia's borders. Atmospheric dioxins recorded in Skopje (Macedonia), downwind of Pančevo immediately following the NATO bombardment, are said to have reached seven times the internationally agreed 'safe' levels.

Dioxins and other airborne toxins resulting from NATO bombing have also been recorded in Poland, Hungary and Greece. Again, further systematic monitoring is required to see whether these emissions, severe but localised in time and space, will lead to significant long-term effects.

Major fears during the NATO bombardment related to the Danube. The location on its banks and tributaries of many industrial works, many of which were targeted by NATO, led to fears of a major ecological catastrophe, a fear fuelled at the height of the bombing by reports of 20km surface oil slicks floating downstream. After the bombing of chemical process works in Pančevo on 18 April, some 1,000 tonnes of ethylene dichloride, a similar volume of 33% hydrochloric acid and 3,000 tonnes of sodium chloride were released into the Danube. In addition eutrophication and high levels of coliform bacteria were reported in the Danube, Sava and other watercourses following damage to sewage works in Novi Sad and elsewhere. The BTF study found no evidence of an ecological disaster for the Danube as a whole. However chemical analysis of river sediments and biotic indices revealed significant chronic pollution, both upstream and downstream of sites directly affected by the conflict, with the likelihood of deleterious effect on aquatic ecosystems and their associated species beyond, as well as within, Yugoslavia's borders.

Subsequent to NATO bombing and overshadowing it, in terms of impact on water quality is the February 2000 cyanide spill from the Aurul gold mine in Baia Mare, Romania. This contaminated the Somes, Tizsa and Danube rivers and has had catastrophic consequences for the Danube ecosystem in SRJ, as well as in Romania and Hungary. It will be some time before the long term effects of this are known, but it seems likely that they will be considerable.

As with the environmental 'hot spots' identified above, the BTF team found it difficult in some cases to distinguish the consequences of NATO action from those arising from years of environmental neglect. In the case of Danube pollution sediment analysis showed a record of accumulation of toxic pollutants from the 1960s, '70s and '80s (Balkans Task Force 1999: 10). There is a critical need for systematic monitoring of water quality, and for investment in clean production and waste management processes. It is clear that international sanctions have significantly held back efforts to integrate SRJ into international and European agreements for water quality monitoring, pollution reduction, and emergency response. Ironically, in other areas it seems likely that economic collapse brought on by sanctions and intensified by the bombing has meant that aquatic pollution has been (temporarily, at least) much reduced. At Pančevo, the most heavily targeted area, no data on preconflict contamination levels was available, but the BTF team was supplied by a local NGO with a list of accidents within the industrial complex over the past 25 years. Local councillors reported a high incidence of 'Pančevo cancer' in the area, and the BTF team concluded that this was most likely to be angiosarcoma of the liver, resulting from exposure to high levels of VCM (Balkans Task Force 1999: 35). The environmental consequences of dioxins and other toxins released as consequence of the burning of 460 tonnes of VCM are impossible to estimate, it seems likely that low level releases of VCM have been going on for a considerable period of time, with direct human health effects. One local resident declared, on meeting with the BTF team "finally you came, we have been waiting for you for ten years"¹.

One issue specific to the Danube concerns through traffic. Although, due to the UN embargo, practically no international traffic has been registered for Yugoslavia since 1995, the volume of international traffic through the area was considerable (Schneidewind 1998). All through traffic on the Danube has been brought to a halt by the bombing, although a

canal system around Novi Sad (built by the Austro-Hungarian engineers who drained the lakes of Vojvodina) allows 'friendly' (principally Russian and Ukrainian) vessels to bypass Novi Sad and thus complete their transit through Djerdap and the Iron Gates to the Black Sea. Serb authorities see repair or replacement of the bridges as the responsibility of the 'international coalition' that destroyed them and have placed additional conditions on permitting the work to start. These include readmission of Yugoslavia into international organisations including the IMF. The lack of haste no doubt relates at least to some degree to the fact that next to Serbia itself, the principal casualties of the bombing are upstream states such as Hungary that allowed NATO to use their airspace for the attacks. A joint report by Hungary and Austria in February 2000 proposed clearance of the ruins of three destroyed bridges in Novi Sad at a cost of \$24 million: it seems unlikely that Serbia will agree to any move which excludes reconstruction as a minimum requirement. Destruction of the bridges is associated with a number of particular environmental problems, real or hypothetical. In the latter category is the possibility that when the Danube freezes, ice floes might be trapped by the still-standing bridge pillars and huge blocks of concrete roadway lying just below the water surface. This could cause water to back up distances up to 100 km and overtop river banks in Hungary and Croatia as well as in Vojvodina itself.

Fears that NATO would bomb the Vinča nuclear research institute, near Belgrade, which it had declared a "legitimate" target, were, happily, unrealised. The Institute includes an operating research reactor and a second reactor sealed since 1984 but with a still active core, and waste stores of various levels of radioactivity. Bombing would certainly have released radioactive nucleotides. The worst-case scenario of a "Chernobyl" like incident in the centre of Europe has receded. However the plant (and several other lesser installations) is still considered to present an environmental hazard, particularly given the uncertain levels of monitoring.

Munitions and mines

A new environmental problem, which, since the NATO attack, Yugoslavia now shares (uniquely in Europe) with Bosnia and Hercegovina, is the hazard of **land mines**. It is estimated that there are upwards of 6,000 minefields. Most of these are in Kosovo, particularly in border areas. Some other fields were laid in other border areas, particularly in Serbia and Vojvodina as part of the preparations to frustrate a NATO invasion with ground troops. However these present less of a threat partly because their extent is less, and partly because their locations are known to a greater degree of precision, than those minefields laid by both contending parties in Kosovo.

To the threat of ground mines must be added the very real hazard (not restricted to Kosovo) of largely unrecorded military wastes together with the legacy of unexploded mines and munitions dropped by NATO forces. In addition, Yugoslav munitions attacked by NATO were often incompletely destroyed. Much remains as environmental hazards with a similar effect. A particular hazard arises from NATO's use of anti-personnel cluster bombs, in defiance of the Hague and Geneva Conventions. These continue to have consequences beyond the immediate death and suffering that they caused. It is estimated that between seven to thirteen percent of bomblets fail to explode immediately and that as a result some 14,000 cluster bombs lie unexploded. When disturbed, their consequences are identical to that of landmines (which have also been outlawed by the Geneva Convention). Ironically, the first NATO fatalities in the Kosovo conflict occurred in June, after the NATO attack had ceased, when two Ghurka guardsmen were killed, not by Yugoslav mines or bullets, but by unexploded cluster bomblets that they had collected in a clearance operation. Subsequently

over 100 individuals (mainly ethnic Albanians, with children disproportionately represented) have been killed or seriously injured by such ordnance.

Other environmental effects of NATO bombing include the production of **secondary toxins**. The most serious of these include the use of depleted uranium (DU) munitions. This is used not merely as a substitute for lead in bullets, but also as armour-piercing enhancement in shells. In this latter use it explodes on impact, releasing a ceramic aerosol which is directly toxic when inhaled and which becomes dispersed as a radioactive dust into the environment. After months of denial, NATO eventually admitted that DU armour-piercing shells were routinely carried and had been fired by A-10 ('Warthog') aircraft. More munitions were used in the attack on Yugoslavia than in the whole of the Gulf War, when almost one million 30mm uranium tipped bullets and over 14,000 large calibre shells were fired, resulting in between 300 and 800 tonnes of DU dust scattered over soil and watercourses. A major problem in assessing levels of immediate and long term environmental risk from DU is that NATO has refused to release any data about the type, quantity and location of use of DU weapons, claiming that no scientific study has ever yet proved a link with cancer (Balkans Task Force Desk Assessment Group 1999). KFOR and humanitarian staff have been privately advised to stay away from areas where DU weapons were used, particularly around Djakovica, Mitrovica, Priština, Uroševac as well as in Serbia proper. However as in Iraq (where there is clear evidence of cancer clusters around sites of DU weapon use), NATO has refused to cooperate with the BTF DU team. Indeed the BTF from the start found great difficulty in securing cooperation from western governments, which refused to release satellite data which would assist its work so that these had eventually to be obtained from the Indian government. This lack of cooperation meant that unlike the four field missions of the UNEP/UNHCS Balkan Task Force, the DU team's work had primarily to be a desk assessment. The most immediate need identified by BTF is for NATO to make available data regarding how much DU was used during the conflict, and where. Without such information, initial risk assessments and the implementation of precautionary measures are impossible. In addition there has still not been any proper study of the health and environmental risks of long and medium term exposure to DU, which needs urgently to be undertaken under the auspices of the WHO.

The rural landscape

Yugoslav **agriculture** is mixed with large enterprises characterising the northern plains and small family farmsteads the upland and marginal areas. One recent feature - particularly in intensively cultivated regions such as Vojvodina - has been the impact of sanctions on farming practices. Serbia in particular has reached virtual self-sufficiency in agricultural products since sanctions began. This has led, in some areas at least, to a more intensive use of land, including the cultivation of previously marginal areas. However, the embargo on the supply of chemical products, including fertilisers, together with the loss of export markets, has led to the strong growth in organic and low-input farming. That trend has been accentuated further in 1999 by NATO bombing of fertiliser factories. The probable consequence has been a lessening of agricultural impacts on the environment.

In Kosovo, too, human pressures in rural areas have dropped, but as a consequence of the displacement of people and the destruction of villages. Despite the return of (ethnic Albanian) refugees, the inaccessibility of large areas of the countryside because of mines seems likely to delay the reestablishment of agricultural practices in rural areas, many of which are following those of Bosnia into 'decay', with scrub encroaching on former pasture and arable land.

Total **forest** cover in SRJ has gradually increased from its low of under ¼ of the land surface in the early 1960s to some 28% in the early 1990s. This is around the European average and higher than in Croatia but much less than in Slovenia or Bosnia-Herzegovina. Since 1960 the forest area has increased by about 4%. Cover varies greatly in different regions, from under 5% in Vojvodina to almost 40% in Kosovo and Montenegro (Savezno Ministarstvo za Životnu Sredinu 1994). Fears of NATO's possible use of defoliants (such as those used in Vietnam) in preparation for a ground war were, fortunately, unrealised. In the event, the most direct effects were limited in extent, such as the major fire in the Lipovica forest following bombing of fuel storage on March 26, 1999. Much more significant is likely to be the consequences of reduced or absent management and illegal logging by local inhabitants (table 2). However, the extent of this is unknown as (as in other areas) little monitoring is taking place.

Table 2: Damage to forests in SRJ

	Illegal cutting	Other damage
1975	19,462	1,809
1985	29,804	6,907
1990	45,804	6,425
1991	63,963	5,611
1992	79,726	2,816

Source: Savezno Ministarstvo za Životnu Sredinu, 1994: *Izveštaj o Stanju Životne Sredine u SR Jugoslaviji u 1992* Belgrade: Savezno Ministarstvo za Životnu Sredinu

Natural and cultural heritage protection

SRJ is located at the centre of one of the most important biogeographical regions in Europe. The high level of scientific education and university expertise has for many years been combined with well developed awareness - and concern - to protect the natural resource (Stevanovic and Vasic 1995; Federal Ministry for Development 1997a). As with the ambient environment, legislation and administration for **nature conservation** in each of the constituent republics broadly corresponds to the situation as it was pre 1991 (Jancar 1987; Fisher 1990; European Parliament Directorate- General for Research 1991; IUCN 1991; Terselic and Juras 1991). Despite a technical understanding of the region's importance, **species protection** in both Serbia and Montenegro is generally recognised to be weak. Outside protected areas, this is based on scheduling of vulnerable species with some 215 plant species protected in Serbia, though only 57 in Montenegro (Federal Ministry for Development 1997a).

Conservation sites and protected landscapes in SRJ cover an area of approximately 6,000 km² or 6% of the territory (over 5% of Serbia and almost 8% of Montenegro). The nine national parks (Biogradska Gora, Djerdap/ Iron Gates, Durmitor, Fruška Gora, Kopaonik, Lovčen, Šar Planina, Skadarsko Jezero and Tara) themselves cover a total of approximately 400,000 ha (equivalent to some 4% of the land surface) and represent the range of habitats and landscape types in the region (table 3).

Table: 3: Protected areas in the SRJ

Category	SRJ	Serbia	Montenegro
National Park	9	5	4
Nature Park	19	19	-
Nature Reserve	89	85	4
Landscape Monuments	3	3	-
Natural spaces around immovable cultural monuments	45	45	-
Natural Monuments	316	261	51
Natural Collections	2	2	-
Woodland/ Forest Parks (& other specific areas)	4		4
Internationally protected areas	6	3	3

Source: Savezno Ministarstvo za Razvoj Nauku i Zivotnu Sredinu, 1996: *Izvestaj o Stanju Zivotne Sredinu y Saveznoj Republici Jugoslaviji za 1994 Godinu* Belgrade: Savezno Ministarstvo za Razvoj Nauku i Zivotnu Sredinu: 46 and Institute of Nature Protection (pers com).

All these areas were in existence prior to 1991, however the Landscape Management Plan for the Republic of Serbia proposes to declare some 10% of the land surface as protected by 2010. Prior to NATO bombing, several areas were being prepared for national park status, including Prokletije. In Serbia, management of national parks is a matter for their five separate autonomous public authorities, whilst in Montenegro the four national parks are managed under the auspices of a single national parks authority. Day-to-day management of lesser-protected sites (such as nature reserves and nature parks) remains (in both states, as in the former SFRJ), delegated to a local level (to municipalities and often to individual enterprises). For example in Serbia, most forested protected areas outside national parks, are managed by 'Srbijašume', the state forestry enterprise. Overall control is exercised through a tripartite relationship between local authorities, the responsible ministries and the quasi- autonomous Institutes.

Transboundary issues are particularly important. Four out of Serbia's five parks (including the proposed Prokletije National Park which abuts Albania) are situated on boundary areas; Kopaonik National Park is also situated partly in Kosovo. Two of Montenegro's four parks are also on the frontier with Albania. In some areas, most particularly those (such as Lake Skadar) which abut Albania there is little or no cooperation with the adjoining conservation authorities. By contrast collaboration with Hungary in respect of the Selevenj sands (which adjoins to Kiskunsag National Park) is cited as a model for transboundary collaboration with a joint management plan and proposals to facilitate cross-border crossings (Brunner 1998). SRJ is signatory to all the international conventions involving designated areas and a number of its protected areas are designated as World Heritage Sites (e.g. Durmitor National Park, Tara Canyon, Kotor and Risan Bays) Ramsar sites (Obedska bara, Skadarsko Jezero) or Biosphere Reserves (Tara and Durmitor).

The degree of protection afforded by designation is variable, however. Most national parks are seen as major recreational venues and tourist attractions. To the threats from development and agricultural intensification must be added hunting and the generalised effects of pollution. Eutrophication and drainage are a particular threat to wetland areas; Obedska Bara, the first protected area to be designated in Yugoslavia (1874) and now a Ramsar site, is just one of many such areas to have lost much of its biological interest, though rehabilitation programmes have been begun.

Because NATO bombing has been most concentrated in residential and commercial areas, direct damage to species and ecosystems seems to have been relatively light.

Nevertheless, in Serbia, four out of five National Parks (Kopaonik, Fruška Gora, Šar Planina and Tara) as well as Prokletije (which was to have been declared a National Park this year) have received direct missile damage. Inevitably, there is an absence of empirical data on the effects of the war on wildlife. The BTF study found that direct physical damage to biodiversity from air strikes was significant within limited areas but of relatively minor importance in relation to the overall size of protected areas and ecosystems around the sites that were hit. There was significant local damage during attacks on communications facilities, to forest ecosystems, and to meadow habitat particularly in Mount Kopaonik, where the 'Bačiste' hotel and meteorological station were targeted, and in Fruška Gora National Park. However the BTF concluded that there appeared to have been no significant long-term genetic, species or ecosystem effects of the bombing (Balkans Task Force Biodiversity Mission 1999), though this conclusion was based on short visits to only a limited number of sites.

Much more significant are the institutional effects, including the disruption to management and monitoring regimes, as a consequence of financial restrictions and administrative disruption. Existing initiatives in environmental protection and conservation have been set back many years by the bombing.

In Kosovo itself a major new problem is the lack of expertise and staff. Most qualified staff - some 100 urban planners, and foresters, 20 Ministry of Environment inspectors, plus the 30 staff of the Šar Planina National Park, left during the conflict and have not returned (Balkans Task Force Biodiversity Mission 1999). The Institute for Nature Conservation office in Priština (Kosovo) was abandoned. Although it has nominally reopened it seems unlikely that any significant work is proceeding (KFOR have stated that the legitimate staff are those who worked there previous to the conflict). The same situation would appear to exist with regard to other offices of environmental agencies. Conservation programmes in Kosovo (such as the reintroduction of the Kosovo peony, *Paeonia decora*) have ceased. Efforts by Yugoslavia to implement international conventions such as the Berne and Biodiversity Conventions have been frustrated as has Yugoslav participation in the activities of international bodies such as IUCN and EUROPARC. In addition, unexploded ordnance is an immediate safety issue, posing a risk to staff working in protected areas. All this also presents a barrier to the regeneration of tourism on which much of the income of these areas depends. However, tourism in some areas, including development of skiing infrastructure in Kopaonik, had for some time been regarded by conservation authorities as a threat. Effective monitoring of species and ecosystems has yet to recommence.

Outside as well as inside protected areas, the enormous damage to property and infrastructure and the need to prioritise humanitarian and economic recovery will inevitably, for a considerable period to come, consume resources that could otherwise be devoted to environmental conservation and to natural and cultural heritage protection. Moreover the heavy materials demands of reconstruction (particularly on minerals, wood products, water and energy) will themselves pose particular environmental threats. Moreover, as Stritih (1999) points out, consequent on the destruction of rural communities and national economies, the economic value of ecosystem resources is also undergoing a transformation. Such values are close to zero for those who have had to flee their land, whilst the subsistence value of land can only be realised if there is sufficient security to farm (Stritih 1999).

Cultural monuments and archaeological heritage whose level of protection may be said to be good prior to 1991, have suffered significantly from 'collateral' damage from NATO bombing in addition, in Kosovo, to the deliberate destruction of mosques (by Serbs)

and of orthodox monuments by ethnic Albanians. There is some evidence also that Serbian cultural monuments in Kosovo and elsewhere in Serbia (such as Gračanica and other monasteries) have been deliberately targeted. If true, such damage is in contravention of international law. Cultural monuments include relatively modern as well as older entities. For example at Kragujevac (the location of the bombed Zastava car plant) most of the male population of the city was machine-gunned in the Šumarice forest by Nazis in 1941 in reprisal for Partisan attacks. Hundreds of monuments commemorating such events are protected throughout SRJ and are at the centre to a category of protected area less common in other parts of Europe (table 3).

Civil society and non-governmental organisations

The strong tradition of civil action and of non-governmental organisation (NGO) activity in SFRJ has, inevitably, been adversely affected by internal political situation and by international isolation. However a 1996 REC study of the state of Yugoslavia's environmental movement found that "despite the embargo, the isolation and the repression, quite a lively NGO movement has continued to exist in Yugoslavia. Even without external support, Yugoslav NGOs have pursued their basic activities, and it appears that, unlike in Bosnia and Hercegovina, where the environmental movement all but disappeared, there are few obstacles to hamper cooperation among them" (Gjigas 1997:13). Many current forms of civic self-organisation developed in the 1980s with the growth of political pluralisation in SFRJ. The 1996 REC study identified some 1,000 alternative, non-profit NGOs in SRJ of which around 100 had an environmental focus, and were equally divided amongst Serbia, Vojvodina, Montenegro and Kosovo. Over 80% of these were registered during the 1990s of which a large number claim to have over 1,000 active members. However membership data is unreliable since only a small proportion of NGOs require payment of dues; levels of activity (and in some cases the existence, other than on paper) of some NGOs may be doubtful (Gjigas 1997). Many NGOs also face economic difficulties and declines in membership. In addition, the bombing has had direct consequences for NGOs. In May 1998, a new Regional Environmental Centre (REC) office was opened in Belgrade, its work funded by the US Environmental Protection Agency. The REC had already held a series of training seminars for NGO activists (funded by the Netherlands Embassy) and had begun the development of a Local Environmental Action Plan (LEAP) process for Yugoslavia. All this work ceased during the conflict and is only now, a year after it ended, being painfully restarted: for example the REC office in Belgrade has reopened, and is working principally on issues related to the Aarhus Convention.

Many NGOs continue to be active however, and can be judged to 'have considerable experience and are important and capable sources of information' (Balkans Task Force 1999: 27). Most active are those scientifically based organisations, which occupied a 'semi-official' niche in the environmental establishment prior to 1991. Examples of such 'establishment' non-profit organisations include *Ecolibri-Bionet* and *Mustella*, both of which are involved in the elaboration of the National Biodiversity Strategy. Since 1991 however new NGO structures have developed. For example rural areas have seen the recent growth of new and different form of agricultural cooperatives. An example is the NGO *Terra*, formed in Subotica (Vojvodina) with the aim of encouraging organic farming, processing and marketing both in the local region and in the whole of Yugoslavia. The initiative is associated with the Subotica based Open University (formerly the Yugoslav Workers' University) created in 1992 to foster civil society and deliver adult education (Csagoly 1999).

Conclusions: the future

Environmental futures in Yugoslavia, as in the other southern republics which once belonged to the much larger socialist federation which bore the same name, are fragile and unpredictable. Post fragmentation recession, aggravated by economic sanctions, international isolation and the NATO bombardment, have considerably reduced economic activity and hence industrial pollution, but they have also greatly reduced the impetus for environmental protection.

Although predictions of a widespread environmental disaster seem confounded by subsequent studies, direct local effects are severe and beyond the direct effects of the bombing, the generalised environmental consequences arising from the economic, political and humanitarian consequences of NATO action have indeed been catastrophic. These have borne most heavily on Kosovo itself, where an effective form of civil administration, an essential precondition for environmental protection, has yet to be established.

Now that the bombing is over, economic reconstruction should be a priority second only to humanitarian aid to those who suffered – from the ethnic conflicts which led to the NATO intervention, from the NATO attacks themselves, and from the ethnic cleansing it precipitated. However, in both Kosovo and in the rest of Yugoslavia, environmental remediation and protection must be an essential component of this process and one for which the NATO states bear the prime responsibility. It is unfortunate that current reconstruction policies of the 'international community' say little about environmental protection apart from local infrastructural projects (such as improving water and waste management systems) and are almost entirely focused on securing a dynamic market economy backed by a strong public institutional framework (European Commission and World Bank 1999).

Some commentators contend that far from being unintended consequences of the conflict, or 'collateral' damage, its human and environmental costs were both predictable and deliberately inflicted. Staddon, in particular, insists that "environmental assessments of the NATO campaign in FRY must proceed from a broader understanding of the complex relations between contemporary Great Power militarism and the environment. ...environmental destruction, pace current official viewpoints [is] not a "regrettable byproduct" of armed conflict, but one of its key means" (Staddon 1999: 1). Without necessarily accepting this argument, it seems clear that remediation measures will only be encouraged by the NATO states that participated in the campaign to the extent that they further its objectives of influencing the trajectory of Yugoslavia's economic and political development. The environmental prognosis is not good. UNHCR has already complained that having 'won' the air war, NATO countries are turning their backs on their own commitment to help clean up the mess they have created. The United Nations High Commission for Refugees complained in August 1999 that it had received less than 50% of the money long pledged to it for emergency relief (and that of all countries, Britain had contributed the least, at only \$800,000 rather less than the cost of one cruise missile). Most of the money contributed to date is for humanitarian aid in Kosovo; NATO countries have declared that they will refuse aid of any kind for the rest of Yugoslavia until changes in political leadership occur. Inevitably, the environment is well down the list of donor priorities. Ironically, some of the positive developments have derived from initiatives taken in respect of other environmental disasters. The Baia Mare cyanide spill in February 2000, where Yugoslavia has received at least some assistance from international funds which have been directed not only to physical clean-up operations but also for information and public participation initiatives.

International support (including technical assistance and collaboration from state, scientific and university bodies outside Yugoslavia) for programmes to repair damaged natural and cultural heritage and to protect the ambient environment is vital. These programmes should include individuals from all ethnic groupings within Yugoslavia. They should include measures designed to reintegrate Yugoslavia with the wider European community of which it is a part. They should also include encouragement to progressive trends within SRJ, for example the development of local community initiatives as well as political encouragement to adopt and implement international and European environmental conventions. The Aarhus Convention (formally, the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters) is particularly significant because it links humanitarian concerns and civic rights (including freedom of information) to environmental protection. This was signed in June 1998 by the EU and 35 governments including Yugoslavia, although like the US, SRJ has yet to ratify it. The UNEP/ UNHCS Balkan Task Force report concluded: "the suspension of international co-operation has had an undisputedly negative impact on environmental management and institutional development in FRY" (Balkans Task Force 1999: 24).

As Yugoslavia's economy painfully recovers and as civil society is slowly re-established, environmental protection must not be seen as an optional 'add-on'. Stabilisation will be accompanied by international investment and both processes will provide opportunities for environmental remediation, for the protection of nature and natural resources, and for the strengthening of conservation institutions, including NGOs. Yugoslavia is not yet party to or a beneficiary of the Regional Environmental Reconstruction Programme (REReP, which has been incorporated into the Stability Pact agenda for the area and which will become the basis for the Environmental Action Plan for South East Europe and for world environmental policy in the environment in the region) (REC 2000). It is important that reconstruction and environmental improvement is based on Yugoslav environmental authorities, enterprises and professionals - not consultants flown in from outside (REC 1999a); they must also have regard to the transboundary nature of many environmental issues. Investment in these areas of a relatively small fraction of the donor funding that will be spent in reconstruction in future years will yield multiple returns, both for the local environment and its peoples and for Europe as a whole (Stritih 1999). A quality environment is an essential complement to human rights and social justice as the foundation for a stable society, in which all citizens can begin again to live together in peace - with each other and with nature.

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