

THE ENVIRONMENTAL IMPACT OF BOMBING ON INDUSTRIAL SITES THROUGHOUT YUGOSLAVIA DURING THE 1999 CONFLICT

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Summary

Managing the urban environment in post conflict areas is a question that unfortunately many officials and non-governmental organizations around the world have to face today. Mostly due to the fact that they are situated close to industrial or military facilities, cities and implicitly their populations, are liable to suffer great destruction during any armed conflict—be it “modern” or “classical.” We have used this differentiation, as it has been observed that along with technological progress, the notion of “traditional war” is in continual transformation, and as a result, methods and indicators for assessing environmental impact are changing from one conflict to another.

According to several scientific studies, during the 1999 conflict between NATO and the army of the Federal Republic of Yugoslavia, severe pollution was recorded at the bombed industrial facilities. Pancevo, Novi Sad, Kragujevac, and Bor are recognized as the main hot spots, harboring serious soil and water contamination. Without considering political implications that determined this conflict, and without focusing on social or humanitarian consequences, the present paper provides an overview of the environmental problems recorded at several bombed facilities across Yugoslavia,

outlining the impact of the NATO intervention versus the existing chronic pollution. The issue of depleted uranium will also be discussed in the present paper. Therefore, the aim of this paper is to open the discussion on the impact that modern warfare can have on the environment in conflict areas.

1. Introduction

In a traditional war the consequences are usually measured in terms of the loss of human lives. To give just a few examples, approximately 20 million people died between 1914 and 1918 in the First World War; more than 38 million deaths occurred during the Second World War between 1939 and 1945, and 2.5 million deaths were recorded for the Korean War, 1950 to 1953. Losses in material goods such as buildings or infrastructure are also used to evaluate the effects of these wars.

Nevertheless, in spite of the great destruction caused by warfare, there has been relatively little published information on the environmental damage, due to different factors. Even more, it has been observed that along with technological progress, the notion of “traditional war” is in continual transformation, and, as a result, methods and indicators for assessing the environmental impact are changing from one conflict to another.

However, during the conflict between NATO (North Atlantic Treaty Organization) and the army of FRY (Federal Republic of Yugoslavia) in 1999, several industrial targets as well as military objectives were bombed. In addition, civilian targets such as government buildings in Belgrade, bridges across the Danube River, and residential houses in Kosovo province, were also hit.

After the failure of the Rambouillet peace negotiations on 19 March 1999, aimed at peaceful resolution of the conflict between the Serb and Albanian population in Kosovo, NATO initiated a campaign entitled “Operation Allied Force”. This action, aimed at imposing by force the conditions of the Rambouillet treaty, consisted of a bombing campaign against Serb targets. It started on 24 March and was suspended on 10 June 1999. With regard to the environmental consequences for targeted areas, the most serious problems seem to have occurred as a result of bombing of industrial facilities throughout the FRY. In addition, Protected Areas and the Danube River are also considered to have suffered from the 1999 conflict. Close attention will be given to evaluating these consequences in the present article.

Furthermore, several hazardous substances were released, and a new and important challenge faced the governmental and local authorities, together with the International Community: mitigation of the negative impacts of these substances on the environment and the human population. Action on this must be integrated into further efforts towards sustainable urban development.

Despite the fact that most of the reports published soon after the conflict, agree about the type of substances that were emitted, the quantities that were released are still a matter of scientific debate.

2. Literature review

It is clear that, as in many other conflicts, the 1999 conflict in Yugoslavia negatively impacted the environment. However, some of the major problems that confronted the scientists investigating the environmental impacts of the conflict were evaluation of the damage and the need to clarify whether the pollutants detected were present as a result of the NATO bombing or were due to accumulated pollution over time (from past industrial activities). The quantities of pollutants that were released in the atmosphere, soil, and surface waters, or infiltrated into groundwater as a result of the conflict, still remain a matter of scientific dispute. This contribution will therefore focus on, and analyze, the results of different studies that examined the environmental impact of the 1999 conflict in FRY.

Conflict areas are generally known as being contaminated with metals, such as Pb, Cu, and Zn, together with various organic micro pollutants. The Regional Environmental Center for Central and Eastern Europe (REC) stated in 1999 that many of the toxic compounds released as a result of bombing are known to have a serious effect on human health. Birth defects, nerve and liver diseases (some of them fatal) are only a few of the possible effects mentioned. At the same time, REC stated that during the 1999 conflict in Yugoslavia 1400 tons of EDC (ethylene-dichloride) were released into the Danube River as a result of bombing at the Pancevo petrochemical complex. Some 3000 tons of a 40% solution of sodium hydroxide and 1000 tons of a 33% solution of hydrogen chloride leaked into the Danube, and 1000 tons of vinyl chloride monomer (VCM) were released into the atmosphere from the same industrial facility. Nevertheless, many of these numbers have a rather informal source of documentation and are not reported as official data. However, the main conclusion of most papers published by the REC is without doubt that the crisis in south-eastern Europe had serious environmental impacts. It correctly points out that the urgent need for clean-up measures in several environmental hot spots must be considered part of the humanitarian effort, and that a regional approach to address and rectify the situation is needed.

A slightly different conclusion can be drawn from the final report by UNEP/UNCHS (United Nations Environmental Program and United Nations Center for Human Settlements), presented to the UN Secretary General on 9 October 1999. This report argues that the Kosovo conflict did not cause an environmental catastrophe affecting the Balkan Region as a whole. However, four environmental hot spots were identified within the boundaries of FRY; these were considered to harbor serious pollution problems, and merited immediate clean-up measures. These hot spots were Pancevo, Kragujevac, Novi Sad, and Bor. The report presents conclusions reached as a result of five field missions and several desk assessments. The field missions consisted of several groups of experts who traveled across FRY, collecting samples and information from different spots that were regarded as having high probabilities of suffering environmental damage. The samples were subsequently analyzed in different laboratories. Statistics and other deterministic techniques were used, and finally conclusions were extracted and presented as part of several individual reports. However, the cause of the pollution observed was not always precisely determined. Furthermore, the report found that the impacts on water, air, soil, and biodiversity must be considered in a trans-boundary context.

Political and social factors are other important aspects that need to be taken into consideration. The Regional Environmental Center was very active in the Balkan Region, before and after the conflict, in promoting NGO activities and encouraging democratic governmental organizations. In a discussion paper prepared by the REC in July 1999, it is demonstrated that the process of reconstruction in the Balkans has both a short-term and long-term dimension. Real remediation of the environmental problems caused jointly by the conflict in Kosovo and chronic pollution, should require much more than immediate clean up measures, as these can only be short-term solutions. Therefore REC admits that “building of proper, credible, and democratic institutions” is one of the main actions that should be carried out in the future for achieving the long-term goal of a stable environment. It was also stated that after the conflict, the main burden of reconstruction of the society, including environmental remediation measures, should fall to FRY. However, cooperation with other Balkan countries is a key issue in guaranteeing the success of the reconstruction. The paper concluded with a series of recommendations for future activities related to institutional and policy development as well as for support of the civil society.

From the political perspective, the response of the international community came promptly after the conflict by establishing the *Stability Pact for South Eastern Europe* in Cologne, on 10 June 1999. At that meeting, foreign ministers from many states of the region (excluding Yugoslavia, for political reasons) together with representatives of the international community, agreed to cooperate in mitigating the adverse impacts of the past conflicts in the region, including the Kosovo conflict in 1999. Environmental remediation, however, was not considered a top priority, and it was only mentioned in one of the working tables on “economic reconstruction.” As a general remark, the documents released at that time confirmed the fact that this meeting was merely a declaration of intention, where the foundations of the Stability Pact were to be laid.

Later, in March 2000, the Regional Environmental Center for Central and Eastern Europe, launched a new proposal entitled “*Regional Environmental Reconstruction Program*” (RERP) based on an earlier initial proposal. Environmental ministers from the countries in the region endorsed this initiative, and moment at that time it was probably the only international initiative that included Yugoslavia in the financing schemes. The main priority areas were identified as strengthening institutions and capacity building projects with a regional cooperation dimension, rehabilitation of environmental damage and civil society development. Following this guideline, the proposed projects were to be financed based on this initiative, with the aim of accomplishing the above mentioned goals. It is, however, interesting to mention that the proposed assistance focused merely on assessing the war damage on a wider scale, and cooperative support grants were aimed at ensuring that investments in pollution remediation were made at the identified hot-spots.

Other relevant materials include two detailed reports from the UNEP/UNCHS Balkan Task Force (BTF). The first one is related to the potential impact on the environment as a result of use of depleted uranium (DU) during the Kosovo conflict. This represents basically a desk assessment, whose conclusions were included in the Final Report. The main argument of this report is that although there might be several local problems arising from the direct or indirect contamination with DU particles in the atmosphere,

this is not a serious problem on a larger spatial scale, even under the worst assumptions. However, neither the effects of the depleted uranium on human health nor the quantities that were released in the environment as a result of bombing, are clearly known, and therefore this report fosters a great deal of uncertainty. The second report concentrates on the “Iron Gate” reservoir, situated on the Danube River, which is downstream of all targeted sites on the Danube, at the border with Romania. The results of several samples analyzed were presented, and the report concluded that although the level of specific pollutants, both in the sediments and Danube water samples, were very high, it concluded this was mainly due to the chronicle pollution that had occurred over time, and not necessarily because of the conflict. It was also observed that the vegetation had adapted very well to the increased level of pollutants. On the other hand, the report admitted that more measurements should be carried out, before drawing a final conclusion.

Scientific analyses of the damage occurring as a result of conflicts other than the one in Yugoslavia do exist. Freedman provides a clear review of the war's consequences on the environment. Several species of wildlife were brought to the edge of extinction as a result of warfare in the past history of humankind. In Europe, for example, the bison (*Bison bonasus*) was brought close to extinction during the First World War, especially by hunting for food by the troops. After a slight recovery by the population in the inter-war period, the population was again decimated during the Second World War and by 1980, about 1000 exemplars were kept in a nature reserve in Poland. In the Pacific, the war was responsible for loss or extreme endangerment of endemic bird species.

For example, on the Twin Island of Midway, the extinction of the Lysan rail (*Poiznaula palmeri*) and Lysan finch (*Telespiza contrans*) came as a result of the U.S. military actions during the Second World War. There are, however, a few cases when the abundance of certain wild animals increased as an indirect result of warfare, especially due to the decrease of exploitation. This was the case of various fur-bearing mammals in Northern and Eastern Europe during the World War II, e.g. polar bear, red fox, and wolf.

These conclusions, nevertheless, were drawn with regard to the classical type of war. When looking at the impact of modern warfare, the environmental impacts can be substantially different. For instance, an experiment on the impacts of radiation from warfare agents showed the effects of a permanent source of gamma radiation on vegetation. The general conclusion was that after an exposure to constant radiation sources, the ecosystem progressively deteriorated at sites close to the point source, depending on the half-life of the radioactive material. This can be used as a background in trying to predict the effects of depleted uranium in the Kosovo war. Coming back to the 1999 conflict, the author believes there are two main questions to be raised. On one hand, a comparison should be made between all the available studies, in order to determine how much the recommendations from these studies differ from one another. On the other hand, it will be interesting to identify the typical response that the international community can offer in such situations. Nevertheless, time is working, in this case, against the environment, as many of the measures that could have been implemented in June 1999 would probably be no longer effective several years after the end of the conflict.

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Biographical Sketch

Macrin Desa was born in Romania in 1974. He completed his secondary education in Bucharest. In 1993 he was admitted to the Aerospace Engineering Institute from Bucharest, and graduated in 1998, with specialization in avionics. However, from his second year of study he became an active member of an environmental organization, Ecosens, where he soon become project coordinator for an international initiative dealing with the environmental implications of projects financed by International Financial

Institutions in Romania. He completed his education with a one year Master degree in sustainable ecology, a program of the University of Bucharest. In 1999 he received a grant from Open Society Institute for a second masters degree in “Environmental Sciences and Policy”. After completing his studies at Central European University in Budapest, Hungary, he returned to Romania where he holds different management positions, as a director of a small fine art transport company, and as an industrial organizer at Michelin Romania.

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